

Our pulses are our assets

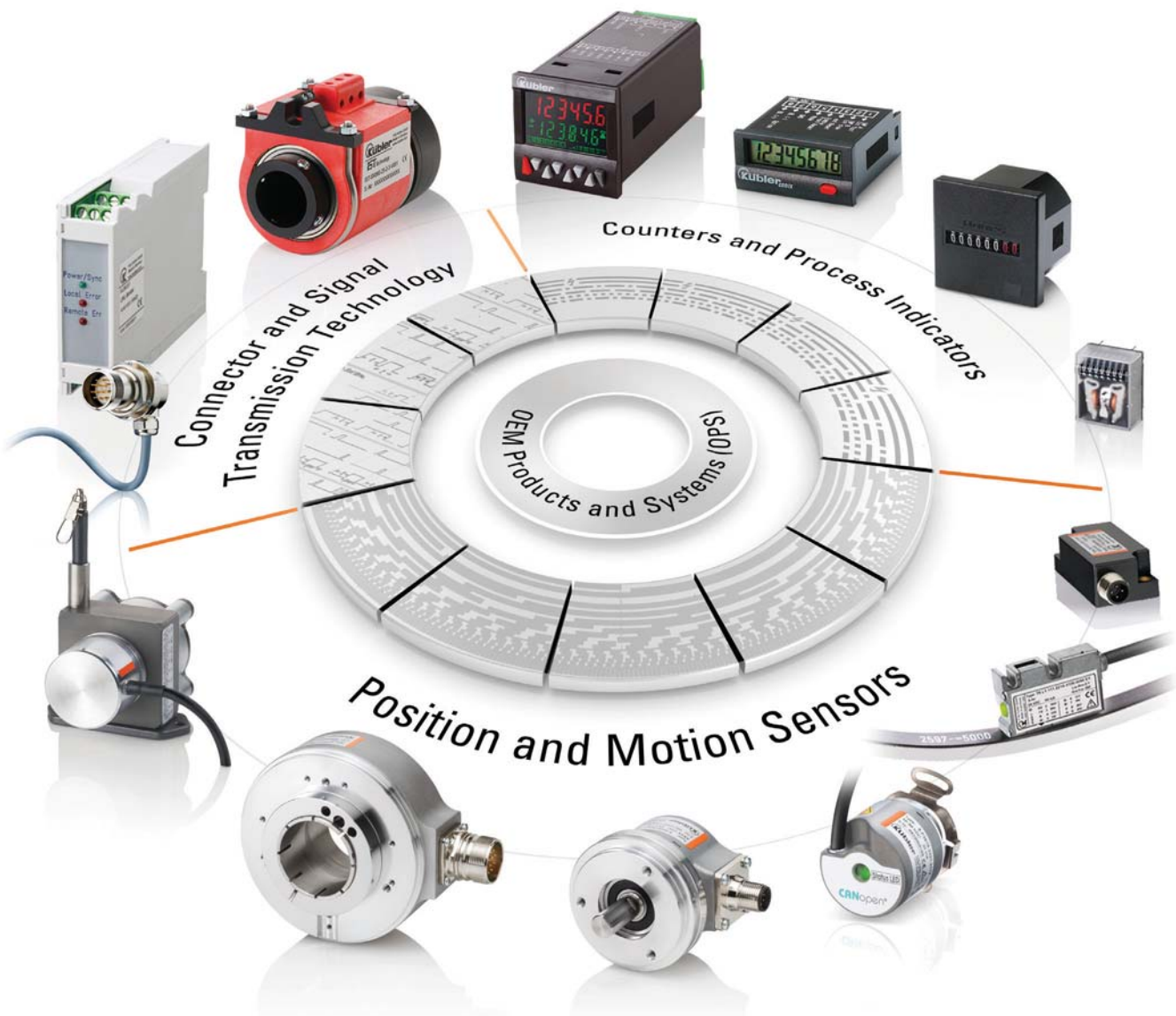


The core business of the Kübler Group is the development, manufacture and marketing of leading-edge position and motion sensors, innovative display and counting technology as well as connection and transmission technology.

Founded in the year 1960, the family business is now led by the next generation of the family, Gebhard and Lothar Kübler. It is active worldwide with the export share of its turnover exceeding 60 percent. 8 group members and 50 strong sales partners offer product know-how, service and advice globally on-site.

We see the opportunities for our business in the field of application oriented innovations and in the provision of outstanding all-round service – always with the success of our customers in mind. With over 320 employees and 3 production sites, we reliably ensure the high level of flexibility of our products, superior quality management as well as exceptional delivery dependability.

Our Product Portfolio



Position and Motion Sensors

- Incremental Encoders
- Absolute Encoders
- Linear Measuring Technology
- Inclometers
- Connection Technology
- Accessories

Counters and Process Indicators

- Display and Preset Counters
- Timers and Preset Hour Meters
- Frequency Meters and Tachometers
- Combination Time and Energy Meters
- Position Displays
- Process Displays and Controllers

Connector and Signal Transmission Technology

- Slip Rings
- Optical fibre signal transmission
- Cables, Connectors and Cordsets

OEM Products and Systems (OPS)

- Customised Display, Measurement and Control Components
- Complete System Solutions: Sensor Technology, Electronics, Mechanics



Presales

Kübler – the service specialists for every industrial sector and application – supplying complete integrated solutions – globally on your doorstep

Sample Service – Fast delivery of customised versions

Selection tool
Kübler website: Product Finder

Delivery Service: 10 by 10,
48 h Express and Repair Service



Kübler Service for planning dependability

Fast, reliable service and professional advice have top priority at Kübler. We are globally on your doorstep in 6 service and application centres and offer our customers planning dependability.

We deliver from stock within one day. We can manufacture your special orders within 48 hours. Moreover, 10 by 10 is our delivery offensive, which ensures that – for quantities of up to 10 pieces – you will receive all catalogue products so marked within 10 days. Our processes and services are certified and are constantly being improved.

10 by 10

With our 10 by 10 Service we will manufacture 10 encoders within 10 working days.
The benefits to you: easier to order, the delivery can be calculated, flexibility for small production batches.



Technical Hotline

Our Hotline will answer your technical questions Mon-Fri within normal working hours:



Kübler GmbH, Germany	+49 7720 3903-35
Kübler France	+33 3 89 53 45 45
Kübler Italy	+39 0 26 42 33 45
Kübler China	+86 10 5134 8680
Kübler India	+91 9819 457 872
Kübler Poland	+48 6 18 49 99 02

Sample and Repair Service

The Kübler Service Centre can quickly manufacture special, customised versions within a short space of time. We are happy to help you with the practicalities of using our products – at your location if desired. We can carry out repairs within a maximum of 5 working days.



48 h Express Service

Short delivery times, a high level of on-time delivery, guaranteed quality and enthusiastic, service-oriented employees – these are what our customers can depend on.
We can process your order within 48 hours; we can ship stock items the same day.





Service Excellence provided by Kübler application specialists for target sectors

Product security – replacement models at the end of the product life-cycle

Aftersales

Service Centres, globally on your doorstep:
Advice, analysis, support during installation in over 50 countries



« We were able to considerably reduce our average delivery time and I can confirm that delivery schedules were always adhered to. Technical support is very professional, efficient and not at all bureaucratic. »

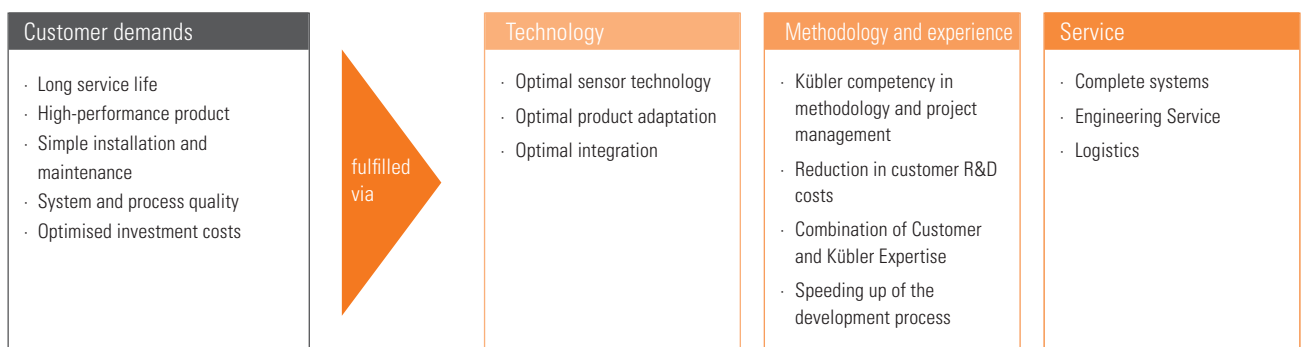
Purchasing Manager, German Producer of Geared Motors

Tailor-made solutions – Kübler Design System

« With the KDS method our customers receive a lasting solution to lowering costs, reducing the number of models available or eliminating quality deficiencies. With KDS we develop product and engineering solutions together. The method stands out because of its structured process; this delivers innovation through experience and cooperation with the customer. »

Gebhard and Lothar Kübler, Managing Directors Kübler GmbH

The Kübler Design System – satisfying customer demands

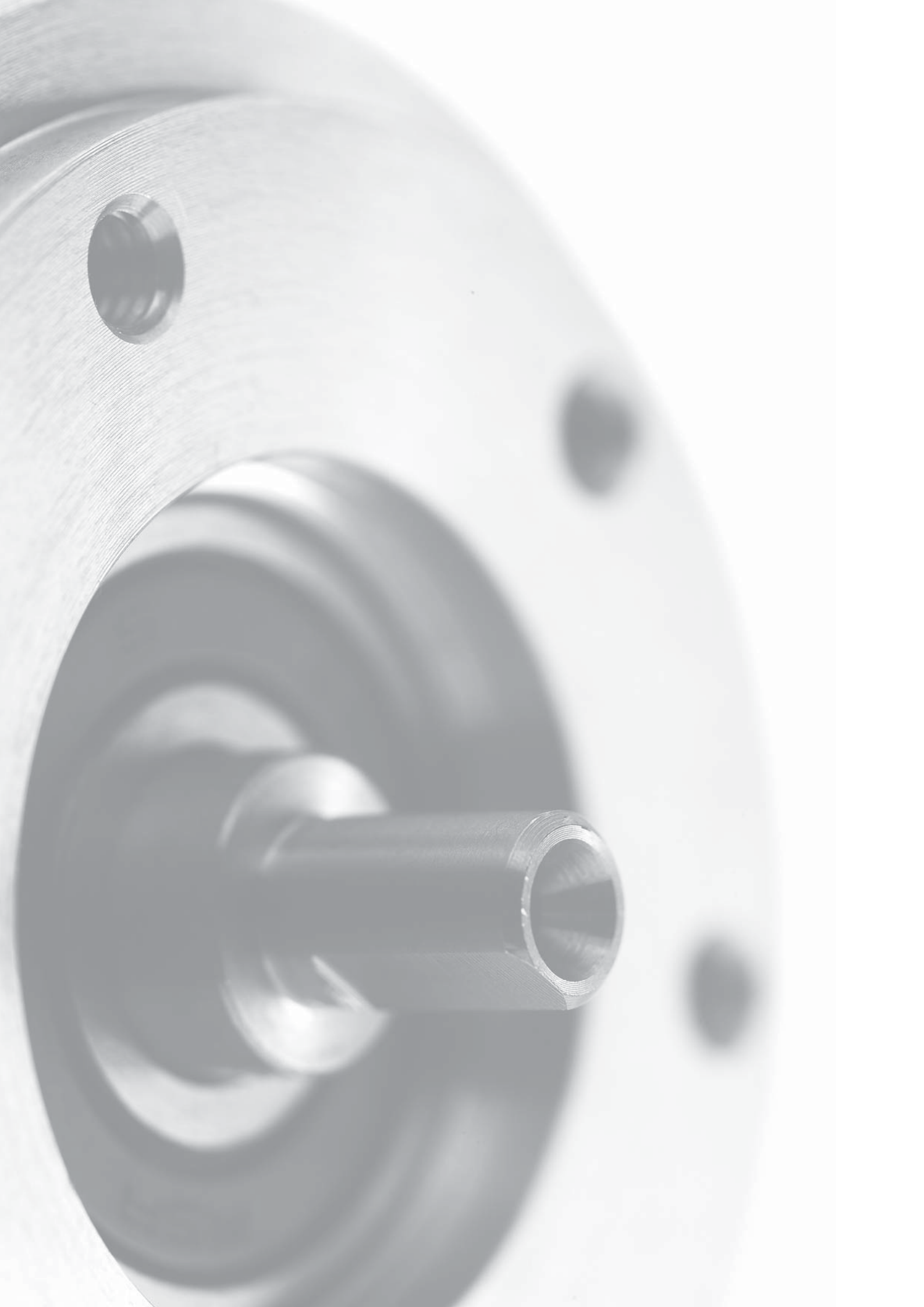


The 4 phases of the Kübler Design System



Position and Motion Sensors 2011

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Product overview

Incremental Encoders

		Ø Dimensions in mm	Magnetic (Accuracy ±1°)	Optical (Accuracy ≤ ±0.015°)	Resolution max. in PPR	Push-pull interface	RS422 interface	Sin Cos interface	Ø Hollow shaft max. in mm	Speed max. in RPM	Temperature range in °C	Protection rating max.	Type of connection Cable	Type of connection Connector	Supply voltage in VDC	Pulse frequency max. in kHz	RoHS compliant	ATEX approval for Zone	Page
	Miniature, optical 2400 (Shaft) 2420 (Hollow shaft)	24	-	•	1.024	•	-	-	6	12.000	-20...+85	IP64	•	-	5...24 8...30	160	•	-	42
	Miniature, magnetic 2430 (Shaft) 2440 (Hollow shaft)	24	•	-	256	-	•	-	6	12.000	-20...+85	IP67	•	-	5	300	•	-	45
	Compact, optical 3610 (Shaft) 3620 (Hollow shaft)	36	-	•	2.500	•	•	-	8	12.000	-20...+85	IP64	•	M12	5...18 8...30	200	•	-	47
	Economy, optical 3700 (Shaft) 3720 (Hollow shaft)	37	-	•	1.024	•	•	-	8	6.000	-20...+70	IP65	•	-	5 5...30 10...30	250	•	-	50
	Functional Safety, optical Sendix 5814 SIL (Shaft) Sendix 5834 SIL (Hollow s.)	58	-	•	1.024 and 2.048	-	-	•	14	12.000	-40...+90	IP67	•	M12 M23	5 10...30	400	•	-	53
	Standard, optical Sendix 5000 (Shaft) Sendix 5020 (Hollow shaft)	58	-	•	5.000	•	•	-	15 15,87	12.000	-40...+85	IP67	•	M12 M23 MIL	5 5...30 10...30	300	•	2; 22	57
	High temperature, optical 5803 (Shaft) 5823 (Hollow shaft)	58	-	•	5.000	•	•	-	12	12.000	-20...+105	IP65	•	M23 MIL	5 10...30	300	•	-	64
	Sine wave outputs, optical 5804 (Shaft) 5824 (Hollow shaft)	58	-	•	5.000	-	-	•	12	12.000	-20...+85	IP65	•	M23	5 10...30	180	•	-	68
	High resolution, optical 5805 (Shaft) 5825 (Hollow shaft)	58	-	•	36.000	•	•	-	12	12.000	-20...+85	IP65	•	M23	5 10...30	800	•	-	72
	Stainless steel, optical Sendix 5006 (Shaft) 5826 (Hollow shaft)	58	-	•	5.000	•	•	-	12	12.000	-40...+85	IP67	•	M12	5 5...30 10...30	300	•	-	76
	Large hollow shaft, optical 5821 (Hollow shaft)	58	-	•	5.000	•	•	-	28	2.500	-20...+70	IP64	•	M12	5 8...30	300	•	-	80

Product overview

Incremental Encoders

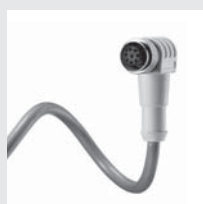
	Ø Dimensions in mm	Magnetic (Accuracy ± 1°)	Optical (Accuracy ≤ ± 0.015°)	Resolution max. in PPR	Push-pull interface	RS422 interface	Sin Cos interface	Ø Hollow shaft max. in mm	Speed max. in RPM	Temperature range in °C	Protection rating max.	Type of connection Cable	Type of connection Connector	Supply voltage in V DC	Pulse frequency max. in kHz	RoHS compliant	ATEX approval for Zone	Page
 Large hollow shaft, optical A020 (Hollow shaft) A02H (Hollow shaft)	100	-	•	5.000	•	•	•	42	6.000	-40...+80	IP65	•	M12 M23	5 5...30 10...30	300	•	-	82
 ATEX, optical 7030 (Shaft/Hollow shaft)	70	-	•	5.000	•	•	-	12	6.000	-20...+60	IP65	•	-	5 10...30	300	•	1; 2; 21; 22	90
 Magnetic measurement system with 0 pulse RI50/LI50 (Hollow shaft)	16 x 10	•	-	3.600	•	•	-	30	9.000	-20...+80	IP67	•	-	4.8 ... 26 4.8 ... 30	250	•	-	92
 Magnetic measurement system without 0 pulse RI20/LI20 (Hollow shaft)	16 x 10	•	-	3.600	•	•	-	30	12.000	-20...+80	IP67	•	-	4.8 ... 26 4.8 ... 30	250	•	-	95

Accessories for Position and Motion Sensors

Kübler original accessories are individually adapted to match each particular model. They meet our high quality demands.



Connectors



Cables



Custom assemblies



Couplings



Flange adapters



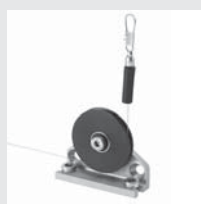
Bearing units



Mounting fixtures



Displays



Draw-wire accessories

Isolation / adapter inserts for hollow shaft encoders

Thermal and electrical isolation of the encoders.

These isolation inserts prevent currents from passing through the encoder bearings. These can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder.

Tip:

By using these adapter inserts you can achieve six different hollow shaft diameters, all on the basis of one encoder.







Product overview

Absolute Encoders Singleturn

		Dimensions in mm	Magnetic (Accuracy $\pm 1^\circ$)	Optical (Accuracy $\leq \pm 0.015^\circ$)	Optical max. in bits	SSI interface	BiSS interface	Analogue interface	Parallel interface	Additional incremental track	Speed max. in RPM	Temperature range in $^\circ\text{C}$	Protection rating max.	Type of connection Cable	Type of connection Connector	Supply voltage in V DC	RoHS compliant	ATEX approval for Zone	Page
	Miniature, magnetic SSI 2450 (Shaft) 2470 (Hollow shaft)	24	•	–	12	•	–	–	–	–	12.000	-20...+85	IP64	•	–	5	•	–	102
	Compact, magnetic SSI Sendix 3650 (Shaft) Sendix 3670 (Hollow shaft)	36	•	–	9	•	–	–	–	–	6.000	-40...+85	IP69k	•	–	5...30	•	2; 22	104
	Compact, magnetic Analogue Sendix 3651 (Shaft) Sendix 3671 (Hollow shaft)	36	•	–	12	–	–	4...20 mA 0...10 V	–	–	6.000	-40...+85	IP69k	•	M12	18...30	•	2; 22	106
	Compact, optical SSI / BiSS Sendix F3653 (Shaft) Sendix F3673 (Hollow shaft)	36	–	•	17	•	•	–	–	Sin Cos RS422	12.000	-40...+90	IP67	•	M12	5 10...30	•	2; 22	118
	Functional Safety, optical SSI / BiSS + SinCos Sendix 5853 SIL (Shaft) Sendix 5873 SIL (Hollow shaft)	58	–	•	17	•	•	–	–	Sin Cos	9.000/ 12.000	-40...+90	IP67	•	M23	5 10...30	•	–	126
	Standard, optical SSI / BiSS Sendix 5853 (Shaft) Sendix 5873 (Hollow shaft)	58	–	•	17	•	•	–	–	Sin Cos RS422	12.000	-40...+90	IP67	•	M12 M23	5 10...30	•	2; 22	131
	Standard, optical Parallel / Analogue 5850 (Shaft) 5870 (Hollow shaft)	58	–	•	14	–	–	4...20 mA	•	–	12.000	-20...+85	IP66	•	M23	5 10...30	•	–	137
	Standard, optical Parallel, Highspeed 5852 (Shaft) 5872 (Hollow shaft)	58	–	•	14	–	–	–	•	–	12.000	-20...+80	IP66	•	M23	5 10...30	•	–	141
	Stainless-steel, optical SSI / Parallel 5876 (Hollow shaft)	58	–	•	14	•	–	–	•	–	6.000	-20...+80	IP67	•	M12	5 10...30	•	2; 22	160
	ATEX, optical SSI 7053 (Shaft)	70	–	•	17	•	–	–	–	–	6.000	-40...+60	IP67	•	–	10...30	•	1; 2; 21; 22	164
	ATEX, optical SSI / Parallel / Analogue 7031 (Shaft / Hollow shaft)	70	–	•	14	•	–	4...20 mA	•	–	6.000	-20...+60	IP65	•	–	5 10...30	•	1; 2; 21; 22	173







Product overview

Absolute Encoders Singleturn Fieldbus

		Ø Dimensions in mm	Magnetic (Accuracy ± 1°)	Optical (Accuracy ≤ ± 0.015°)	CANopen	SAE J1939	Profibus DP	EtherCAT	Type of connection Cable	Type of connection Connector	Resolution max. in Bit	Speed max. in RPM	Temperature range in °C	Protection rating max.	Supply voltage in V DC	RoHS compliant	ATEX approval for Zone	Page
	Compact, magnetic Sendix M3658 (Shaft) Sendix M3678 (Hollow shaft)	36	•	–	•	•	–	–	•	M12	14	6.000	-40...+85	IP69k	8...30	•	2; 22	110
	Compact, optical Sendix F3658 (Shaft) Sendix F3678 (Hollow shaft)	36	–	•	•	–	–	–	•	–	16	12.000	-40...+85	IP67	10...30	•	2; 22	122
	Standard, optical Sendix 5858 (Shaft) Sendix 5878 (Hollow shaft)	58	–	•	•	–	•	•	•	M12 M23	16	12.000	-40...+80	IP67	10...30	•	2; 22	144
	ATEX, optical 7058 (Shaft)	70	–	•	•	–	•	–	•	–	16	6.000	-40...+60	IP67	10...30	•	1; 2; 21; 22	167






Product overview

Absolute Encoders Multiturn

	Dimensions in mm	Optical (Accuracy $\leq \pm 0.015^\circ$)	Resolution max. in bits ST+MT	SSI interface	BiSS interface	RS485 interface	Additional incremental track	Speed max. in RPM	Temperature range in °C	Protection rating max.	Type of connection Cable	Type of connection Connector	Supply voltage in V DC	RoHS compliant	ATEX approval for Zone	Page
 <p>Compact, optical Sendix F3663 (Shaft) Sendix F3683 (Hollow shaft)</p>	36	•	17 + 24	•	•	–	SinCos RS422	12.000	-40...+90	IP67	•	M12	5 10...30	•	2; 22	180
 <p>Functional Safety, optical Sendix 5863 SIL (Shaft) Sendix 5883 SIL (Hollow s.)</p>	58	•	17 + 12	•	•	–	SinCos	12.000	-40...+90	IP67	•	M23	5 10...30	•	–	188
 <p>Standard, optical Sendix 5863 (Shaft) Sendix 5883 (Hollow shaft)</p>	58	•	17 + 12	•	•	–	SinCos RS422	12.000	-40...+90	IP67	•	M12 M23	5 10...30	•	2; 22	193
 <p>Standard, programmable optical / magnetic 5862 (Shaft) 5882 (Hollow shaft)</p>	58	•	13 + 12	–	–	•	RS422	6.000	-20...+85	IP65	•	M23	4,5...30 10...30	•	–	219
 <p>Standard, programmable optical / magnetic 9081 (Large Hollow shaft)</p>	90	•	13 + 12	•	–	•	RS422	6.000	-20...+70	IP65	•	M23	4,75...30 10...30	•	–	228
 <p>ATEX, optical 7063 (Shaft)</p>	70	•	17 + 12	•	–	–	–	6.000	-40...+60	IP67	•	–	10...30	•	1; 2; 21; 22	239

Product overview

Absolute Encoders Multiturn Fieldbus

		Ø Dimensions in mm	Optical (Accuracy $\leq \pm 0$)	Resolution max. in bits ST+MT	CANopen	CANlift	Profibus DP	DeviceNet	EtherCAT	Speed max. in RPM	Temperature range in °C	Protection rating max.	Type of connection Cable	Type of connection Connector	Supply voltage in V DC	RoHS compliant	ATEX approval for Zone	Page
	Compact, optical Sendix F3668 (Shaft) Sendix F3688 (Hollow shaft)	36	•	16 + 16	•	–	–	–	–	12.000	-40...+85	IP67	•	–	10...30	•	2; 22	184
	Standard, optical Sendix 5868 (Shaft) Sendix 5888 (Hollow shaft)	58	•	16 + 12	•	•	•	–	•	9.000	-40...+90	IP67	•	M12 M23	10...30	•	2; 22	199
	Standard, optical / magnetic 5860 (Shaft/Hollow shaft)	58	•	13 + 12	–	–	–	•	–	6.000	-20...+85	IP65	•	M12	10...30	•	–	224
	Standard, optical / magnetic 9080 (large hollow shaft)	90	•	13 + 12	•	–	•	•	–	6.000	-10...+70	IP65	•	M12	10...30	•	–	232
	ATEX, optical 7068 (Shaft)	70	–	16 + 12	•	–	•	–	–	6.000	-40...+60	IP67	•	–	10...30	•	1; 2; 21; 22	242



Product overview

Linear Measuring Technology




		Measuring max. in m	Accuracy max.	Resolution max.	Dimensions in mm	Incremental RS422/ Push-pull	Incremental SinCos	Absolute Analogue	Absolute SSI/ BiSS	Absolute Fieldbus	Speed max. in m/s	Temperature range in °C	Protection rating max.	Type of connection Cable	Type of connection Connector	RoHS compliant	Page
	Magn. measuring system resolution min. 10 µm Limes LI20 / B1	50	dep. on meas. length 0.08 mm for 1 m	10 µm	10x25x40	•	-	-	-	-	25	-20...+80	IP67	•	-	•	250
	Magn. measuring system resolution min. 5 µm Limes LI50 / B2	50	dep. on meas. length 0.1 mm for 1 m	5 µm	10x25x40	•	-	-	-	-	16	-20...+80	IP67	•	-	•	253
	Draw wire encoder A50 Measuring length 1.25 m	1.25	±0.05% of measuring range	0.05 mm	50x50x max. 99	•	-	4...20 mA 0...10 V 1kΩ	•	•	10	-20...+85	IP67	•	M12	•	256
	Draw wire encoder B80 Measuring length 3 m	3	±0.05% of measuring range	0.05 mm	80x80 x max. 144	•	•	4...20 mA 0...10 V 1kΩ	•	•	10	-20...+90	IP67	•	M12 M23	•	259
	Draw wire encoder C120 Measuring length 6 m	6	±0.05% of measuring range	0.08 mm	120x120x max. 136	•	•	4...20 mA 0...10 V 1kΩ	•	•	10	-20...+90	IP67	•	M12 M23	•	262
	Draw wire encoder D135 Measuring length 40 m	40	±0.05% of measuring range	0.08 mm	135x136 x max. 318	•	•	4...20 mA 0...10 V 1kΩ	•	•	10	-20...+90	IP67	•	M12 M23	•	265
	Draw wire mechanics Miniature	2	±0.1% of measuring range	0.1 mm	40x40x max. 72	•	-	4...20 mA 0...10 V 10 kΩ	-	-	0.8	-20...+90	-	•	-	•	270
	Draw wire encoder, Standard Measuring length 6 m	6	±0.1% of measuring range	0.1 mm	105x85 x max. 163	•	•	-	•	•	3	-20...+70	-	•	M12 M23	•	274
	Elevator Measuring System for Shaft-copying LM	120	±0.5 mm	0.1 mm	dep. on type	•	•	-	•	•	6	-20...+85	IP67	•	M12 M23 MIL	•	276
	Mini measuring wheel system	∞	±0.015°	0.1 mm	74x50x48	•	•	-	-	-	2.000 rpm	-20...+80	IP64	•	-	•	282
	Length measuring system with rack & pinion	∞	0.5 mm	0.1 mm	dep. on rack	•	•	-	-	-	0.5	-20...+80	IP67	•	M12 M23 MIL	•	283
	Length measuring system with measuring wheel	∞	±0.015°	0.1 mm	dep. on the measuring wheel	•	•	-	-	-	2.000 rpm	-20...+80	IP67	•	M12 M23 MIL	•	284




Product overview

Inclinometers

		Measuring angle max.	Accuracy max.	Resolution max.	Dimensions in mm	Absolute Analogue	Absolute Fieldbus	Speed max. in m/s	Temperature range in °C	Protection rating max.	Type of connection Connector	RoHS compliant	Page
	Inclinometer analogue IS40	±60°	±03°	0.05°	60x30 x20	4...20 mA 0.1...4.9V	–	Reaction time 0.1 s	-30...+70	IP68	M12	•	290
	Inclinometer CANopen IS60, 2-dimensional	±60°	±0.2°	0.05°	68x42.5 x42.5	–	•	Reaction time 0.1 s	-40...+80	IP68	M12	•	292



Product overview

Connecting Technology Connectors		N° of pins	Housing	Connection technology	Cable diameter \varnothing in mm	Straight connector	Right angle connector	wall/panel lead-through	Page
	M12	4/5/8	Metal	Screw terminals	6 – 8	•	•	•	from 296
	M23	9/12/17	Metal	Solder pins	5.5 – 10.5	•	–	•	306
	MIL	7/10	Metal	Solder pins	5 – 8	•	–	–	309

Connecting Technology Cordsets		PVC cable	PUR cable	TPE cable	LWL	Straight connector	Right angle connector	for incremental encoders	for SSI / BiSS encoders	for Fieldbus	for analogue interfaces	Page
	M12	•	•	–	–	•	•	•	•	•	•	from 297
	M23	•	•	•	–	•	–	•	•	–	•	from 307
	LWL	–	–	–	•	•	–	•	•	–	–	from 312

Product overview

Connecting Technology Optical Fibre Modules (LWL)

		Interface	Transmission distance in m	Input frequency in kHz	Transmission rate in Mbit/s	Temperature in °C	Supply voltage in VDC	Power consumption in W	Page
	LWL	RS422	1.000	400	120	-10 ... +60	5 10...30	2	312
	LWL.A	SSI	1.000	500	120	-10 ... +60	5 10...30	2	314

Encoders can be used in applications, where length, positions, speed or an angular position are measured. They transform mechanical movements into electrical signals and can be divided into incremental and absolute measuring systems.

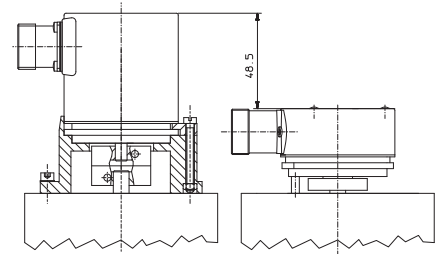
Incremental encoders generate pulses, where the number of pulses can be a measure of speed, length or position.

In absolute encoders, every position corresponds to a unique code pattern, so that even after a power cut the actual position is recognised, when power is re-applied.

In principle we can supply all encoders, whether with a solid shaft or in a hollow shaft version.

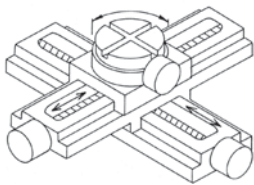
Using a hollow shaft encoder saves up to 30 % of costs and up to 50% of the required space compared to a shaft encoder. This is achieved by avoiding additional couplings, brackets and other assembly aids.

To mount a hollow shaft encoder it just needs to be pushed onto the shaft, clamped, and in the simplest case prevented from rotating by using a cylinder pin. Moreover, in principle, hollow shaft encoders require less installation depth.

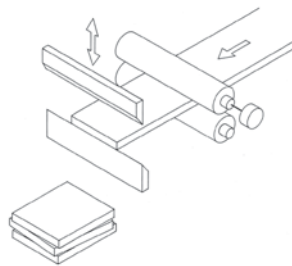


Application examples

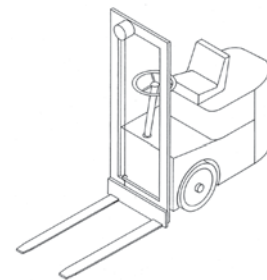
Angular measurement



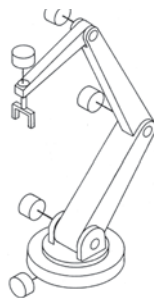
Positioning



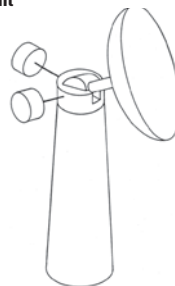
Detecting of fork's position



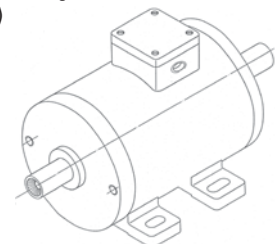
Detecting of position







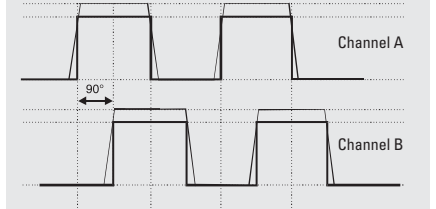
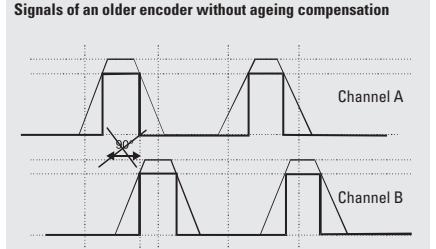
Angular measurement



Velocity measurement, e.g. in drive engineering (geared motors)



Encoders Selection Criteria

Conformity	<p>All Kübler encoders fully comply with the CE-regulations and are intensively tested in our EMC laboratories.</p>	<p>They conform to CE requirements according to EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3.</p>
High quality of signals	<p>Kübler's encoders excel thanks to electronic temperature and ageing compensation.</p>	
Approvals	<p>Many of our products are UL (Underwriters Laboratories Inc.) approved.</p> <p>Many of our products can also be supplied on request with EX approval for use in Hazardous Areas Zones 2 and 22.</p> <div style="text-align: center;">    </div> <div style="text-align: center; margin-top: 20px;">  </div>	<p>All new plant and equipment that is destined for use in explosion-protected areas must be installed according to Directive 94/9/EG (ATEX 100a).</p> <p>Our products that are approved for use in hazardous areas carry additional labelling in line with RL 94/9/EG and EN 50014.</p> <p>Kübler is active worldwide and has made a commitment to protecting the environment. Our products comply with the RoHS standards.</p>
Ageing compensation	<p>Every LED loses some of its luminosity over time. Without ageing compensation the excellent quality of the output signals would suffer. The phase shift of 90° necessary to detect the direction of rotation would be lost. This effect however is prevented by means of special electronic circuitry.</p> <p>Benefit:</p> <p>The ageing compensation circuit ensures the same signal, even after many years of operating time. The downtime of machines will be reduced dramatically and the reliability is increased.</p>	<div style="margin-bottom: 10px;"> <p>Signals of a new encoder</p>  </div> <div> <p>Signals of an older encoder without ageing compensation</p>  </div>
Temperature compensation	<p>This circuit ensures that the signal will remain the same over the whole working temperature range.</p>	<p>Benefit:</p> <p>The positioning accuracy of a machine will not be affected by temperature changes.</p>
Current Consumption	<p>The typical values for current consumption given in the catalogue apply for ambient temperature (23°C). Because of the temperature compensation, the current consumption of the encoder rises with the temperature.</p>	<p>This increase in current is taken into consideration when giving the figure for maximum current consumption. The output currents are dependent on the user's input circuit and are therefore not included in the figures given; these should therefore be calculated and added in.</p>
Short-circuit Protection	<p>The outputs of all the encoders are short-circuit protected, provided that the supply voltage is correctly wired. If an output is connected by mistake to 0 V or +U_B or with another output, the device will not be damaged. As soon as the error is corrected, the encoder is ready for use again.</p>	<p>Benefit:</p> <p>Wiring circuit errors during installation that often occur in the hectic of day-to-day industrial environments do not lead to the encoder being permanently damaged.</p>

Encoders Selection Criteria

Environmental conditions



The environmental conditions in which the encoder operates can have a significant influence on its service life, for example

- The ambient temperature
- The expected shaft load
- Soiling and humidity
- Noise interference

Thanks especially to the high-quality technology employed in our encoders, they are particularly suitable for use in harsh environments.

Numerous references from our customers, including Bosch, Siemens, Bombardier and from suppliers to the automotive industry, are proof of this.

Temperature

Working temperature:

Is defined as the environmental temperature, in which the encoder will produce the signals defined in the data sheets.

Operating temperature:

Is defined as the environmental temperature, in which the encoder can be operated without incurring damage.

Soiling and humidity

The IP classification according to EN 60529 describes how the encoder is protected against particles and water. It is described as an abbreviation "IP" followed by two numbers.

These two tables summarise the most used IP ratings.

Protection against particles (first digit)

The higher the number the smaller the particles.

0	Not protected
1	protected against particles 50 mm and larger
2	protected against particles 12.5 mm and larger
3	protected against particles 2.5 mm and larger
4	protected against particles 1.0 mm and larger
5	protected against dust
6	dust proof

Protection against water (second digit)

The higher the number, the higher the water pressure can be.

0	Not protected
1	Protected against vertically falling drops of water
2	Protected against vertically falling drops of water when enclosure is tilted up to 15°
3	Protected against spraying water
4	Protected against splashing water
5	Protected against water jets
6	Protected against powerful water jets
7	Protected against the effects of temporary immersion in water
8	Protected against the effects of continuous immersion in water

Our encoders have a protection up to IP 69k.

9K	acc. to DIN 40050 / Part 9: protected against high-pressure water/ steam jet cleaning
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Designation of colours to DIN IEC 757

abbreviation	colour
BK	black
BN	brown
RD	red
OG	orange
YE	yellow
GN	green
BU	blue
VT	violet
GY	grey
WH	white
PK	pink
GD	gold
TQ	turquoise
SR	silver

Encoders Installing Encoders

Product overview
Basics

Encoders shafts and in turn their bearings are subjected to loads for a variety of reasons:

- Installation tolerances when mounting the encoders (radial and angular displacement)
- Thermal changes, e.g. linear expansion of the drive shaft
- Effects of wear, e.g. radial runout of the drive shaft or vibrations

These load factors have a direct effect on the life expectancy of the shaft bearings and on the quality of the signal.

Facilities must therefore be provided during installation to compensate for these forces. For encoders having a solid shaft this is generally done by using shaft couplings between the drive shaft and the encoder shaft. The solution with hollow shaft encoders is to use stator couplings, fixing brackets or torque stops between the encoder flange and the mounting surface.

Not making use of a coupling but instead rigidly mounting the shaft and the encoder housing generally leads to unacceptably high loads on the bearings; the ensuing wear will cause the encoder to fail prematurely.

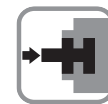
In order to avoid permanent damage of the encoder, certain bearing loads should not be exceeded. If hollow shaft encoders are correctly installed and the torque stops or stator couplings that are available from Kübler are used, then no problems should occur. For solid shaft encoders the maximum permitted axial and radial loads are shown in the appropriate technical data.

Safety-Lock™ – Safety-Lockplus™



Safety-Lock™

Interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration and tolerance of installation errors. Machine downtime and repairs are eliminated.



Safety-Lock™

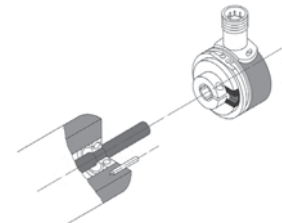
Safety-Lockplus™

The proven Safety-Lock™ construction with additional mechanically protected shaft seal.

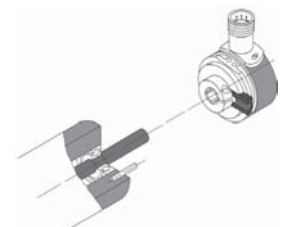
Mounting options for hollow shaft encoders

Mounting of a hollow shaft encoder with torque stop and pin (easiest and fastest mounting).

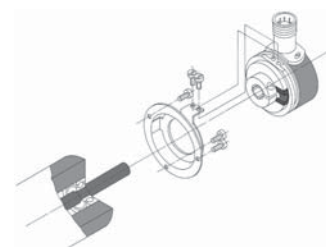
Standard hollow shaft encoders are equipped with the torque stop. (Cylindrical pin not supplied.)



Mounting of a hollow shaft encoder with extended torque stop and long pin.



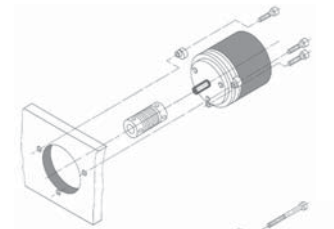
Mounting of a hollow shaft encoder with a stator coupling.



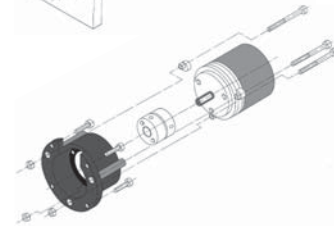
Encoders Installing Encoders

Mounting examples for shaft encoders with synchronous flange

Mounting with fastening eccentrics and coupling (to reduce shaft overload).

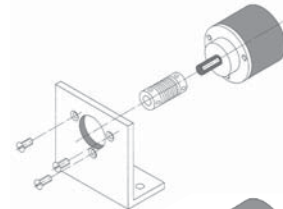


Mounting with assembly bell, fastening eccentrics and coupling (to prevent shaft overload and to isolate the encoder thermally and electrically).

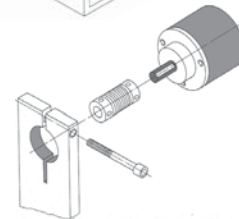


Mounting examples for shaft encoders with clamping bracket

Mounting with an angular bracket and coupling (to reduce shaft overload).



Mounting with a commonly used clamping device and coupling (to reduce shaft overload).



Loading of encoder shaft bearings using coupling forces

With all spring couplings (shaft coupling, stator coupling, fixing bracket), alignment and axial errors are converted to a force that corresponds to the spring constant of the coupling.

This force has to be absorbed by the encoder shaft bearings. When installing an encoder, this should be done with as little force as possible, i.e. without any unnecessary initial tension on the coupling. If this is adhered to, then with all Kübler couplings adequate tolerance compensation is guaranteed for the whole service life of the encoder bearings.

This force does not occur with torque stops for hollow shaft encoders, where the encoder is prevented from turning also by means of a pin or rod.

Although the encoder is prevented from rotating due to a rigid interlock, the encoder is still free to move in any other direction. This is of course dependent on it being mounted in such a way that it has freedom to move radially and especially axially (thermal linear expansion of the drive shaft!).

Possible errors in accuracy due to couplings

1. Deviations in accuracy caused by torsion of a spring coupling (in particular shaft couplings)

This deviation in accuracy is defined by the torque to be transmitted (bearing friction and mass moment of inertia) and by the torsional spring constant of the torque stop.

The following applies:

$$\text{Max. error (degree)} = \frac{\text{max. torque [Ncm]}}{\text{torsional spring constant [Ncm/Grad]}}$$

The following table serves to estimate the ratio between such an error and the smallest increment of an encoder:

Relationship between the resolution of an encoder in bit and the smallest increment in angular degrees:

Resolution	binary	10 bit	11 bit	12 bit	13 bit	14 bit	17 bit
	ppr	1024	2048	4096	8192	16384	131072
Increment	degrees	0.352	0.176	0.088	0.044	0.022	0.0028
	degrees:min:sec	0:21:06	0:10:33	0:05:16	0:02:38	0:01:19	0:00:10
	sec	1266	633	316	158	79	10

Possible errors in accuracy due to couplings

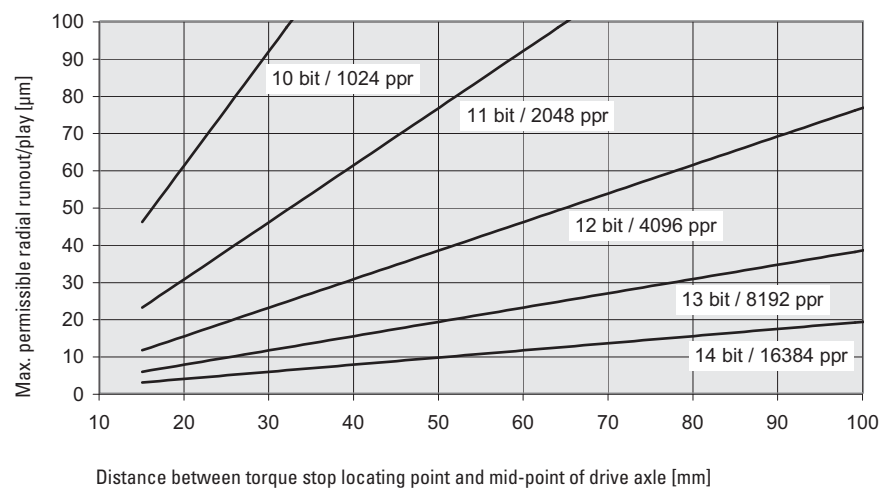
2. Deviations in accuracy caused by radial play in the drive shaft with asymmetrical mounting of the couplings

Here one has to differentiate between couplings that are mounted in an axially symmetrical manner round the shaft (all shaft couplings, many stator couplings) and asymmetrically mounted couplings (many stator couplings, all mounting brackets and pin-based torque stops).

With asymmetrical couplings deviations in accuracy can arise due to radial movements of the drive shaft (radial runout/play); this is determined by the system. These deviations are dependent on the amount of the radial play and the distance of the torque stop locating point from the drive shaft.

The relationship is shown in the following diagram:

Maximum permissible radial runout to achieve an accuracy >1/2 LSB when using an asymmetrical 1 point torque stop



Particular shaft loading due to toothed-wheels, gear-pulleys and similar elements

Measuring wheels, toothed wheels or gear pulleys, which are mounted directly on the encoder shaft, exert radial forces on the latter, dependent on prestressing and angular acceleration.

Kübler encoders are designed so that they can absorb these forces to a great extent. The maximum permissible load capacity of the shaft is shown in the technical data for the encoder.

If these load values may be exceeded in a particular application, then the encoder shaft must be isolated from the radial load by interposing an appropriate shaft with its own bearings that can absorb the forces.

Kübler offers suitable bearing blocks and bearing boxes for this purpose (please refer to the 'Accessories' section in the catalogue).

Encoders Incremental Encoders

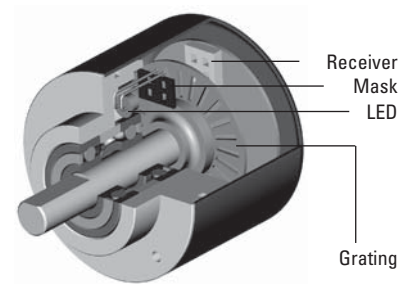
Assembly and function

Optical scanning

A disc fitted with a grating, having a code pattern of slits and bars, is mounted so that it can rotate between an LED and a receiver.

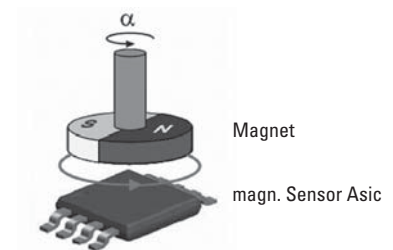
The light emitted by the LED is modulated by the mask and grating and then strikes the receiver, which produces a signal proportional to the luminosity.

When the disc rotates this signal has a shape that approximates to a sine wave.



Magnetic Scanning

The magnetic field created by a rotating permanent magnet is scanned by a sensor ASIC. Each angular position has underlying field vectors, which are converted by the ASIC into incremental signals.



Mechanical advantages of Kübler encoders

- Robust bearing construction: „Safety-Lock™ Design“, Interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration and tolerance of installation errors. Machine downtime and repairs are eliminated.

- Ideal for use outdoors thanks to its solid die-cast housing and radial shaft seal.

The Sendix Incremental benefits from a high IP67 protection rating and a wide operating temperature range from -40°C up to +90°C.



Processing of the signals

The sine wave signals are then processed in a specially designed electronic circuitry. Most controllers require square-wave signals on their input.

The signals are therefore pre-processed accordingly in the encoder and made available using various output circuits depending on the application.

Number of channels

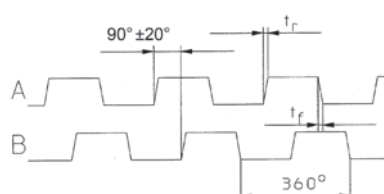
Encoders with one output channel:

Encoders with one output channel are used where no direction sensing is needed, e.g. speed control or length measuring.

Encoders with two output channels:

Applications, where the direction of rotation should be sensed, e.g. positioning, require encoders with two channels A and B being shifted 90° out of phase. By detecting the phase shift, the direction can be determined.

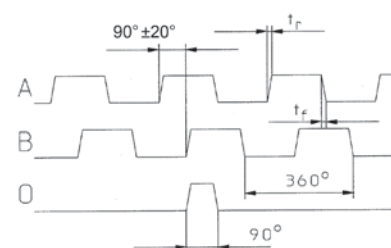
- Shaft turning clockwise, top-view of shaft / for hollow shaft encoders, viewing the flange
- Inverted signals available
 t_r = rise time
 t_f = fall time



Encoders with three output channels

In addition to the two channels A and B a zero pulse is available, which occurs once per revolution and is usually used for the reference run (zero point calibration) of a machine.

- Shaft turning clockwise, top-view of shaft / for hollow shaft encoders, viewing the flange
- Inverted signals available
- 0 pulse is linked to AND with channel A and B
 t_r = rise time
 t_f = fall time



Encoders Incremental Encoders

Product overview
Basics

Multiplication of pulses

The resolution of a two channel encoder can be multiplied by two or four using special edge detection circuitry.

An encoder with physically 5000 pulses per revolution can generate 20000 pulses per revolution using this technique.

Inverted signals

When used in environments, with a lot of electrical noise and/or if very long cable distances are required, we recommend using encoders with inverted (complementary) signals.

These signals are always available with output circuits of the RS422 type and sine wave outputs or optionally with push-pull outputs.

Resolution

The required angular or linear resolution of an application determines the number of pulses per revolution. Linear movements must first be converted into rotary, for example by means of a spindle.

Example:

An encoder is equipped with a measuring wheel. Every revolution corresponds to a distance of 200 mm (circumference). The accuracy should be 0.1 mm. What is the required resolution (ppr)?

- given:
- Circumference of the measuring wheel: $U = 200$ [mm]
 - Accuracy of the system: $G = 0.1$ [mm]
- wanted:
- Resolution of the encoder: $A = ?$ [pulses/resolution]

$$\text{Resolution} = \frac{\text{Circumference}}{\text{Accuracy}} = \frac{U}{G}$$

The required resolution would be 2000 ppr (pulses per revolution).

Pulse frequency

The required pulse frequency can be calculated as a result of the number of pulses per revolution (PPR) and the maximum speed (RPM). The maximum pulse frequency is shown in the data sheet specifications for each encoder.

Generally this is 300 KHz, but can be up to 800 KHz with high-resolution encoders.

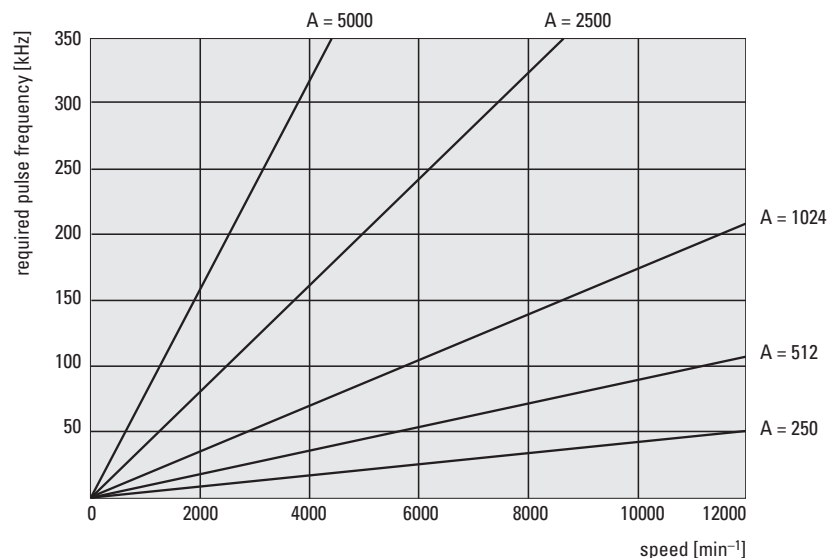
Example:

- given:
- Speed $n = 3000$ min^{-1}
 - Resolution of the encoder $R = 1000$ ppr
- wanted:
- Required pulse frequency of the encoder

$$f_{\text{max}} = \frac{n \times A}{60}$$

The required pulse frequency is thus 50 KHz. This can now be compared with the maximum possible pulse frequency of the desired encoder.

This diagram can be used to estimate the required pulse frequency



Outputs and voltage supplies (overview)

Kübler offers a wide range of possible outputs and voltage supplies for any application:

Output	Inverted signals	Voltage supply
RS422 (TTL compatible)	yes	5 V DC
RS422 (TTL compatible)	yes	10 ... 30 V DC or 5 ... 30 V DC
Push Pull output	no	10 ... 30 V DC or 5 ... 30 V DC
Push Pull output	yes	10 ... 30 V DC or 5 ... 30 V DC
Push Pull (7272)	yes	5 ... 30 V DC
Sine wave voltage output	yes	5 V DC
Sine wave voltage output	yes	10 ... 30 V DC

If the encoder is to be used in an environment that has a high level of electrical noise or if long cable runs are used, then the use of inverted signals is highly recommended.

Sensor outputs

With long cable runs, the inherent resistance of the cables can lead to a situation where insufficient supply voltage is available to the encoder.

Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.

Digital outputs

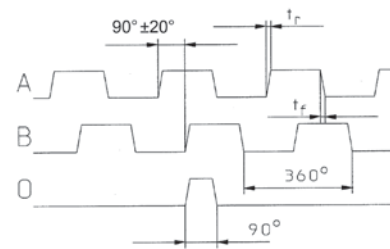
The sine wave signal from the optical system is first digitised to have square wave signals available.

- Shaft turning clockwise, top view of shaft
- Inverted signals are available
- 0 pulse is linked to AND with channel A and B

To transmit the signals there are two possible outputs available. RS422 (TTL compatible) or push-pull.

When choosing the suitable output for the application the following points have to be considered:

- The corresponding unit / controller the encoder will be connected to
- The required cable length
- The sensitivity against electrical noise or other interference



Push-pull outputs

Push-pull outputs are suitable for count interface cards, electronic counters or PLC inputs. They are available in two versions:

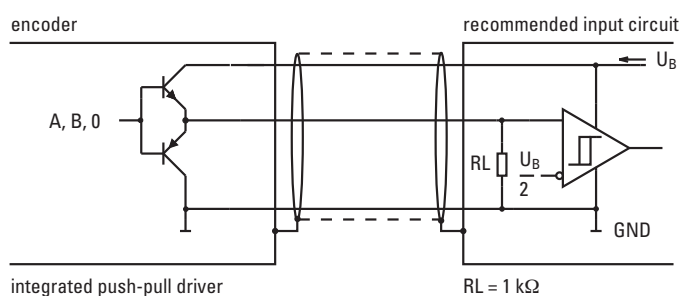
Push-pull:

- Push-pull with integrated wave impedance adjustment, recommended cable impedance 40 ... 150 Ω
- Recommended for long cable lengths, high pulse frequencies and output voltages to 30 V
- With or without inverted (complementary) signals

Push-pull (7272):

- Universal line driver 5 ... 30 V with low-level (max 0.5 V)
- Recommended for cable lengths up to 30 m
- With inverted signals

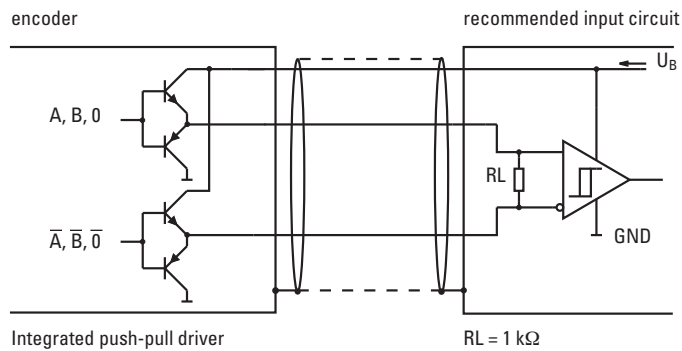
Output circuit and recommended input circuit push-pull without inverted signals



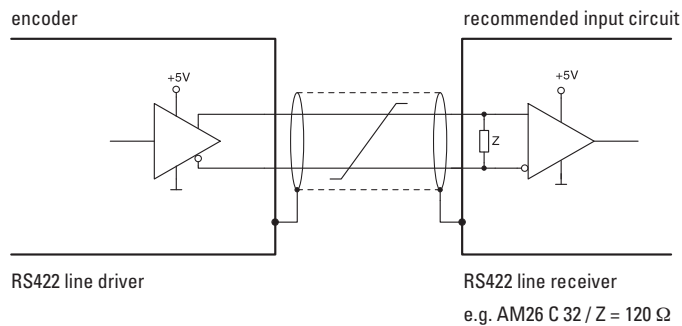
Encoders Incremental Encoders

Product overview
Basics

Output circuit and recommended input circuit push-pull with inverted signals



RS422 Output circuit and recommended input circuit

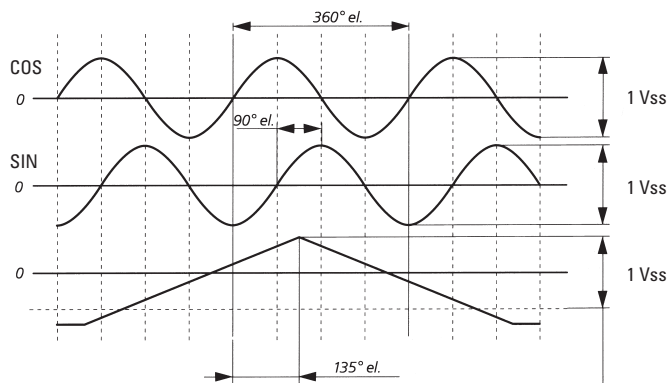


Sine wave outputs

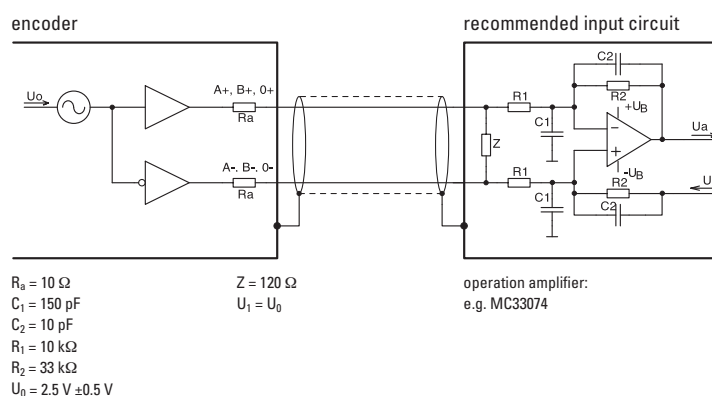
The sine wave signals are available as voltage signals. They can be further processed in the evaluation electronics. Due to the interpolation of the two signals, which are 90° out of phase, a very high resolution can be achieved.

Further they are very suitable for digital drives with a very slow movement, e.g. for grinding machines or lifts and elevators.

- Shaft turning clockwise, top view of shaft
- 0 pulse is generated once per turn



Output circuit and recommended input circuit for sine wave voltage signals



Cable lengths for incremental encoders

Depending on the output circuit and the electrical noise the following cable lengths are recommended:

Output circuit	max. cable length	Encoder connected to e.g.
Push-pull without inverted signals	100 m ¹⁾	Kübler counter/SPS
Push-pull with inverted signals	250 m ¹⁾	SPS/IPC ²⁾
Push-Pull with inverted signals (7272)	30 m	
RS422 with inverted signals	up to 1000 m (> 50 m dep. on frequency)	SPS/IPC ²⁾
Voltage sine with inverted signals	50 m	SPS/IPC ²⁾
Sine wave 1 Vss	50 m	10 ... 30 V DC

Annotations:

- Depending on the application the recommended cable length can be shorter, especially in areas with a high level of electrical noise.
- Always use shielded cables - the shield should be connected at both the encoder and controller ends!
- The core diameter of the signal cores should be > 0.14 mm²
- The core diameter of the voltage supply cores should be large enough depending on the cable length, that the voltage supply of the encoder is high enough and the signals do not go below the minimum levels!

1) Depends on frequency

2) IPC = industrial PC

Encoders Absolute Encoders

Design and function

Optical Scanning

The light that is emitted by an LED is modulated by a code pattern, which is applied to a rotating disc; this is scanned by a special Kübler Opto ASIC. A unique bit pattern is assigned to each position and this is generally available as Gray Code.

The advantage, compared with incremental encoders, lies in the fact that any movement of the shaft whilst voltage is not applied is immediately detected when power is re-applied, ensuring the correct position is always available.

Advantage:

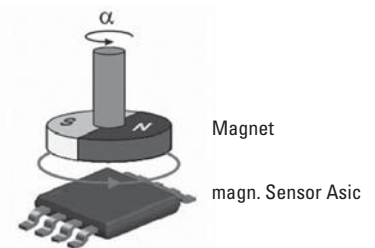
No reference runs after starting-up are necessary as with incremental systems.

Safety is increased and the time taken for reference runs is saved.

Magnetic Scanning

The magnetic field created by a rotating permanent magnet is scanned by a sensor ASIC. Each angular position has underlying field vectors, which are converted by the ASIC into an electrical signal.

Depending on the version, this output signal can be either SSI, 0...10V, 4...20mA or CANopen.



Mechanical advantages of Kübler encoders

- Sturdy bearing construction, Safety-Lock™ and Safety-Lockplus™, interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration and a rugged ability to withstand installation errors. Machine downtime and repairs are thus eliminated.

Encoders with Safety-Lockplus™ Design are additionally equipped with a mechanically protected shaft seal.

- Ideal for use outdoors thanks to its solid die-cast housing and radial shaft seal. The Sendix Absolute benefits from a high IP67 protection rating and a wide operating temperature range from -40 °C up to +90 °C.



Versions

Singleturn encoders

Depending on the number of divisions they generate unique positions per revolution. After one complete revolution the process re-commences at the start position.

They are suitable for angular measurement over a maximum of one turn of the shaft (=360°), for example in robotics, with cam controllers and in other controlled rotary motion.

Multiturn encoders

Up to 17 Bit unique angular positions per revolution are provided. In addition the number of revolutions is detected. Up to 4096 (12 Bit) unique revolutions can be made available on the output.

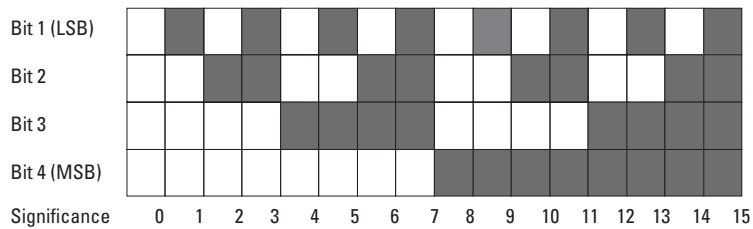
Multiturn encoders are suitable for angular measurement over more than one turn of a shaft, for example with longer traverse paths, such as high rack storage areas, cranes or machine tools.

Code types

Binary Code

The Binary Code can be processed very easily by computer systems. When using optical read-out, errors may occur, because the change from one bit to another on the different concentric tracks

(LSB, LSB+1...) is not exactly synchronized. Due to this, without any correction of the code, the position information could be wrong.



Gray Code

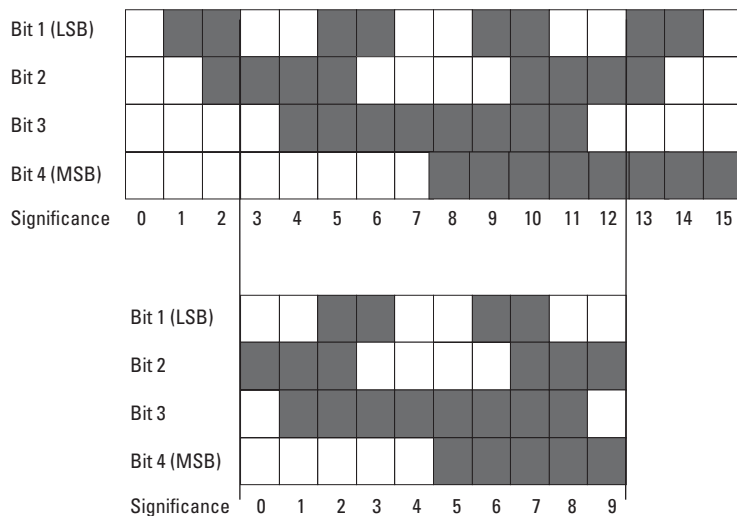
The Gray Code is a single-step code, which guarantees that from one position to the next only 1 bit changes.

This leads to reliable scanning of the code and consequently of the positions.

Symmetrically capped Gray Code (Gray-Excess):

If a particular section of the complete Gray Code is extracted, this results in the so-called Gray Excess Code

This permits even-numbered divisions, such as 360, 720, 1000, and 1440.



Reversion of the Gray Code

The code values increase when the shaft is turning clockwise.

The Gray code is reversible, i.e. if the most significant bit (MSB) is inverted, the code values decrease when the shaft is turning clockwise.

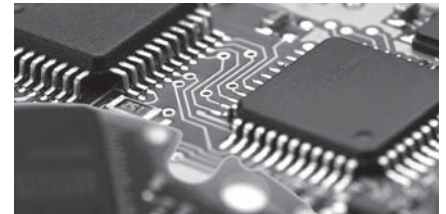
Encoders
Absolute Encoders
Patented Integrative Technology


Integrative Technology, developed and patented by Kübler, is a package of measures that ensures compact construction, high signal quality, high shock resistance - up to 2500 m/s², high reliability and a high level of immunity to EMC.

This is achieved using an Opto ASIC, a multilayer board and an especially shock resistant and space-saving method of mounting the sensor unit. In addition the use of a highly optimized interface ASIC ensures the integration of several hundred individual components. Components that had previously been needed to balance the system, such as balancing potentiometers, can be dispensed with.

Advantages of Integrative technology:

Singleturn shaft encoders are available with the same dimensions as their incremental correspondents. This allows for easy mechanical substitution.


The mechanical Sendix multiturn stage with gear


- Multiturn gear with purely optical scanning technology. Completely resistant to magnetic fields.
- First stage with double bearing layer
- Special materials ensure temperature stability and long service life
- Through hollow shaft diameter up to 14 mm - up to 15 mm as blind hollow shaft
- Specially developed gear teeth allow for very high rotational speeds and eliminate wear


The electronic Sendix multiturn stage with Intelligent Scan Technology™


Firstly all the single and multiturn functions of the encoder are integrated on an Opto ASIC. With multiturn versions the optical sensor technology can achieve a resolution of up to 41 bits. Furthermore, the new Intelligent Scan Technology ensures 100% magnetic insensitivity.

Sendix F36: The compact revolution

The absolute multiturn and singleturn variants with a size of just 36 mm are able to offer a through hollow shaft diameter of up to 10 mm.

The Sendix F36 are the first multiturn encoders with Intelligent Scan Technology™.



Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.

Mechanical or electronic gears?

Absolute singleturn and multiturn encoders have established themselves as the standard method for measuring linear displacement or angular position. With absolute encoders a reference trip is no longer needed after system start-up or a power-down. Multiturn encoders in particular are now being employed, where previously incremental encoders had predominated, for example with geared motors or in lifts.

Today all manner of multiturn encoders are available in a variety of designs.

As a rule the manufacturers offer either mechanical gears for 'counting turns', or swear by electronic counters with electronic data storage. They are critical of any other technology.

The fact is however: it is not a case of which is better or worse; each technology has its advantages and drawbacks.

Only the actual application can decide.

Outputs

To transfer the position data to a controller, different interfaces are available.

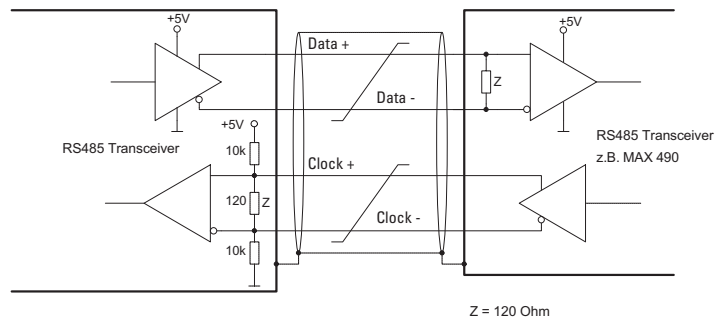
Synchronous Serial Interface (SSI)

Compared to the parallel interface, the SSI interface needs less components and the EMC-characteristics are much better.

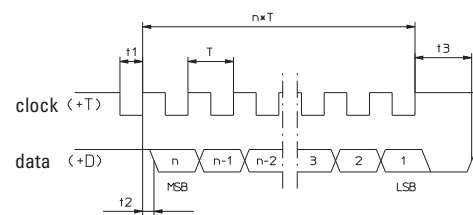
In addition less lines are needed for transmission and the possible cable length is much longer.

Output circuit and recommended input circuit

5862, 5882, 9081



Data transmission SSI



- $t_1 = T / 2$
- $t_2 < 1 / (4 \times f_{max})$
- $t_3 = \text{Monoflop time (see below)}$
- $n = \text{Resolution in bit}$
- $1 / f_{max} \leq T \leq 1 / f_{min}$
- $f_{min} = \text{min. clock rate (see data sheet)}$
- $f_{max} = \text{max. clock rate (see data sheet)}$

At rest, the clock and data lines are at a high level. With the first falling clock-pulse edge, the current encoder data are stored in the buffer ready to be sent. With the next rising clock-pulse edge, the data are transmitted bit by bit, starting with the MSB. The transfer of a complete data word requires $n+1$ rising clock-pulse edges (n =resolution in bit), e.g. 14 clock signals for a complete readout of a 13 bit encoder.

After the last positive-going clock-pulse edge the data line will remain for the duration of the monoflop time t_3 at a low level, until the encoder is ready for a new data word. The clock line must stay high for at least as long, and then can begin a new read-out sequence again with the next falling edge.

Please note!

Only for type 5850, 5870, 5862, 5882 and 9081:

The updating of the data occurs synchronously with the read-out cycle. So, the data are as up-to-date as the interval time between two read-outs.

A periodic read-out of the encoder in the application is therefore recommended, using appropriately short cycle times, so that current position values are constantly maintained. It is not possible to read out the same data word several times.

Monoflop time of the encoder: $t_3 = \text{max. } 40\mu\text{s}$

Only for the new Sendix Absolute encoders:

The updating of the data occurs immediately with the first falling edge of the clock signal. The data are thus always up-to-date. If a repeated read-out of the same data word is desired, then a new clock sequence must be started within the time interval t_3 . If the clock sequence is terminated before the necessary number of clock pulses, needed for a complete readout of the data word, has been transmitted, then after a further time interval t_3 the data line will go high again and signal that the last read-out sequence has been aborted. It will also indicate that it is ready for a new data word to be sent. Monoflop time of the encoder: $t_3 = \text{see data sheet}$.

BISS-Interface

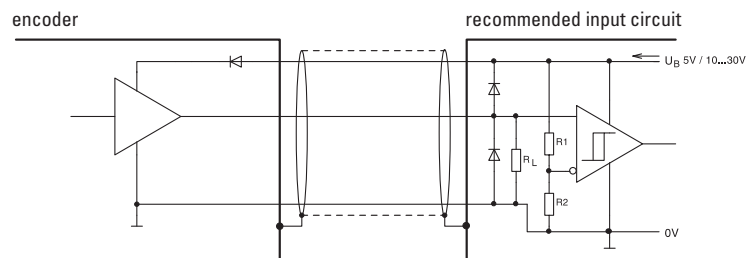
We offer absolute encoders with a wide variety of interfaces. Details about our BiSS interface can be found on our website at:

www.kuebler.com/service/biss_en.pdf

Parallel output

This type of transfer is very fast. All bits of a position are transferred simultaneously each via a separate line.

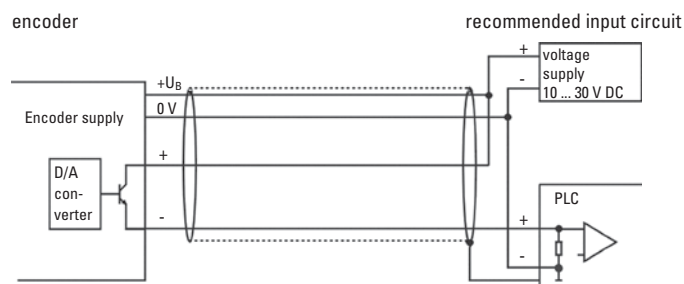
Output circuit and recommended input circuit



Integrated push-pull driver

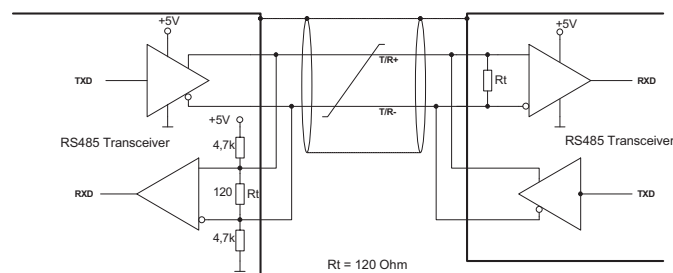
Analogue output 4 ... 20 mA

Output circuit and recommended input circuit



RS485 interface (half-duplex)

Output circuit and recommended input circuit



Encoders with internal termination have a fixed terminating resistor R_t built in.

This variant is designed for point-to-point transmissions between 2 devices.

With devices having external termination the user must activate the terminating resistor by placing a jumper between pins 5 and 6. This option is suitable to the construction of bus systems with several encoders.

With bus systems, the EIA-485 standard recommends terminating each end of a data link circuit with a terminating resistor.

The RS485 interface is asynchronous. In half duplex operation it is not possible to send and receive at the same time. The data transmission is controlled via ESC commands.

Bus systems

Bus systems: we offer absolute encoders with a wide variety of Fieldbus bus systems. Details about our Fieldbus bus systems can be found on our website at: www.kuebler.com/service/fieldbus.pdf



Cable lengths

Cable length: the following maximum cable lengths are recommended, depending on the output circuitry and any noise sources present:

Interface and output circuit	max. cable length	Connected to
Parallel CMOS/TTL	2 m	SPS/IPC ¹⁾
Parallel push-pull	100 m	SPS/IPC ¹⁾
SSI	up to 1000 m ²⁾	SPS/IPC ¹⁾
RS422 /RS485	1000 m	SPS/IPC ¹⁾
Analogue 4 ... 20 mA	200 m	

Annotations:

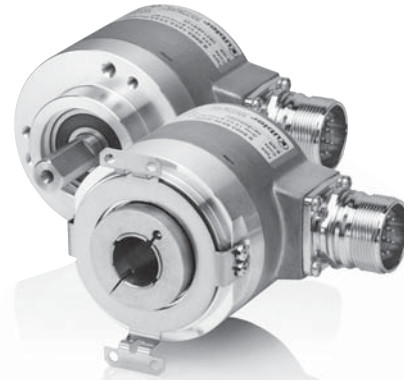
- Depending on the application the max. allowed cable length can be shorter, especially in areas with strong electrical noise.
- Always use shielded cables
- The core diameter of the signal cores should be $\geq 0.14 \text{ mm}^2$
- The core diameter of the voltage supply cores should be large enough depending on the cable length, that the voltage supply of the encoder is high enough and the signals do not go below the minimum levels! We strictly recommend the use of the cable types written down in the accessories.

1) IPC = Industrial PC

2) Depends on clock frequency:
at 100 kHz L_{max} approx. 250 m; at $f = 250 \text{ kHz}$ L_{max} approx. 50 m

Incremental and absolute encoders for Functional Safety

Safety is – not least since the EU Machinery Directive 2006/42/EG – an “integral part of the construction of drives”. When choosing the right encoder for functional safety the principle applies that safety is achieved through the intelligent combination of encoder, controller and actuator.



Sendix SSI absolute encoders, with an additional Sin/Cos incremental output, and Sin/Cos versions of incremental encoders are available with certification. But safety goes further than this: safe components are characterised by a robust reliable interface and by the ability to cope with high mechanical and electronic loads.

Safe Incremental Encoder Function

In order to achieve safe incremental information with the encoder, the controller must monitor the validity of the analogue, 90° phase-shifted sine/cosine signals with the help of the function: $\sin^2 + \cos^2 = 1$

Safe Absolute Encoder Function

In order to obtain safe information with the encoder regarding the absolute position, the controller counts the incremental pulses and compares the result with the absolute positions also provided by the encoder.

Safe mechanical connection

A 100% reliable mechanical connection is required for a safe function in the applications. Suitably sturdy fixing elements can help eliminate the risk of faults.

Compliance with Safety Standards

According to DIN EN 13849-1 and DIN EN 61800-5-2 up to SIL3/PLe/Cat.4 the following safety functions can be implemented with the encoder:

SS1:	Safe Stop 1	controlled braking, STO after time or standstill
SS2:	Safe Stop 2	controlled braking until SOS
SOS:	Safe Operating Stop	safe operating stop in position control
SLS:	Safe Limited Speed	
SLI:	Limited Increment of Position	
SLP:	Safe Limited Position	
SSR:	Safe Speed Range	
SDI:	Safe Direction	
SSM:	Safe Speed Monitoring	

Linear Measuring Technology

Magnetic measuring system

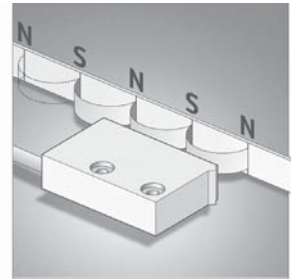
up to 90 m measuring length, up to 0.005 mm resolution

The idea:

A magnetic sensor is guided across a magnetic band without coming into contact with it. The changes in polarity on the magnetic band are counted and intermediate values are interpolated. Our engineers have fine-tuned the system to such a degree that resolutions up to 0.005 mm are possible.

The system is not affected by dust, shavings or humidity and is resistant to many liquids and to oil.

Assembly is easy - the magnetic band just has to be glued into place. There are no problems for calibration.



The distance between the sensor and the magnetic band can be up to 2 mm.

Repeat accuracy is very high.

Where is our LIMES system used?

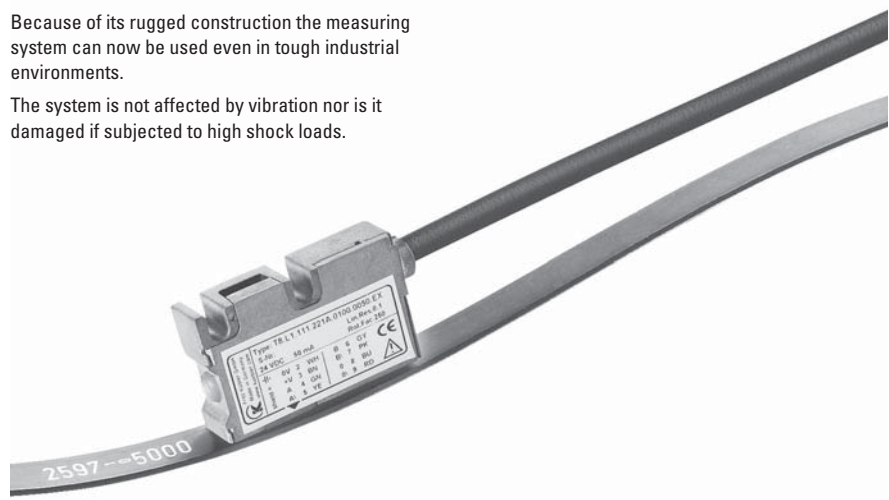
The measuring system offers an economical alternative to optical systems in applications where the high accuracy of the glass rules is not absolutely necessary but where up till now no other suitable alternative has been available.

Because of its rugged construction the measuring system can now be used even in tough industrial environments.

The system is not affected by vibration nor is it damaged if subjected to high shock loads.

Our flexible magnetic band offers a further interesting area of application, due to the fact that it can be fitted round very large shafts.

The maximum length of the magnetic band is 90 m!



Length measuring kits

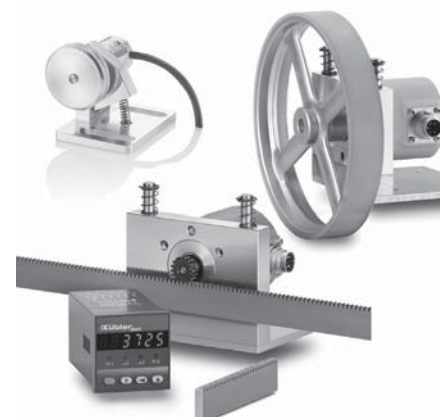
unlimited length, resolution up to 0.1 mm

We have taken our expertise from the fields of sensor and counting technology and applied this to length measuring kits.

We will supply you the measuring wheel, the encoder and the counter – **all from one source.**

Plug in and go – saves you time and effort – no need to assemble the component parts.

We supply the complete kits.



Linear Measuring Technology / Connection Technology

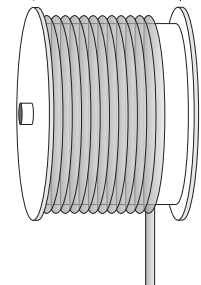
Draw wire systems

Measuring length up to 40 m,
Resolution up to 0.1 mm

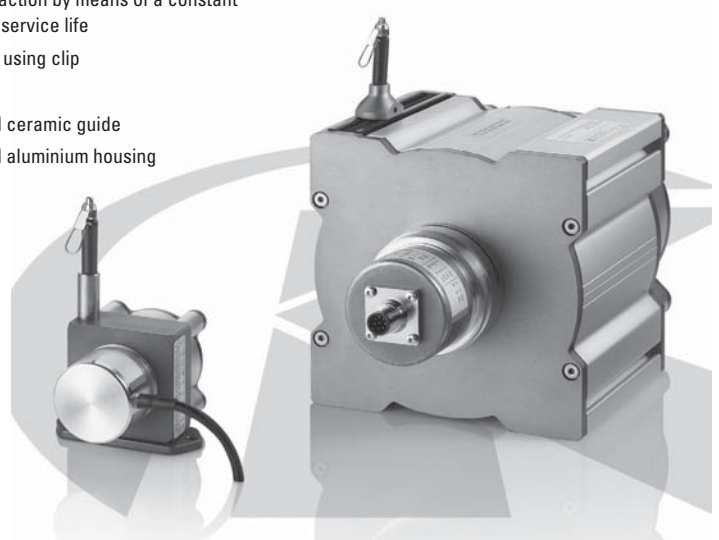


The idea:

At the core of a draw wire encoder is a drum mounted on bearings, onto which a wire is wound. The winding takes place via a spring-loaded device. The number of revolutions is measured by means of an encoder. If the circumference of the drum is known, then the length can be calculated from it.



- Specially for demanding applications
- With analogue sensors (0 ... 10 V, 4 ... 20 mA, potentiometer) or encoders (incremental, absolute, fieldbus)
- Measuring lengths from 250 mm up to 40000 mm
- High travelling speed
- High acceleration
- Dynamic spring traction by means of a constant force spring, long service life
- Simple wire fixing using clip
- Quick mounting
- Diamond-polished ceramic guide
- Titanium anodised aluminium housing



Product overview
Basics

The idea behind our Connection Technology System



Connection Technology from Kübler = System Safety!

All the products in the Connection Technology section have been tested and approved with the relevant compatible Kübler sensors.

They ensure the full functionality and high signal quality of our sensors.

Your benefit:

- Elimination of connection errors
– no laborious fault finding
- Optimal shielding
– avoids EMC problems
- Shorter installation times
– saves time, cuts costs
- No time-consuming search for the right connector or cable
– saves time, eliminates errors





Kubler
Fritz Kubler GmbH
Made in Germany
www.kuebler.com

Type: 8.5020.D85H.1024
10-30 VDC 100 mA
S-Nr: 0929502BD4

CE

0V : 1
+ UB : 2
↑

Incremental Encoders

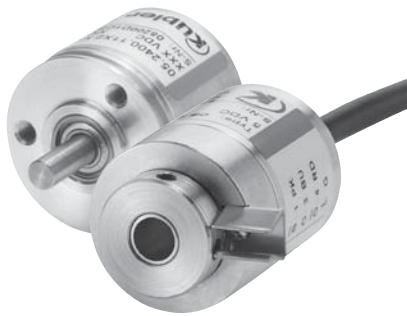
Series	Type	Interface	Page
Miniature, optical	2400 / 2420 (Shaft / Hollow shaft)	Push-Pull	42
Miniature, magnetic	2430 / 2440 (Shaft / Hollow shaft)	RS422	45
Compact, optical	3610 / 3620 (Shaft / Hollow shaft)	Push-Pull / RS422	47
Economy, optical	3700 / 3720 (Shaft / Hollow shaft)	Push-Pull / RS422	50
Functional Safety, optical	Sendix 5814 SIL / 5834 SIL (Shaft / Hollow shaft)	SinCos	53
Standard, optical	Sendix 5000 / 5020 (Shaft / Hollow shaft)	Push-Pull / RS422	57
High temperature, optical	5803 / 5823 (Shaft / Hollow shaft)	Push-Pull / RS422	64
Sine wave outputs, optical	5804 / 5824 (Shaft / Hollow shaft)	SinCos	68
High resolution, optical	5805 / 5825 (Shaft / Hollow shaft)	Push-Pull / RS422	72
Stainless steel, optical	Sendix 5006 (Shaft)	Push-Pull / RS422	76
	Sendix 5826 (Hollow shaft)	Push-Pull / RS422	78
Large hollow shaft, optical	5821 (Hollow shaft)	Push-Pull / RS422	80
	A020 (Hollow shaft)	Push-Pull / RS422 / SinCos	82
	A02H (Hollow shaft) / Heavy Duty	Push-Pull / RS422 / SinCos	85
ATEX, optical	7030 (Shaft)	Push-Pull / RS422	90
Magnetic measurement system	RI50 / LI50	Push-Pull / RS422	92
	RI20 / LI20	Push-Pull / RS422	95

Incremental Encoders

Miniature, optical

2400 / 2420 (Shaft / Hollow shaft)

Push-Pull



The incremental miniature encoders type 2400 / 2420 with their optical sensor technology offer a resolution of up to 1024 PPR.

With a diameter of just 24 mm this encoder is ideal for use where space is tight.



High rotational speed



Temperature
-20° + 85°



Shock / vibration resistant



Short-circuit proof



Magnetic field proof



Optical sensor

Reliable

- Robust bearing construction
- Cable outlet boasts high degree of strain relief thanks to multiple clamping.
- Short-circuit proof inputs

Versatile

- Ideally suited for use in small devices
- Meets the certification requirements of Railways Standard EN 50121

Order code Shaft version

05.2400 . XXXX . XXXX
Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.

10 by 10

Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.

a Flange

- 1 = ø 24 mm
- 2 = ø 30 mm
- 3 = ø 28 mm

c Output circuit / Power supply

- 1 = Push-Pull (without inverted signal) / 5 ... 24 V DC
- 2 = Push-Pull (with inverted signal) / 5 ... 24 V DC
- 3 = Push-Pull (without inverted signal) / 8 ... 30 V DC
- 4 = Push-Pull (with inverted signal) / 8 ... 30 V DC

e Pulse rate

- 4, 6, 8, 10, 16, 20, 25, 36, 40,
- 50, 60, 80, 100, 120, 125, 180,
- 200, 250, 300, 360, 400, 500,
- 512, 1000, 1024
- (e.g. 360 pulses => 0360)
- Other pulse rates on request

Stock types

- 05.2400.1122.0050
- 05.2400.1122.0360
- 05.2400.1122.0500
- 05.2400.1122.1000
- 05.2400.1122.1024

b Shaft (ø x L)

- 1 = ø 4 x 10 mm
- 2 = ø 6 x 10 mm
- 3 = ø 5 x 10 mm, with flat

d Type of connection

- 1 = axial cable (2 m PVC cable ø 4.5 mm)
- 2 = radial cable (2 m PVC cable ø 4.5 mm)

Order code Hollow shaft

05.2420 . 1XXX . XXXX
Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.

10 by 10

Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.

a Flange

- 1 = ø 24 mm

b Blind hollow shaft

(insertion depth max. 14 mm)

- 1 = ø 4 mm
- 2 = ø 6 mm

c Output circuit / Power supply

- 1 = Push-Pull (without inverted signal) / 5 ... 24 V DC
- 2 = Push-Pull (with inverted signal) / 5 ... 24 V DC
- 3 = Push-Pull (without inverted signal) / 8 ... 30 V DC
- 4 = Push-Pull (with inverted signal) / 8 ... 30 V DC

e Pulse rate

- 4, 6, 8, 10, 16, 20, 25, 36, 40,
- 50, 60, 80, 100, 120, 125, 180,
- 200, 250, 300, 360, 400, 500,
- 512, 1000, 1024
- (e.g. 360 pulses => 0360)
- Other pulse rates on request

Stock types

- 05.2420.1212.0360
- 05.2420.1212.0500
- 05.2420.1212.1000
- 05.2420.1222.0500
- 05.2420.1222.1000
- 05.2420.1222.1024

Mounting accessory for shaft encoders

Coupling

Bellows coupling ø 15 mm for shaft 4 mm

8.0000.1201.0404

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.

Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Incremental Encoders

Miniature, optical	2400 / 2420 (Shaft / Hollow shaft)	Push-Pull
---------------------------	-------------------------------------------	------------------

Mechanical characteristics		
Speed		max. 12 000 min ⁻¹
Rotor moment of inertia		approx. 0.1 x 10 ⁻⁶ kgm ²
Starting torque		< 0.01 Nm
Shaft load capacity	radial	10 N
	axial	20 N
Weight		approx. 0.06 kg
Protection to EN 60529	housing side	IP65
	flange side	IP50 (IP64 on request)
Working temperature range		-20°C ... +85°C
Materials	shaft	stainless steel
	hollow shaft	brass
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

Electrical characteristics		
Output circuit		Push-Pull (7272) ¹⁾ Push-Pull (7272) ¹⁾
Supply voltage		5 ... 24 V DC ²⁾ 8 ... 30 V DC
Power consumption (no load)		max. 50 mA max. 50 mA
Permissible load / channel		max. 50 mA max. 50 mA
Pulse frequency		max. 160 kHz max. 160 kHz
Signal level	high	min. U _B - 2.5 V
	low	max. 0.5 V min. U _B - 3 V
		max. 0.5 V
Rising edge time t_r		max. 1 µs max. 1 µs
Falling edge time t_f		max. 1 µs max. 1 µs
Short circuit proof outputs		yes yes
UL-certified		File 224618
CE compliant acc. to		EN 61000-6-2, EN 55011 Class B
RoHS compliant acc. to		EU guideline 2002/95/EG

Incremental Encoders

An independent test laboratory (TTI-PG115/96-01) approved by the German Accreditation Council (DAR) certified the compliance with the Railways Standard, according to EN 50121. This means our encoder is compatible with higher electromagnetic noise standards than standard industrial encoders.



You will have a higher quality encoder even in applications with higher EMC noise levels. We will gladly send you a copy of the test report on request. When ordering an encoder to the railway standard, please ensure you state this explicitly on the order.

Terminal assignment

Signal	0V	+U _B	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Cable colour with inverted signal	WH	BN	GN	YE	GY	PK	BU	RD
Cable colour without inverted signal	WH	BN	GN		YE		GY	

1) Max. recommended cable length 30 m

2) With 24 V DC there is no tolerance above 24 V DC. Please use output circuit 8 ... 30 V DC.

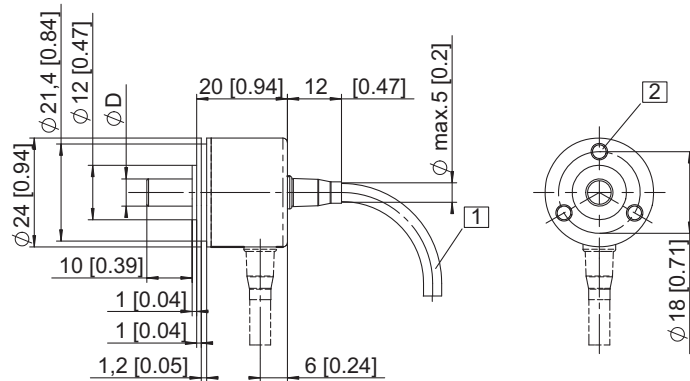
Incremental Encoders

Miniature, optical **2400 / 2420 (Shaft / Hollow shaft)** **Push-Pull**

Dimensions shaft version

Flange type 1 (ø 24 mm)

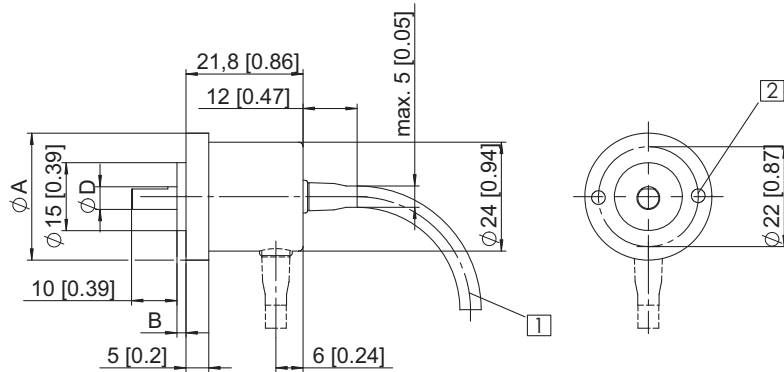
- 1 min R50 [1.97]
- 2 3 x M3, 4[0.16] deep



Flange type 2 (ø 30 mm) Flange type 3 (ø 28 mm)

Flange type	2	3
A	ø 30 mm	ø 28 mm
B	3 mm	2 mm

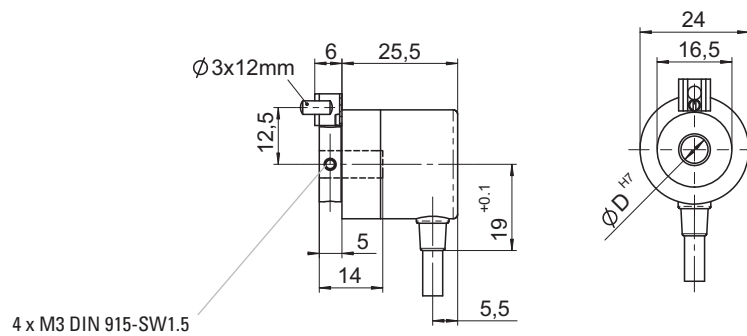
- 1 min R50 [1.97]
- 2 2 x M3, 4[0.16] deep



Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
We recommend the use of suitable couplings (see Accessories section).

Dimensions hollow shaft version



Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
A cylindrical pin, for use as a torque stop, is supplied.

Incremental Encoders

Miniature, magnetic	2430 / 2440 (Shaft / Hollow shaft)	RS422
----------------------------	-------------------------------------------	--------------



Thanks to their non-contact magnetic scanning technology the miniature-format encoders 2430 and 2440 guarantee exceptional ruggedness – and this with a resolution of up to 256 pulses per revolution.

As a result of their compact outer diameter, they are ideal for use where installation space is restricted.



Incremental Encoders

High rotational speed	Temperature -20° + 85°	Shock / vibration resistant	Short-circuit proof	Reverse polarity protection	Magnetic sensor technology

Magnetically robust

- The non-contact magnetic technology prevents wear and guarantees a long service life.
- Multiple clamping affords high strain relief to the cable outlet, ensuring longer life.
- Wide temperature range from -20°C up to +85°C
- Flexible connection possibilities: can be supplied with radial or axial cable outlet

Compact Power

- Resolution up to 256 PPR
- Shaft and hollow shaft version

Order code	8.2430	.	X	X	6	X	.	XXXX
Shaft version	Type		a	b	c	d		e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange <u>1 = ø 24 mm</u> 2 = ø 30 mm 3 = ø 28 mm	b Shaft (ø x L) 1 = ø 4 x 10 mm <u>2 = ø 6 x 10 mm</u> 3 = ø 5 x 10 mm, with flat	c Output circuit / Power supply <u>6 = RS422 (with inverted signal) / 5 V DC</u>	e Pulse rate 1 ... 128 (factory programmable) <u>256</u> (e.g. 128 pulses => 0128) Other pulse rates on request
d Type of connection 1 = axial cable (2 m PVC cable ø 4.5 mm) <u>2 = radial cable (2 m PVC cable ø 4.5 mm)</u>			

Order code	8.2440	.	1	X	6	X	.	XXXX
Hollow shaft	Type		a	b	c	d		e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange <u>1 = ø 24 mm</u>	b Blind hollow shaft (insertion depth max. 14 mm) 1 = ø 4 mm <u>2 = ø 6 mm</u>	c Output circuit / Power supply <u>6 = RS422 (with inverted signal) / 5 V DC</u>	e Pulse rate 1 ... 128 (factory programmable) <u>256</u> (e.g. 128 pulses => 0128) Other pulse rates on request
d Type of connection 1 = axial cable (2 m PVC cable ø 4.5 mm) <u>2 = radial cable (2 m PVC cable ø 4.5 mm)</u>			

Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 15 mm for shaft 4 mm	8.0000.1201.0404
-----------------	-----------------------------------------	-------------------------

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Incremental Encoders

Miniature, magnetic	2430 / 2440 (Shaft / Hollow shaft)	RS422
----------------------------	-------------------------------------------	--------------

Mechanical characteristics		
Speed		max. 12.000 min ⁻¹
Rotor moment of inertia		approx. 0.1 x 10 ⁻⁶ kgm ²
Starting torque		< 0.01 Nm
Shaft load capacity	radial	10 N
	axial	20 N
Weight		approx. 0.06 kg
Protection acc. to EN 60529	housing side	IP65 (IP67K on request)
	flange side	IP50 (IP67K on request)
Working temperature range		-20° C ... +85° C
Materials	shaft / hollow shaft	stainless steel
	clamping flange	MS58
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

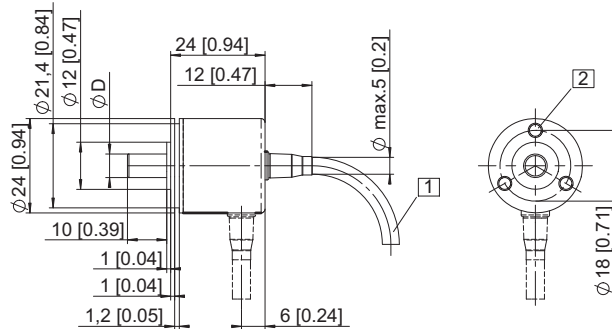
Electrical characteristics		
Output circuit		RS422 (TTL-compatible)
Supply voltage		5 V ±5%
Power consumption with inverted signal (no load)		typ. 40 mA / max. 90 mA
Permissible load/channel		max. ±20 mA
Pulse frequency		max. 300 kHz
Signal level	high	min. 2.5 V
	low	max. 0.5 V
Rising edge time t _r		max. 200 ns
Falling edge time t _f		max. 200 ns
Min. flange distance		0.5 μs ¹⁾
Short circuit proof outputs ²⁾		yes ³⁾
Reverse connection of the supply voltage		no
CE compliant acc. to		EN 61000-6-2, EN 55011 Class B
RoHS compliant acc. to		EU guideline 2002/95/EG

Terminal assignment

Signal:	0 V	+U _B	\bar{A}	A	\bar{B}	B	$\bar{0}$	0
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD

Dimensions shaft version

Flange type 1 (ø 24 mm)

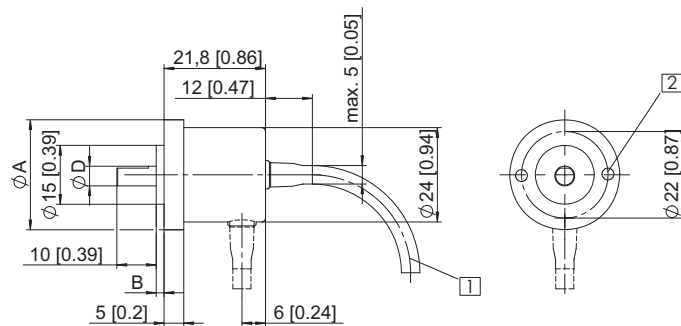


- 1) min. R50 [1.97] 2) 3 x M3, 4 [0.16] deep

Flange type 2 (ø 30 mm)

Flange type 3 (ø 28 mm)

Flange type	2	3
A	ø 30 mm	ø 28 mm
B	3 mm	2 mm

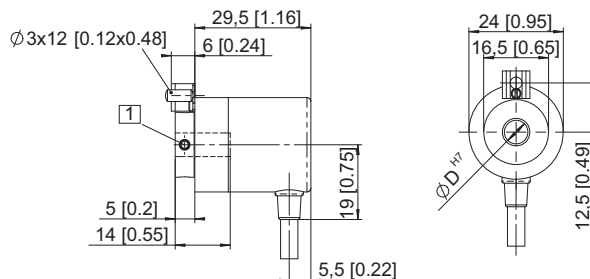


- 1) min. R50 [1.97] 2) 3 x M3, 4 [0.16] deep

Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Dimensions hollow shaft version



- 1) 4 x M3 DIN 915 - SW15

Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! Cylindrical pin (ISO 2338-A-3m6 x 10) for torque stop incl. in scope of delivery.

1) For max. speed use a counter with input frequency of min. 500 kHz.

2) If supply voltage correctly applied.

3) Only one channel allowed to be shorted-out:
If U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted.
If U_B = 5 ... 30 V short circuit to channel or 0 V is permitted.

Incremental Encoders

Compact, optical	3610 / 3620 (Shaft / Hollow shaft)	Push-Pull / RS422
-------------------------	-------------------------------------------	--------------------------



The compact incremental encoders type 3610 / 3620 with optical sensor technology are available with a resolution of up to 2500 PPR.

The versions with hollow shaft are designed for diameters up to 8 mm.



High rotational speed	Temperature	Shock / vibration resistant	Short-circuit proof	Magnetic field proof	Optical sensor

Compact

- Only 36 mm outer diameter
- Through hollow shaft up to 8 mm
- Ideally suited for use where space is tight

Versatile

- Available with cable outlet or M12 connector
- Maximum resolution of 2500 pulses per revolution
- Supply voltage 5 ... 18 V DC or 8 ... 30 V DC

Incremental Encoders

Order code

Shaft version

8.3610 . X X X X . X X X X

Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange
2 = synchro flange
3 = clamping flange
- b** Shaft (ø x L)
1 = ø 4 x 10 mm
2 = ø 5 x 10 mm
3 = ø 6 x 12,5 mm, with flat
5 = ø 6,35 (1/4") x 12,5 mm, with flat

- c** Output circuit / Power supply
2 = Push-Pull with inverted signal / 5 ... 18 V DC
3 = Push-Pull without inverted signal / 8 ... 30 V DC
4 = Push-Pull with inverted signal / 8 ... 30 V DC
5 = RS422 with inverted signal / 8 ... 30 V DC
6 = RS422 with inverted signal / 5 V DC

- d** Type of connection
1 = axial cable (2 m PVC cable)
2 = radial cable (2 m PVC cable)
3 = M12 connector, 8-pin, axial
4 = M12 connector, 8-pin, radial

- e** Pulse rate
25, 100, **200**, 360, **500**, 512
600, 1000, **1024**, 1500,
2000, **2048**, **2500**
(e.g. 500 pulses => 0500)
Other pulse rates on request

Order code

Hollow shaft

8.3620 . X X X X . X X X X

Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange
1 = with short torque stop
2 = with long torque stop
5 = with stator coupling
- b** Through hollow shaft
2 = ø 6 mm
3 = ø 6.35 mm (1/4")
4 = ø 8 mm

- c** Output circuit / Power supply
2 = Push-Pull with inverted signal / 5 ... 18 V DC
3 = Push-Pull without inverted signal / 8 ... 30 V DC
4 = Push-Pull with inverted signal / 8 ... 30 V DC
5 = RS422 with inverted signal / 8 ... 30 V DC
6 = RS422 with inverted signal / 5 V DC

- d** Type of connection
E = radial cable (2 m PVC cable)
4 = M12 connector, 8-pin, radial

- e** Pulse rate
25, 100, **200**, 360, **500**, 512
600, 1000, **1024**, 1500,
2000, **2048**, **2500**
(e.g. 500 pulses => 0500)
Other pulse rates on request

Incremental Encoders

Compact, optical	3610 / 3620 (Shaft / Hollow shaft)	Push-Pull / RS422
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1201.0606
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Connection Technology

Connector, self-assembly	M12	05.CMB-8181-0
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Cordset, pre-assembled with 2 m PVC cable	M12	05.WAKS8-2/P00
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

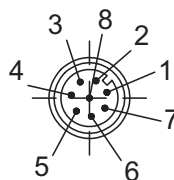
Mechanical characteristics		
Speed	shaft version	max. 12000 min ⁻¹
	hollow shaft version	max. 6000 min ⁻¹
Rotor moment of inertia		approx. 0.2×10^{-6} kgm ²
Starting torque		< 0.05 Nm
Shaft load capacity	radial	40 N
	axial	20 N
Weight		approx. 0.08 kg
Protection to EN 60529	housing side	IP65
	flange side	IP50 (IP64 on request)
Working temperature range		-20°C ... +85°C
Materials	shaft	stainless steel
	hollow shaft	brass
	housing	chromated Aluminium
	cable	PVC
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

Electrical characteristics		
Output circuit	Push-Pull (7272) ¹⁾	Push-Pull (7272) ¹⁾
Supply voltage	5 ... 18 V DC	8 ... 30 V DC
Power consumption with inverted signal (no load)	max. 40 mA	max. 40 mA
Permissible load / channel	max. ± 50 mA	max. ± 50 mA
Pulse frequency	max. 200 kHz	max. 200 kHz
Signal level	high	min. $U_B - 2.5$ V
	low	max. 0.5 V
Rising edge time t_r	max. 1 μ s	max. 1 μ s
Falling edge time t_f	max. 1 μ s	max. 1 μ s
Short circuit proof outputs ²⁾	yes	yes
Reverse connection of the supply voltage	yes	yes
UL-certified	File 224618	
CE compliant acc. to	EN 61000-6-2, EN 55011 Class B	
RoHS compliant acc. to	EU guideline 2002/95/EG	

Terminal assignment

Signal	0V	+UB	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Cable colour with inverted signal	WH	BN	GN	YE	GY	PK	BU	RD
Cable colour without inverted signal	WH	BN	GN		YE		GY	
M12 connector, eurofast, 8-pin, with inverted signal	1	2	3	4	5	6	7	8
M12 connector, eurofast, 8-pin, without inverted signal	1	2	3		5		7	

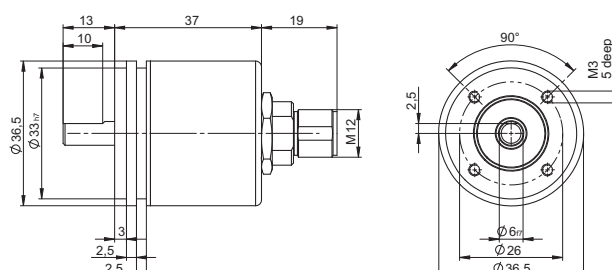
Top view of mating side, male contact base



M12 connector, 8-pin

Dimensions shaft version

Synchro flange



1) Max. recommended cable length 30 m
2) If supply voltage correctly applied

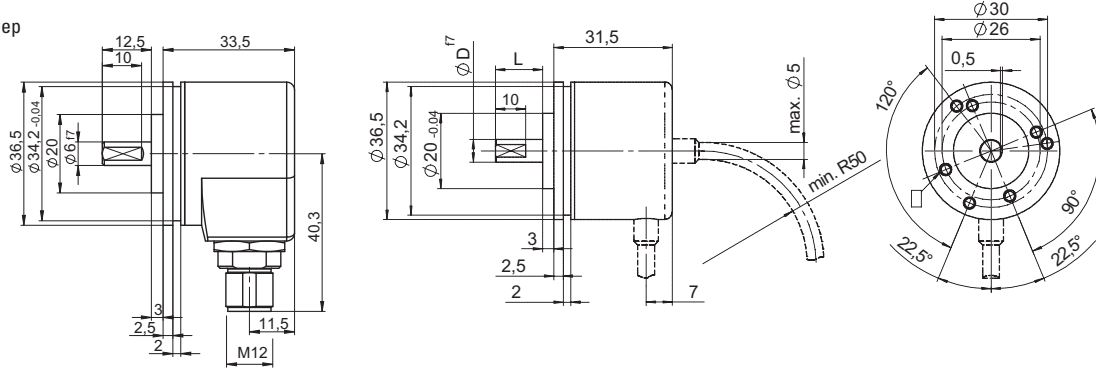
Incremental Encoders

Compact, optical **3610 / 3620 (Shaft / Hollow shaft)** **Push-Pull / RS422**

Dimensions shaft version

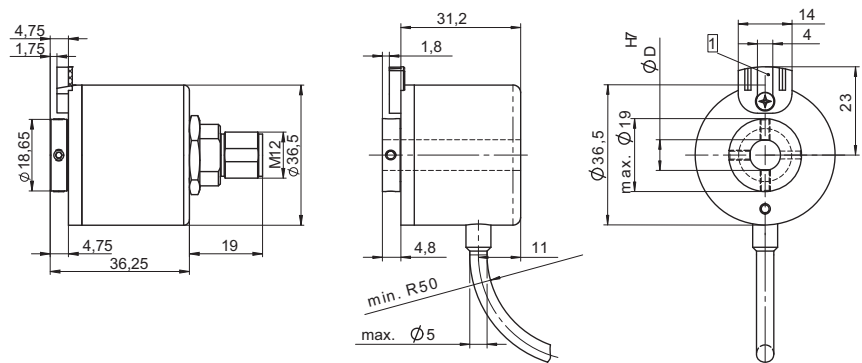
Clamping flange

1 M3, 5 mm deep



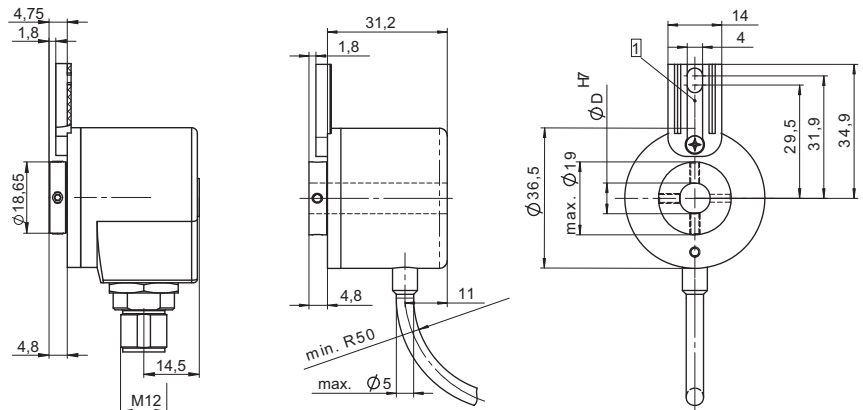
Dimensions hollow shaft version

Flange with torque stop short



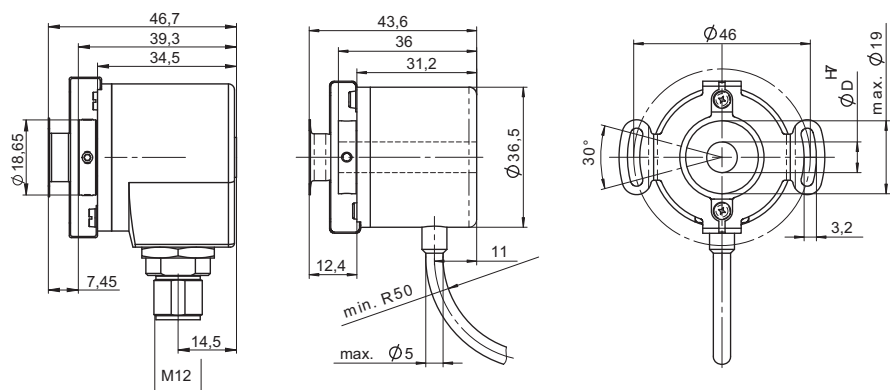
Flange with torque stop long

1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, $\varnothing 4$ mm



Flange with stator coupling double-winged

Shaft: Minimum insertion depth 1.5 x D



Incremental Encoders

Economy, optical	3700 / 3720 (Shaft / Hollow shaft)	Push-Pull / RS422
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The incremental economy encoders type 3700 / 3720 with optical sensor technology are a particularly compact and economical solution.

The carbon-fibre reinforced plastic housing of these incremental encoders is, nevertheless, extremely robust and resistant.

Magnetic field proof	Reverse polarity protection	Short-circuit proof	High IP value	Optical sensor

Reliable

- Tube Tech® cable outlet with extremely high strain relief
- Ideal for outdoor use thanks to high IP protection

Versatile

- Through hollow shaft up to 8 mm
- Compact size of only 37 mm
- Up to 1024 pulses per revolution

Order code Shaft version	8.3700 Type	. XXXXX . XXXX a b c d e	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	
a Flange <u>1 = without fixing attachment</u> A = flange adapter, mounted	c Output circuit / Power supply 1 = RS422 / 5 V DC ±5 % <u>3 = Push-Pull (with inverted signal) / 5 ... 30 V DC</u> 4 = Push-Pull (with inverted signal) / 10 ... 30 V DC	d Type of connection ²⁾ <u>1 = axial cable (1 m PVC cable)</u> <u>2 = radial cable (1 m PVC cable)</u> 3 = axial cable (2 m PVC cable) 4 = radial cable (2 m PVC cable) 5 = axial cable (3 m PVC cable) 6 = radial cable (3 m PVC cable) 7 = axial cable (5 m PVC cable) 8 = radial cable (5 m PVC cable)	e Pulse rate 10, 25, 50, 60, 100, 200, 250, 300, <u>360, 400, 500, 512, 600, 1000, 1024</u> (e.g. 360 pulses => 0360) Other pulse rates on request	<i>Stock types</i> 8.3700.1332.0050 8.3700.1332.1000 8.3700.1332.0360 8.3700.1332.1024 8.3700.1332.0500

Order code Hollow shaft	8.3720 Type	. XXXXX . XXXX a b c d e	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	
a Flange / through hollow shaft 1 = with short torque stop 2 = with long torque stop <u>5 = with stator coupling double-winged</u>	c Output circuit / Power supply 1 = RS422 / 5 V DC ±5 % <u>3 = Push-Pull (with inverted signal) / 5 ... 30 V DC</u> 4 = Push-Pull (with inverted signal) / 10 ... 30 V DC	d Type of connection ²⁾ 1 = radial cable (1 m PVC cable) <u>2 = radial cable (2 m PVC cable)</u> 3 = radial cable (3 m PVC cable) 4 = radial cable (5 m PVC cable)	e Pulse rate 10, 25, 50, 60, 100, 200, 250, 300, <u>360, 400, 500, 512, 600, 1000, 1024</u> (e.g. 360 pulses => 0360) Other pulse rates on request	<i>Stock types</i> 8.3720.5631.0360 8.3720.5611.1024 8.3720.5631.1000 8.3720.5631.1024

Mounting accessory for shaft encoders	Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1201.0606
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) "Tube Tech®" cable outlet guarantees 10 x higher strain relief than traditional cabling methods plus higher IP-Protection.
Other cable lengths are available on request.

Incremental Encoders

Economy, optical	3700 / 3720 (Shaft / Hollow shaft)	Push-Pull / RS422
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Mechanical characteristics		
Speed		max. 6 000 min ⁻¹
Rotor moment of inertia	shaft version	approx. 0.4 x 10 ⁻⁶ kgm ²
	hollow shaft version	1.4 x 10 ⁻⁶ kgm ²
Starting torque	shaft version	< 0.007 Nm
	hollow shaft version	< 0.01 Nm
Shaft load capacity	radial	20 N
	axial	10 N
Weight		approx. 0.1 kg
Protection to EN 60529	bearings, shaft	IP65
	cable outlet	IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-20°C ... +70°C ¹⁾
Materials	shaft / hollow shaft	stainless steel
	housing, flange	PPA, 40% CF (carbon fibre)
	cable	PVC
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz

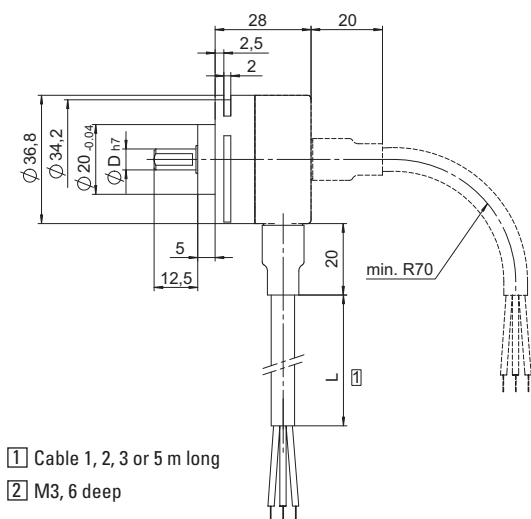
Electrical characteristics			
Output circuit	RS422 (TTL compatible)	Push-Pull (7272) ⁴⁾	Push-Pull (7272) ⁴⁾
Supply voltage	5 V (±5%)	5 ... 30 V DC	10 ... 30 V DC
Power consumption with inverted signal (no load)	typ. 40 mA /	typ. 50 mA/	typ. 50 mA/
	max. 90 mA	max. 100 mA	max. 100 mA
Permissible load / channel	max. ±20 mA	max. ±20 mA	max. ±20 mA
Pulse frequency	max. 250 kHz	max. 250 kHz	max. 250 kHz
Signal level	high	min. U _B - 2.0 V	min. U _B - 2.0 V
	low	max. 0.5 V	max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 1 µs	max. 1 µs
Falling edge time t_f	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs ²⁾	yes ³⁾	yes	yes
Reverse connection of the supply voltage	no	no	yes
UL-certified	File 224618		
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

Incremental Encoders

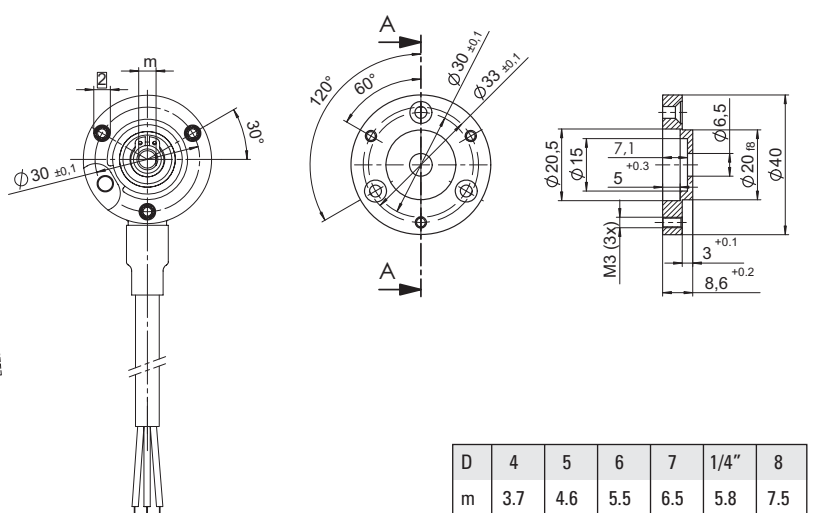
Terminal assignment

Signal	0V	+U _B	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD

Dimensions shaft version



Adapting flange Type A



Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

1) For versions with push-pull output and supply voltage >15 V DC: max. 55°C
 2) If supply voltage correctly applied.

3) Only one channel allowed to be shorted-out:
 If U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 ... 30 V short circuit to channel or 0 V is permitted.
 4) Max. recommended cable length 30 m

Incremental Encoders

Economy, optical

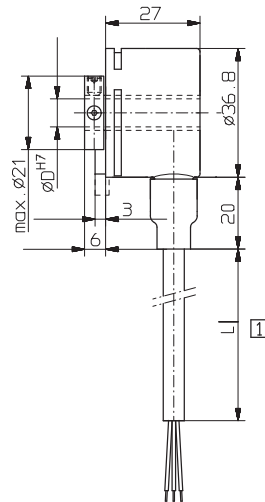
3700 / 3720 (Shaft / Hollow shaft)

Push-Pull / RS422

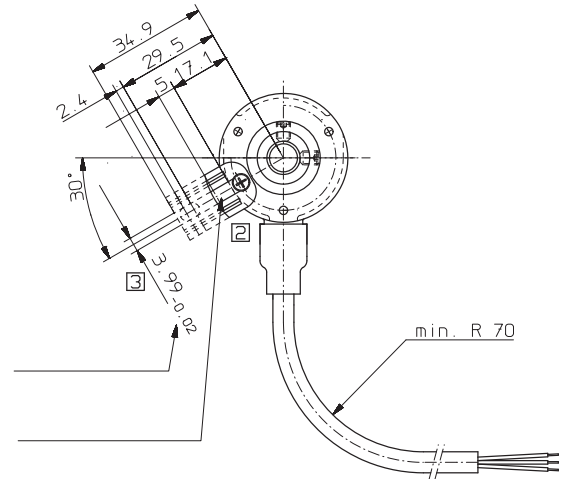
Dimensions hollow shaft version

Flange with torque stop short

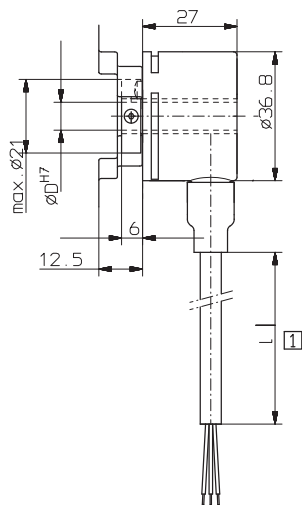
Long torque stop version is shown dashed



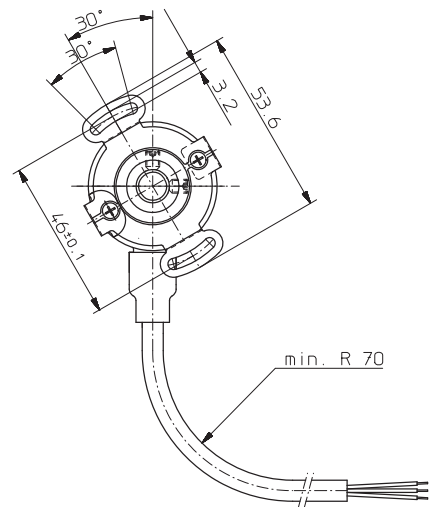
- 1 Cable length 1, 2, 3 or 5 m
- 2 Slot for torque stop, 3 mm deep
- 3 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ϕ 4 mm



Flange with stator coupling, double-winged

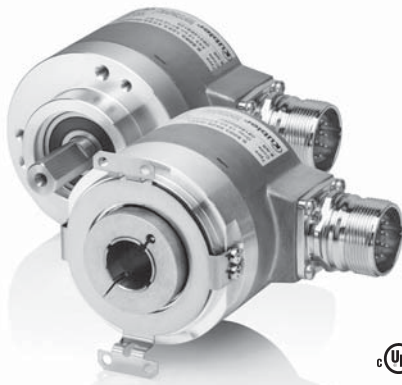


- 1 Cable length 1, 2, 3 or 5 mm



Incremental Encoders

Functional Safety, optical Sendix 5814 SIL/5834 SIL (Shaft / Hollow shaft) SinCos



The incremental encoders Sendix 5814 SIL and 5834 SIL are perfectly suited for use in safety-related applications up to SIL3 according to DIN EN ISO 61800-5-2 or PLe to DIN EN ISO 13849.

These encoders are particularly suited for applications in the field of safe drive engineering.



Incremental Encoders

Safety-Lock™	High rotational speed	Temperature -40° + 90°	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Reverse polarity protection	SinCos	Seawater-resistant version on request

Certified Safety

- Certified by the BGIA - Institute for Occupational Safety and Health
- Suitable for SIL3 applications acc. to DIN EN ISO 61800-5-2
- Suitable for PLe applications acc. to DIN EN ISO 13849
- With incremental SinCos tracks

Flexible

- Shaft and Hollow shaft versions
- Cable and connector variants
- Various mounting options available

Order code **8.5814SIL** . **1** **X** **X** **X** . **X** **X** **X** **X**

Shaft version Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange</p> <p><u>1 = clamping flange, ø 58 mm, IP65</u></p> <p>b Shaft (ø x L)</p> <p><u>2 = 10 x 20 mm, with flat</u></p> <p>A = 10 x 20 mm, with feather key shaft slot</p> | <p>c Interface / Power supply</p> <p>1 = SinCos / 5 V DC</p> <p><u>2 = SinCos / 10 ... 30 V DC</u></p> | <p>d Type of connection</p> <p>1 = axial cable (1 m PVC)</p> <p><u>2 = radial cable (1 m PVC)</u></p> <p>3 = M23 connector, 12 pin, axial</p> <p>4 = M23 connector, 12 pin, radial</p> <p>5 = M12 connector, 8 pin, axial</p> <p>6 = M12 connector, 8 pin, radial</p> | <p>e Pulse rate</p> <p>1024, <u>2048</u></p> <p><i>optional on request</i></p> <p>- seawater-resistant</p> <p>- special cable length</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

Order code **8.5834SIL** . **X** **X** **X** **X** . **X** **X** **X** **X**

hollow shaft Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange</p> <p>A = with torque stop set, IP65</p> <p><u>B = with stator coupling, IP65</u></p> <p>b Hollow shaft</p> <p>3 = ø 10 mm</p> <p><u>4 = ø 12 mm</u></p> <p>5 = ø 14 mm</p> <p>K = ø 10 mm, tapered shaft</p> | <p>c Interface / Power supply</p> <p>1 = SinCos / 5 V DC</p> <p><u>2 = SinCos / 10 ... 30 V DC</u></p> | <p>d Type of connection</p> <p><u>2 = radial cable (1 m PVC)</u></p> <p>4 = M23 connector, 12 pin, radial</p> <p>6 = M12 connector, 8 pin, radial</p> <p>E = tangential cable outlet</p> <p>cable length 1 m (PVC cable)</p> | <p>e Pulse rate</p> <p>1024, <u>2048</u></p> <p><i>optional on request</i></p> <p>- seawater-resistant</p> <p>- special cable length</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

Connection Technology

Connector, self-assembly (straight)	M12	05.CMB-8181-0
	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M12	05.WAKS8-2/P00
	M23	8.0000.6901.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Incremental Encoders

Functional Safety, optical Sendix 5814 SIL / 5834 SIL (Shaft / Hollow shaft) SinCos

Notes regarding "Functional Safety"
 These encoders are suitable for use in safety-related systems up to SIL3 to DIN EN ISO 61800-5-2 and PLe to DIN EN ISO 13849 in conjunction with controllers or evaluation units, which possess the necessary functionality. Additional functions can be found in the operating manual.

Mechanical characteristics		
Max. speed, shaft version		
without shaft seal (IP65) up to 70°C		12 000 min ⁻¹ , 10 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		11 000 min ⁻¹ , 9 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
Max. speed, hollow shaft version		
without shaft seal (IP65) up to 70°C		9 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		8 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		4 000 min ⁻¹ , 2 000 min ⁻¹ (continuous)
Starting torque, shaft version		
without shaft seal (IP65)		< 0.01 Nm
with shaft seal (IP67)		< 0.05 Nm
Starting torque, hollow shaft version		
without shaft seal (IP65)		< 0.03 Nm
Moment of inertia		
Shaft version		4.0 x 10 ⁻⁶ kgm ²
Hollow shaft version		7.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial / axial	80 N / 40 N
Weight		approx. 0.45 kg
Protection EN 60 529	housing side shaft side	IP67 IP65, opt. IP67
Working temperature range		-40°C ... +90°C ¹⁾
Materials	shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast housing PVC
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

Electrical characteristics		
Supply voltage	5 V DC ± 5%	10 ... 30 V DC
Current consumption (no load)	max. 70 mA	max. 45 mA
Reverse polarity protection of the power supply (U _B)	yes	
UL certified	File 224618	
Conforms to CE requirements acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3	
RoHS compliant acc. to	EU guideline 2002/95/EG	

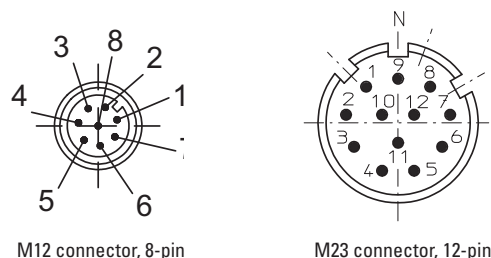
Output SinCos (A / B)	
Max. frequency -3dB	400 kHz
Signal level	1 V _{pp} (± 20%)
Short circuit proof	yes ²⁾

Terminal assignment

Signal:	GND	+V	A	A inv	B	Binv	shield
Cable colour:	WH	BN	GN	YE	GY	PK	shield
M23 connector:	10	12	5	6	8	1	PH ³⁾
M12	1	2	3	4	5	6	PH ³⁾

- +V: Encoder Power Supply +V DC
- GND: Encoder Power Supply Ground (0V)
- PE: Protective earth
- PH: Plug connector housing (Shield)
- A, Ainv: Sine output
- B, Binv: Cosine output

Top view of mating side, male contact base



1) Cable version: -30°C ... +90°C fixed installation
 2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied
 3) PH = Shield is attached to connector housing

Incremental Encoders

Functional Safety, optical **Sendix 5814 SIL/5834 SIL (Shaft / Hollow shaft)** **SinCos**

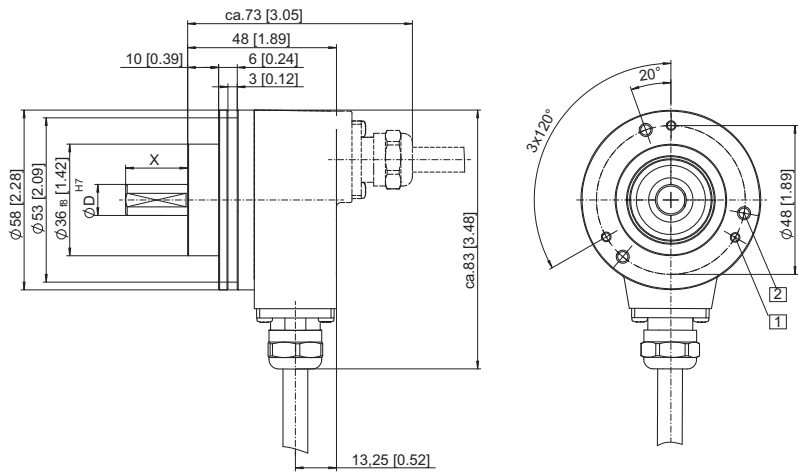
Dimensions shaft version

Clamping flange

Flange type 1 with shaft type 2

(Drawing with cable)

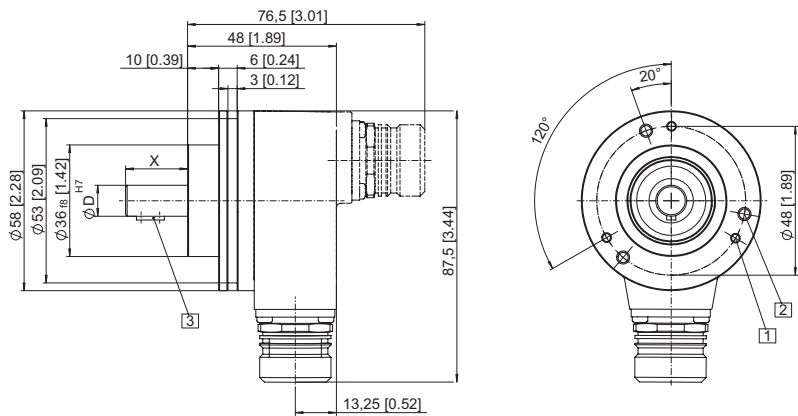
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



Flange type 1 with shaft type A

(Drawing with M23 connector)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep
- 3 Feather key DIN 6885 - A - 3x3x6
optional: Feather key DIN 6885 - A - 4x4x8



Incremental Encoders

Incremental Encoders

Functional Safety, optical

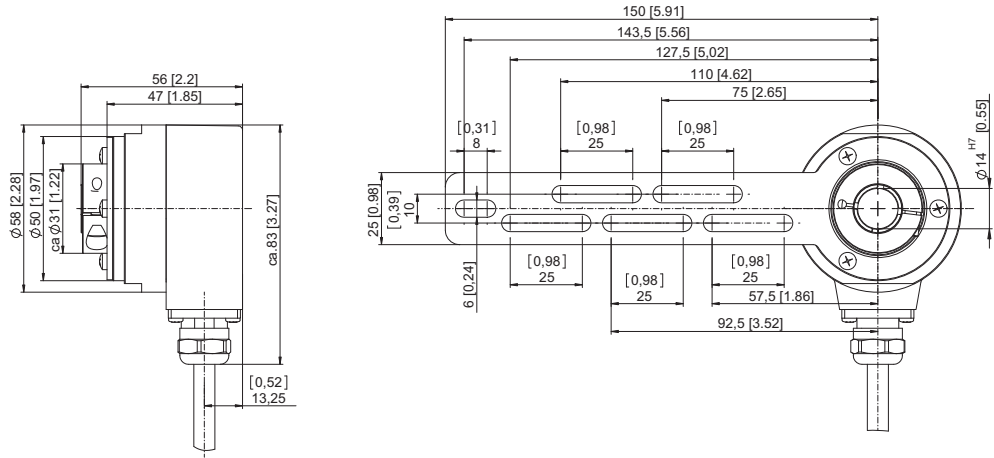
Sendix 5814 SIL / 5834 SIL (Shaft / Hollow shaft)

SinCos

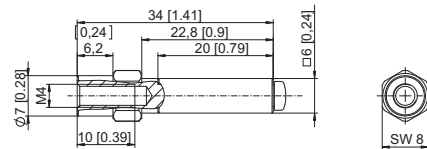
Dimensions hollow shaft version

With torque stop set
flange type A

(Drawing with cable)



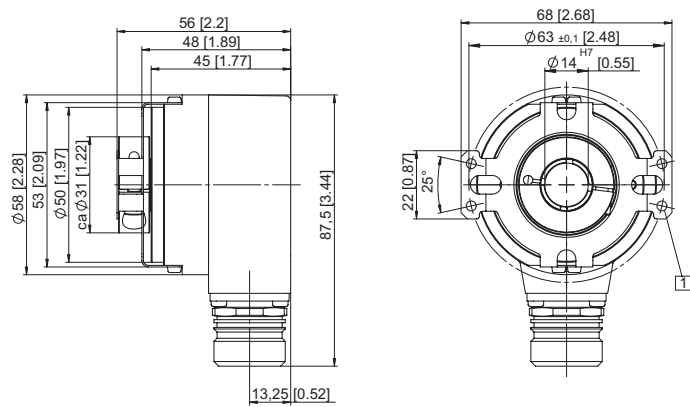
Torque pin with rectangular sleeve
with M4 thread, 10 deep



Flange with stator coupling and hollow shaft
Flange type B

(Drawing with M23 connector)

1 for (4x) M3 screw



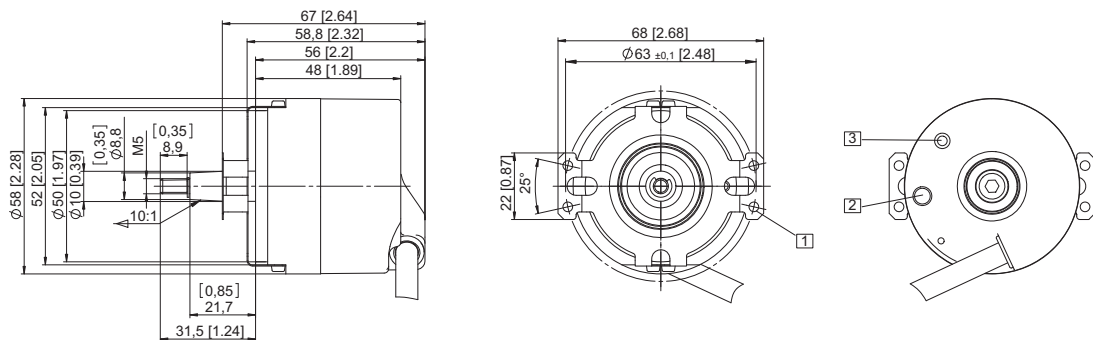
Flange with stator coupling and tapered shaft
Flange type B

(Drawing with tangential cable outlet)

1 for (4x) M3 screw

2 Status LED

3 SET button



Incremental Encoders

Standard, optical **Sendix 5000 / 5020 (Shaft / Hollow shaft)** **Push-Pull / RS422**



Due to their sturdy bearing construction in Safety Lock™ Design, the Sendix 5000 and 5020 offer high resistance against vibration and installation errors.

The rugged housing, high protection level of up to IP67, as well as the wide temperature range of -40°C up to +85°C, make this product range the perfect encoder for all applications.



Incremental Encoders

Safety-Lock™	High rotational speed	Temperature -40° +85°	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater-resistant version on request

Robust performance

- Increased resistance against vibrations and tolerance of installation errors, elimination of machine downtime and repairs thanks to sturdy bearing construction in "Safety-Lock™ Design"
- Ensures highest safety against field breakdowns and is thus suitable also for outside use thanks to its resistant die-cast housing and protection up to IP67
- Wide temperature range (-40°C...+85°C)
- Also available in seawater resistant version

Many variants

- Suitable connection variant for every specific case: Cable connection, M23 connector, M12 connector
- Reliable mounting in a wide variety of installation situations: Comprehensive and proven fixing possibilities
- Compatible with all US and European standards,
- Max. 5000 pulses per revolution

Order code

8.5000 . **X****X****X****X** . **XXXX**
Type a b c d e

If for each parameter of an encoder the **underlined preferred option** is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 5 = synchro flange, ø 50,8 mm, IP67
- 6 = synchro flange, ø 50,8 mm, IP65
- 7 = clamping flange, ø 58 mm, IP67
- 8 = clamping flange, ø 58 mm, IP65**
- A = synchro flange, ø 58 mm, IP67
- B = synchro flange, ø 58 mm, IP65**
- C = square flange, 63.5 mm, IP67
- D = square flange, 63.5 mm, IP65
- G = Euro flange, 115 mm, IP67¹⁾

b Shaft (ø x L), with flat

- 1 = ø 6 x 10 mm**
- 2 = ø 6,35 x 15,875 mm (1/4" x 5/8")
- 3 = ø 10 x 20 mm**
- 4 = ø 9,5 x 15,875 mm (3/8" x 5/8")
- 5 = ø 12 x 20 mm
- 6 = ø 8 x 15mm
- B = ø 11 x 33 mm, with feather key shaft slot²⁾

c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 ... 30 V DC
- 2 = Push-Pull (7272 with inverted signal) / 5 ... 30 V DC
- 4 = RS422 (with inverted signal) / 5 V DC**
- 5 = Push-Pull (with inverted signal) / 10 ... 30 V DC**

d Type of connection

- 1 = axial cable (1 m PVC cable)
- 2 = radial cable (1 m PVC cable)**
- 3 = M12 connector, 8-pin, axial
- 4 = M12 connector, 8-pin, radial**
- 7 = M23 connector, 12-pin, axial
- 8 = M23 connector, 12-pin, radial**
- Y = MIL connector, 10-pin, radial

e Pulse rate

- 1, 5, 10, 12, 36, 100, 200, 250, 256, **360**, 400, 500, **512**, 600, 800, **1000**, **1024**, 1200, 2000, **2048**, **2500**, **3600**, **4096**, **5000**
- (e.g. 100 pulses => 0100)
- Other pulse rates on request

Stock types

8.5000.8358.0200	8.5000.B157.1024
8.5000.8358.0360	8.5000.B157.5000
8.5000.8358.0500	8.5000.8354.1024
8.5000.8358.1000	8.5000.8354.5000
8.5000.8358.5000	

optional on request

- Ex 2/22
- seawater-resistant
- special cable length

1) Only in conjunction with shaft B
 2) Only in conjunction with flange G

Incremental Encoders

Standard, optical	Sendix 5000 / 5020 (Shaft / Hollow shaft)	Push-Pull / RS422
--------------------------	--------------------------------------------------	--------------------------

Order code Hollow shaft	8.5020 Type	<table border="1" style="border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> <td style="padding: 2px 5px;"><u>X</u></td> </tr> <tr> <td style="padding: 2px 5px;">a</td> <td style="padding: 2px 5px;">b</td> <td style="padding: 2px 5px;">c</td> <td style="padding: 2px 5px;">d</td> <td colspan="6"></td> <td style="padding: 2px 5px;">e</td> </tr> </table>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	a	b	c	d							e	<p>If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.</p>	
<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>																
a	b	c	d							e															
a Flange	c Output circuit / Power supply	e Pulse rate																							
1 = with torque stop, IP67 <u>2 = with torque stop, IP65</u> 3 = with fastening arm, IP67 4 = with fastening arm, IP65 7 = with stator coupling, ø 65 mm, IP67 <u>8 = with stator coupling, ø 65 mm, IP65</u> C = with stator coupling, ø 63 mm, IP67 <u>D = with stator coupling, ø 63 mm, IP65</u>	1 = RS422 (with inverted signal) / 5 ... 30 V DC 2 = Push-Pull (7272 with inverted signal) / 5 ... 30 V DC <u>4 = RS422 (with inverted signal) / 5 V DC</u> <u>5 = Push-Pull (with inverted signal) / 10 ... 30 V DC</u>	1, 5, 10, 12, 36, 100, 200, 250, 256, <u>360</u> , 400, 500, <u>512</u> , 600, 800, <u>1000</u> , <u>1024</u> , 1200, 2000, <u>2048</u> , <u>2500</u> , <u>3600</u> , <u>4096</u> , <u>5000</u> (e.g. 100 pulses => 0100) Other pulse rates on request																							
b Hollow shaft	d Type of connection	Stock types																							
1 = ø 6 mm 2 = ø 6.35 mm (1/4") <u>3 = ø 10 mm</u> 4 = ø 9.52 mm (3/8") <u>5 = ø 12 mm</u> 6 = ø 12.75 mm (1/2") 7 = ø 15.875 mm (5/8") <u>8 = ø 15 mm</u> <u>9 = ø 8 mm</u> A = ø 14 mm	1 = radial cable (1 m PVC cable) <u>2 = M12 connector, 8-pin, radial</u> <u>4 = M23 connector, 12-pin, radial</u> 7 = MIL connector, 10-pin, radial <u>E = tangential cable outlet (1 m PVC cable)</u> H = tangential cable outlet (0.3 m PVC cable, including M12 connector for central fastening)	8.5020.2351.1000 8.5020.2351.2500 8.5020.2551.0500 8.5020.8552.1024 8.5020.8552.5000																							
		<i>optional on request</i> - Ex 2/22 - seawater-resistant - special cable length																							

Mounting accessory for shaft encoders

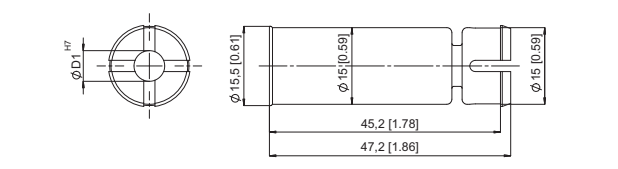
Coupling	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
--------------------------------------------------	--	--------------------	-------------------------

Isolation / adapter inserts for hollow shaft encoders

Thermal and electrical isolation of the encoders (Temperature range -40 ... +115°C)
Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder.



Tip:
By using these adapter inserts you can achieve six different hollow shaft diameters, all on the basis of one encoder with 15 mm hollow shaft.

D1	Isolation insert	
6 mm [0.24"]		8.0010.4021.0000
6.35 mm [0.25"]		8.0010.4022.0000
8 mm [0.32"]		8.0010.4020.0000
9.53 mm [0.38"]		8.0010.4024.0000
10 mm [0.39"]		8.0010.4023.0000
12 mm [0.47"]		8.0010.4025.0000
12.7 mm [0.50"]		8.0010.4026.0000

Connection Technology

Connector, self-assembly	M12	05.CMB-8181-0
	M23	8.0000.5012.0000
	MIL	8.0000.5062.0000
Cordset, pre-assembled with 2 m PVC cable	M12	05.WAKS8-2/P00
	M23	8.0000.6201.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Incremental Encoders

Standard, optical	Sendix 5000 / 5020 (Shaft / Hollow shaft)	Push-Pull / RS422
--------------------------	--------------------------------------------------	--------------------------

Mechanical characteristics			
Max. Speed	IP65	12 000 min ⁻¹ 6 000 min ⁻¹ (continuous)	Weight ca. 0.4 kg
	IP67	6 000 min ⁻¹ 3 000 min ⁻¹ (continuous)	
Rotor moment of inertia	shaft version	approx. 1.8 x 10 ⁻⁶ kgm ²	Protection to EN 60529 without shaft seal IP 65 with shaft seal IP 67
	hollow shaft version	approx. 6 x 10 ⁻⁶ kgm ²	
Starting torque	IP65	< 0.01 Nm	EX approval for hazardous areas optional Zone 2 and 22
	IP67	< 0.05 Nm	
Shaft load capacity	radial	80 N	Working temperature range -40°C ¹⁾ ... +85°C
	axial	40 N	
			Materials shaft stainless steel
			Shock resistance acc. to EN 60068-2-27 2500 m/s ² , 6 ms
			Vibration resistance acc. to EN 60068-2-6 100 m/s ² , 10 ... 2000 Hz

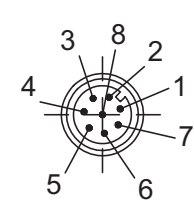
Electrical characteristics				
Output circuit	RS422 (TTL compatible)	RS422 (TTL compatible)	Push-Pull	Push-Pull (7272)
Supply voltage	5 ... 30 V DC	5 V ±5%	10 ... 30 V DC	5 ... 30 V DC
Power consumption with inverted signal (no load)	typ. 40 mA / max. 90 mA	typ. 40 mA / max. 90 mA	typ. 50 mA / max. 100 mA	typ. 50 mA / max. 100 mA
Permissible load / channel	max. ±20 mA	max. ±20 mA	max. ±20 mA	max. ±20 mA
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz ²⁾
Signal level	high	min. 2.5 V	min. U _B - 1 V	min. U _B - 2.0 V
	low	max. 0.5 V	max. 0.5 V	max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Falling edge time t_f	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs³⁾	yes ⁴⁾	yes ⁴⁾	yes	yes
Reverse connection of the supply voltage	yes	no	yes	no
UL-certified	File 224618			
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to	EU guideline 2002/95/EG			

Terminal assignment

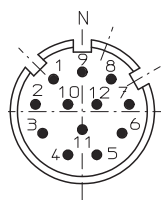
Signal		0 V GND	+U _B	0 V Sens	+U _B Sens	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	shield
M23 connector multifast, 12-pin	Pin:	10	12	11	2	5	6	8	1	3	4	5)
M12 connector eurofast, 8-pin	Pin:	1	2			3	4	5	6	7	8	5)
MIL connector (MS styled), 10-pin	Pin:	F	D		E	A	G	B	H	C	I	J ⁵⁾
Cable	colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

Isolate unused outputs before initial startup

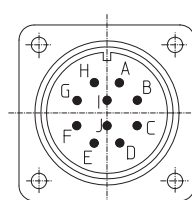
Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin



MIL connector, 10-pin

1) With connector: -40°C, cable fixed: -30°C, cable moved: -20°C
 2) Max. recommended cable length 30 m
 3) If supply voltage correctly applied.

4) Only one channel allowed to be shorted-out:
 If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 - 30 V, short-circuit to channel or 0 V is permitted.
 5) Shield is attached to connector housing.

Incremental Encoders

Standard, optical

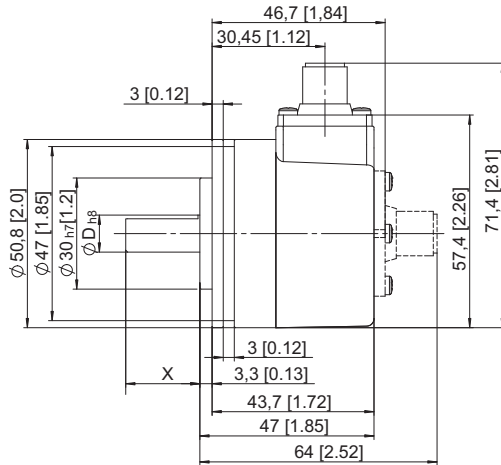
Sendix 5000 / 5020 (Shaft / Hollow shaft)

Push-Pull / RS422

Dimensions shaft version

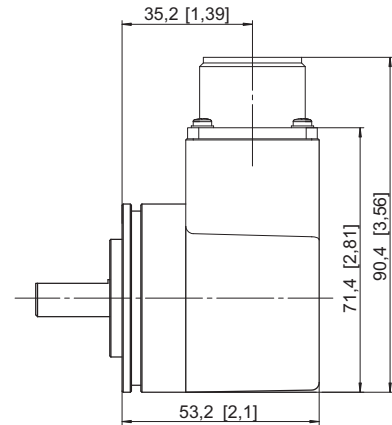
Synchro flange, ø 50,8 mm [2.0"]

Flange type 5 and 6



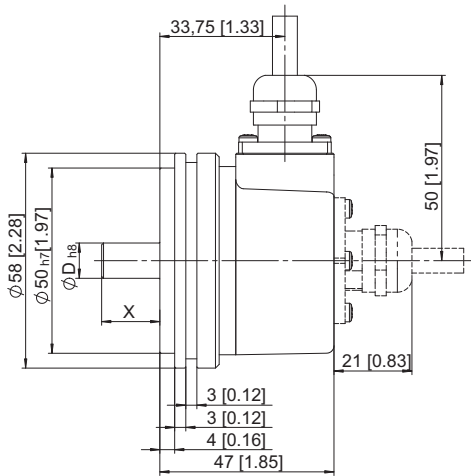
1 M3, 6 [0.24] deep

MIL-connector version



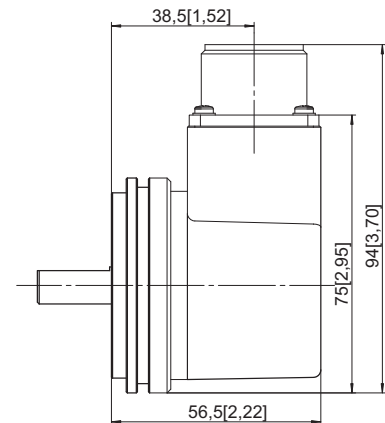
Synchro flange, ø 50.8 mm [2.0"]

Flange type A and B



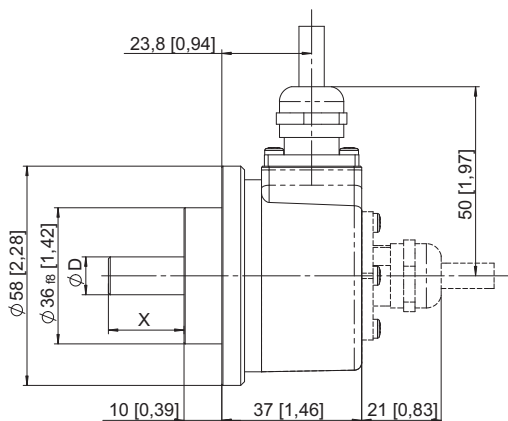
1 M3, 6 [0.24] deep

MIL-connector version



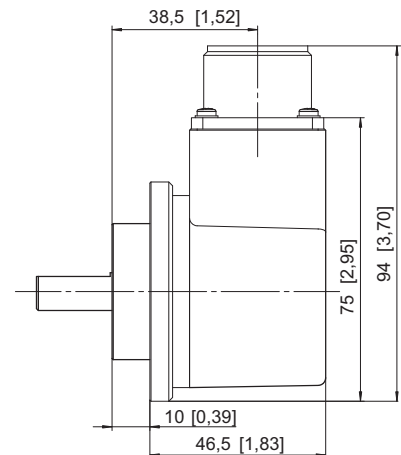
Clamping flange, ø 50.8 mm [2.0"]

Flange type 7 and 8



1 M3, 6 [0.24] deep

MIL-connector version



Incremental Encoders

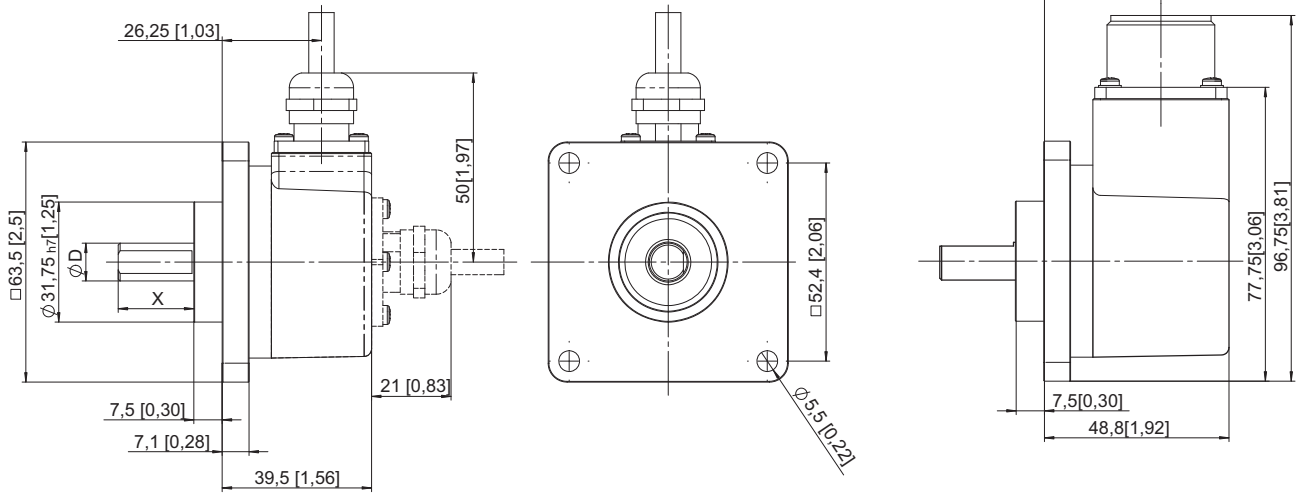
Standard, optical **Sendix 5000 / 5020 (Shaft / Hollow shaft)** **Push-Pull / RS422**

Dimensions shaft version

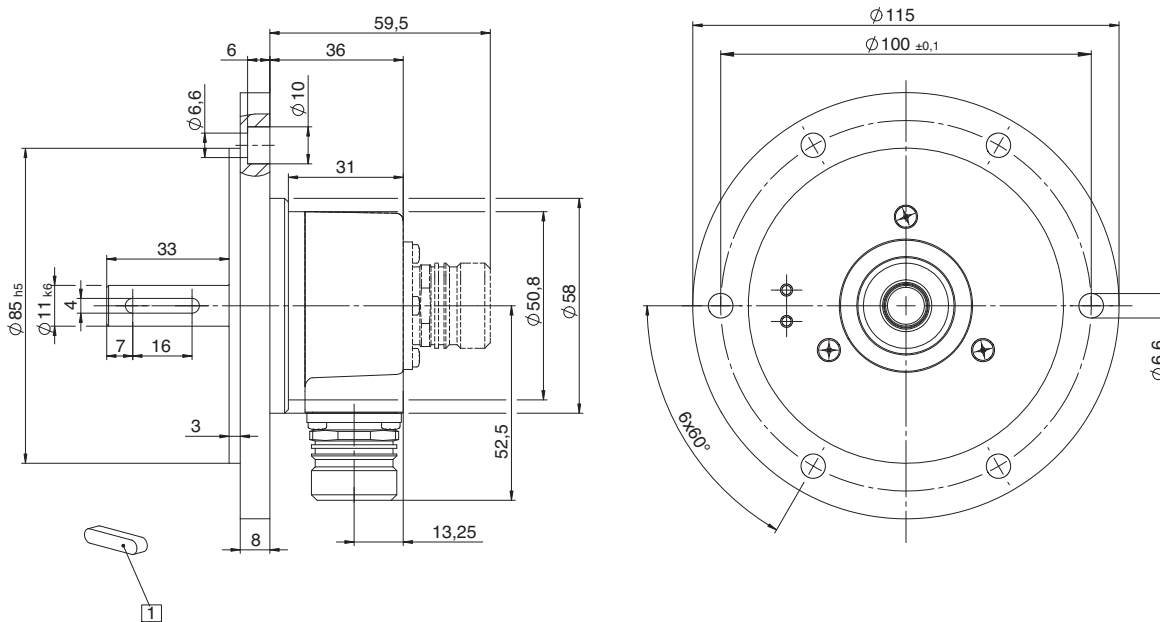
Rectangular flange, $\square 63.5$ mm [2.5"]

Flange type C and D

MIL-contractor version



Euro flange, $\varnothing 115$ mm
Flange type G



1 215342 Set attached

Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
We recommend the use of suitable couplings (see Accessories section).

Incremental Encoders

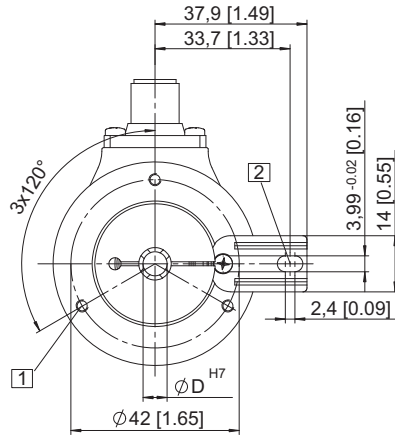
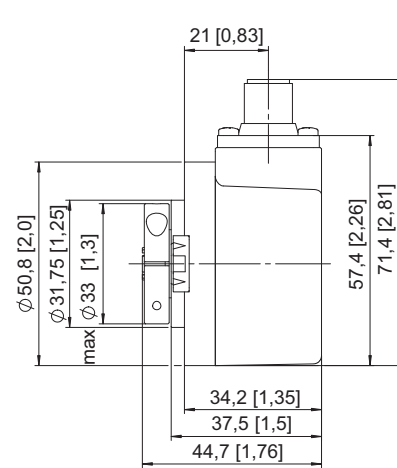
Standard, optical

Sendix 5000 / 5020 (Shaft / Hollow shaft)

Push-Pull / RS422

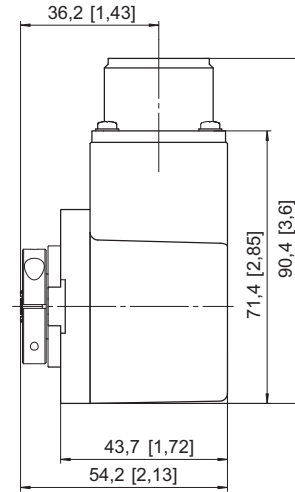
Dimensions hollow shaft version

Flange with long torque stop, \varnothing 50.8 mm [2.0"]
Flange type 1 and 2



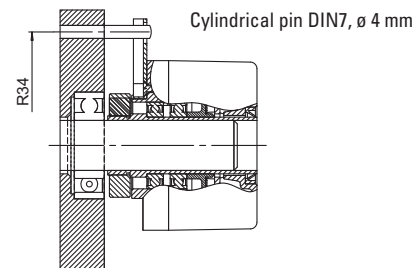
- 1 M3, 6 [0.24] deep
- 2 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm

MIL-connector version



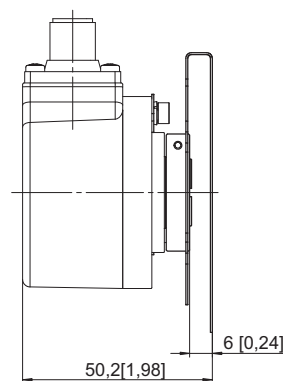
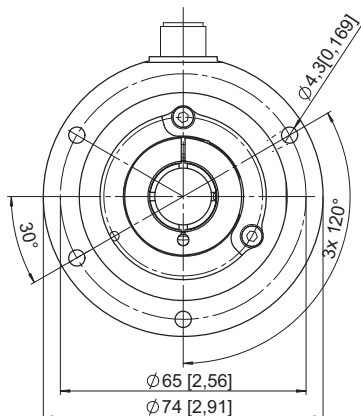
Mounting advice

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
We recommend the use of suitable couplings (see Accessories section).



Flange with stator coupling
Flange type 7 and 8

Pitch circle 65 mm

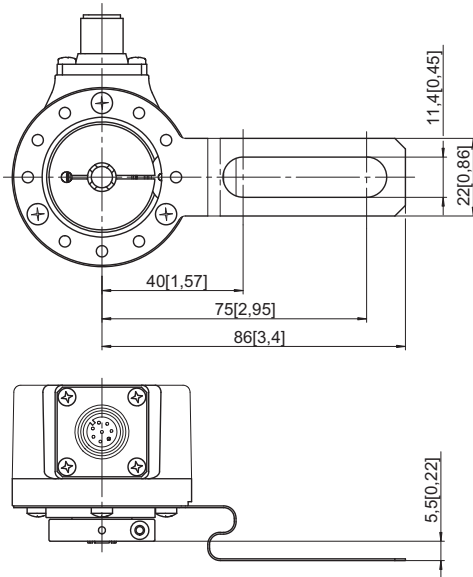


Incremental Encoders

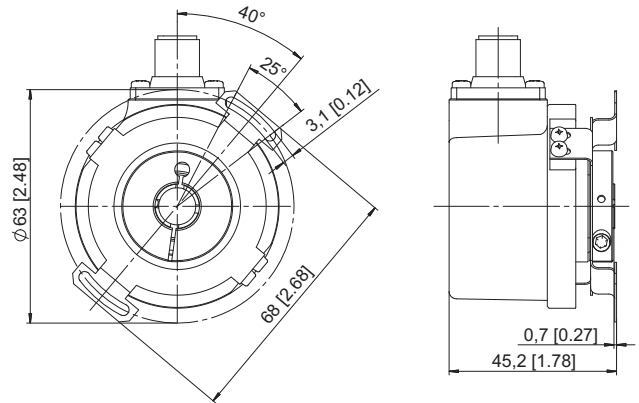
Standard, optical **Sendix 5000 / 5020 (Shaft / Hollow shaft)** **Push-Pull / RS422**

Dimensions hollow shaft version

Flange with fastening arm, long
Flange type 3 and 4

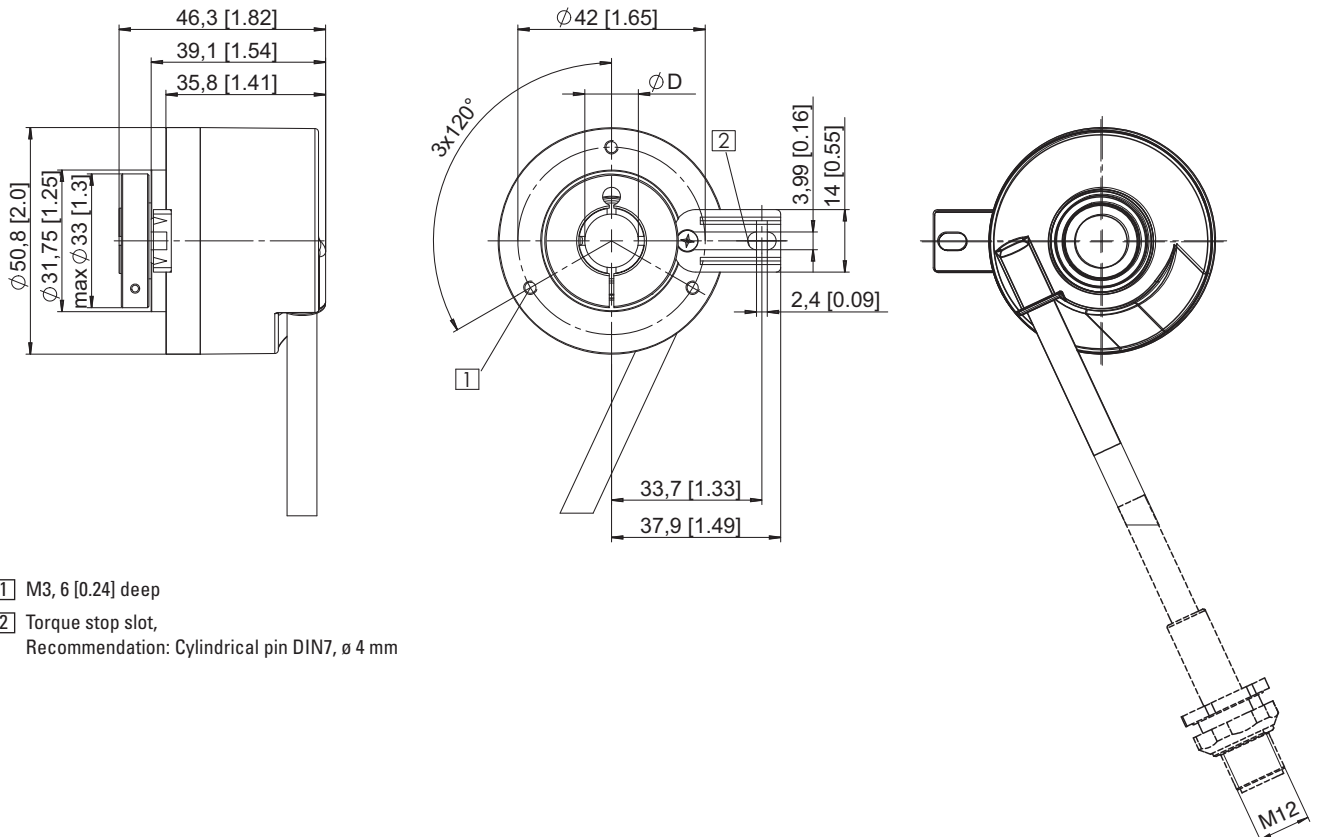


Flange with stator coupling, double-winged, ϕ 63 mm
Flange type C and D



Incremental Encoders

Flange with long torque stop and tangential cable outlet
Type of connection E



- 1 M3, 6 [0.24] deep
- 2 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ϕ 4 mm

Incremental Encoders

High temperature, optical

5803 / 5823 (Shaft / Hollow shaft)

Push-Pull / RS422



The incremental encoders of the high temperature series 5803 / 5823 can be used at up to max. 110°C.

The high heat resistance – at the same time as high speed – make these encoders the ideal solution for all applications in a high temperature environment.



High rotational speed



Temperature



High IP value



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Reverse polarity protection



Optical sensor

Powerful

- Can be used at temperatures of up to max. 110°C
- High resolution up to 5000 PPR
- Maximum speed of 12000 RPM

Flexible

- Various connection types for different application purposes
- Shaft or hollow shaft version
- With push-pull or RS422 interface

Order code Shaft version

8.5803 . XXXX . XXXX
Type a b c d e

a Flange

- 1 = clamping flange \varnothing 58 mm
- 2 = synchro flange \varnothing 58 mm
- M = square flange 63.5 mm (2.5")
- P = synchro flange \varnothing 63.5 mm (2.5")

b Shaft ($\varnothing \times L$), with flat

- 1 = \varnothing 6 x 10 mm
- 2 = \varnothing 10 x 20 mm
- P = \varnothing 9,5 x 22,2 mm (7/8" x 3/8")¹⁾

c Output circuit / Power supply

- 4 = RS422 (with inverted signal) / 5 V DC
- 5 = RS422 (with inverted signal) / 10 ... 30 V DC
- 6 = Push-Pull (with inverted signal) / 10 ... 30 V DC
- 7 = Push-Pull (without inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = axial cable (1 m TPE cable)
- 2 = radial cable (1 m TPE cable)
- 3 = M23 connector, 12-pin, axial, without mating connector
- 5 = M23 connector, 12-pin radial, without mating connector
- W = 7-pin connector radial, „MIL“ specified without mating connector²⁾
- Y = 10-pin connector, „MIL“ specified without mating connector

e Pulse rate

- 25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000
- (e.g. 100 pulses => 0100)
- Other pulse rates on request

Order code Hollow shaft

8.5823 . XXXX . XXXX
Type a b c d e

a Flange

- 1 = with through shaft
- 2 = with blind hollow shaft³⁾
- 3 = with through shaft and stator coupling
- 4 = with blind hollow shaft³⁾ and stator coupling

b Shaft ($\varnothing \times L$)

- 1 = \varnothing 6 mm without seal
- 2 = \varnothing 6 mm with seal
- 3 = \varnothing 8 mm without seal
- 4 = \varnothing 8 mm with seal
- 5 = \varnothing 10 mm without seal
- 6 = \varnothing 10 mm with seal
- 7 = \varnothing 12 mm without seal
- 8 = \varnothing 12 mm with seal

c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 V DC
- 2 = Push-Pull (without inverted signal) / 10 ... 30 V DC
- 3 = Push-Pull (with inverted signal) / 10 ... 30 V DC
- 4 = RS422 (with inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = radial cable (1 m TPE cable)
- 2 = M23 connector, 12-pin, radial, without mating connector

e Pulse rate

- 25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000
- (e.g. 100 pulses => 0100)
- Other pulse rates on request

1) Only in conjunction with flange M or P
2) Only with output 7

3) Insertion depth \leq 30 mm

Incremental Encoders

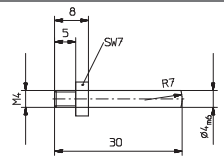
High temperature, optical	5803 / 5823 (Shaft / Hollow shaft)	Push-Pull / RS422
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Mounting accessory for shaft encoders

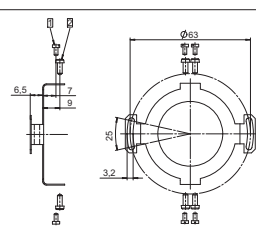
Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling \varnothing 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops	With fixing thread	8.0010.4700.0000
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Stator coupling		8.0010.4D00.0000
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Connection Technology

Connector, self-assembly	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Speed	shaft	max. 12000 min ⁻¹
	hollow shaft without shaft seal	max. 12000 min ⁻¹
	hollow shaft with shaft seal ¹⁾	max. 6000 min ⁻¹
Rotor moment of inertia	shaft	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft	approx. 6.0 x 10 ⁻⁶ kgm ²
Starting torque	without seal	< 0.01 Nm
	with seal	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg
Protection acc. to EN 60 529	shaft	IP65
	hollow shaft without seal	IP40
	hollow shaft with seal	IP66
Working temperature range	without seal	-20°C ... +105°C
	with seal	-20°C ... +90°C
Materials	shaft	stainless steel H7
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz

Electrical characteristics		
Output circuit:	RS422 (TTL compatible)	Push-Pull
Power supply	5 V (\pm 5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)		
	without inverted signal	typ. 55 mA / max. 125 mA
	with inverted signal	typ. 40 mA / max. 100 mA
Permissible load / channel	max. \pm 20 mA	max. \pm 30 mA
Pulse frequency	max. 300 kHz	max. 300 kHz
Signal level	high	min. 2.5 V
	low	max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 1 μ s
Falling edge time t_f	max. 200 ns	max. 1 μ s
Short circuit proof outputs ²⁾	yes ³⁾	yes
Reverse connection of the supply voltage	no; 10 ... 30 V: yes	yes
CE compliant acc. to EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3		

1) For continuous operation max. 3000 min⁻¹, ventilated
 2) If supply voltage correctly applied.
 3) Only one channel allowed to be shorted-out:
 If U_B= 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
 If U_B= 5 - 30 V, short-circuit to channel or 0 V is permitted.

Incremental Encoders

Incremental Encoders

High temperature, optical

5803 / 5823 (Shaft / Hollow shaft)

Push-Pull / RS422

Terminal assignment

Signal		0 V	0 V Sensor ²⁾	+U _B	+U _B Sensor ²⁾	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	shield
M23 connector, 12-pin	Pin	10	11	12	2	5	6	8	1	3	4	PH ¹⁾
MIL connector, 7-pin	Pin	F	–	D	E	A	–	B	–	C	–	G
MIL connector, 10-pin	Pin	F	–	D	E	A	G	B	H	C	I	J
Cable colour		WH 0.5 mm ²	WH	BN 0.5 mm ²	BN	GN	YE	GY	PK	BU	RD	

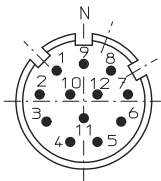
- 1) PH = Shield is attached to connector housing
 2) The sensor cables are connected to the supply voltage internally. If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

If the circuits are not being used, then they should be individually isolated and not connected.

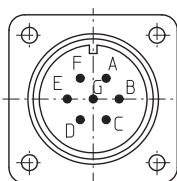
Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial start-up.

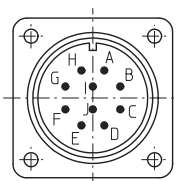
Top view of mating side, male contact base



M23 connector, 12-pin



MIL connector, 7-pin

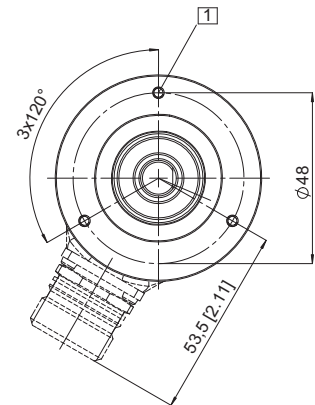
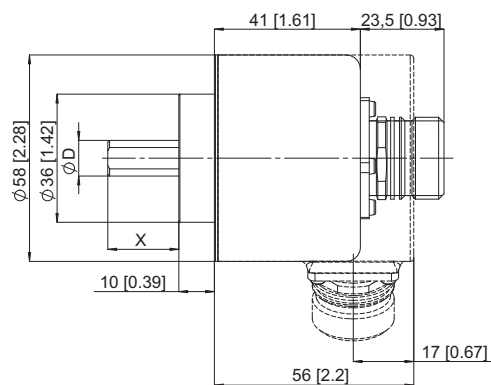


MIL connector, 10-pin

Dimensions shaft version

**Clamping flange, ø 58 mm
Flange type 1**

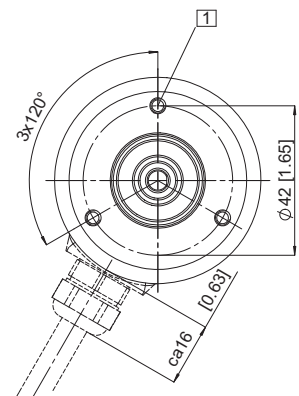
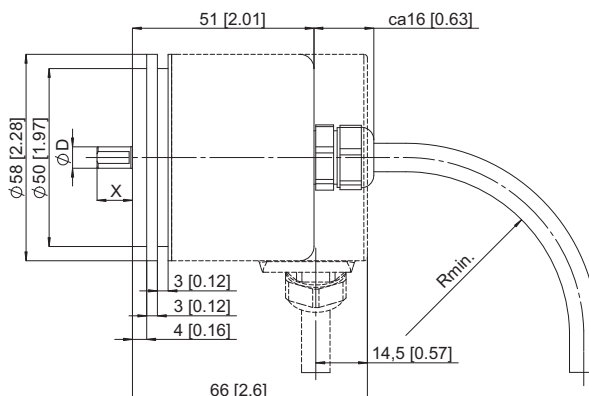
1 3 x M3, 5 [0.2] deep



**Clamping flange, ø 58 mm
Flange type 2**

1 3 x M3, 5 [0.2] deep

R_{min}:
 - securely installed: 55 mm
 - flexibly installed: 70 mm



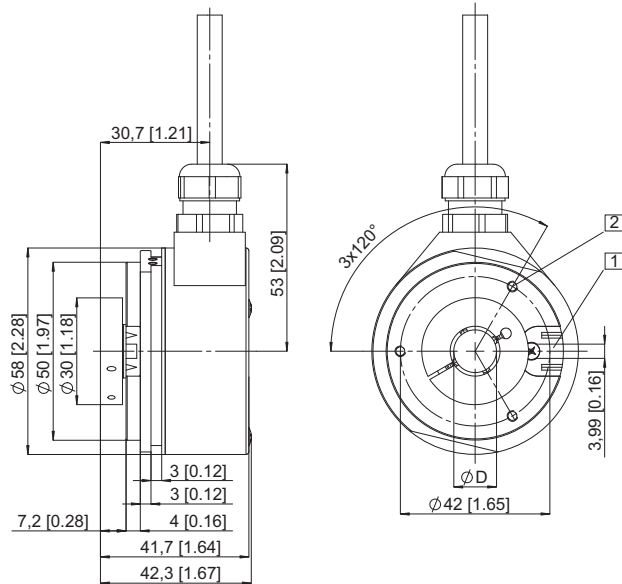
Incremental Encoders

High temperature, optical	5803 / 5823 (Shaft / Hollow shaft)	Push-Pull / RS422
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Dimensions hollow shaft version

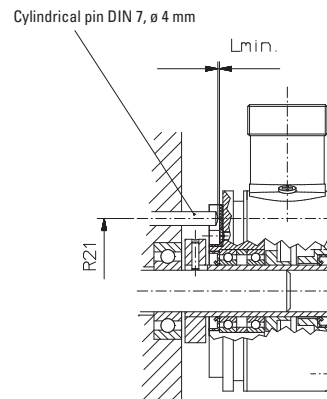
Flange type 1 and 2

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ϕ 4 mm
- 2 M3, 5 [0.2] deep

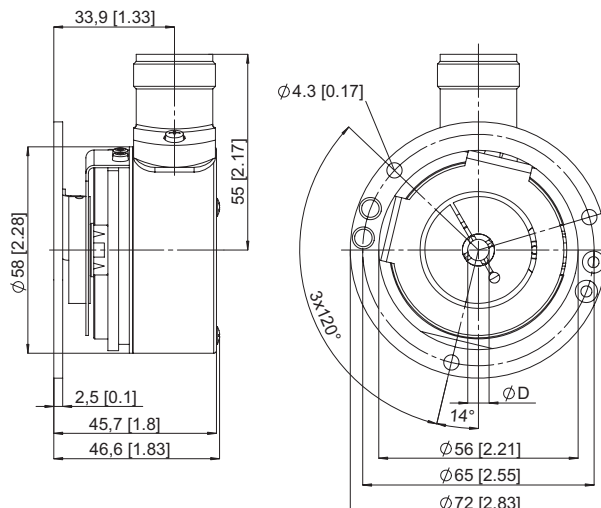


Mounting advice:

- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.
- 2) When mounting a hollow shaft encoder, we recommend using a torque stop pin that fits into the torque stop slot or a stator coupling.
- 3) When mounting the encoder ensure the dimension L_{min} is greater than the axial maximum play of the drive. Otherwise there is a danger that the device could mechanically seize up.



Flange type 3 and 4



Note:
Minimum insertion depth $1.5 \times D_{\text{hollow shaft}}$

Incremental Encoders

Sine wave outputs, optical

5804 / 5824 (Shaft / Hollow shaft)

SinCos



The incremental encoders type 5804 / 5824 offer a SinCos interface.

They are ideal for use in drive engineering.



High rotational speed



Temperature
-20° + 85°



High IP value



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Optical sensor

High performance

- High resolution up to 5000 PPR
- Maximum speed up to 12000 RPM
- High IP protection up to max. IP66

Adaptable

- Shaft or hollow shaft version
- With cable or connector

Order code

Shaft version

8.5804 . XXXXX . XXXX
Type a b c d e

a Flange

- 1 = clamping flange \varnothing 58 mm
- 2 = synchro flange \varnothing 58 mm

b Shaft ($\varnothing \times L$), with flat

- 1 = \varnothing 6 x 10 mm
- 2 = \varnothing 10 x 20 mm

c Output circuit / Power supply

- 1 = SinCos, 1 Vss (inverted signal) / 5 V DC
- 2 = SinCos, 1 Vss (inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = axial cable (1 m TPE cable)
- 2 = radial cable (1 m TPE cable)
- 3 = M23 connector, 12-pin, axial, without mating connector
- 5 = M23 connector, 12-pin, radial, without mating connector

e Pulse rate

- 25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000
- (e.g. 100 pulses => 0100)
- Other pulse rates on request

Order code

Hollow shaft

8.5824 . XXXXX . XXXX
Type a b c d e

a Flange

- 1 = with through shaft
- 2 = with blind hollow shaft ¹⁾
- 3 = with through shaft and stator coupling
- 4 = with blind hollow shaft ¹⁾ and stator coupling

b Hollow shaft

- 1 = \varnothing 6 mm without seal
- 2 = \varnothing 6 mm with seal
- 3 = \varnothing 8 mm without seal
- 4 = \varnothing 8 mm with seal
- 5 = \varnothing 10 mm without seal
- 6 = \varnothing 10 mm with seal
- 7 = \varnothing 12 mm without seal
- 8 = \varnothing 12 mm with seal

c Output circuit / Power supply

- 1 = SinCos, 1 Vss (inverted signal) / 5 V DC
- 2 = SinCos, 1 Vss (inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = radial cable (1 m TPE cable)
- 2 = M23 connector, 12-pin, radial, without mating connector

e Pulse rate

- 25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000
- (e.g. 100 pulses => 0100)
- Other pulse rates on request

1) Insertion depth \leq 30 mm

Incremental Encoders

Sine wave outputs, optical	5804 / 5824 (Shaft / Hollow shaft)	SinCos
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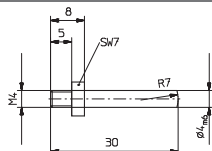
Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling \varnothing 19 mm for shaft 10 mm	8.0000.1101.1010

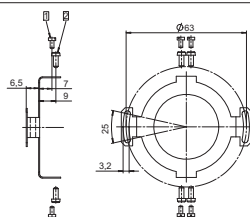
Mounting accessory for hollow shaft encoders

Cylindrical pin, long	With fixing thread	8.0010.4700.0000
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for torque stops



Stator coupling		8.0010.4D00.0000
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Connection Technology

Connector, self-assembly	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Speed	shaft	max. 12000 min ⁻¹
	hollow shaft without shaft seal	max. 12000 min ⁻¹
	hollow shaft with shaft seal ¹⁾	max. 6000 min ⁻¹
Rotor moment of inertia	shaft	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft	approx. 6.0 x 10 ⁻⁶ kgm ²
Starting torque	without seal	< 0.01 Nm
	with seal	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg
Protection acc. to EN 60 529	shaft	IP65
	hollow shaft without seal	IP40
	hollow shaft with seal	IP66
Working temperature range	without seal	-20°C ... +85°C ²⁾
	with seal	-20°C ... +80°C ²⁾
Materials	shaft	stainless steel H7
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz

Electrical characteristics		
Output circuit	SinCos, U = 1 V _{ss}	SinCos, U = 1 V _{ss}
Power supply	5 V (±5%)	10 ... 30 V DC
Power consumption with inverted signal (no load)	typ. 65 mA / max. 110 mA	typ. 65 mA / max. 110 mA
-3 dB frequency	≤ 180 kHz	≤ 180 kHz
Signal level	channels A/B	1 V _{ss} (±20%)
	channel 0	0.1 ... 1.2 V
		0.1 ... 1.2 V
Short circuit proof outputs ³⁾	yes	yes
Reverse connection of the supply voltage	no	yes
CE compliant acc. to EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3		

1) For continuous operation max. 3000 min⁻¹, ventilated
2) 70°C for cable version
3) If supply voltage correctly applied.

Incremental Encoders

Sine wave outputs, optical		5804 / 5824 (Shaft / Hollow shaft)					SinCos					
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Terminal assignment

Signal		0 V	0 V Sensor ²⁾	+U _B	+U _B Sensor ²⁾	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	shield
12-pin connector	Pin	10	11	12	2	5	6	8	1	3	4	PH ¹⁾
Cable colour		WH 0.5 mm ²	WH	BN 0.5 mm ²	BN	GN	YE	GY	PK	BU	RD	

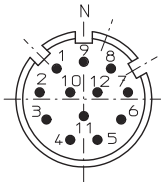
- 1) PH = Shield is attached to connector housing
- 2) The sensor cables are connected to the supply voltage internally. If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

If the circuits are not being used, then they should be individually isolated and not connected.

Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial start-up.

Top view of mating side, male contact base

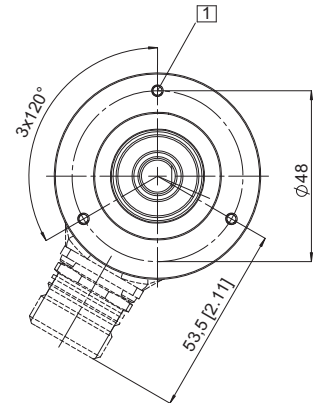
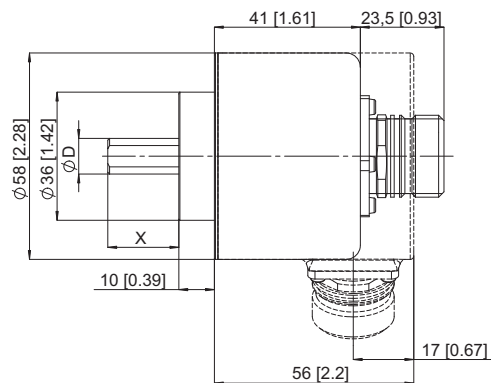


12-pin connector

Dimensions shaft version

Clamping flange, ø 58 mm
Flange type 1

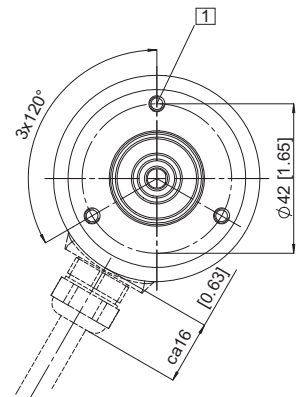
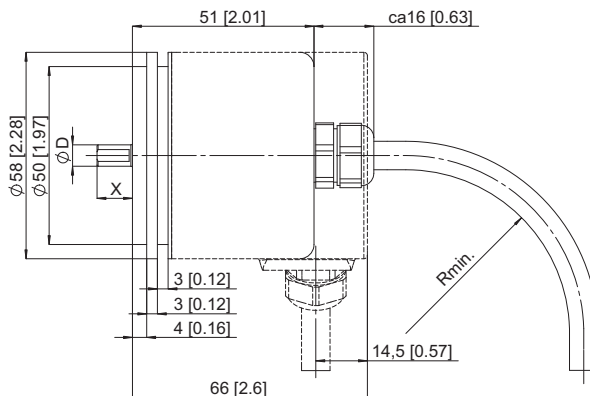
1) 3 x M3, 5 [0.2] deep



Clamping flange, ø 58 mm
Flange type 2

1) 3 x M3, 5 [0.2] deep

R_{min}:-
- securely installed: 55 mm
- flexibly installed: 70 mm



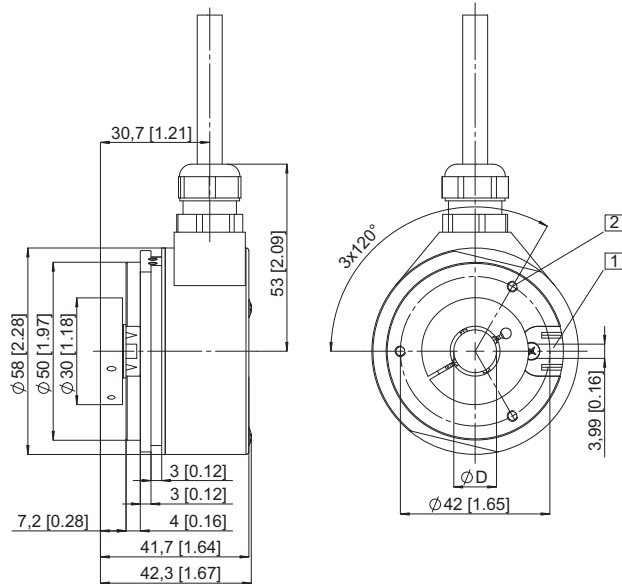
Incremental Encoders

Sine wave outputs, optical	5804 / 5824 (Shaft / Hollow shaft)	SinCos
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Dimensions hollow shaft version

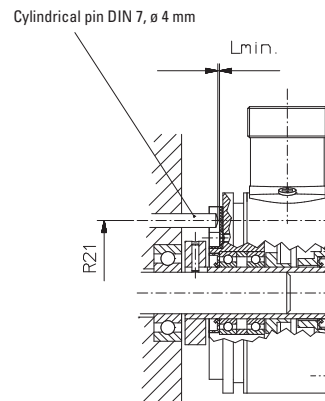
Flange type 1 and 2

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 M3, 5 [0.2] deep

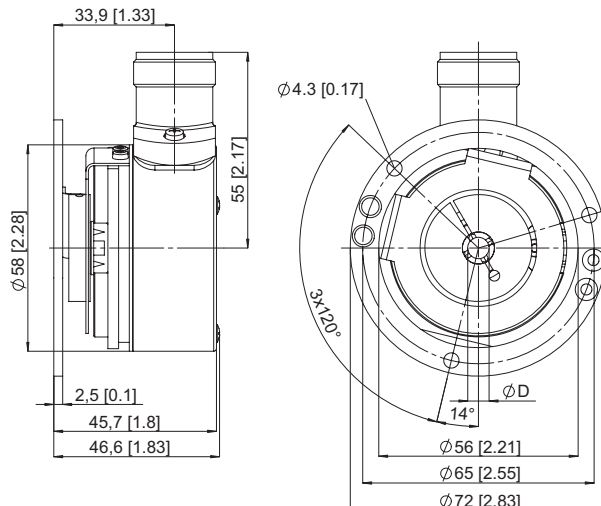


Mounting advice:

- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.
- 2) When mounting a hollow shaft encoder, we recommend using a torque stop pin that fits into the torque coupling.
- 3) When mounting the encoder ensure the dimension L_{min} is greater than the axial maximum play of the drive. Otherwise there is a danger that the device could mechanically seize up.



Flange type 3 and 4



Note:
Minimum insertion depth $1.5 \times D_{\text{hollow shaft}}$

Incremental Encoders

High resolution, optical

5805 / 5825 (Shaft / Hollow shaft)

Push-Pull / RS422



The incremental encoders type 5805 / 5825 offer resolutions up to max. 36000 PPR.

They are thus perfect for use in applications where a very high level of accuracy is required.



High rotational speed



Temperature
-20° + 85°



High IP value



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Optical sensor

High performance

- High shaft loading capability
- Maximum speed up to 12000 RPM
- High IP protection up to max. IP66

Many variants

- With RS422 or push-pull interface
- With cable or connector

Order code

8.5805

. XXXXX . XXXXX

Shaft version

Type

a b c d e

a Flange

- 1 = clamping flange \varnothing 58 mm
- 2 = synchro flange \varnothing 58 mm

b Shaft ($\varnothing \times L$), with flat

- 1 = \varnothing 6 x 10 mm
- 2 = \varnothing 10 x 20 mm

c Output circuit / Power supply

- 4 = RS422 (with inverted signal) / 5 V DC
- 5 = RS422 (with inverted signal) / 10 ... 30 V DC
- 6 = Push-Pull (with inverted signal) / 10 ... 30 V DC
- 7 = Push-Pull (without inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = axial cable (1 m TPE cable)
- 2 = radial cable (1 m TPE cable)
- 3 = M23 connector, 12-pin, axial, without mating connector
- 5 = M23 connector, 12-pin, radial, without mating connector

e Pulse rate

- 6000, 7200, 8000, 8192, 9000, 10000, 18000, 36000 (e.g. 18000 pulses => 18000)
- Other pulse rates on request

Order code

8.5825

. XXXXX . XXXXX

Hollow shaft

Type

a b c d e

a Flange

- 1 = with through shaft
- 2 = with blind hollow shaft ¹⁾
- 3 = with through shaft and stator coupling
- 4 = with blind hollow shaft ¹⁾ and stator coupling

b Hollow shaft

- 1 = \varnothing 6 mm without seal
- 2 = \varnothing 6 mm with seal
- 3 = \varnothing 8 mm without seal
- 4 = \varnothing 8 mm with seal
- 5 = \varnothing 10 mm without seal
- 6 = \varnothing 10 mm with seal
- 7 = \varnothing 12 mm without seal
- 8 = \varnothing 12 mm with seal

c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 V DC
- 2 = Push-Pull (without inverted signal) / 10 ... 30 V DC
- 3 = Push-Pull (with inverted signal) / 10 ... 30 V DC
- 4 = RS422 (with inverted signal) / 10 ... 30 V DC

d Type of connection

- 1 = radial cable (1 m TPE cable)
- 2 = M23 connector, 12-pin, radial, without mating connector

e Pulse rate

- 6000, 7200, 8000, 8192, 9000, 10000, 18000, 36000 (e.g. 18000 pulses => 18000)
- Other pulse rates on request

¹⁾ Insertion depth \leq 30 mm

Incremental Encoders

High resolution, optical	5805 / 5825 (Shaft / Hollow shaft)	Push-Pull / RS422
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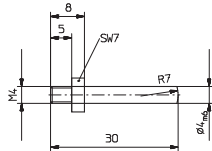
Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling \varnothing 19 mm for shaft 10 mm	8.0000.1101.1010

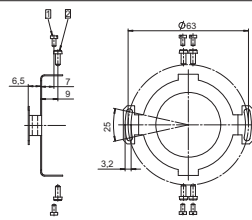
Mounting accessory for hollow shaft encoders

Cylindrical pin, long	With fixing thread	8.0010.4700.0000
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for torque stops



coupling		8.0010.4D00.0000
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Connection Technology

Connector, self-assembly	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Speed	shaft	max. 12000 min ⁻¹
	hollow shaft without shaft seal	max. 12000 min ⁻¹
	hollow shaft with shaft seal ¹⁾	max. 6000 min ⁻¹
Rotor moment of inertia	shaft	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft	approx. 6.0 x 10 ⁻⁶ kgm ²
Starting torque	without seal	< 0.01 Nm
	with seal	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg
Protection acc. to EN 60 529	shaft	IP65
	hollow shaft without seal	IP40
	hollow shaft with seal	IP66
Working temperature range	without seal	-20°C ... +85°C
	with seal	-20°C ... +80°C
Materials	shaft	stainless steel H7
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10 ... 2000 Hz

Electrical characteristics		
Output circuit	RS422 (TTL compatible)	Push-Pull
Power supply	5 V (±5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)		
	without inverted signal	typ. 90 mA / max. 135 mA
	with inverted signal	typ. 70 mA / max. 120 mA
Permissible load / channel	max. ±20 mA	max. ±30 mA
Pulse frequency	max. 800 kHz	max. 600 kHz
Signal level	high	min. 2.5 V
	low	max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 1 μs
Falling edge time t_f	max. 200 ns	max. 1 μs
Short circuit proof outputs ²⁾	yes ³⁾	yes
Reverse connection of the supply voltage	nein; 10 ... 30 V: yes	yes
CE compliant acc. to EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3		

1) For continuous operation max. 3000 min⁻¹, ventilated
2) If supply voltage correctly applied

3) Only one channel allowed to be shorted-out
If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
If U_B = 5 - 30 V, short-circuit to channel or 0 V is permitted.

Incremental Encoders

High resolution, optical

5805 / 5825 (Shaft / Hollow shaft)

Push-Pull / RS422

Terminal assignment

Signal	0 V	0 V Sensor ²⁾	+U _B	+U _B Sensor ²⁾	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	shield
M23 connector, 12-pin	Pin 10	Pin 11	Pin 12	Pin 2	Pin 5	Pin 6	Pin 8	Pin 1	Pin 3	Pin 4	PH ¹⁾
Cable colour (5805)	WH 0.5 mm ²	WH	BN 0.5 mm ²	BN	GN	YE	GY	PK	BU	RD	
Cable colour (5825)	WH	GY/PK	BN	BU/RD	GN	YE	GY	PK	BU	RD	

1) PH = Shield is attached to connector housing

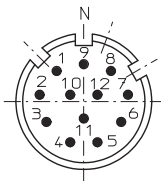
2) The sensor cables are connected to the supply voltage internally if long feeder cables are involved they can be used to adjust or control the voltage at the encoder

If the circuits are not being used, then they should be individually isolated and not connected.

Using RS422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial start-up.

Top view of mating side, male contact base

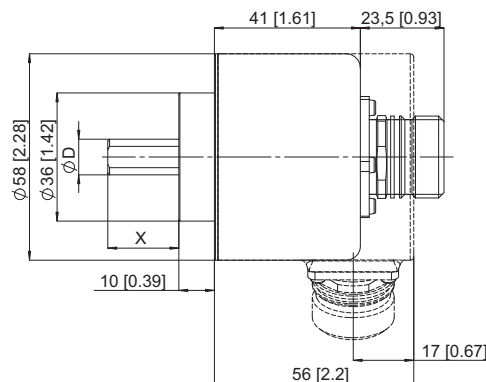


12-pin connector

Dimensions shaft version

**Clamping flange, ø 58
Flange type 1**

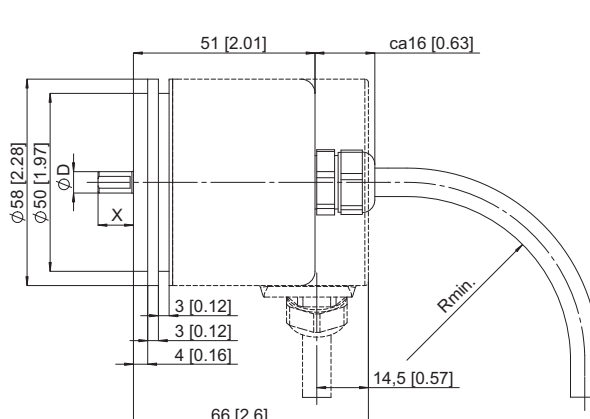
1) 3 x M3, 5 [0.2] deep



**Clamping flange, ø 58 mm
Flange type 2**

1) 3 x M3, 5 [0.2] deep

Rmin.:
- securely installed: 55 mm
- flexibly installed: 70 mm



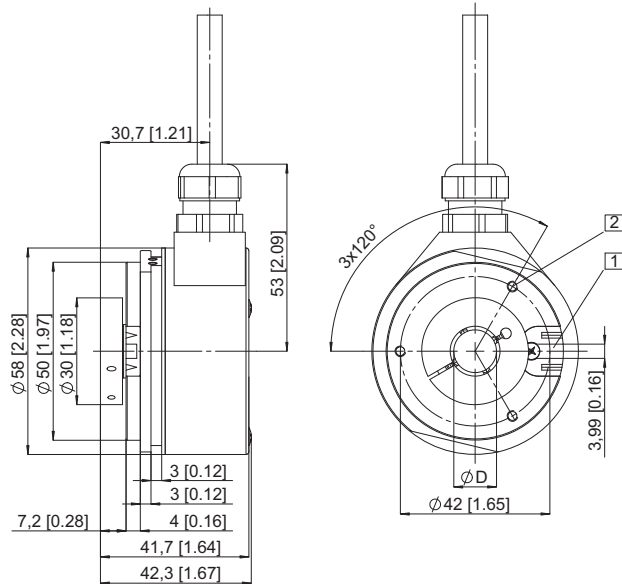
Incremental Encoders

High resolution, optical	5805 / 5825 (Shaft / Hollow shaft)	Push-Pull / RS422
---------------------------------	-------------------------------------------	--------------------------

Dimensions hollow shaft version

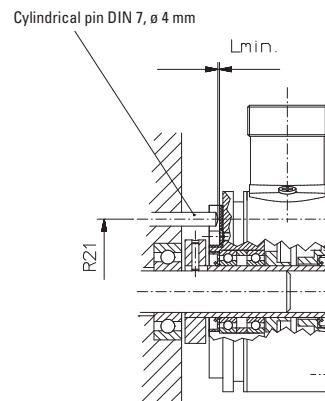
Flange type 1 and 2

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 M3, 5 [0.2] deep

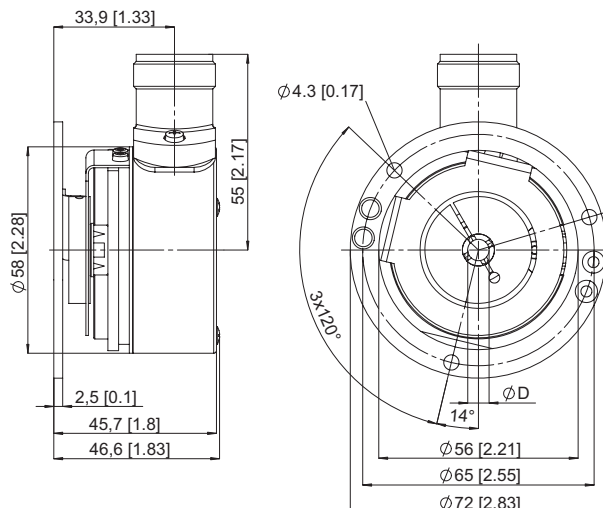


Mounting advice:

- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.
- 2) When mounting a hollow shaft encoder, we recommend using a torque stop pin that fits into the torque stop slot or a stator coupling.
- 3) When mounting the encoder ensure the dimension L_{min} is greater than the axial maximum play of the drive. Otherwise there is a danger that the device could mechanically seize up.



Flange type 3 and 4



Note:

Minimum insertion depth $1.5 \times D_{\text{hollow shaft}}$

Incremental Encoders

Stainless steel, optical

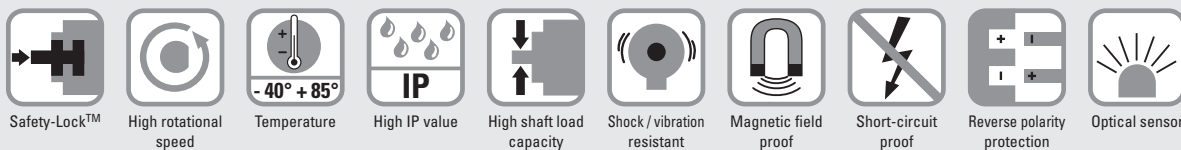
Sendix 5006 (Shaft)

Push-Pull / RS422



The Sendix incremental 5006 in stainless-steel offers optimum material resistance and thus virtually unlimited durability.

The high-grade Viton seals, the IP67 level of protection as well as the wide temperature range additionally ensure impermeability and ruggedness.



Durable and sealed

- Protection rating IP67
- Rugged stainless-steel housing
- Viton seals
- Wide temperature range -40 ... +85°C
- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors

Flexible in use

- Compatible with all common US and European standards,
- Supply voltage 5 ... 30 V DC, various interface options, max. 5000 PPR
- Compact dimensions:
Outer diameter 50 mm, installation depth max. 47 mm

Order code Shaft version

8.5006 . **XXX4** . **XXXX**
Type a b c d e

a Flange

- 7 = clamping flange, metric \varnothing 58 mm
- A = synchro flange, metric \varnothing 58 mm
- C = square flange, 63.5 mm [2.5"]

b Shaft ($\varnothing \times L$), with flat

- 1 = \varnothing 6 mm x 10 mm
- 3 = \varnothing 10 mm x 20 mm
- 8 = \varnothing 9,5 x 22,2 mm (7/8" x 3/8")

c Output circuit / Power supply

- 2 = Push-Pull (7272 with inverted signal) / 5 ... 30 V
- 4 = RS422 (with inverted signal) / 5 V
- 5 = Push-Pull (with inverted signal) / 10 ... 30 V

d Type of connection

- 4 = M12 connector, 8-pin, radial

e Pulse rate

- 360, 512, 1000, 1024, 2000, 2048, 2500, 3600, 4096, 5000 (e.g. 100 pulses => 0100)
- Other pulse rates on request

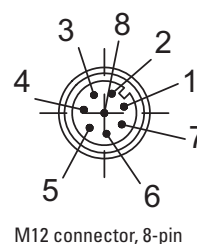
Mechanical characteristics

Speed ¹⁾	max. 6000 min ⁻¹
Rotor moment of inertia	approx. 1.8×10^{-6} kgm ²
Starting torque	< 0.05 Nm
Weight	ca. 0.4 kg
Load capacity of shaft	radial 80 N axial 40 N
Protection acc. to EN 60 529	IP67
EX approval for hazardous areas	optional Zone 2 and 22
Working temperature	-40°C ... +85°C
Materials	housing, flange, shaft stainless steel, 1.4305 connector stainless steel seals Viton
Shock resistance acc. to EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 10...2000 Hz

Terminal assignment

Signal:	0 V GND	+U _B	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	shield
M12 connector, eurofast, 8-pin, Pin	1	2	3	4	5	6	7	8	PH ²⁾

Top view of mating side, male contact base



1) For continuous operation max. 3000 min⁻¹
2) PH = Shield is attached to connector housing

Incremental Encoders

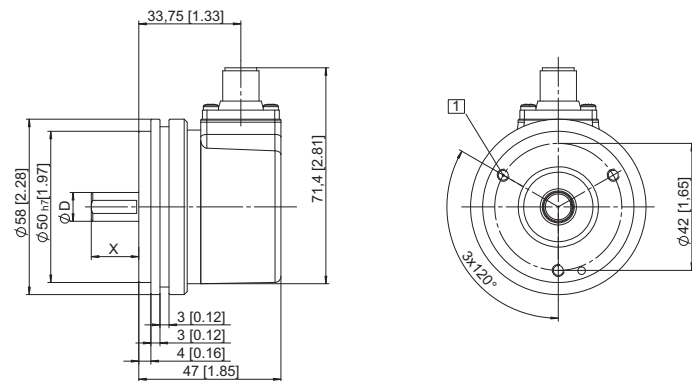
Stainless steel, optical	Sendix 5006 (Shaft)	Push-Pull / RS422
---------------------------------	----------------------------	--------------------------

Electrical characteristics			
Output circuit	RS422 (TTL-compatible)	Push-Pull	Push-Pull (7272)
Supply voltage	5 V ±5%	10 ... 30 V DC	5 ... 30 V DC
Current consumption with inverted signal (no load)	typ. 40 mA / max. 90 mA	typ. 50 mA / max. 100 mA	typ. 50 mA / max. 100 mA
Permissible load/channel	max. ±20 mA	max. ±20 mA	max. ±20 mA
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz
Signal level	high low	min. 2.5 V max. 0.5 V	min. U _B - 1 V max. 0.5 V
Rise time t _r	max. 200 ns	max. 1 μs	max. 1 μs
Fall time t _f	max. 200 ns	max. 1 μs	max. 1 μs
Short circuit proof outputs ¹⁾	yes ²⁾	yes	yes
Reverse connection of the supply voltage	no	yes	no
UL-certified	File 224618		
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

Incremental Encoders

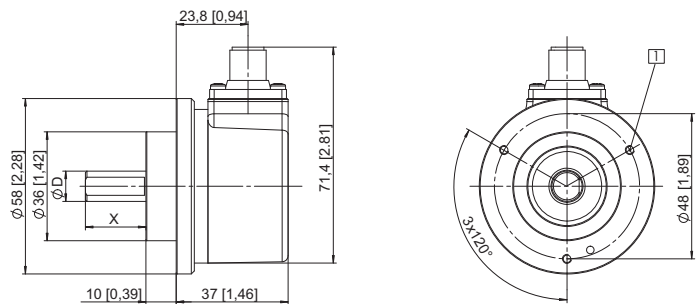
Dimensions

Synchro flange, ø 58 mm
Flange type A



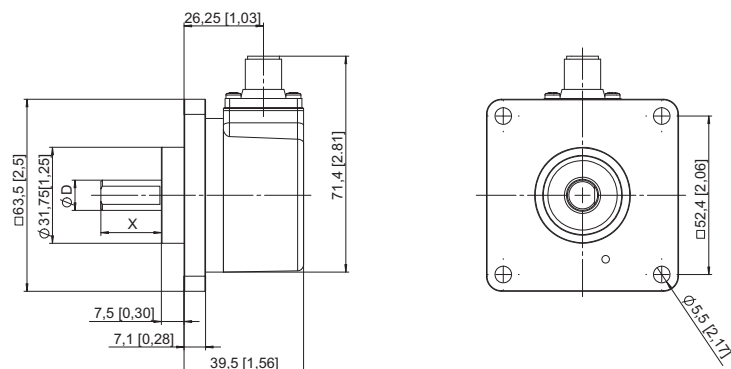
1) 3 x M3, 6 [0.24] deep

Clamping flange, ø 58 mm
Flange type 7



1) M3, 5,5 [0.21] deep

Square flange, □63.5 mm [2.5"]
Flange type C



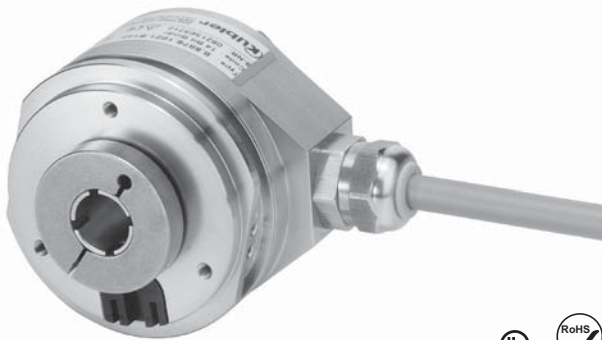
1) If supply voltage correctly applied
 2) Only one channel allowed to be shorted-out:
 If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 - 30 V, short-circuit to channel or 0 V is permitted.

Incremental Encoders

Stainless steel, optical

Sendix 5826 (Hollow shaft)

Push-Pull / RS422



Thanks to their stainless-steel housing, the incremental hollow shaft encoders type 5826 are particularly suitable for those applications that make high demands on the composition and properties of the materials used.

Stainless steel encoders are therefore often used in areas subjected to aggressive cleaning materials, as a result of high hygiene requirements.



High rotational speed



Temperature
-20° + 80°



High IP value



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Optical sensor

Custom-fit

- With cable connection
- Through hollow shaft with 10 mm or 12 mm diameter
- Protection up to IP66

Adaptable

- High resolution up to 5000 PPR
- Numerous connection possibilities, thanks to wide range of interfaces and supply voltages

Order code
Hollow shaft

8.5826 . **1** **X** **X** **1** . **XXXX**
Type **a** **b** **c** **d** **e**

a Flange
1 = with through shaft

b Hollow shaft
6 = ø 10 mm with seal
8 = ø 12 mm with seal

c Output circuit / Power supply
1 = RS422 (with inverted signal) / 5 V DC
2 = Push-Pull (without inverted signal) / 10 ... 30 V DC
3 = Push-Pull (with inverted signal) / 10 ... 30 V DC
4 = RS422 (with inverted signal) / 10 ... 30 V DC
5 = Push-Pull (without inverted signal) / 5 ... 30V DC
6 = Push-Pull (with inverted signal) / 5 ... 30 V DC
7 = RS422 (with inverted signal) / 5 ... 30 V DC

d Type of connection
1 = radial cable (1 m PUR cable)

e Pulse rate
25, 50, 60, 100, 125, 200, 250, 256,
300, 360, 500, 512, 600, 720, 800,
1000, 1024, 1200, 1250, 1500, 2000,
2048, 2500, 3000, 3600, 4000, 4096,
5000
(e.g. 100 pulses => 0100)
Other pulse rates on request

Terminal assignment

Signal	0 V	0 V Sensor ¹⁾	+U _B	+U _B Sensor ¹⁾	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Cable colour	WH	GY PK	BN	BU RD	GN	YE	GY	PK	BU	RD

If the circuits are not being used, then they should be individually isolated and not connected.

Using RS422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial start-up.

1) The sensor cables are connected to the supply voltage internally.
If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

Incremental Encoders

Stainless steel, optical	Sendix 5826 (Hollow shaft)	Push-Pull / RS422
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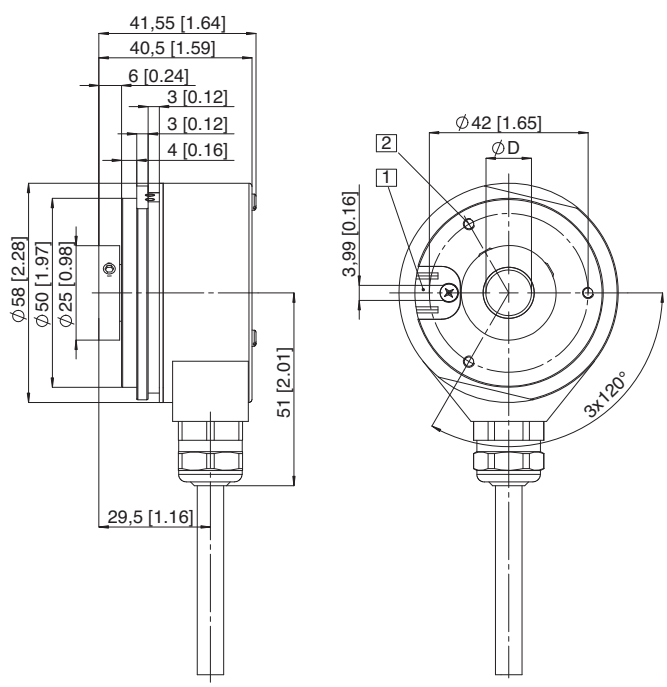
Mechanical characteristics	
Speed	max. 6000 min ⁻¹ 1)
Rotor moment of inertia	approx. 6.0 x 10 ⁻⁶ kgm ²
Starting torque	< 0.05 Nm
Weight	approx. 0.4 kg
Protection acc. to EN 60 529	IP66
Working temperature range	without seal -20°C ... +80°C
Materials	shaft stainless steel
Shock resistance acc. EN 60068-2-27	2000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 10 ... 2000 Hz

Electrical characteristics		
Output circuit	RS422 (TTL-compatible)	Push-Pull
Power supply	5 V (±5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)		
without inverted signal	–	typ. 55 mA / max. 125 mA
with inverted signal	typ. 40 mA / max. 90 mA	typ. 80 mA / max. 150 mA
Permissible load / channel	max. ±20 mA	max. ±30 mA
Pulse frequency	max. 300 kHz	max. 300 kHz
Signal level	high min. 2.5 V low max. 0.5 V	min. U _B - 2.5 V max. 2.0 V
Rising edge time t_r	max. 200 ns	max. 1 µs
Falling edge time t_f	max. 200 ns	max. 1 µs
Short circuit proof outputs 2)	yes 3)	yes
Reverse connection of the supply voltage	no; 10 ... 30 V: yes	yes
CE compliant acc. to	EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3	

Incremental Encoders

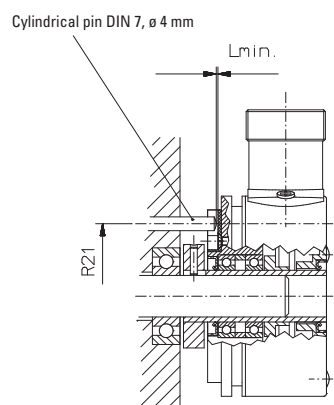
Dimensions

- 1) Torque stop slot, Recommendation: Cylindrical pin DIN7, ø 4 mm
- 2) 3 x M3, 5 [0.2] deep



Mounting advice:

- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.
- 2) When mounting a hollow shaft encoder, we recommend using a torque stop pin that fits into the torque stop slot or a stator coupling.
- 3) When mounting the encoder ensure the dimension L_{min.} is greater than the axial maximum play of the drive. Otherwise there is a danger that the device could mechanically seize up.



1) For continuous operation 3000 min⁻¹, ventilated
 2) If supply voltage correctly applied.
 3) Only one channel allowed to be shorted-out:
 If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 - 30 V, short-circuit to channel or 0 V is permitted.

Incremental Encoders

Large hollow shaft, optical	5821 (Hollow shaft)	Push-Pull / RS422
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Optimised proportions, optimised costs:

With an overall diameter of just 58 millimetres the series 5821 boasts a hollow shaft of up to 28 millimetres diameter

Temperature -20° + 85°	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection

Adaptable

- Through hollow shaft from 16 mm up to 28 mm
- With cable connection or M12 connector
- High resolution up to 5000 PPR

Order code	8.5821	. 1 X X X .	XXXX
Hollow shaft	Type	a b c d	e

<p>a Flange 1 = with spring element</p> <p>b Hollow shaft 3 = ø 28 mm 5 = ø 25 mm 6 = ø 24 mm C = ø 20 mm K = ø 16 mm (other on request)</p>	<p>c Output circuit / Power supply 1 = RS422 (with inverted signal) / 5 V DC 3 = Push-pull (with inverted signal) / 8 ... 30 V DC 4 = RS422 (with inverted signal) / 8 ... 30 V DC</p>	<p>d Type of connection 1 = radial cable (1 m PVC cable) E = M12 connector, 8-pin, radial</p>	<p>e Pulse rate 50, 60, 100, 125, 250, 400, 500, 512, 960, 1000, 1024, 2000, 2048, 5000 (e.g. 100 pulses => 0100)</p> <p>Other pulse rates on request</p>
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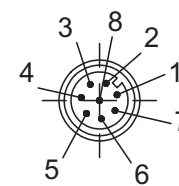
Connection Technology		
Connector, self-assembly (straight)	M12	05.CMB-8181-0
Cordset, pre-assembled with 2 m PVC cable	M12	05.WAKS8-2/P00

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Terminal assignment

Signal:	0 V GND	+U _B	A	\bar{A}	B	\bar{B}	0	$\bar{0}$	shield
M12 connector, eurofast, 8-pin, Pin	1	2	3	4	5	6	7	8	PH ¹⁾
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	shield

Top view of mating side, male contact base



8-pin M12 connector

1) PH = Shield is attached to connector housing

Incremental Encoders

Large hollow shaft, optical **5821 (Hollow shaft)** **Push-Pull / RS422**

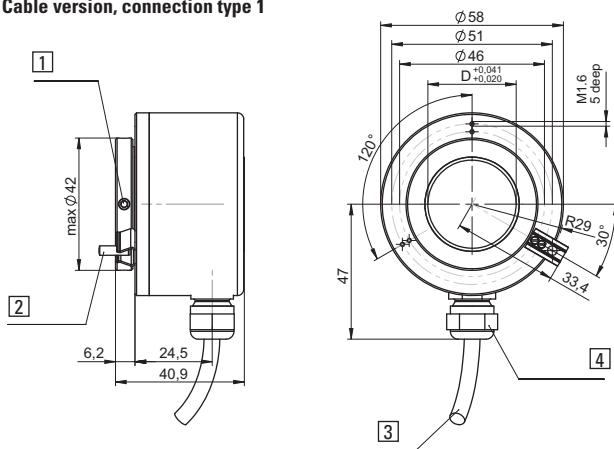
Mechanical characteristics	
Speed	max. 2500 min ⁻¹
Rotor moment of inertia	approx. 3.5 x 10 ⁻⁶ kgm ²
Starting torque	< 0.1 Nm
Weight	approx. 0.4 kg
Protection acc. to EN 60 529	IP64
Working temperature range	
at max. speed 2000 min ⁻¹	-20°C ... +70°C
at max. speed 2500 min ⁻¹	-20°C ... +60°C
Materials	steel
Shock resistance acc. to EN 60068-2-27	1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 35...2000 Hz

Electrical characteristics		
Output circuit	RS 422	Push-Pull (7272)
Supply voltage	5 V ±5% / 8 ... 30 V DC	8 ... 30 V DC
Power consumption with inverted signal (no load)	typ. 40 mA/max. 90 mA	typ. 40 mA/max. 100 mA
Permissible load/channel	max. ±20 mA	max. ±40 mA
Pulse frequency	max. 300 kHz	max. 200 kHz
Signal level	high low	min. 2.5 V max. 0.5 V
Rise time t_r	max. 200 ns	max. 1 µs
Fall time t_f	max. 200 ns	max. 1 µs
Short circuit proof outputs ¹⁾	yes	yes
Reverse connection of the supply voltage	yes	yes
CE compliant acc. to	EN 61000-6-2, EN 55011 Class B	
RoHS compliant acc. to	EU guideline 2002/95/EG	

Incremental Encoders

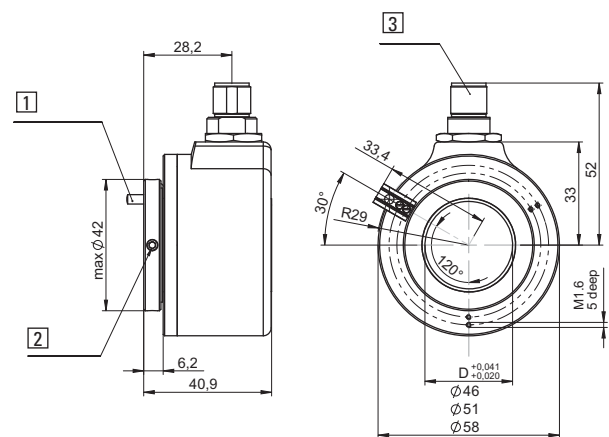
Dimensions

Flange with torque stop, ø 58 mm
Cable version, connection type 1



- 1) 4 x socket set screw M4x6 DIN 913
- 2) Cylindrical pin 3m6x12 DIN 6325 included
- 3) Cable length 2 metres
- 4) Cable gland PG7

M12 connector version, connection type E



- 1) 4 x socket set screw M4x6 DIN 913
- 2) Cylindrical pin 3m6x12 DIN 6325 included
- 3) Connector M12

1) If supply voltage correctly applied.
2) PH = Shield is attached to connector housing

Incremental Encoders

Large hollow shaft, optical	A020 (Hollow shaft)	Push-Pull / RS422 / SinCos
-----------------------------	---------------------	----------------------------



The incremental encoder type A020 with optical sensor technology is available with a through hollow shaft up to max. 42 mm diameter.

With an installation depth of just 43 mm it is optimally suited for mounting on large shafts, even where space is tight.



High rotational speed	High IP value	Shock / vibration resistant	Magnetic field proof	Optical sensor

Compact

- Minimal installation depth but large hollow shaft
- Available with compact M12 connector
- Torque stop can be implemented even with small radius

Flexible

- With Push-Pull, RS422 or SinCos interface
- Hollow shaft from 10 mm up to 42 mm as standard
- With cable connection, M23 or M12 connectors

Order code Hollow shaft

8.A020	.XXXX	.XXXX
Type	a b c d	e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 1 = without mounting aid
- 2 = with short spring element
- 3 = with long spring element**
- 5 = with fastening arm long

b Hollow shaft

- 1 = ø 42 mm
- 2 = ø 38 mm
- 3 = ø 28 mm
- 4 = ø 25.4 mm (1")
- 5 = ø 25 mm**
- 6 = ø 24 mm
- A = ø 30 mm**
- B = ø 40 mm
- C = ø 20 mm

c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 V DC**
- 2 = Push-pull (without inverted signal) / 10 ... 30 V DC
- 3 = Push-pull (with inverted signal) / 10 ... 30 V DC**
- 4 = RS422 (with inverted signal) / 10 ... 30 V DC
- 5 = Push-pull (with inverted signal) / 5 ... 30 V DC
- 8 = SinCos, 1 Vss (with inverted signal) / 5 V DC
- 9 = SinCos, 1 Vss (with inverted signal) / 10 .. 30 V DC
- A = Push-pull 7272 / 5 ... 30 V DC

d Type of connection

- 1 = radial cable (1 m PVC cable)
- 2 = M23 connector, 12-pin, radial, without mating connector**
- E = M12 connector, 8-pin, radial

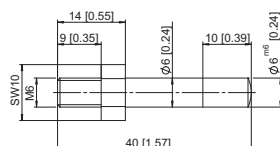
e Pulse rate

- 50, 360, 512, 600, 1000, **1024**, 1500, 2000, **2048**, 2500, 4096, **5000**
- (e.g. 360 pulses => 0360)
- Other pulse rates on request
- SinCos version not available with pulses <1024

Mounting accessory for hollow shaft encoders

Cylindrical pin, long

for torque stops



With fixing thread

8.0010.4700.0003

Connection Technology

Connector, self-assembly

- M12
- M23

05.CMB-8181-0
8.0000.5012.0000

Cordset, pre-assembled with 2 m PVC cable

- M12
- M23

05.WAKS8-2/P00
8.0000.6201.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories. Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Incremental Encoders

Large hollow shaft, optical	A020 (Hollow shaft)	Push-Pull / RS422 / SinCos
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Mechanical characteristics	
Speed	max. 3000 min ⁻¹ 1)
Rotor moment of inertia 2)	< 150 x 10 ⁻⁶ kgm ²
Starting torque with sealing	< 0.2 Nm
Weight	approx. 0.7 kg
Protection acc. to EN 60 529	IP65
Working temperature range	-40°C 3) ... +70°C
Materials	shaft stainless steel H7
Shock resistance acc. EN 60068-2-27	1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 10...2000 Hz

Electrical characteristics SinCos output		
Output circuit	SinCos U = 1 Vss	SinCos U = 1 Vss
Power supply	5 V ±5%	10 ... 30 V DC
Power consumption with inverted signal (no load)	typ. 65 mA/max. 110 mA	typ. 65 mA/max. 110 mA
-3 dB frequency	≤180 kHz	≤180 kHz
Signal level		
channels A/B	1 Vss (±20%)	1 Vss (±20%)
channel 0	0.1 ... 1.2 V	0.1 ... 1.2 V
Short circuit proof outputs 4)	yes	yes
Reverse connection of the supply voltage	no	yes
UL certified	File 224618	
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	
RoHS compliant acc. to	EU guideline 2002/95/EG	

Incremental Encoders

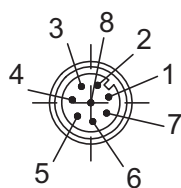
Electrical characteristics			
Output circuit	RS422 (TTL-compatible)	Push-Pull	Push-Pull (7272)
Power supply	5 V (±5 %) o. 10 ... 30 V DC	10 ... 30 V DC	5 ... 30 V DDC
Power consumption (no load)			
without inverted signal	–	typ. 55 mA/max. 125 mA	–
with inverted signal	typ. 40 mA/max. 90 mA	typ. 80 mA/max. 150 mA	typ. 50 mA/max. 100 mA
Permissible load / channel	max. ±20 mA	max. ±30 mA	max. ±20 mA
Pulse frequency	max. 300 kHz	max. 300 kHz	max. 300 kHz3)
Signal level	high min. 2.5 V low max. 0.5 V	min. U _B – 3 V max. 2.5 V	min. U _B – 2.0 V max. 0.5 V
Rising edge time t_r	max. 200 ns	max. 1 μs	max. 1 μs
Falling edge time t_f	max. 200 ns	max. 1 μs	max. 1 μs
Short circuit proof outputs 4)	yes 5)	yes	yes
Reverse connection of the supply voltage	no, 10 ... 30 V: yes	yes	no
UL certified	File 224618		
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

Terminal assignment

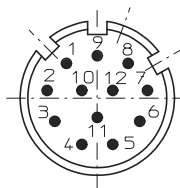
Signal:	0 V GND	+U _B	0 V Sensor	+U _B Sensor	A	\bar{A}	B	\bar{B}	Z	\bar{Z}	shield
M23 connector, multifast, 12-pin, Pin	10	12	11	2	5	6	8	1	3	4	PH 6)
M12 connector, eurofast, 8-pin connector, Pin	1	2			3	4	5	6	7	8	PH 6)
Cable colour	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

Isolate unused outputs before initial start-up.

Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin

1) Short term (app. 15 min. range) up to 3500 min⁻¹
 2) Depending on shaft diameter
 3) With connector: -40°C, securely installed: -30°C, flexibly installed: -20°C
 4) If supply voltage correctly applied.

5) Only one channel allowed to be shorted-out:
 If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 - 30 V, short-circuit to channel or 0 V is permitted.
 6) PH = Shield is attached to connector housing

Incremental Encoders

Large hollow shaft, optical

A020 (Hollow shaft)

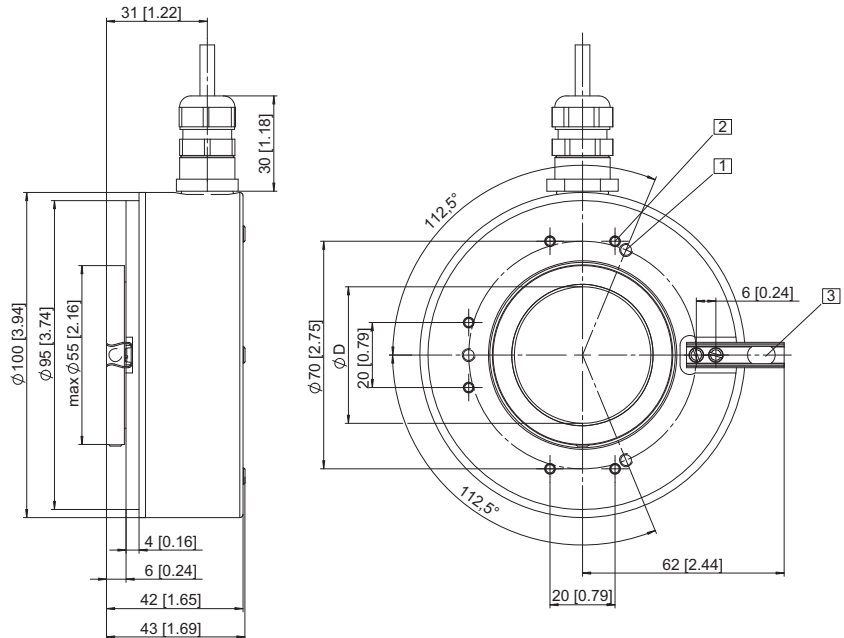
Push-Pull / RS422 / SinCos

Dimensions hollow shaft version

With spring element long

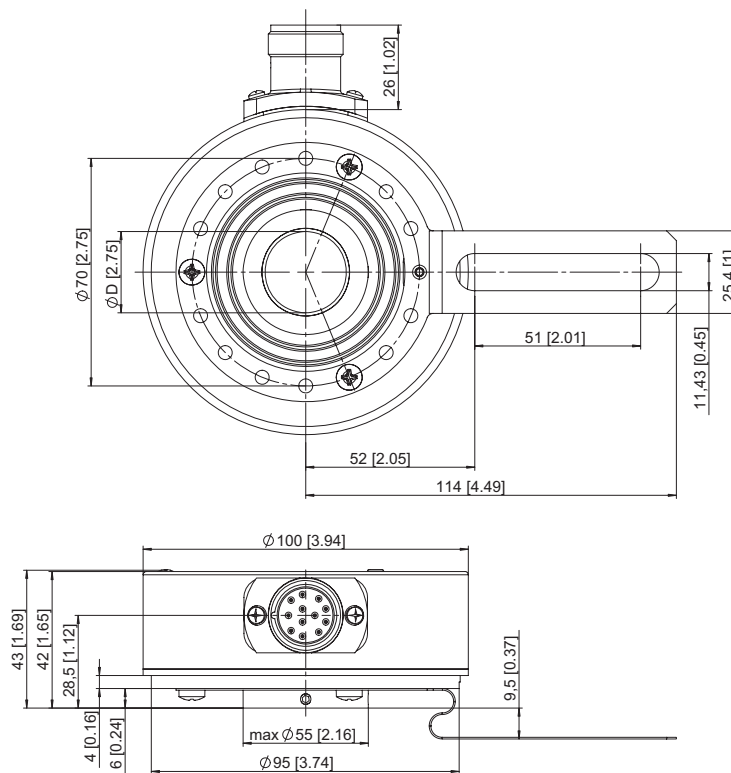
Flange type 3

- 1 3 x M4, 7 [0.28] deep
- 2 6 x M3, 8 [0.31] deep
- 3 Cylindrical pin DIN6325, \varnothing 6 mm



With fastening arm, long

Flange type 5



Note:
Minimum insertion depth $1.5 \times D_{\text{hollow shaft}}$

Incremental Encoders

Large hollow shaft, optical	A02H (Hollow shaft) / Heavy Duty	Push-Pull / RS422 / SinCos
------------------------------------	-----------------------------------------	-----------------------------------



The Heavy Duty incremental encoder type A02H boasts a high degree of ruggedness in a very compact design.

Its special construction makes it perfect for all applications in very harsh environments.



Incremental Encoders

High rotational speed	High IP value	High shaft load capacity	Shock/vibration resistant	Magnetic field proof	Optical sensor

Heavy Duty - Robust

- Special shaft connection with interlocked bearings
- Balanced stainless-steel clamping ring
- Optional isolation inserts available to protect against shaft currents

Compact and versatile

- Only 49 mm installation depth
- With cable connections, M23 or M12 connectors
- With Push-Pull, RS422 or SinCos interface

Order code Shaft / Hollow shaft version

8.A02H	.XXXXX.	XXXX
Type	a b c d	e

a Flange

- 1 = without mounting aid
- 2 = with short spring element
- 3 = with long spring element
- 5 = with fastening arm long

b Hollow shaft

- 1 = ø 42 mm
- 2 = ø 38 mm
- 3 = ø 28 mm
- 4 = ø 25.4 mm (1")
- 5 = ø 25 mm
- 6 = ø 24 mm
- 7 = ø 32 mm
- A = ø 30 mm
- B = ø 40 mm
- C = ø 20 mm
- H = ø 35 mm
- M = ø 19 mm

c Output circuit / Power supply

- 1 = RS422 (with inverted signal) / 5 V DC
- 2 = Push-pull (without inverted signal) / 10 ... 30 V DC
- 3 = Push-pull (with inverted signal) / 10 ... 30 V DC
- 4 = RS422 (with inverted signal) / 10 ... 30 V DC
- 5 = Push-pull (with inverted signal) / 5 ... 30 V DC
- 8 = SinCos, 1 Vss (with inverted signal) / 5 V DC
- 9 = SinCos, 1 Vss (with inverted signal) / 10 .. 30 V DC
- A = Push-pull 7272 / 5 ... 30 V DC

d Type of connection

- 1 = radial cable (1 m PVC cable)
- 2 = M23 connector, 12-pin, radial, without mating connector
- E = M12 connector, 8-pin, radial

e Pulse rate

- 50, 360, 512, 600, 1000, 1024, 1500, 2000, 2048, 2500, 4096, 5000
- (e.g. 360 pulses => 0360)
- Other pulse rates on request

SinCos version not available with pulses <1024

- optional on request
- Ex 2/22
- special cable length

Incremental Encoders

Large hollow shaft, optical

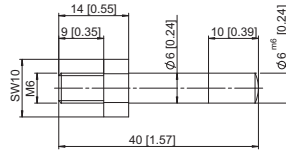
A02H (Hollow shaft) / Heavy Duty

Push-Pull / RS422 / SinCos

Mounting accessory for hollow shaft encoders

Cylindrical pin long

for torque stops



With fixing thread

8.0010.4700.0003

Tether arm large, flexible



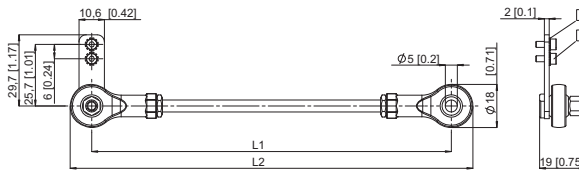
Length L

Length L	L1	L2
70 mm	70 [2.76]	88 [3.46]
100 mm	100 [3.94]	118 [4.65]
150 mm	150 [5.91]	168 [6.61]

8.0010.40S0.0000

8.0010.40T0.0000

8.0010.40U0.0000



1 Socket screw M2.5 x 6

2 Lock washer

Fastening arm, short



8.0010.4T00.0000

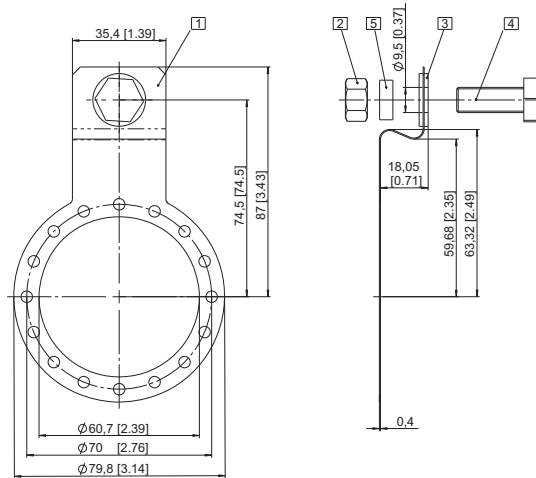
1 Curved spring element

2 Hexagonal nut 3/8 - 16 UNC

3 Washer (isolating)

4 Hexagonal screw 3/8 16 UNC x 1"

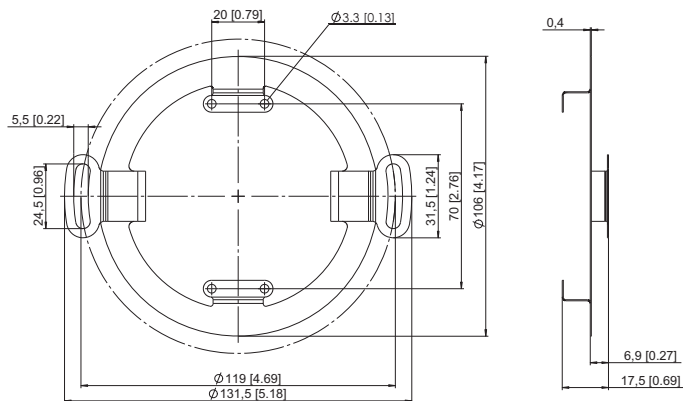
5 Washer D10.4 x 15 x 15



Stator coupling



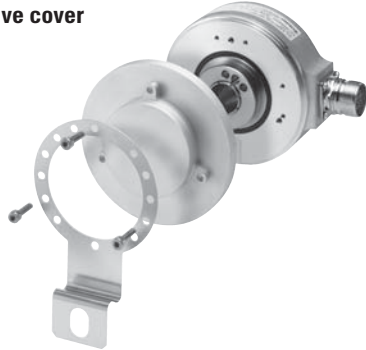
8.0010.40V0.0000



Incremental Encoders

Large hollow shaft, optical **A02H (Hollow shaft) / Heavy Duty** **Push-Pull / RS422 / SinCos**

Protective cover



For applications with a very high degree of pollution, Kübler now offers a protective cover for

- Improved reliability
- Extension of the service life of the encoder

8.0010.40Y0.0001

Scope of delivery:

- Protective cover
- Fastening arm (8.0010.4T00.0000)
- 3 screws for fixing to the encoder

Incremental Encoders

Tapered shaft mounting kit

for A02H with hollow shaft \varnothing 38 mm



For use in upgrading for tapered shaft mounting. Tapered shafts are used for high-precision direct coupling. An isolation insert is also included in the mounting kit; this reliably protects the encoder from shaft currents.

8.0010.4028.0000

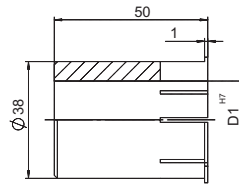
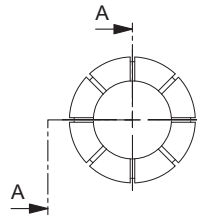
Included in the set:

- Insert for cone blind hole, cone 1:10, 17 mm length
- Isolation insert
- Allen screw for central fixing

Mounting accessory for hollow shaft encoders

Isolation insert for hollow shaft \varnothing 38 mm

(Temperature range -40 ... +115°C)



\varnothing D1:
12 mm
12.7 mm (1/2")
14 mm
15.875 mm
16 mm
18 mm
19.05 mm (3/4")
20 mm
25 mm
25.4 mm
31.75 mm (1 1/4")

Order-no:
8.0010.4091.0000
8.0010.4013.0000
8.0010.4027.0000
8.0010.4070.0000
8.0010.4019.0000
8.0010.4080.0000
8.0010.4090.0000
8.0010.4011.0000
8.0010.4012.0000
8.0010.4050.0000
8.0010.4060.0000

Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC motor and considerably shorten the service life of the encoder bearings. For more details please call our Technical Hotline (+49 7720 3903 92) or send us an email (info@kuebler.com)

Isolation insert for hollow shaft \varnothing 42 mm

External diameter 42 mm / Internal diameter 38 mm

8.0010.4017.0000

Connection Technology

Connector, self-assembly

M12
M23

05.CMB-8181-0
8.0000.5012.0000

Cordset, pre-assembled with 2 m PVC cable

M12
M23

05.WAKS8-2/P00
8.0000.6201.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories. Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Incremental Encoders

Large hollow shaft, optical A02H (Hollow shaft) / Heavy Duty Push-Pull / RS422 / SinCos

Mechanical characteristics		
Speed	at 70°C at 80°C	max. 6000 min ⁻¹ 1) max. 3500 min ⁻¹ 1)
Rotor moment of inertia		< 220 x 10 ⁻⁶ kgm ² 2)
Starting torque with sealing		< 0.2 Nm
Weight		approx. 0.8 kg
Protection acc. to EN 60 529		IP65
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C 3) ... +80°C
Materials	shaft	stainless steel, bore tolerance H7
Shock resistance acc. EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10...2000 Hz

Electrical characteristics SinCos output		
Output circuit	SinCos U = 1 Vss	SinCos U = 1 Vss
Power supply	5 V ±5%	10 ... 30 V DC
Power consumption with inverted signal (no load)	typ. 65 mA/max. 110 mA	typ. 65 mA/max. 110 mA
-3 dB frequency	< 180 kHz	< 180 kHz
Signal level		
channels A/B	1 Vss (±20%)	1 Vss (±20 %)
channel 0:	0.1 ... 1.2 V	0.1 ... 1.2 V
Short circuit proof outputs 4)	yes	yes
Reverse connection of the supply voltage	no	yes
UL certified	File 224618	
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	
RoHS compliant acc. to	EU guideline 2002/95/EG	

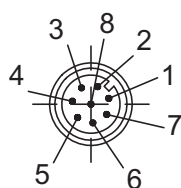
Electrical characteristics				
Output circuit		RS422 (TTL-compatible)	Push-Pull	Push-Pull (7272)
Power supply		5 V (±5 %) o. 10 ... 30 V DC	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)				
	without inverted signal	–	typ. 55 mA/max. 125 mA	–
	with inverted signal	typ. 40 mA/max. 90 mA	typ. 80 mA/max. 150 mA	typ. 50 mA/max. 100 mA
Permissible load / channel		max. ±20 mA	max. ±30 mA	max. ±20 mA
Pulse frequency		max. 300 kHz	max. 300 kHz	max. 300 kHz 5)
Signal level	high low	min. 2.5 V max. 0.5 V	min. U _B - 3 V max. 2.5 V	min. U _B - 2.0 V max. 0.5 V
Rising edge time t _r		max. 200 ns	max. 1 µs	max. 1 µs
Falling edge time t _f		max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs 4)		yes	yes	yes
Reverse connection of the supply voltage		no, 10 ... 30 V: yes	yes	no
UL certified		File 224618		
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
CE compliant acc. to		EU guideline 2002/95/EG		

Terminal assignment

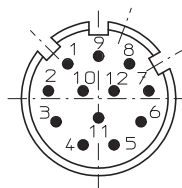
Signal:	0 V GND	+U _B	0 V Sensor	+U _B Sensor	A	\bar{A}	B	\bar{B}	Z	\bar{Z}	shield
M23 connector, multifastr, 12-pin, Pin	10	12	11	2	5	6	8	1	3	4	PH 6)
M12 connector, eurofast, 8-pin, Pin	1	2			3	4	5	6	7	8	PH 6)
Cable colour	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	shield

Isolate unused outputs before initial start-up.

Top view of mating side, male contact base



8-pin M12 connector



12-pin M23 connector

1) During the run-in-phase of approx. 2 hours, reduce the limits for working temperature_{max} or speed max by 1/3.
2) Depending on shaft diameter
3) With connector: -40°C, securely installed: -30°C, flexibly installed: -20°C

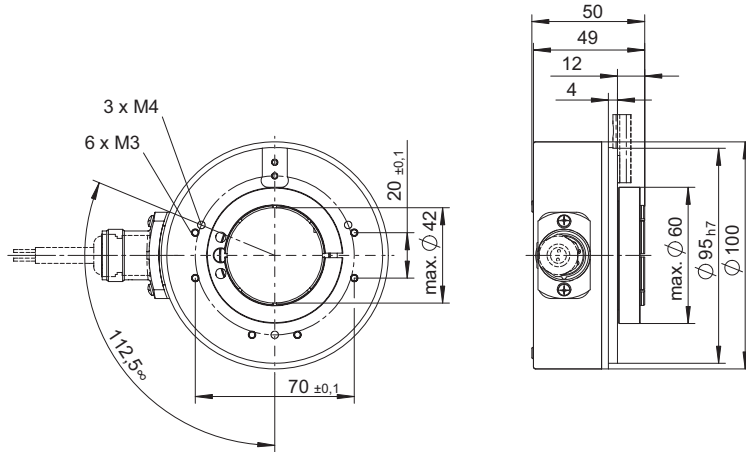
4) If supply voltage correctly applied.
5) Max. recommended cable length 30 m
6) PH = Shield is attached to connector housing

Incremental Encoders

Large hollow shaft, optical	A02H (Hollow shaft) / Heavy Duty	Push-Pull / RS422 / SinCos
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Dimensions hollow shaft version

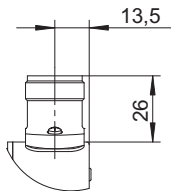
Without mounting aid
Flange type 1



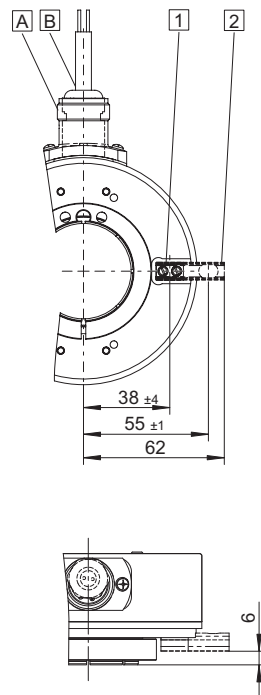
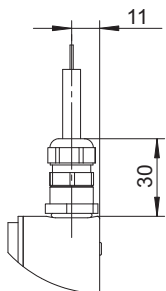
With spring element

- 1 Spring element short (flange type 2)
- 2 Spring element long (flange type 3)

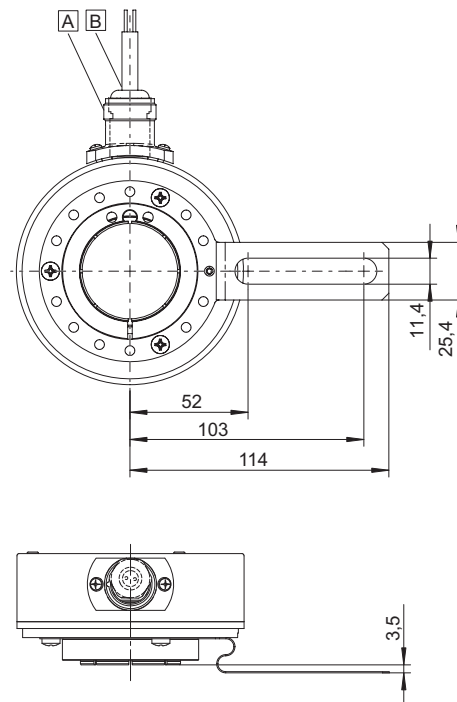
A Plug version



B Cable version

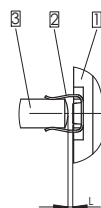


With fastening arm long Flange type 5



Mounting using the spring element - short

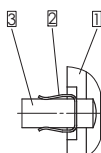
When mounting the encoder, ensure that dim. L is larger than the maximum axial play of the drive in the direction of the arrow.



- 1 Flange
- 2 Spring element - short
- 3 Cylindrical pin

Mounting using the spring element - long

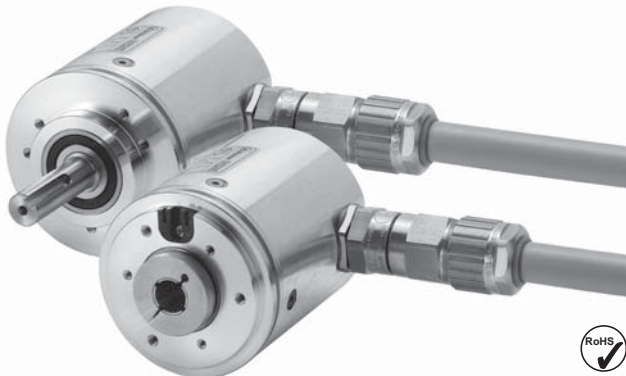
Cylindrical pin fed through the bore of the spring



- 1 Flange
- 2 Spring element - long
- 3 Cylindrical pin

Incremental Encoders

ATEX, optical	7030 (Shaft)	Push-Pull / RS422
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The incremental encoders type 7030 with optical sensor technology offer Ex protection in a compact 70 mm housing.

These encoders in shaft or hollow shaft version with their flameproof enclosure are optimally suited for use in hazardous areas.



Ex approval	High rotational speed	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Optical sensor

Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:

Compact

- Can be used even when space is tight
- Installation depth only 94 mm, diameter 70 mm (hollow shaft version)

Order code Shaft / Hollow shaft version

8.7030	.XX	X2	.XXXX
Type	a	b c	d

- | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange and hollow shaft or shaft</p> <p>14 = synchro flange with through hollow shaft \varnothing 12 mm</p> <p>25 = clamping flange with shaft \varnothing 12 mm</p> <p>26 = clamping flange with shaft \varnothing 12 mm and mounted flange adapter</p> <p>27 = stator coupling with through hollow shaft 12 mm</p> | <p>c Output circuit / Power supply</p> <p>1 = RS422 (with inverted signal) / 5 V</p> <p>2 = Push-Pull (without inverted signal) / 10 ... 30 V</p> <p>3 = Push-Pull (with inverted signal) / 10 ... 30 V</p> <p>4 = RS422 (with inverted signal) / 10 ... 30 V</p> <p>c Type of connection</p> <p>2 = radial cable (2 m PVC cable)</p> <p>other cable lengths on request</p> | <p>d Pulse rate</p> <p>25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000</p> <p>(e.g. 250 pulses => 0250)</p> <p>Other pulse rates on request</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Mechanical characteristics	
Speed	max. 6000 min ⁻¹
Rotor moment of inertia	approx. 15 x 10 ⁻⁶ kgm ²
Starting torque	< 0.05 Nm
Load capacity of shaft	radial 80 N axial 40 N
Weight	approx. 1.2 kg
Protection acc. to EN 60 529	IP65
EX approval for hazardous areas	ATEX, Explosion proof zone 1, 2 and 21, 22 Category (gas) Category (dust)
Working temperature range	-20°C ... +60°C
Materials	shaft stainless steel
Shock resistance acc. EN 60068-2-27	1000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 35...2000 Hz

Electrical characteristics			
Output circuit	RS422	Push-Pull (7272)	
Power supply	5 V \pm 5% / 10 ... 30 V DC	10 ... 30 V DC	
Power consumption (no load)	without inverted signal – typ. 55 mA/max. 125 mA with inverted signal typ. 40 mA/max. 90 mA typ. 80 mA/max. 150 mA		
Permissible load / channel	max. \pm 20 mA	max. \pm 30 mA	
Pulse frequency	max. 300 kHz	max. 300 kHz	
Signal level	high min. 2.5 V low max. 0.5 V	min U _B - 2.5 V max. 2.0 V	
Rising edge time t _r	max. 200 ns	max. 1 s	
Falling edge time t _f	max. 200 ns	max. 1 s	
Short circuit proof outputs ¹⁾	yes ²⁾	yes	
Reverse connection of the supply voltage	no	yes	
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

1) If supply voltage correctly applied.
 2) Only one channel allowed to be shorted-out:
 If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 - 30 V, short-circuit to channel or 0 V is permitted.

Incremental Encoders

ATEX, optical	7030 (Shaft)	Push-Pull / RS422
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Terminal assignment

Signal	0 V	0 V Sensor ²⁾	+U _B	+U _B Sensor ²⁾	A	Ā	B	B̄	0	0̄	shield
Cable colour	WH	GY PK	BN	BU RD	GN	YE	GY	PK	BU	RD	PH ¹⁾

- 1) PH = Shield is attached to connector housing
- 2) The sensor cables are connected to the supply voltage internally. If long feeder cables are involved they can be used to adjust or control the voltage at the encoder.

If the circuits are not being used, then they should be individually isolated and not connected.

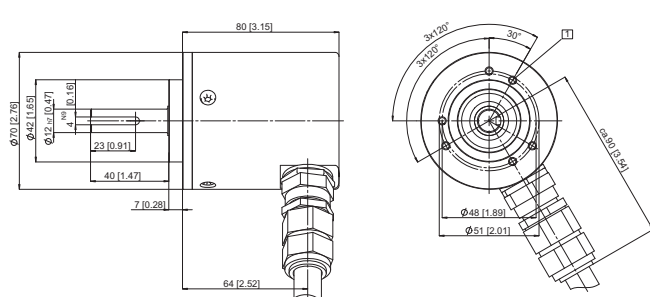
Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial start-up.

Incremental Encoders

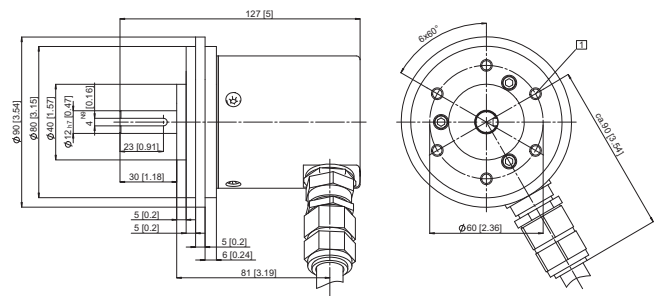
Dimensions shaft version

Clamping flange with shaft ø 12 mm



1 6 x M6, 12 [0.47] deep

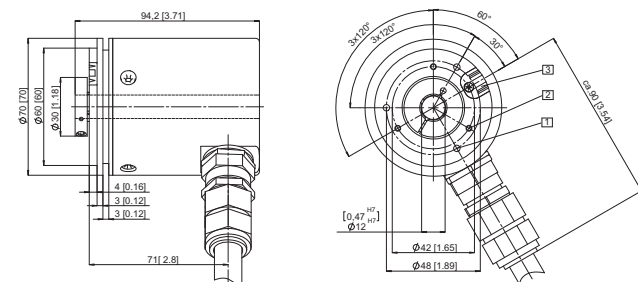
Clamping flange with shaft ø 12 mm and mounted flange adapter



1 6 x M6, 12 [0.47] deep

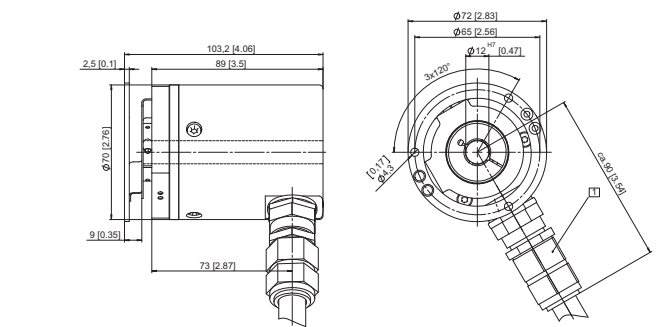
Dimensions hollow shaft version

Synchro flange



- 1 3 x M4, 6 [0.24] deep
- 2 3 x M3, 5 [0.20] deep
- 3 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ø 4 mm

Stator coupling



1 Angular position of the cable outlet is not defined

Incremental Encoders

Magnetic measurement system	RI50 / LI50	Push-Pull / RS422
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Thanks to its installation depth of just 16 mm, the magnetic measurement system RI50/LI50, comprising a magnetic ring and sensor head, is ideally suited to plant and machinery where space is very tight.

In contrast to our measuring system RI20/LI20, a single zero pulse is also implemented here.



High rotational speed	High IP value	Shock / vibration resistant	Reverse polarity protection

Hard-wearing and robust

- High shock and vibration resistance
- Protection rating IP67
- Non-contact measurement system

Fast start - up

- Function display via LED
- Large mounting tolerance between magnetic band and sensor head
- Slotted hole fixing ensures simple alignment

Selection guide Limes LI50 / Magnetic ring RI50

Pulse rates/PPR ¹⁾	Order code Magnetic ring RI50	Order code Magnetic sensor Limes LI50	max. rotational speed (electronic) ²⁾	
			without using index signal	using index signal
1000	8.RI50.031.XXXX.112	8.LI50.11X1.1050	9000	3000
2000	8.RI50.031.XXXX.112	8.LI50.11X1.1100	4000	3000
1024	8.RI50.048.XXXX.112	8.LI50.11X1.1032	9000	2000
2048	8.RI50.048.XXXX.112	8.LI50.11X1.1064	4000	2000
3600	8.RI50.055.XXXX.112	8.LI50.11X1.1100	2500	1700

Order code Magnetic sensor Limes LI50	<table border="1" style="border-collapse: collapse; margin: auto;"> <tr> <td style="padding: 2px;">8.LI50</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">X</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">XXX</td> </tr> <tr> <td style="font-size: 8px;">Type</td> <td></td> <td></td> <td style="font-size: 8px;">a</td> <td style="font-size: 8px;">b</td> <td></td> <td></td> <td style="font-size: 8px;">c</td> <td style="font-size: 8px;">d</td> </tr> </table>	8.LI50	.	1	1	X	1	.	1	XXX	Type			a	b			c	d
8.LI50	.	1	1	X	1	.	1	XXX											
Type			a	b			c	d											
a Output circuit / Power supply 1 = RS422 / 4.8 ... 26 V DC 2 = Push-Pull / 4.8 ... 30 V DC	b Type of connection 1 = cable PUR, 2 m length	c Reference signal 1 = separate index signal (linked with A and B)	d Interpolation factor ¹⁾ 032, 050, 064, 100 <i>Stock types</i> 8.LI50.1121.1032																

Order code Magnetic ring RI50	<table border="1" style="border-collapse: collapse; margin: auto;"> <tr> <td style="padding: 2px;">8.RI50</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">XXX</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">XXXX</td> <td style="padding: 2px;">.</td> <td style="padding: 2px;">112</td> </tr> <tr> <td style="font-size: 8px;">Type</td> <td></td> <td style="font-size: 8px;">a</td> <td></td> <td style="font-size: 8px;">b</td> <td></td> <td></td> </tr> </table>	8.RI50	.	XXX	.	XXXX	.	112	Type		a		b		
8.RI50	.	XXX	.	XXXX	.	112									
Type		a		b											
a Outer diameter 031 = 31 mm 048 = 48.3 mm 055 = 54.7 mm	b Bore diameter 0600 = 6 mm 1500 = 15 mm 2540 = 25.4 mm (1" ³⁾ 0800 = 8 mm 1587 = 15.875 mm (5/8" ³⁾ 1000 = 10 mm 2000 = 20 mm 3000 = 30 mm ³⁾ 1200 = 12 mm 2500 = 25 mm ³⁾ 3500 = 35 mm ⁴⁾	<i>Stock types</i> 8.RI50.048.0600.112													

1) The pulse rate (ppr) results from the combination of the magnetic sensor with the various outer diameters.
 2) With an input frequency of the evaluation unit of 250 kHz
 3) Only possible for outer diameters 048 and 055
 4) Only possible for outer diameter 055

Incremental Encoders

Magnetic measurement system	RI50 / LI50	Push-Pull / RS422
------------------------------------	--------------------	--------------------------

Accessory for Limes LI50: Display Type 572



Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, A, B, B for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel (at TTL-input)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory, reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS232

Position display, 6-digit
with 4 fast switch outputs and serial interface:

6.572.0116.D05

with 4 fast switch outputs and serial interface and scalable analogue output

6.572.0116.D95

Position display, 8-digit
with 4 fast switch outputs and serial interface:

6.572.0118.D05

with 4 fast switch outputs and serial interface and scalable analogue output

6.572.0118.D95

Incremental Encoders

Mechanical characteristics	
Speed	max. 12000 min ⁻¹
Protection acc. to EN60529	P67
Working temperature	-20°C ... +80°C
Shock resistance	500 g / 1 ms
Vibration resistance	30 g / 10 ... 2000 Hz
Housing (Sensor)	Zinc die-cast
Pole gap	5 mm from pole to pole

Electrical characteristics		
Output circuit	RS422	Push-Pull
Supply voltage	4.8...26 V DC	4.8...30 V DC
Power consumption (no load)	typ 25 mA / max. 60 mA	
Permissible load/channel	max. 20 mA	
Min. pulse edge interval	1 µs	
Reference signal	fixed	
System accuracy	typ 0.3° with shaft tolerance g6	

Terminal assignment

Signal	0 V GND	+U _B	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD

Incremental Encoders

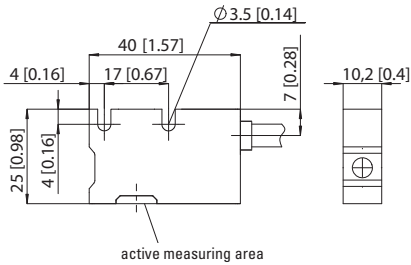
Magnetic measurement system

RI50 / LI50

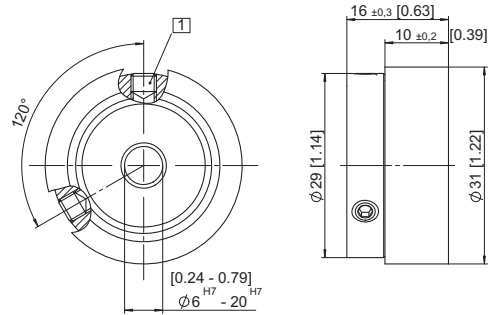
Push-Pull / RS422

Dimensions

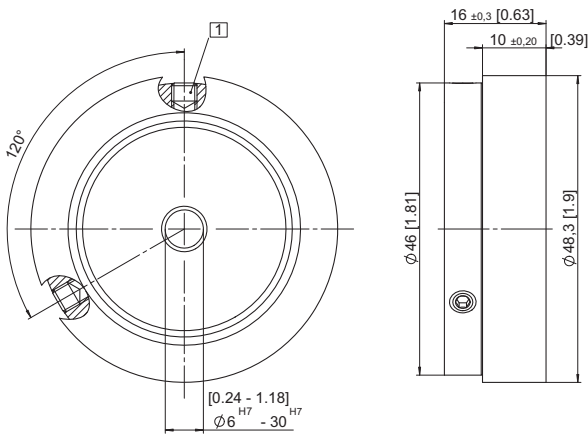
Measuring head Limes LI50



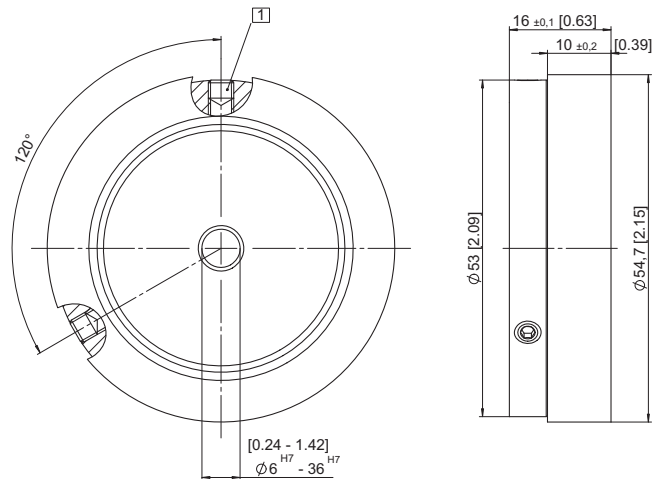
Magnetic ring, ø 31 mm, 8.RI50.031.XXXX.112



Magnetic ring, ø 48.3 mm, 8.RI50.048.XXXX.112



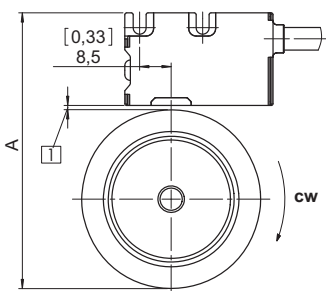
Magnetic ring, ø 54.7 mm, 8.RI50.055.XXXX.112



1 M4 Set screw

Mounting orientation and permissible mounting tolerances

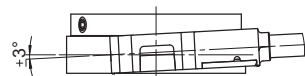
Distances



1 Distance Sensor / Magnetic ring:
0.1 ... 1.5 mm (1 mm recommended)

Magnetic ring	A for distance sensor / magnetic ring = 1 mm
8.RI50.031.XXXX.111	57.0
8.RI50.048.XXXX.111	74.3
8.RI50.055.XXXX.111	80.7

Torsion



Offset



Tilting



Warning:

When mounting the sensor head, please ensure its correct orientation to the magnetic ring!

Incremental Encoders

Magnetic measurement system	RI20 / LI20	Push-Pull / RS422
------------------------------------	--------------------	--------------------------



Thanks to its installation depth of just 16 mm, the magnetic measurement system RI20/LI20, comprising a magnetic ring and sensor head, is ideally suited to plant and machinery where space is very tight.

The non-contact measuring principle enables fault-free operation even under the most difficult environmental conditions.

Incremental Encoders

High rotational speed	High IP value	Shock / vibration resistant	Reverse polarity protection

Hard-wearing and robust

- High shock and vibration resistance
- Protection rating IP67
- Non-contact measurement system

Fast start-up

- Function display via LED
- Large mounting tolerance between magnetic band and sensor head
- Slotted hole fixing ensures simple alignment

Selection guide Limes LI20 / Magnetic ring RI20

Pulse rates / PPR ¹⁾ (further PPR on request)	Order code Magnetic ring RI20	Order code Magnetic sensor Limes LI20	max. rotational speed RPM ²⁾
250	8.RI20.031.XXXX.111	8.LI20.11X1.2005	12000
1000	8.RI20.031.XXXX.111	8.LI20.11X1.2020	2400
2500	8.RI20.031.XXXX.111	8.LI20.11X1.2050	3900
1024	8.RI20.041.XXXX.111	8.LI20.11X1.2016	7000
360	8.RI20.045.XXXX.111	8.LI20.11X1.2005	12000
3600	8.RI20.045.XXXX.111	8.LI20.11X1.2050	2700

Order code Magnetic sensor Limes LI20	8.LI20 Type	. 1	1	X	1	. 2	XXX
a Output circuit / Power supply 1 = RS422 / 4.8 ... 26 V DC 2 = Push-Pull / 4.8 ... 30 V DC	b Type of connection 1 = Cable PUR, 2 m length	c Reference signal 2 = Index periodical			d Interpolation factor ¹⁾ 005, 016, 020, 050	Stock types	
						8.LI20.1111.2005	8.LI20.1121.2005
						8.LI20.1111.2020	8.LI20.1121.2020
						8.LI20.1111.2050	8.LI20.1121.2050

Order code Magnetic ring RI20	8.RI20 Type	. XXX	. XXXX	. 111
a Outer diameter 031 = 31 mm 041 = 41.5 mm 045 = 45 mm	b Bore diameter 0800 = 8 mm 0952 = 9.525 mm (3/8") 1000 = 10 mm 1200 = 12 mm	1500 = 15 mm 1587 = 15.875 mm (5/8") 1800 = 18 mm 2000 = 20 mm	2500 = 25 mm 2540 = 25.4 mm (1") ³⁾ 3000 = 30 mm ³⁾	Stock types
				8.RI20.031.0800.111
				8.RI20.031.1000.111
				8.RI20.031.1200.111
				8.RI20.031.1587.111
				8.RI20.031.1500.111
				8.RI20.041.0800.111
				8.RI20.045.0800.111
				8.RI20.045.0952.111
				8.RI20.045.1200.111
				8.RI20.045.1500.111
				8.RI20.045.2500.111

1) The pulse rate (ppr) results from the combination of the magnetic sensor with the various outer diameters.
2) With an input frequency of the evaluation unit of 250 kHz
3) Only possible for outer diameters 041 and 045

Incremental Encoders

Magnetic measurement system	RI20 / LI20	Push-Pull / RS422
------------------------------------	--------------------	--------------------------

Accessory for Limes LI20: Display Type 572



Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, A, B, B for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel (at TTL-input)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory, reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS232

Position display, 6-digit
with 4 fast switch outputs
and serial interface:

6.572.0116.D05

with 4 fast switch outputs
and serial interface and
scalable analogue output

6.572.0116.D95

Position display, 8-digit
with 4 fast switch outputs
and serial interface:

6.572.0118.D05

with 4 fast switch outputs
and serial interface and
scalable analogue output

6.572.0118.D95

Mechanical characteristics	
Speed	max. 12000 min ⁻¹
Protection acc. to EN60529	housing IP67
Working temperature	-20°C ... +80°C
Shock resistance	500 g / 1 ms
Vibration resistance	30 g / 10 ... 2000 Hz
Housing (Sensor)	Zinc die-cast
Pole gap	2 mm from pole to pole

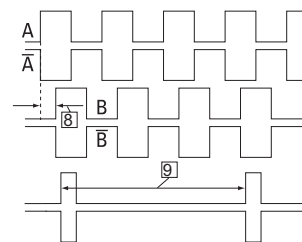
Electrical characteristics		
Output circuit	RS422	Push-Pull
Supply voltage	4.8 ... 26 VDC	4.8 ... 30 VDC
Power consumption (no load)	typ 25 mA, max. 60 mA	
Permissible load/channel	120 Ohm	±20 mA
Min. pulse edge interval	1 µs	
Reference signal	Index periodical	
System accuracy	typ 0.3° with shaft tolerance g6	

Signal figures

with rotation of the magnetic ring in the CW direction (see draft „Mounting tolerances“)

9] periodic index signal (every 2mm) the logical assignment A, B and I-signal can change

8] Min. Pulse interval: pay attention to the instructions in the technical data



Incremental Encoders

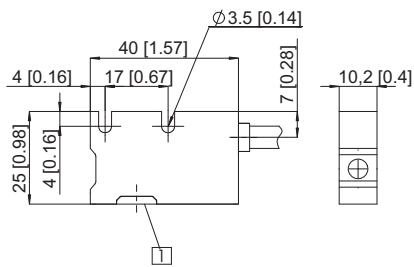
Magnetic measurement system	RI20 / LI20								Push-Pull / RS422
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Terminal assignment

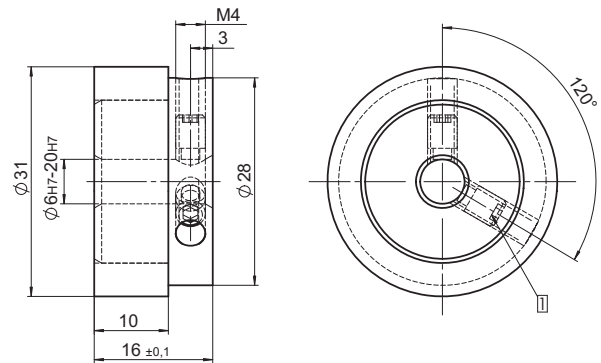
Signal	0 V GND	U _B	A	\bar{A}	B	\bar{B}	I	\bar{I}	shield
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	shield is on the housing

Dimensions

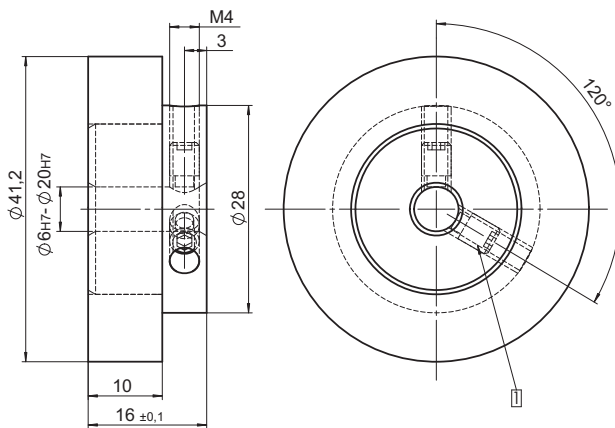
Magnetic sensor Limes LI20



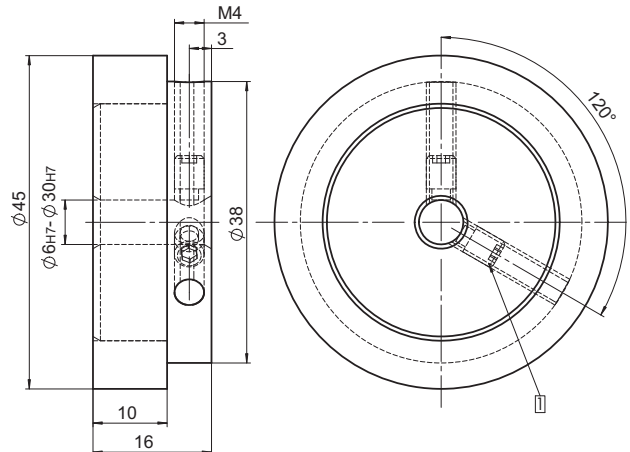
Magnetic ring, \varnothing 31 mm, 8.RI20.031.XXXX.111



Magnetic ring, \varnothing 41.2 mm, 8.RI20.041.XXXX.111



Magnetic ring, \varnothing 45 mm, 8.RI20.045.XXXX.111



1 set screw M4

Recommended tolerance of the drive shaft diameter: g6

Incremental Encoders

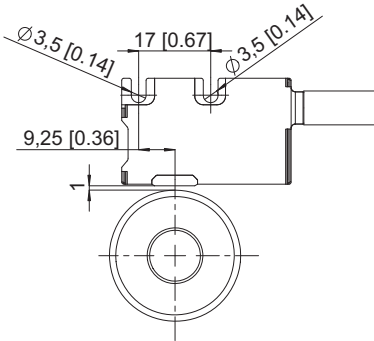
Magnetic measurement system

RI20 / LI20

Push-Pull / RS422

Mounting orientation and permissible mounting tolerances

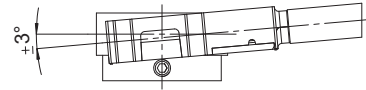
Distances



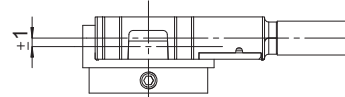
1 Distance Sensor / Magnetic ring:
0.1 ... 1.0 mm (0.4 mm recommended)

Magnetic ring	A for distance sensor / magnetic ring: = 0.4 mm
8.RI20.031.XXXX.111	56.4
8.RI20.041.XXXX.111	66.6
8.RI20.045.XXXX.111	70.4

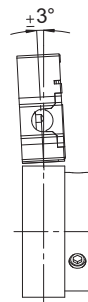
Torsion



Offset



Tilting



Warning: When mounting the sensor head, please ensure its correct orientation to the magnetic ring!



Absolute Encoders - Singleturn

Series	Type	Interface	Page
Miniature, magnetic	2450 / 2470 (Shaft / Hollow shaft)	SSI	102
Compact, magnetic	Sendix 3650 / 3670 (Shaft / Hollow shaft)	SSI	104
	Sendix 3651 / 3671 (Shaft / Hollow shaft)	Analogue	106
	Sendix M3658 / M3678 (Shaft / Hollow shaft)	CANopen	110
	Sendix M3658 / M3678 (Shaft / Hollow shaft)	SAE J1939	114
Compact, optical	Sendix F3653 / F3673 (Shaft / Hollow shaft)	SSI / BiSS	118
	Sendix F3658 / F3678 (Shaft / Hollow shaft)	CANopen	122
Functional Safety, optical	Sendix 5853 SIL / 5873 SIL (Shaft / Hollow shaft)	SSI / BiSS + SinCos	126
Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS	131
	5850 / 5870 (Shaft / Hollow shaft)	Parallel / Analogue	137
	5852 / 5872 (Shaft / Hollow shaft)	Parallel, Highspeed	141
	Sendix 5858 / 5878 (Shaft / Hollow shaft)	Profibus-DP	144
	Sendix 5858 / 5878 (Shaft / Hollow shaft)	CANopen	148
	Sendix 5858 / 5878 (Shaft / Hollow shaft)	EtherCAT	155
Stainless steel encoder, optical	5876 (Hollow shaft)	SSI, Parallel	160
ATEX, optical	Sendix 7053 (Shaft)	SSI	164
	Sendix 7058 (Shaft)	Profibus-DP	167
	Sendix 7058 (Shaft)	CANopen	170
	7031 (Shaft / Hollow shaft)	SSI / Parallel / Analogue	173

Absolute Encoders - Singleturn

Miniature, magnetic

2450 / 2470 (Shaft / Hollow shaft)

SSI



The absolute singleturn encoders 2450 and 2470 with SSI interface are the specialists when space is tight.

Because of their high 12 bit resolution with 4096 different positions for 360° they offer exceptional repeat accuracy.



High rotational speed



Temperature
-20° + 85°



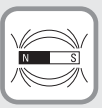
Shock / vibration resistant



Short-circuit proof



Reverse polarity protection



Magnetic sensor

Minimal space requirement

- The outer diameter measures 24 mm; the shaft diameter at least 4 mm
- Flexible connection with radial or axial cable outlet

Durable and accurate

- Long service life and freedom from wear due to non-contact measuring system
- Wide temperature range from -20°C up to +85°C
- High 12 bit resolution with 4096 different positions for 360°

Order code Shaft version

8.2450 . XX1X . G121
Type a b c d e

- a Flange**
1 = ø 24 mm
2 = ø 30 mm
3 = ø 28 mm

- b Shaft (ø x L)**
1 = ø 4 x 10 mm
2 = ø 6 x 10 mm
3 = ø 5 x 10 mm, with flat

- c Output circuit / Power supply**
1 = SSI / 5 V DC
- d Type of connection**
1 = axial cable (2 m PVC cable ø 4.5 mm)
2 = radial cable (2 m PVC cable ø 4.5 mm)

- e Gray-Code**
12 bit resolution

Order code Hollow shaft

8.2470 . 1X1X . G121
Type a b c d e

- a Flange**
1 = ø 24 mm

- b Blind hollow shaft (insertion depth max. 14 mm)**
1 = ø 4 mm
2 = ø 6 mm

- c Output circuit / Power supply**
1 = SSI / 5 V DC
- d Type of connection**
1 = axial cable (2 m PVC cable ø 4.5 mm)
2 = radial cable (2 m PVC cable ø 4.5 mm)

- e Gray-Code**
12 bit resolution

Mounting accessory for shaft encoders

Coupling

Bellows coupling ø 15 mm for shaft 4 mm

8.0000.1201.0404

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Absolute Encoders - Singleturn

Miniature, magnetic	2450 / 2470 (Shaft / Hollow shaft)	SSI
----------------------------	-------------------------------------------	------------

Mechanical characteristics		
Speed		max. 12.000 min ⁻¹
Rotor moment of inertia		approx. 0.1 x 10 ⁻⁶ kgm ²
Starting torque		< 0.01 Nm
Shaft load capacity	radial	10 N
	axial	20 N
Weight		approx. 0.06 kg
Protection to EN 60529	housing side	IP65 (IP67 on request)
	flange side	IP50 (IP67 on request)
Working temperature range		-20°C ... +85°C ¹⁾
Materials	shaft / hollow shaft	stainless steel
	clamping ring	MS58
Shock resistance acc. to EN 60068-2-27		1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-27		100 m/s ² , 55 ... 2000 Hz

Electrical characteristics SSI Interface	
Sensor	
Supply voltage	5 (+0.4) V DC ¹⁾
Power consumption (no load)	< 40 mA
Reverse connection of the supply voltage	yes
Measuring range	360°
Resolution / Code	12 bit / Gray
Linearity (25°C)	< 1.5°
Repeat accuracy	≤ 0.4°
Data refresh rate	typ 100 µs
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 55011 Class B
SSI interface	
Clock speed	100 kHz ... 750 kHz
Output driver	RS485
Monoflop time typ / max.	16 µs / 20 µs
Short circuit proof outputs	yes ²⁾
Permissible load / channel	typ. 60 Ohm (acc. to RS485)

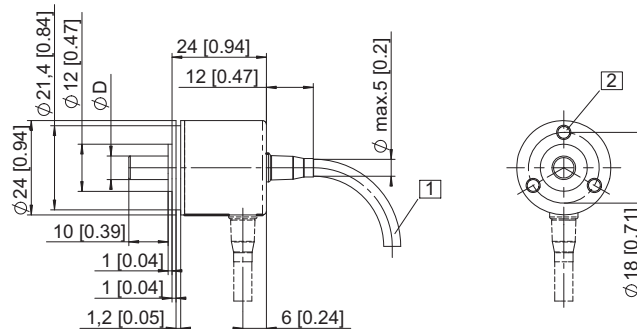
Terminal assignment

Signal	0V	+U _B	+T	-T	+D	-D
Cable colour	WH	BN	GN	YE	GY	PK

Dimensions shaft version

Flange Type 1 (ø 24 mm)

- 1 min. R50 [1.97]
- 2 3 x M3, 4 [0.16] deep

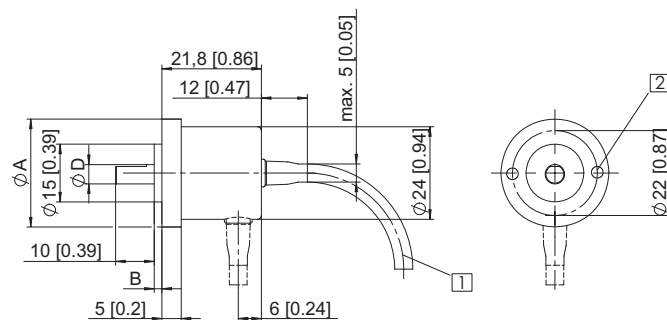


Flange Type 2 (ø 30 mm)

Flange Type 3 (ø 28 mm)

Flange Type	2	3
A	ø 30 mm	ø 28 mm
B	3 mm	2 mm

- 1 min. R50 [1.97]
- 2 2 x M3, 4 [0.16] deep

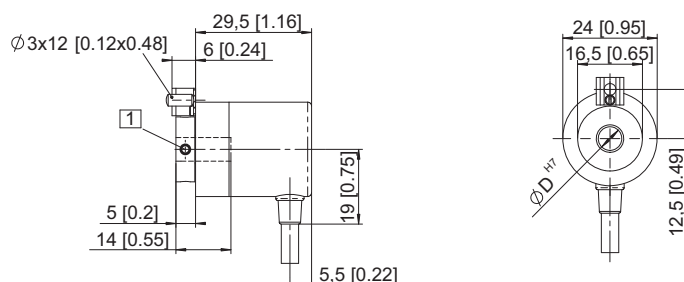


Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Dimensions hollow shaft version

- 1 4 x M3 DIN 915 - SW15



Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! A cylindrical pin (ISO 2338-A-3m6 x 10), for use as a torque stop, is supplied.

1) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)
 2) Short circuit to 0 V or to output, only one channel at a time, supply voltage correctly applied

Absolute Encoders - Singleturn

Compact, magnetic

Sendix 3650 / 3670 (Shaft / Hollow shaft)

SSI



The Sendix 3650 and Sendix 3670 singleturn encoders with SSI interface and magnetic sensor technology boast a resolution of 9 bits.

With a protection rating of up to IP69k, these encoders are resistant to shock and to extreme fluctuations in temperature, making them ideal for use in the most demanding outdoor applications.



Safety-Lock™



High rotational speed



Temperature

-40° + 85°



High IP value



High shaft load capacity



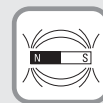
Shock / vibration resistant



Short-circuit proof



Reverse polarity protection



Magnetic sensor



Seawater-resistant version on request

Safe Use

- Non-contact measurement system offers a long-service life, free of wear
- Rugged die-cast housing and IP protection up to 69K for perfect sealing
- High resistance to shock and vibration for excellent durability

Compact and powerful

- Outer diameter of only 36 mm
- Hollow shaft version can accommodate a blind hollow shaft of up to 10 mm, which can be fixed individually via a torque stop pin or stator coupling.
- 360° with 9 bit resolution (512 positions)

Order code Shaft version

8.3650 . 2X22 . B9XX

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.



a Flange
2 = synchro flange

b Shaft (ø x L),
with flat
3 = ø 6 x 12,5 mm
5 = ø 6,35 (1/4") x 12,5 mm

c Output circuit/
Power supply
2 = SSI / 5 ... 30 V DC

e Code type and Division
B9 = 9 bit binary

g Option 2 *optional on request*
1 = IP67 - Ex 2/22
2 = IP69K - seawater-resistant
- special cable length

d Type of connection
2 = radial cable (1 m PUR)

f Option 1
1 = count direction cw ¹⁾
2 = count direction ccw ¹⁾

Order code Hollow shaft

8.3670 . XX22 . B9XX

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.



a Flange
2 = with torque stop set
5 = with stator coupling

b Hollow shaft
2 = ø 6 mm
3 = ø 6.35 mm (1/4")
4 = ø 8 mm
6 = ø 10 mm

c Output circuit/
Power supply
2 = SSI / 5 ... 30 V DC

e Code type and Division
B9 = 9 bit binary

g Option 2 *optional on request*
1 = IP67 - Ex 2/22
2 = IP69K - seawater-resistant
- special cable length

d Type of connection
2 = radial cable (1 m PUR)

f Option 1
1 = count direction cw ¹⁾
2 = count direction ccw ¹⁾

Mounting accessory for shaft encoders

Coupling

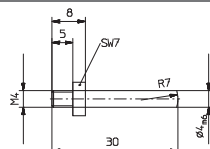
Bellows coupling ø 19 mm for shaft 6 mm

8.0000.1101.0606

Mounting accessory for hollow shaft encoders

Cylindrical pin, long

for torque stops



With fixing thread

8.0010.4700.0000

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.

Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) cw = Increasing code values when shaft turning clockwise (cw).
Top view on shaft

Absolute Encoders - Singleturn

Compact, magnetic **Sendix 3650 / 3670 (Shaft / Hollow shaft)** **SSI**

Mechanical characteristics	
Max. speed	6000 min ⁻¹
Starting torque	< 0.06 Nm
Load capacity of shaft	radial 40 N axial 20 N
Weight	approx. 0.2 kg
Protection EN 60 529/DIN 40050-9	IP67 / IP69k
EX approval for hazardous areas	optional Zone 2 and 22
Working temperature range	-40°C ... +85°C
Materials	shaft / hollow shaft stainless steel flange aluminium housing zinc die-cast housing cabel PUR
Shock resistance acc. EN 60068-2-27	5000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	300 m/s ² , 10 ... 2000 Hz
Permanent shock resistance acc. EN 60068-2-27	1000 m/s ² , 2 ms
Vibration (broad-band random) EN 60068-2-64	5 ... 2500 Hz, 100 m/s ²

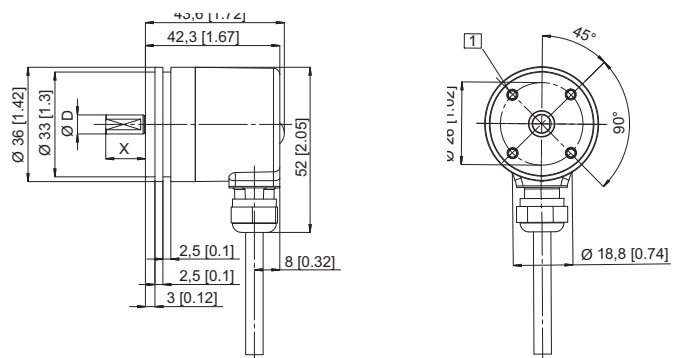
Electrical characteristics SSI Interface	
Sensor	
Supply voltage	5 ... 30 V DC ¹⁾
Current consumption (no load)	max. 41 mA
Reverse connection of the supply voltage	yes
Measuring range	360°
Resolution	9 bit / Binary (512 steps)
Linearity	< 1.0 %
Repeat accuracy (25°C)	< 0.2 %
Status LED	green reference point display turns ON at 2.1°
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3, EN 61000-4-8 (behaviour under magnetic influence)
SSI interface	
SSI clock rate	100 kHz ... 750 kHz
Output driver	RS485
Monoflop time typ / max.	16 µs / 20 µs
Short circuit proof outputs	yes ²⁾
Permissible load / channel	typ. 120 Ohm (acc. to RS485)

Terminal assignment

Signal	0V	+U _B	0 V Sens	+U _B Sens	+T	-T	+D	-D
Cable colour	WH	BN	BU	RD	GN	YE	GY	PK

Dimensions shaft version

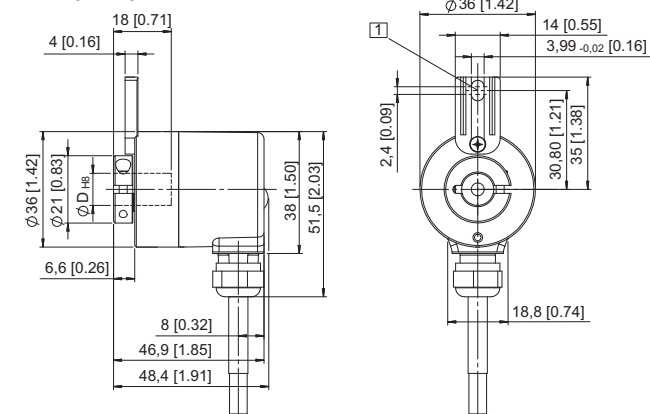
Synchro flange, ø 36 mm



1) M3, 6 [0.24] deep

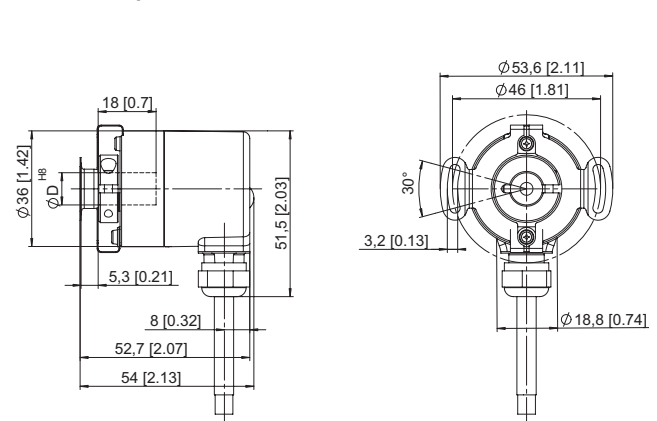
Dimensions hollow shaft version

with torque stop set, ø 36 mm



1) Torque stop slot, Recommendation: Cylindrical pin DIN7, ø 4 mm

with stator coupling, ø 36 mm



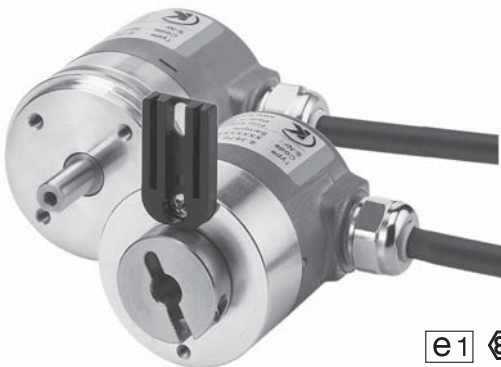
1) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%).
2) Short-circuit proof to 0 V or output, only one channel at a time, when supply voltage is correctly applied.

Absolute Encoders - Singleturn

Compact, magnetic

Sendix 3651 / 3671 (Shaft / Hollow shaft)

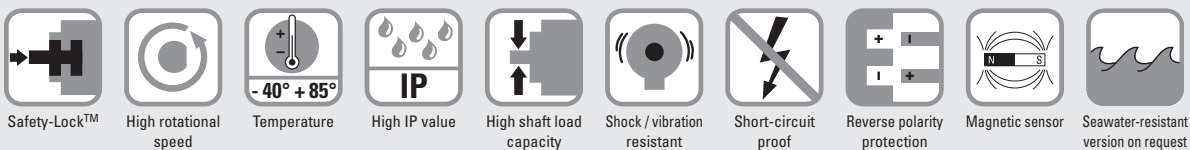
Analogue



Thanks to their different interfaces and measurement ranges, the Sendix 3651 and Sendix 3671 singleturn encoders with analogue interface, in shaft and hollow shaft versions, are particularly flexible in use.

A green and a red LED, acting as reference point and fault indicators, ensure easy installation and troubleshooting.

These encoders have an e1-approval from the German Federal Motor Transport Authority.



Safe operation

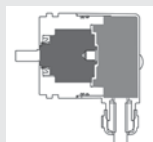
- Non-contact measuring system for long-life non-wear applications
- Rugged die cast housing and IP protection up to 69K for an exceptional tightness
- High shock and vibration resistance for an exceptional robustness

Compact and effective

- Outer diameter of only 36 mm
- The hollow shaft version is fitted with a blind hole with a diameter of up to 10 mm. It can be mounted as required with either a torque stop pin or a stator coupling.
- 360° with 12 bit resolution (4096 positions)
- For use in 12 V or 24 V vehicle electrical systems

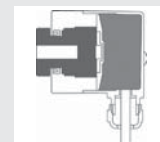
Safety-Lockplus™

IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal



Sensor-Protect™

Fully encapsulated electronics, separate mechanical bearing assembly



Order code Shaft version

8.3651 . 2XXXX . XXXXX
Type a b c d e f g h

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange
2 = synchro flange

c Output circuit ²⁾
3 = current output
4 = voltage output

e Measuring range
1 = 1 x 360°
2 = 1 x 180°
3 = 1 x 90°
4 = 1 x 45°

g Option 1
1 = count direction cw ¹⁾
2 = count direction ccw ¹⁾

optional on request
- Ex 2/22
- seawater-resistant
- special cable length

b Shaft (ø x L), with flat
3 = ø 6 x 12.5 mm
5 = ø 6.35 (1/4") x 12.5 mm
6 = ø 8 x 12.5 mm

d Type of connection
1 = axial cable (1 m PUR)
2 = radial cable (1 m PUR)
3 = M12 connector, axial
4 = M12 connector, radial

f Output / Power supply
3 = 4 ... 20 mA / 10 ... 30 V DC
4 = 0 ... 10 V / 15 ... 30 V DC
5 = 0 ... 5 V / 10 ... 30 V DC

h Option 2
1 = IP67
2 = IP69K

Order code Hollow shaft

8.3671 . XXXXX . XXXXX
Type a b c d e f g h

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange
2 = with torque stop set
5 = with stator coupling

c Output circuit ²⁾
3 = current output
4 = voltage output

e Measuring range
1 = 1 x 360°
2 = 1 x 180°
3 = 1 x 90°
4 = 1 x 45°

g Option 1
1 = count direction cw ¹⁾
2 = count direction ccw ¹⁾

optional on request
- Ex 2/22
- seawater-resistant
- special cable length

b Hollow shaft
2 = ø 6 mm
3 = ø 6.35 mm (1/4")
4 = ø 8 mm
6 = ø 10 mm

d Type of connection
1 = axial cable (1 m PUR)
2 = radial cable (1 m PUR)
3 = M12 connector, axial
4 = M12 connector, radial

f Output / Power supply
3 = 4 ... 20 mA / 10 ... 30 V DC
4 = 0 ... 10 V / 15 ... 30 V DC
5 = 0 ... 5 V / 10 ... 30 V DC

h Option 2
1 = IP67
2 = IP69K

1) cw = Increasing code values when shaft turning clockwise (cw). Top view on shaft
2) Output circuit "3" only in conjunction with output "3", Output circuit "4" only in conjunction with output "4" or "5".

Absolute Encoders - Singleturn

Compact, magnetic	Sendix 3651 / 3671 (Shaft / Hollow shaft)	Analogue
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1101.0606
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M12	8.0000.5116.0000
Cordset, pre-assembled with 2 m PVC cable	M12	05.WAKS4.5-2/P00

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics	
Max. speed	6000 min ⁻¹
Starting torque	< 0.06 Nm
Load capacity of shaft	radial 40 N axial 20 N
Weight	approx. 0.2 kg
Protection EN 60 529/DIN 40050-9	IP67 / IP69k
EX approval for hazardous areas	optional Zone 2 and 22
Working temperature range	-40°C ... +85°C
Materials	shaft / hollow shaft stainless steel flange aluminium housing zinc die-cast housing cable PUR
Shock resistance acc. EN 60068-2-27	5000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	300 m/s ² , 10 ... 2000 Hz
Permanent shock resistance acc. EN 60068-2-29	1000 m/s ² , 2 ms
Vibration (broad-band random) EN 60068-2-64	5 ... 2500 Hz, 100 m/s ² - rms

General electrical characteristics	
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3 and EN 61000-4-8 (behaviour under magnetic influence)
e1 compliant acc. to	EU guideline 2009/19/EG (acc. to EN 55025, ISO 11452 and ISO 7637)

Electrical characteristics current interface 4 ... 20 mA

Sensor	
Power supply	10 ... 30 V DC
Current consumption (no load)	max. 38 mA
Reverse connection of the supply voltage	yes
Measuring range	45°, 90°, 180° or 360°
Resolution	12 bit
Linearity	< 1° (360° measuring range)
Repeat accuracy (25°C)	< 0.1° (360° measuring range)
Status LED	Red break in current loop, input load too high. Green reference point display turns ON at cw: betw. 0° and 1° at ccw: betw. 0° and -1°
Current loop	
Output load	max. 200 Ohm at 10 V DC max. 900 Ohm at 24 V DC
Setting time	< 1 ms (R _{load} = 400 Ohm, 25°C)
Short-circuit proof outputs	When the supply voltage is correctly applied. But not output to 0 V or to +U _B . Supply voltage and sensor output signal are not galvanically isolated.

Electrical characteristics voltage interface

Sensor	
Power supply	output 0 ... 5 V 10 ... 30 V DC output 0 ... 10 V 15 ... 30 V DC
Current consumption (no load)	max. 35 mA
Reverse connection of the supply voltage	yes
Measuring range	45°, 90°, 180° or 360°
Resolution	12 bit
Linearity	< 1° (360° measuring range)
Repeat accuracy (25°C)	< 0.1° (360° measuring range)
Voltage output	
Current output	max. 10 mA
Setting time	< 1 ms (R _{load} ≥ 1 KOhm, 25°C)
Short-circuit proof outputs	When the supply voltage is correctly applied. But not output to 0 V or to +U _B . Supply voltage and sensor output signal are not galvanically isolated.
Status LED	Green reference point display turns ON at cw: betw. 0° and 1° at ccw: betw. 0° and -1°

Absolute Encoders - Singleturn

Compact, magnetic

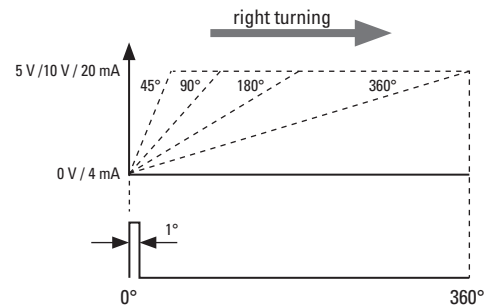
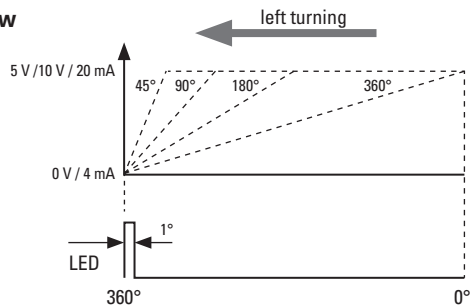
Sendix 3651 / 3671 (Shaft / Hollow shaft)

analogue

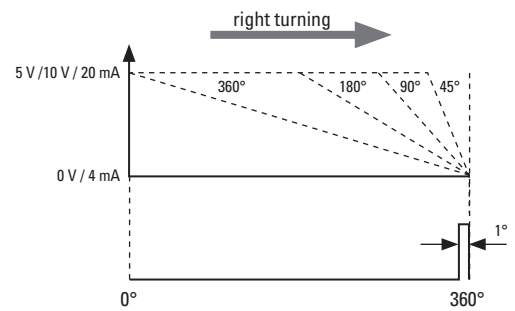
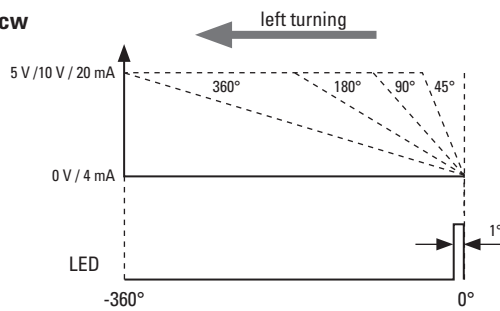
Example (output signal profile)

Measurement range 45° / 90° / 180° / 360°

Version cw

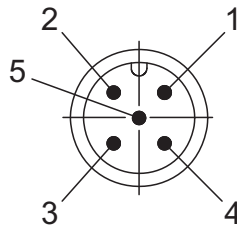


Version ccw



Terminal assignment

Signal	0V	+U _B	+I	-I
Cable colour	WH	BN	GN	YE
M12 / Pin	3	2	4	5



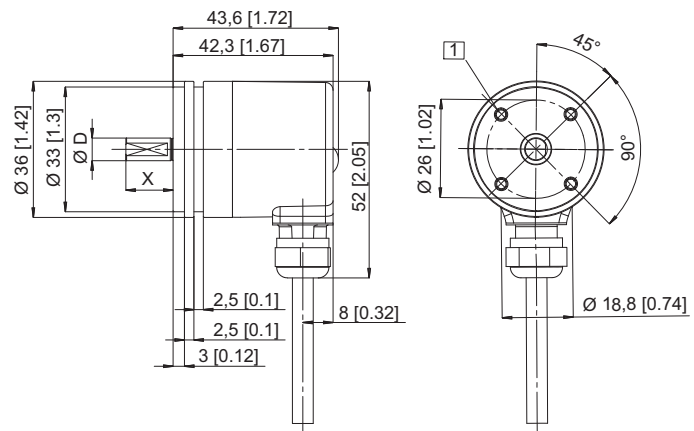
Absolute Encoders - Singleturn

Compact, magnetic **Sendix 3651 / 3671 (Shaft / Hollow shaft)** **analogue**

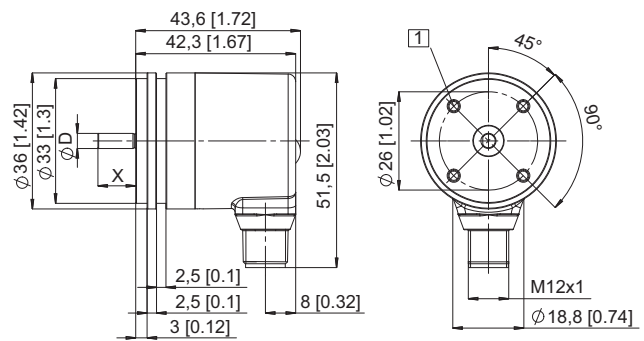
Dimensions shaft version

Synchro flange, \varnothing 36 mm

1 M3, 6 [0.24] deep



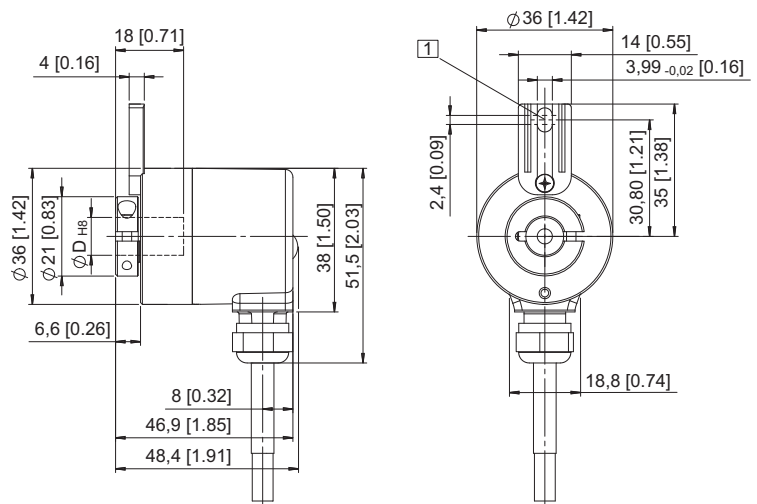
1 M3, 6 [0.24] deep



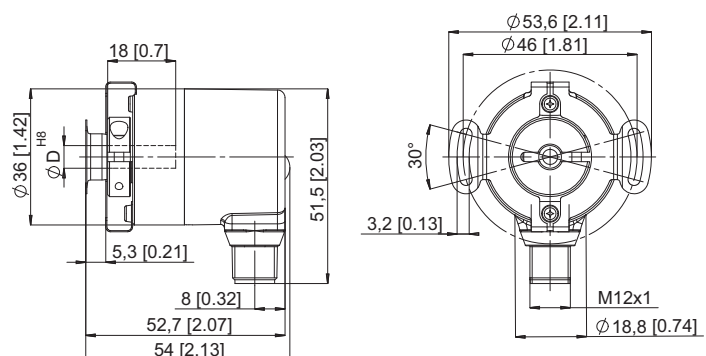
Dimensions hollow shaft version

With torque stop set, \varnothing 36 mm

1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm



With stator coupling, \varnothing 36 mm



Absolute Encoders - Singleturn

Compact, magnetic

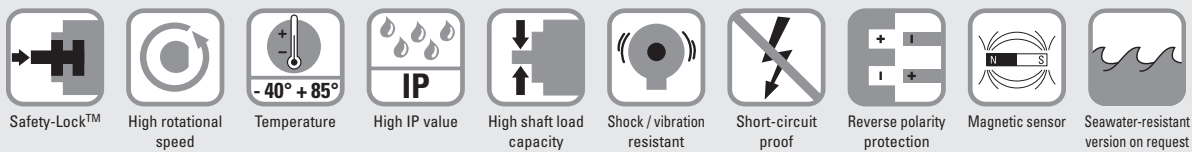
Sendix M3658 / M3678 (Shaft / Hollow shaft)

CANopen



The Sendix M3658 and Sendix M3678 Absolute Encoders - Singleturn with CANopen interface and magnetic sensor technology boast a resolution of 14 bits.

With a protection rating of up to IP69k, these encoders are resistant to shock and to extreme fluctuations in temperature, making them ideal for use in the most demanding outdoor applications.



Safe Technology

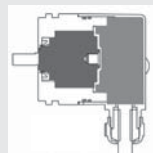
- Increased resistance against vibration and installation errors
- Sturdy bearing construction in Safety Lock™ Design
- Resistant die cast housing and protection up to IP69K

Versatile Applications

- CANopen Encoder profile DS406 V3.2
- Fast determination of the operating status via two-colour LED
- With M12 connector or cable connection

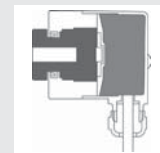
Safety-Lockplus™

IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal



Sensor-Protect™

Fully encapsulated electronics, separate mechanical bearing assembly



Order code Shaft version

8.M3658 . 2XCX . 21 1X

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange
2 = synchro flange

c Output circuit / Power supply
C = CANopen DS301 V4.02 / 8 ... 30 V DC

f Protection
1 = IP67
2 = IP69K
optional on request
- Ex 2/22
- seawater-resistant
- special cable length

b Shaft (ø x L), with flat
3 = ø 6 x 12,5 mm
5 = ø 6,35 (1/4") x 12,5 mm
6 = ø 8 x 12,5 mm

d Type of connection
2 = radial cable (1 m PUR)
4 = M12 connector, radial

e Fieldbus profile
21 = CANopen Encoder profile DS406 V3.2

Order code Hollow shaft

8.M3678 . XXCX . 21 1X

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange
2 = with torque stop set
5 = with stator coupling

c Output circuit / Power supply
C = CANopen DS301 V4.02 / 8 ... 30 V DC

f Protection
1 = IP67
2 = IP69K
optional on request
- Ex 2/22
- seawater-resistant
- special cable length

b Hollow shaft
2 = ø 6 mm
3 = ø 6,35 mm (1/4")
4 = ø 8 mm
6 = ø 10 mm

d Type of connection
2 = radial cable (1 m PUR)
4 = M12 connector, radial

e Fieldbus profile
21 = CANopen Encoder profile DS406 V3.2

Absolute Encoders - Singleturn

Compact, magnetic	Sendix M3658 / M3678 (Shaft / Hollow shaft)	CANopen
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1101.0606
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M12	8.0000.5116.0000
Cordset, pre-assembled with 2 m PVC cable	M12	8.0000.6V81.0002

Programming set

including:	<ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0015
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics	
Max. speed	6000 min ⁻¹
Starting torque	< 0.06 Nm
Load capacity of shaft	radial 40 N axial 20 N
Weight	ca. 0.2 kg
Protection EN 60 529/DIN 40050-9	IP67 / IP69k
EX approval for hazardous areas	optional Zone 2 and 22
Working temperature range	-40°C ... +85°C
Materials	shaft/hollow shaft stainless steel flange aluminium housing zinc die-cast housing cable PUR
Shock resistance acc. EN 60068-2-27	5000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	300 m/s ² , 10 ... 2000 Hz
Permanent shock resistance acc. EN 60068-2-27	1000 m/s ² , 2 ms
Vibration (broad-band random) EN 60068-2-64	5 ... 2500 Hz, 100 m/s ² - rms
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3, EN 61000-4-8 (behaviour under magnetic influence)

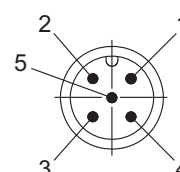
Interface characteristics CANopen	
Resolution	1 ... 16384 (14 bit), (scaleable: 1 ... 16384)
Default value	16384 (14 bit)
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	CANopen profile DS406 V3.2 with manufacturer-specific add-ons LSS-Service DS305 V2.0
Baud rate	10 ... 1000 kbit/s (Software configurable)
Node address	1 ... 127 (Software configurable)
Termination switchable	Software configurable
LSS Protocol	CIA LSS protocol DS305 Global command support for node address and baud rate. Selective commands via attributes of the identity object.

General electrical characteristics

Power supply	5 ... 30 V DC
Current consumption (no load)	max. 25 mA
Reverse connection of the supply voltage (U_B)	yes
Measuring range	360°
Linearity	< 1°
Repeat accuracy (25°C)	< 0.1°
Data refresh rate	400 μ s
Status LED	LED ON or blinking red Error display LED ON or blinking green Status display

Terminal assignment

Signal	+U _B	0 V	CAN GND	CAN High	CAN Low
M12 / Pin	2	3	1	4	5
Cable colour	BN	WH	GY	GN	YE



Absolute Encoders - Singleturn

Compact, magnetic

Sendix M3658 / M3678 (Shaft / Hollow shaft)

CANopen

General information about CANopen

The CANopen encoders of the M3658 and M3678 series support the latest CANopen communication profile according to DS301 V4.02. In addition, device specific profiles like the encoder profile DS406 V3.2 are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CANbus.

When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

The following output values may be combined in a freely variable way as PDO (PDO mapping): position, speed as well as the status of the working area.

The encoders are available with a connector or a cable connection.

The device address and baud rate can be set/modified by means of the software. The two colour LED located on the back indicates the operating or fault status of the CAN bus, as well as the status of the internal diagnostics.

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated.

Class C2 functionality:

- NMT Slave
- Heartbeat Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus / Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
 - 1 work area with upper and lower limit and the corresponding output states
 - Variable PDO mapping for position, speed, work area status
 - Extended failure management for position sensing with integrated temperature control
 - User interface with visual display of bus and failure status 1 LED two colours
 - Customer-specific memory - 16 Bytes
 - Customer-specific protocol
- "Watchdog controlled" device

LSS Layer Setting Services DS305 V2.0

- Global support of Node-ID and baud rate
- Selective protocol via identity object (1018h)

CANbus Connection

The CANopen encoders are equipped with a Bus trunk line in various lengths and can be terminated in the device.

The devices do not have an integrated T-coupler nor they are looped internally and must therefore only be used as end devices.

If possible, drop lines should be avoided, as in principle they lead to signal reflections. As a rule the reflections caused by the drop lines are not critical, if they have completely decayed before the point in time when the scanning occurs.

The sum of all the drop lines should not, for a particular baud rate, exceed the maximum length L_u .

$L_u < 5$ m cable length for 125 Kbit

$L_u < 2$ m cable length for 250 Kbit

$L_u < 1$ m cable length for 1 Mbit

When used as a drop line, the termination resistor should not be activated.

For a network with 3 encoders and 250 Kbit the maximum length of the drop line/encoder must not exceed 70 cm.

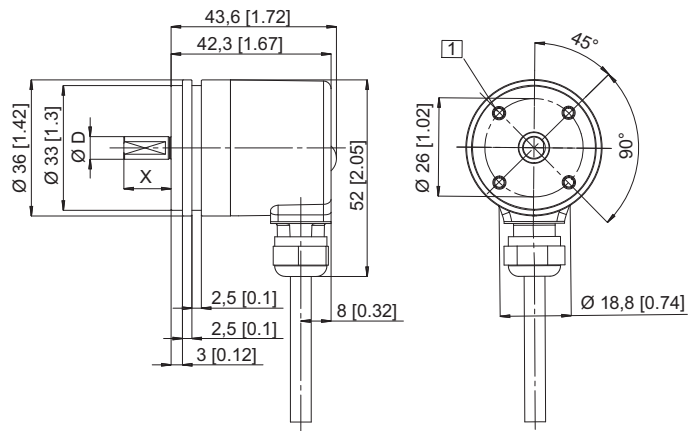
Absolute Encoders - Singleturn

Compact, magnetic	Sendix M3658 / M3678 (Shaft / Hollow shaft)	CANopen
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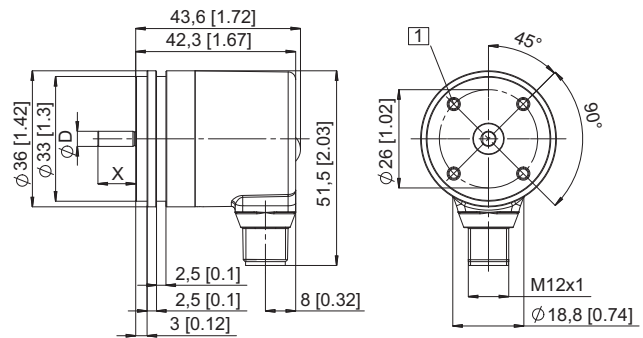
Dimensions shaft version

Synchro flange, \varnothing 36 mm

1 M3, 6 [0.24] deep



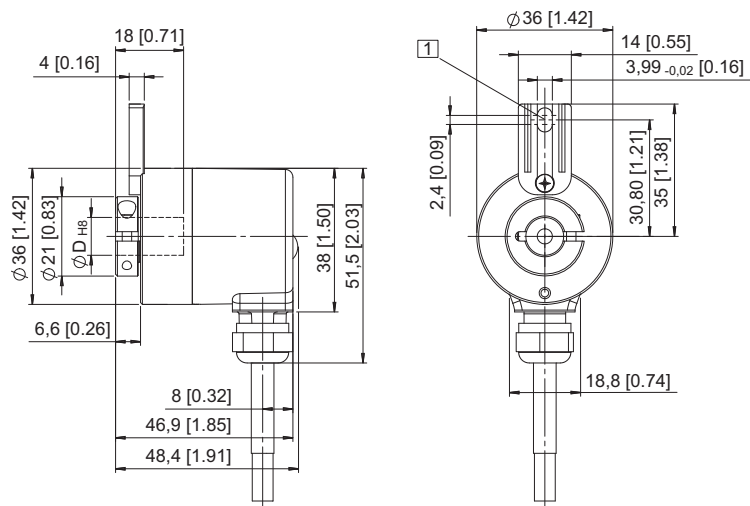
1 M3, 6 [0.24] deep



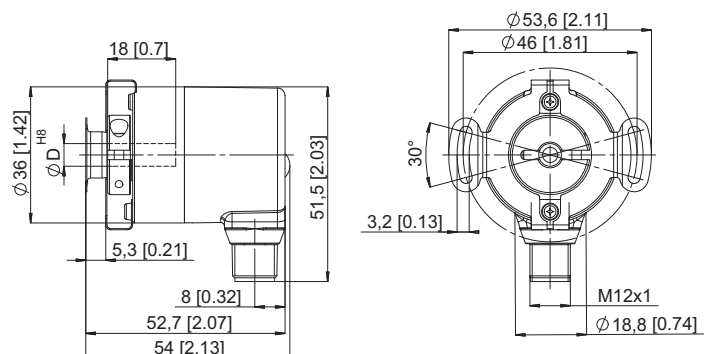
Dimensions hollow shaft version

With torque stop set, \varnothing 36 mm

1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm



With stator coupling, \varnothing 36 mm

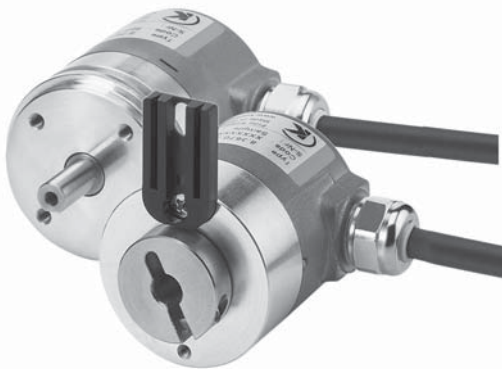


Absolute Encoders - Singleturn

Compact, magnetic

Sendix M3658 / M3678 (Shaft / Hollow shaft)

SAE J1939



The absolute Sendix encoders M3658 and M3678 with SAE J1939 interface support all common requirements of the special protocol for utility vehicles and make a considerable contribution to the comprehensive system diagnostics or to fast fault localisation.

The encoders offer fast, error-free start-up with no need to set switches; the encoder address is assigned automatically via Address Claiming (ACL).



SAE J1939



Safety-Lock™
(Shaft)



High rotational
speed



-40° + 85°

Temperature



High IP value



High shaft load
capacity



Shock / vibration
resistant



Short-circuit
proof



Reverse polarity
protection



Magnetic sensor



Seawater-resistant
version on request

Safe Technology

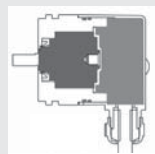
- Increased resistance against vibration and installation errors
- Sturdy bearing construction in Safety Lock™ Design
- Resistant die cast housing and protection up to IP69K

Versatile Applications

- Up-to-the-minute Fieldbus performance in the application: SAE J1939 with CAN-Highspeed to ISO 11898
- Fast determination of the operating status via two-colour LED
- Fast, error-free start up with no need to set switches; with automatic Address Claiming (ACL)

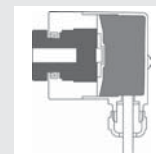
Safety-Lockplus™

IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal



Sensor-Protect™

Fully encapsulated electronics, separate mechanical bearing assembly



Order code Shaft version

8.M3658 . 2XCX . 32 1X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange
2 = synchro flange

c Output circuit / Power supply
C = CAN Highspeed / 8 ... 30 V DC

e Fieldbus profile
32 = J1939 optional on request

b Shaft (ø x L), with flat
3 = ø 6 x 12.5 mm
5 = ø 6.35 (1/4") x 12.5 mm
6 = ø 8 x 12.5 mm

d Type of connection
2 = radial cable (1 m PUR)
4 = M12 connector, radial

f Protection
1 = IP67
2 = IP69k

Order code Hollow shaft

8.M3678 . XXCX . 32 1X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange
2 = with torque stop set
5 = with stator coupling

c Output circuit / Power supply
C = CAN Highspeed / 8 ... 30 V DC

e Fieldbus profile
32 = J1939 optional on request

b Hollow shaft
2 = ø 6 mm
3 = ø 6.35 mm (1/4")
4 = ø 8 mm
6 = ø 10 mm

d Type of connection
2 = radial cable (1 m PUR)
4 = M12 connector, radial

f Protection
1 = IP67
2 = IP69k

Absolute Encoders - Singleturn

Compact, magnetic	Sendix M3658 / M3678 (Shaft / Hollow shaft)	SAE J1939
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 6 mm	8.0000.1101.0606
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M12	8.0000.5116.0000
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Cordset, pre-assembled with 2 m PVC cable	M12	8.0000.6V81.0002
--------------------------------------------------	-----	-------------------------

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics	
Max. speed	6000 min ⁻¹
Starting torque	< 0.06 Nm
Load capacity of shaft	radial 40 N axial 20 N
Weight	ca. 0.2 kg
Protection EN 60 529/DIN 40050-9	IP67 / IP69k
EX approval for hazardous areas	optional Zone 2 and 22
Working temperature range	-40°C ... +85°C
Materials	shaft/hollow shaft stainless steel flange aluminium housing zinc die-cast housing cable PUR
Shock resistance acc. EN 60068-2-27	5000 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	300 m/s ² , 10 ... 2000 Hz
Permanent shock resistance acc. EN 60068-2-27	1000 m/s ² , 2 ms
Vibration (broad-band random) EN 60068-2-64	5 ... 2500 Hz, 100 m/s ² - rms

Diagnostic LED (two-colour, red/green)	
LED ON or blinking	red error display green status display

General electrical characteristics	
Power supply	8 ... 30 V DC
Current consumption (no load)	max. 25 mA
Reverse connection of the supply voltage (U_B)	yes
Measuring range	360°
Linearity	< 1°
Repeat accuracy	< 0.1°
Data refresh rate	400 μ s
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3

Interface characteristics CANopen	
Resolution	1 ... 16384 (14 bit), scaleable: 1 ... 16384
Default value	16384 (14 bit)
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	SAE J1939
Baud rate	250 kbit/s
Node address	1 ... 255 (via address claiming)
Termination	software configurable

Absolute Encoders Singleturn

Absolute Encoders - Singleturn

Compact, magnetic

Sendix M3658 / M3678 (Shaft / Hollow shaft)

SAE J1939

General Information concerning SAE J1939

The protocol J1939 originates from the international Society of Automotive Engineers (SAE) and operates on the physical layer with high speed CAN as per ISO11898. The application emphasis lies in the area of the power train and chassis of commercial vehicles.

It serves to transfer diagnostic data (for example, motor speed, position, temperature) and control information. Type series M3658 and M3678 encoders support the total functionality of J1939. This protocol is a multimaster system with decentralised network management that does not involve channel-based communication.

It supports up to 254 logic nodes and 30 physical control devices per segment. The information is described as Parameters (signals) and combined on 4 memory pages (Data Pages) into Parameter Groups (PGs). Each parameter group can be identified via a unique number, the Parameter Group Number (PGN). Independently of this, each signal is assigned a unique SPN (Suspect Parameter Number).

The major part of the communication occurs cyclically and can be received by all control devices without the explicit request for data (Broadcast). Furthermore the parameter groups are optimised to a length of 8 data bytes. This enables very efficient utilization of the CAN protocol.

If greater amounts of data need to be transferred, then transport protocols (TP) can be used: BAM (Broadcast Announce Message) and CMTD (Connection Mode Data Transfer). With BAM TP the transfer of data occurs as a broadcast.

Encoder Implementation SAE J1939

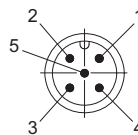
- PGNs that are adaptable to the customer's application
- Resolution of address conflicts -> Address Claiming (ACL)
- Continuous checking whether control addresses have been assigned twice within a network
- Change of control device addresses during run-time
- Unique identification of a control device with the help of a name that is unique worldwide. This name serves to identify the functionality of a control device in the network
- Predefined PGs for Position, Speed and Alarm
- 250 kbit/s, 29 bit Identifier
- Watchdog controlled device

A two-colour LED, located on the rear of the encoder, signals the operating and fault status of the J1939 protocol, as well as the status of the internal sensor diagnostics.



Terminal assignment

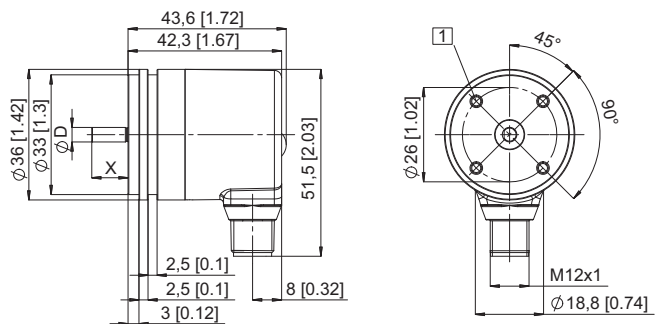
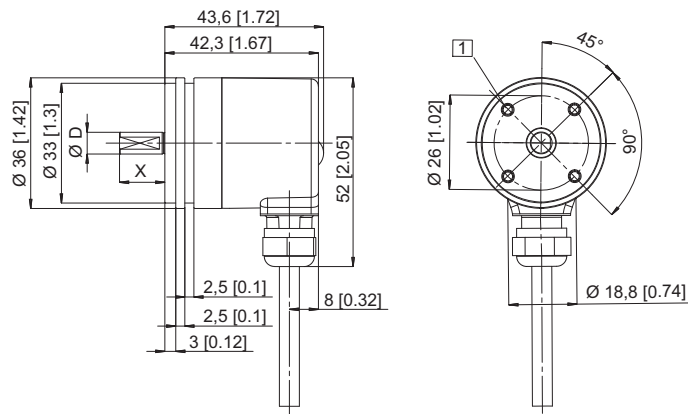
Signal	+U _B	0 V	CAN GND	CAN High	CAN Low
M12 / Pin	2	3	1	4	5
Cable colour	BN	WH	GY	GN	YE



Absolute Encoders - Singleturn

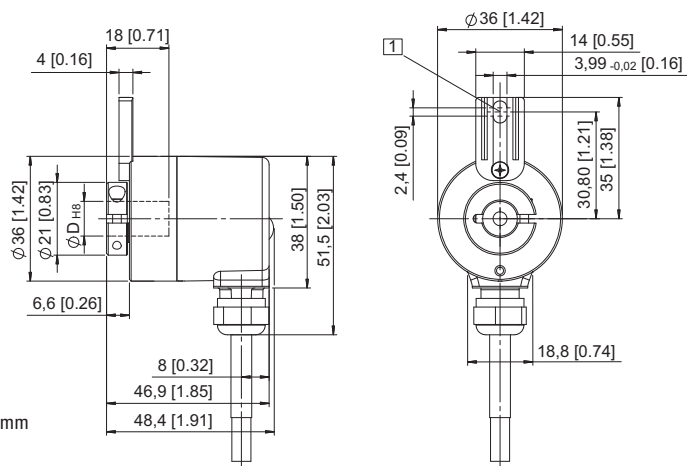
Compact, magnetic	Sendix M3658 / M3678 (Shaft / Hollow shaft)	SAE J1939
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Dimensions shaft version Synchro flange, ø 36 mm



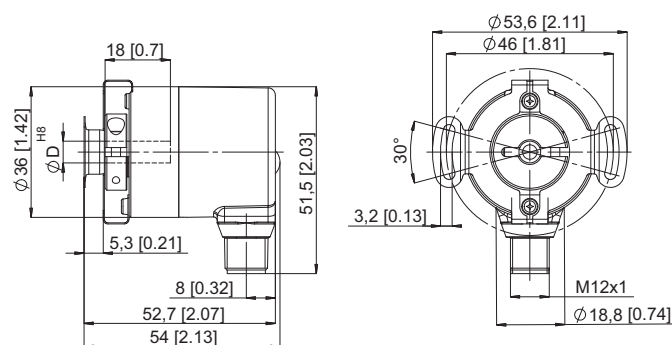
1 M3, 6 [0.24] deep

Dimensions hollow shaft version With torque stop set, ø 36 mm



1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ø 4 mm

With stator coupling, ø 36 mm



Absolute Encoders – Singleturn

Compact, optical

Sendix F3653 / F3673 (Shaft / Hollow shaft)

SSI / BiSS



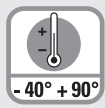
The Sendix F36 singleturn with SSI or BiSS interface boasts exceptional ruggedness and compact dimensions. With a size of just 36 x 42 mm it offers a through hollow shaft of up to 8 mm or a blind hollow shaft of up to 10 mm. Its high-precision optical sensor technology can achieve a resolution of up to 17 bits.



Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.



Safety-Lock™



Temperature
-40° + 90°



High IP value
IP



High shaft load capacity



Shock / vibration resistant



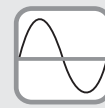
Magnetic field proof



Short-circuit proof



Reverse polarity protection



SinCos



Optical sensor



Seawater-resistant version on request

Reliable and magnetically insensitive

- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +90°C

Optimised performance

- High-precision with a data refresh rate of the position value $\leq 1\mu\text{s}$
- High-resolution feedback in real-time via incremental outputs SinCos and RS422
- Short control cycles, clock rate with SSI up to 2 MHz / with BiSS up to 10 MHz

Order code

Shaft version

8.F3653 . XXXX . XX 12
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, \varnothing 36 mm
1 = clamping flange, IP67
2 = synchro flange, IP67
3 = clamping flange, IP65
4 = synchro flange, IP65
- b** Shaft ($\varnothing \times L$), with flat
1 = \varnothing 6 x 12,5 mm
2 = \varnothing 6,35 (1/4") x 12,5 mm
3 = \varnothing 8 x 15 mm
4 = \varnothing 9,5 x 15,875 mm (3/8" x 5/8")
5 = \varnothing 10 x 20 mm

- c** SSI or BiSS Interface / Power supply
1 = 5 V DC
2 = 10 ... 30 V DC
3 = 5 V DC and 2048 ppr SinCos track
4 = 10 ... 30 V DC and 2048 ppr SinCos
5 = 5 V DC, with sensor output for monitoring the voltage on the encoder
6 = 5 V DC and 2048 ppr SinCos, with sensor output for monitoring the voltage on the encoder
7 = 5 V DC and 2048 ppr incremental signals RS422
8 = 10 ... 30 V DC and 2048 ppr incremental signals RS422

- d** Type of connection
1 = cable, tangential (1 m PUR)
3 = cable, tangential (5 m PUR)
8 = M12 connector, 8-pin, axial ¹⁾

- f** Resolution
A = 10 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST
- optional on request
- Ex 2/22
- seawater-resistant
- special cable length

Order code

Hollow shaft

8.F3673 . XXXX . XX 12
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, \varnothing 36 mm, IP65
1 = with torque stop, short
2 = with stator coupling
3 = with torque stop, long
- b** Hollow shaft
1 = \varnothing 6 mm
2 = \varnothing 6.35 mm (1/4")
3 = \varnothing 8 mm
4 = \varnothing 10 mm
(Blind hollow shaft)

- c** SSI or BiSS Interface / Power supply
1 = 5 V DC
2 = 10 ... 30 V DC
3 = 5 V DC and 2048 ppr SinCos track
4 = 10 ... 30 V DC and 2048 ppr SinCos
5 = 5 V DC, with sensor output for monitoring the voltage on the encoder
6 = 5 V DC and 2048 ppr SinCos, with sensor output for monitoring the voltage on the encoder
7 = 5 V DC and 2048 ppr incremental signals RS422
8 = 10 ... 30 V DC and 2048 ppr incremental signals RS422

- d** Type of connection
1 = cable, tangential (1 m PUR)
3 = cable, tangential (5 m PUR)
8 = M12 connector, 8-pin, axial ²⁾

- f** Resolution
A = 10 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST
- optional on request
- Ex 2/22
- seawater-resistant
- special cable length

1) Only with output circuits 1 and 2
2) Only with output circuits 1 and 2 in combination with blind hollow shaft 10 mm

Absolute Encoders – Singleturn

Compact, optical	Sendix F3653 / F3673 (Shaft / Hollow shaft)	SSI / BiSS
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 8 mm	8.0000.1101.0808
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	M12, suitable for connection type 8	05.CMB 8181-0
Cordset, pre-assembled with 2 m PVC cable	M12, suitable for connection type 8	05.WAKS8-2/P00

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Maximum speed		
Shaft- or blind hollow shaft version without shaft seal (IP65)		12 000 min ⁻¹ 10 000 min ⁻¹ (continuous op.)
Shaft version (IP67) or hollow shaft version (IP65) with shaft seal		10 000 min ⁻¹ 8 000 min ⁻¹ (continuous op.)
Starting torque	without shaft seal with shaft seal (IP67)	< 0.007 Nm < 0.01 Nm
Shaft load capacity	radial axial	40 N 20 N
Weight		ca. 0.2 kg
Protection to EN 60 529	housing side shaft side	IP 67 IP 65 (solid shaft version opt. IP67)
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +90°C
Materials	shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast PUR
Shock resistance acc. to EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics		
Supply voltage		5 V DC \pm 5% or 10 ... 30 V DC
Current consumption (no load)	5 V DC 10 ... 30 V DC	max. 60 mA max. 30 mA
Reverse connection of the supply voltage		yes
CE compliant acc. to		EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3
RoHS compliant acc. to		EU guideline 2002/95/EG

Interfaces

General interface characteristics

Output driver	RS485 transceiver type
Permissible load/channel	max. \pm 30 mA
Signal level	high typ 3.8 V low with $I_{Load} = 20$ mA typ 1.3 V
Short-circuit proof outputs	yes ¹⁾

SSI interface

Resolution, singleturn	10 ... 17 bit
Code	Binary or Gray
SSI clock rate	\leq 14 bit 50 kHz ... 2 MHz \geq 15 bit 50 kHz ... 125 kHz
Monoflop time	\leq 15 μ s
Note: If the clock cycle starts within the monoflop time a second data transfer begins with the same data. If the clock cycle starts after the monoflop time the cycle begins with the new values. The update rate is dependent on the clock speed, data length and monoflop time.	
Data refresh rate	up to 14 bit \leq 1 μ s up to 15 ... 17 bit 4 μ s
Status and Parity bit	on request

BiSS interface

Resolution, singleturn	10 ... 17 bit
Code	Binary
BiSS Clock rate	up to 10 MHz
Max. update rate	< 10 μ s, depends on the clock rate and the data length
Data refresh rate	\leq 1 μ s
Note: – Bi-directional, programmable parameters are: resolution, code, direction, alarms and warnings – CRC data verification	

Incremental outputs (A/B), 2048 ppr

	SinCos	RS422 TTL-compatible
Max. frequency -3dB	400 kHz	400 kHz
Signal level	1 Vpp (\pm 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof	yes ¹⁾	yes ¹⁾

1) Short circuit proof to 0V or to output when supply voltage correctly applied

Absolute Encoders – Singleturn

Compact, optical	Sendix F3653 / F3673 (Shaft / Hollow shaft)	SSI / BiSS
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SET input

Input	active high	
Input type	comparator	
Signal level (+V = supply voltage)	high	min. 60 % of +V, max: +V
	low	max. 30 % of +V
Input current	< 0.5 mA	
Min. pulse duration (SET)	10 ms	
Input Delay	1 ms	
New position data readable after	1 ms	
Internal processing time	200 ms	

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms, after which the new position data can be read via SSI or BiSS. Once the SET function has been triggered, the encoder requires an internal processing time of typ. 200 ms; during this time the supply voltage must not be switched off.

The SET function should be carried out whilst the encoder is at rest.

Power-ON

After Power-ON the device requires a time of approx. 150 ms before valid data can be read.

Hot plugging of the encoder should be avoided.

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The status output will switch to LOW.

Response time (DIR input)	1 ms
----------------------------------	------

Status output

Output driver	Open Collector, internal pull up resistor 22 kOhm
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Permissible load	max. 20 mA
-------------------------	------------

Signal level	high +V
	low < 1 V

Active	low
---------------	-----

The status output serves to display various alarm or error messages. In normal operation the status output is HIGH (Open Collector with int. pull-up 22 kOhm).

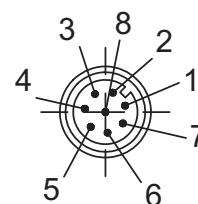
An active status output (LOW) displays:
LED fault (failure or ageing) – over-temperature – undervoltage
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

Terminal assignment

Interface	Type of connection	Features	Cable
1, 2	1, 3	SSI or BiSS, SET, DIR, Status	Signal: GND +V +C -C +D -D SET DIR Stat PE
			Cable colour: WH BN GN YE GY PK BU RD VT Shield
1, 2	8	SSI or BiSS, SET, DIR	M12 connector
			M12 connector: 1 2 3 4 5 6 7 8 PH
3, 4	1, 3	SSI or BiSS, SET, DIR, 2048 SinCos	Signal: GND +V +C -C +D -D SET DIR A A inv B B inv PE
			Cable colour: WH BN GN YE GY PK BU RD BK VT GY-PK RD-BU Shield
5	1, 3	SSI or BiSS, SET, DIR, Sensor outputs	Signal: GND +V +C -C +D -D SET DIR GND _{sens} +V _{sens} PE
			Cable colour: WH BN GN YE GY PK BU RD VT RD-BU Shield
6	1, 3	SSI or BiSS, 2048 SinCos Sensor outputs	Signal: GND +V +C -C +D -D GND _{sens} +V _{sens} A A inv B B inv PE
			Cable colour: WH BN GN YE GY PK BU RD BK VT GY-PK RD-BU Shield
7, 8	1, 3	SSI or BiSS, 2048 incr. RS422	Signal: GND +V +C -C +D -D A A inv B B inv PE
			Cable colour: WH BN GN YE GY PK BK VT GY-PK RD-BU Shield

- +V: Encoder power supply +V DC
- GND: Encoder power supply ground GND (0V)
- +C, -C: Clock signal
- +D, -D: Data signal
- SET: Set input. The current position becomes defined as position zero.
- DIR: Direction input: If this input is active, output values are counted backwards (decrease) when the shaft is turning clockwise.
- Stat: Status output
- PE: Protective earth
- PH: Plug connector housing (Shield)
- A, A inv: Incremental output channel A
- B, B inv: Incremental output channel B

Top view of mating side, male contact base:



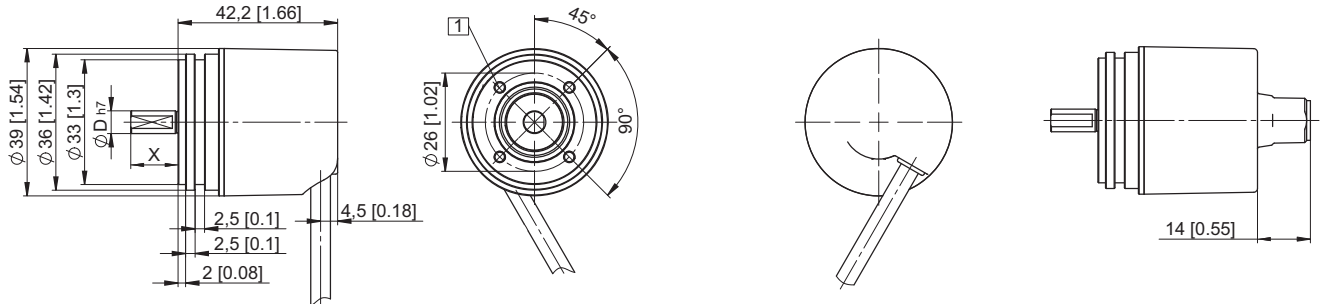
M12 connector, 8-pin

Absolute Encoders – Singleturn

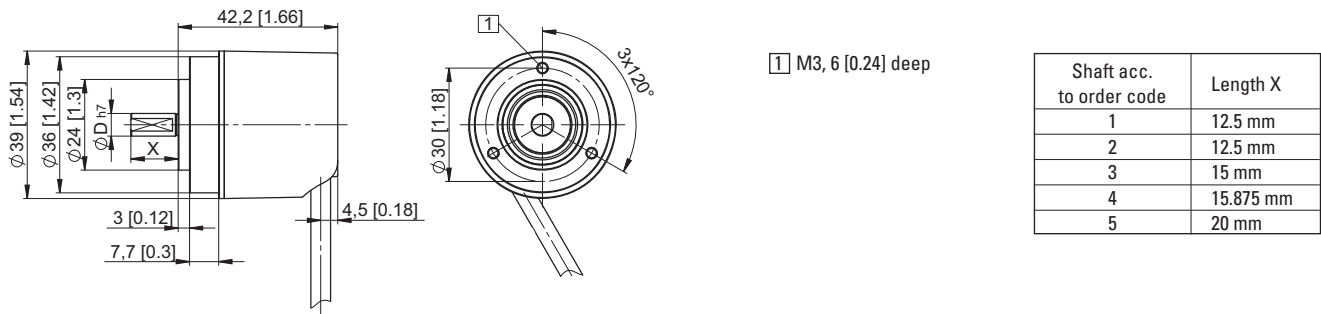
Compact, optical	Sendix F3653 / F3673 (Shaft / Hollow shaft)	SSI / BiSS
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Dimensions shaft version:

Synchro flange, \varnothing 36 mm



Clamping flange, \varnothing 36 mm



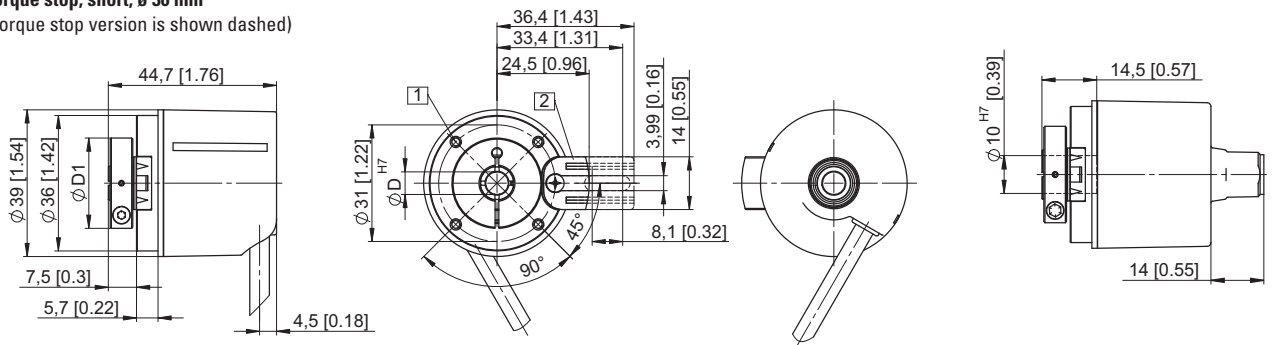
Shaft acc. to order code	Length X
1	12.5 mm
2	12.5 mm
3	15 mm
4	15.875 mm
5	20 mm

Absolute Encoders
Singleturn

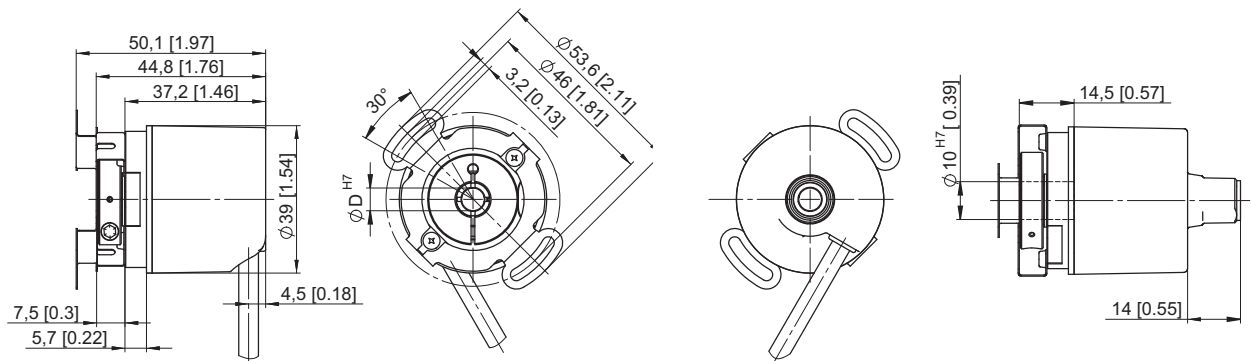
Dimensions hollow shaft version:

With torque stop, short, \varnothing 36 mm

(Long torque stop version is shown dashed)



With stator coupling, \varnothing 36 mm



Insertion depth for blind hollow shaft 14,5 mm

- 1 M2.5, 5 [0.2] deep
- 2 Torque stop slot, Recommendation: Cylindrical pin DIN7, \varnothing 4 mm

Hollow shaft acc. to order code	D1
1	\varnothing 24 mm
2	\varnothing 24 mm
3	\varnothing 25.5 mm
4	\varnothing 25.5 mm

Absolute Encoders – Singleturn

Compact, optical	Sendix F3658 / F3678 (Shaft / Hollow shaft)	CANopen
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The Sendix F36 singleturn with CANopen interface boasts exceptional ruggedness and compact dimensions. With a size of just 36 x 42 mm it offers a shaft or a blind hollow shaft of up to 10 mm. Its high-precision optical sensor technology can achieve a resolution of up to 16 bits.



Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.

Ex 2/22 cULus pending



CANopen

Safety-Lock™	Temperature -40° +85°	High IP value IP	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater-resistant version on request

Reliable and magnetically insensitive

- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +85°C

Up-to-the-minute Fieldbus performance

- CANopen with current encoder profile
- LSS services for configuration of the node address and baud rate
- Variable PDO mapping in the memory

Order code 8.F3658 . XX 2 X . 21 1 2
Shaft version Type a b c d e

If for each parameter of an encoder the **underlined preferred option** is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, ø 36 mm
 1 = clamping flange, IP67
 2 = synchro flange, IP67
 3 = clamping flange, IP65
4 = synchro flange, IP65
- b** Shaft (ø x L), with flat
 1 = ø 6 x 12,5 mm
 2 = ø 6,35 (1/4") x 12,5 mm
3 = ø 8 x 15 mm
 4 = ø 9,5 x 15,875 mm (3/8" x 5/8")
 5 = ø 10 x 20 mm

- c** Interface / Power supply
2 = CANopen DS301 V4.02 / 10 ... 30 V DC
- d** Type of connection
1 = cable, tangential (1 m PUR)
 3 = cable, tangential (5 m PUR)

- optional on request*
 - Ex 2/22
 - seawater-resistant
 - special cable length

- e** Fieldbus profile
21 = CANopen Encoder profile DS406 V3.2

Order code 8.F3678 . XX 2 X . 21 1 2
Hollow shaft Type a b c d e

If for each parameter of an encoder the **underlined preferred option** is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, ø 36 mm, IP65
 1 = with torque stop, short
2 = with stator coupling
 3 = with torque stop, long

- b** Blind hollow shaft
4 = ø 10 mm
 5 = ø 6 mm
 6 = ø 6.35 mm (1/4")
 7 = ø 8 mm

- c** Interface / Power supply
2 = CANopen DS301 V4.02 / 10 ... 30 V DC
- d** Type of connection
1 = cable, tangential (1 m PUR)
 3 = cable, tangential (5 m PUR)

- optional on request*
 - Ex 2/22
 - seawater-resistant
 - special cable length

- e** Fieldbus profile
21 = CANopen Encoder profile DS406 V3.2

Absolute Encoders – Singleturn

Compact, optical	Sendix F3658 / F3678 (Shaft / Hollow shaft)	CANopen
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 8 mm	8.0000.1101.0808
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Programming set

including:	<ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0015
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

 Absolute Encoders
Singleturn

Mechanical characteristics

Maximum speed		
shaft- or blind hollow shaft version		12 000 min ⁻¹
without shaft seal (IP65)		10 000 min ⁻¹ (continuous op.)
shaft version (IP67) or hollow shaft version		10 000 min ⁻¹
(IP65) with shaft seal		8 000 min ⁻¹ (continuous op.)
Starting torque	without shaft seal	< 0.007 Nm
	with shaft seal (IP67)	< 0.01 Nm
Shaft load capacity	radial	40 N
	axial	20 N
Weight		ca. 0.2 kg
Protection to EN 60 529	housing side	IP 67
	shaft side	IP 65 (solid shaft version opt. IP67)
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +85°C
Materials	shaft / hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast
	cable	PUR
Shock resistance acc. to EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

Diagnostic LED (two-colour, red/green)

LED ON or blinking	red	Error display
	green	Status display

General electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 80 mA
Reverse connection of the supply voltage (U_b)	yes
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, and EN 61000-6-3

Interface characteristics CANopen

Resolution Singleturn	1 ... 65536 (16 bit), scaleable: 1 ... 65536
Default value Singleturn	8192 (13 bit)
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	CANopen profile DS406 V3.2 with manufacturer-specific add-ons LSS-Service DS305 V2.0
Baud rate	10 ... 1000 kbit/s (Software configurable)
Node address	1 ... 127 (Software configurable)
Termination switchable	Software configurable
LSS Protocol	CIA LSS protocol DS305 Global command support for node address and baud rate Selective commands via attributes of the identity object

Absolute Encoders – Singleturn

Compact, optical

Sendix F3658 / F3678 (Shaft / Hollow shaft)

CANopen

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device-specific profiles like the encoder profile DS406 V3.2 are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CANbus. When switching the device on, all parameters, which have been saved on a flash memory to protect them against power failure, are loaded again.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position**, **speed** as well as the **status of the working area**.

The encoders are available with a connector or a cable connection.

The device address and baud rate can be set/modified by means of the software.

The two-colour LED located on the back indicates the operating or fault status of the CAN bus, as well as the status of the internal diagnostics.

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated. Class C2 functionality:

- NMT Slave
- Heartbeat Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus / Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- 1 work area with upper and lower limit and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing
- User interface with visual display of bus and failure status 1 LED two colours
- Customer-specific memory - 16 Bytes
- Customer-specific protocol

“Watchdog controlled” device

LSS Layer Setting Services DS305 V2.0

- Global support of Node-ID and baud rate
- Selective protocol via identity object (1018h)

CANbus Connection

The CANopen encoders are equipped with a Bus trunk line in various lengths and can be terminated in the device.

The devices do not have an integrated T-coupler nor they are looped internally and must therefore only be used as end devices.

If possible, drop lines should be avoided, as in principle they lead to signal reflections. As a rule the reflections caused by the drop lines are not critical, if they have completely decayed before the point in time when the scanning occurs.

The sum of all the drop lines should not, for a particular baud rate, exceed the maximum length L_u .

L_u < 5 m cable length for 125 Kbit

L_u < 2 m cable length for 250 Kbit

L_u < 1 m cable length for 1 Mbit

When used as a drop line, the termination resistor should not be activated.

For a network with 3 encoders and 250 Kbit the maximum length of the drop line/ encoder must not exceed 70 cm.

Terminal assignment

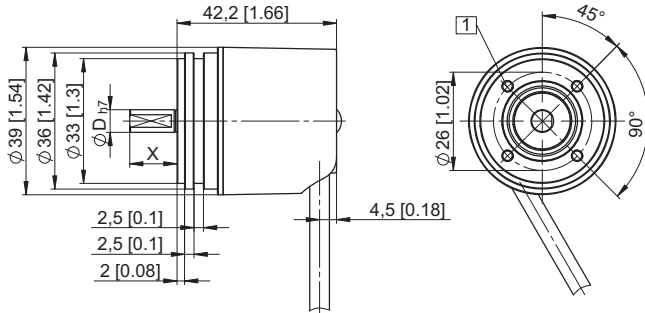
Signal:	+U _B	0 V	CAN GND	CAN High	CAN Low
Cable colour:	BN	WH	GY	GN	YE

Absolute Encoders – Singleturn

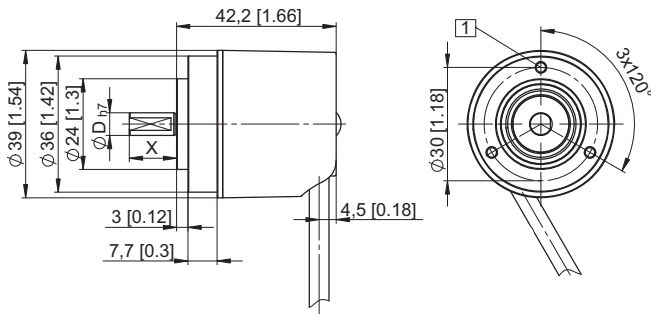
Compact, optical	Sendix F3658 / F3678 (Shaft / Hollow shaft)	CANopen
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Dimensions shaft version

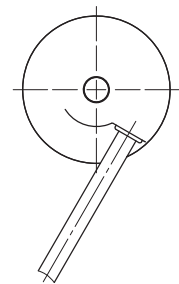
Synchro flange, \varnothing 36 mm



Clamping flange, \varnothing 36 mm



1 M3, 6 [0.24] deep

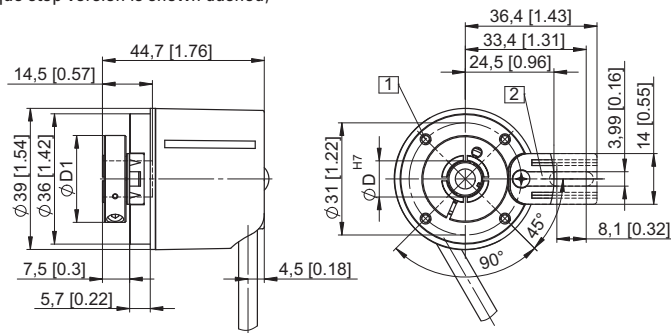


Absolute Encoders
Singleturn

Dimensions hollow shaft version

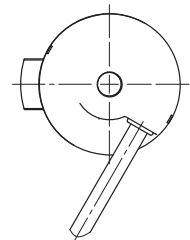
With torque stop, short, \varnothing 36 mm

(Long torque stop version is shown dashed)

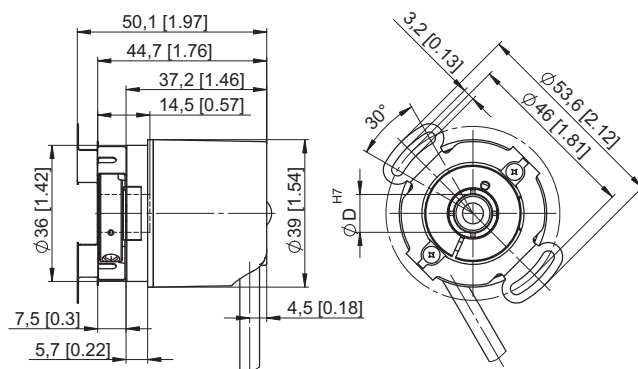


1 M2.5, 5 [0.2] deep

2 Torque stop slot
Recommendation:
Cylindrical pin DIN7, \varnothing 4 mm



With stator coupling, \varnothing 36 mm



Hollow shaft acc. to order code	D1
1	\varnothing 24 mm
2	\varnothing 24 mm
3	\varnothing 25.5 mm
4	\varnothing 25.5 mm

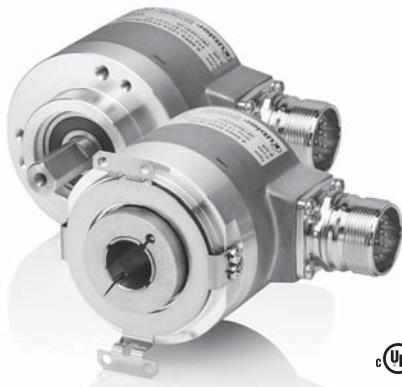
Insertion depth for blind hollow shaft 14,5 mm

Absolute Encoders – Singleturn

Functional Safety, optical

Sendix 5853 SIL / 5873 SIL (Shaft / Hollow shaft)

SSI / BiSS + SinCos



The absolute singleturn encoders Sendix 5853 SIL and 5873 SIL are perfectly suited for use in safety-related applications up to SIL3 according to DIN EN ISO 61800-5-2 or PLe to DIN EN ISO 13849.

The extra strong Safety-Lock™ Design interlocked bearings, the high integration density of the components based on OptoASIC technology and the rugged die-cast housing make these devices ideal also for demanding applications outdoors.



Safety-Lock™



High rotational speed



Temperature -40° + 90°



High IP value



High shaft load capacity



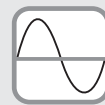
Shock / vibration resistant



Magnetic field proof



Reverse polarity protection



SinCos



Optical sensor



Seawater-resistant version on request

Certified Safety

- Certified by the BGIA - Institute for Occupational Safety and Health
- Suitable for SIL3 applications acc. to DIN EN ISO 61800-5-2
- Suitable for PLe applications acc. to DIN EN ISO 13849
- SSI or BiSS interface with incremental SinCos tracks

Flexible

- Shaft and Hollow shaft versions
- Cable and connector variants
- Various mounting options available

Order code Shaft version

8.5853SIL
Type

1 **X** **X** **X** . **X** **X** **2** **X**

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange
1 = Clamping flange, ø 58 mm, IP65
- b** Shaft (ø x L)
2 = 10 x 20 mm, with flat
A = 10 x 20 mm, with feather key shaft slot
- c** Output circuit / Power supply
3 = SSI/BiSS + 2048 ppr SinCos track / 5 V DC
4 = SSI/BiSS + 2048 ppr SinCos / 10 ... 30 V DC

- d** Type of connection
1 = axial cable (1 m PVC)
2 = radial cable (1 m PVC)
3 = M23 connector, 12-pin, axial
4 = M23 connector, 12-pin, radial
- e** Code
B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

- f** Resolution ¹⁾
A = 10 bit ST
1 = 11 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST

- g** Input / output ¹⁾
2 = SET, DIR inputs
additional status output
- h** Options (Service)
1 = No Option
2 = Status LED
3 = SET button and Status LED
- optional on request
- seawater-resistant
- special cable length

Order code Hollow shaft

8.5873SIL
Type

X **X** **X** **X** . **X** **X** **2** **X**

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.

- a** Flange
A = with torque stop set, IP65
B = with stator coupling, IP65
- b** Hollow shaft
3 = ø 10 mm
4 = ø 12 mm
5 = ø 14 mm
K = ø 10 mm, tapered shaft
- c** Output circuit / Power supply
3 = SSI/BiSS + 2048 ppr SinCos track / 5 V DC
4 = SSI/BiSS + 2048 ppr SinCos track / 10 ... 30 V DC

- d** Type of connection
2 = radial cable (1 m PVC)
4 = M23 connector, 12-pin, radial
E = tangential cable outlet
cable length 1 m (PVC cable)
- e** Code
B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

- f** Resolution ¹⁾
A = 10 bit ST
1 = 11 bit ST
2 = 12 bit ST
3 = 13 bit ST
4 = 14 bit ST
7 = 17 bit ST

- g** Input / output ¹⁾
2 = SET, DIR inputs
additional status output
- h** Options (Service)
1 = No Option
2 = Status LED
3 = SET button and Status LED
- optional on request
- seawater-resistant
- special cable length

1) Resolution, preset value and count direction are factory-programmable

Absolute Encoders – Singleturn

Functional Safety, optical	Sendix 5853 SIL / 5873 SIL (Shaft / Hollow shaft)	SSI / BiSS + SinCos
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Connection Technology		
Connector, self-assembly (straight)	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002.0031

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Notes regarding "Functional Safety"
These encoders are suitable for use in safety-related systems up to SIL3 to DIN EN ISO 61800-5-2 and PLe to DIN EN ISO 13849 in conjunction with controllers or evaluation units, which possess the necessary functionality. Additional functions can be found in the operating manual.

Mechanical characteristics	
Max. speed, shaft version	
without shaft seal (IP65) up to 70°C	12 000 min ⁻¹ , 10 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C	11 000 min ⁻¹ , 9 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
Max. speed, hollow shaft version	
without shaft seal (IP65) up to 70°C	9 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C	8 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}	4 000 min ⁻¹ , 2 000 min ⁻¹ (continuous)
Starting torque, shaft version	
without shaft seal (IP65)	< 0.01 Nm
with shaft seal (IP67)	< 0.05 Nm
Starting torque, hollow shaft version	
without shaft seal (IP65)	< 0.03 Nm
Moment of inertia	
Shaft version	4.0 x 10 ⁻⁶ kgm ²
Hollow shaft version	7.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft radial / axial	80 N / 40 N
Weight	approx. 0.45 kg
Protection EN 60 529 housing side shaft side	IP67 IP65, opt. IP67
Working temperature range	-40°C ... +90°C ¹⁾
Materials shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast housing PVC
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

Electrical characteristics	
Supply voltage	5 V DC ± 5% or 10 ... 30 V DC
Current consumption 5 V DC (w/o output load) 10 ... 30 V DC	max. 70 mA max. 45 mA
Reverse polarity protection of the power supply (U_B)	yes
UL certified	File 224618
Conforms to CE requirements acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

General Interface characteristics	
Output driver	RS485 transceiver type
Permissible load / channel	max. 20 mA
Signal level high low at I _{Load} = 20 mA	typ 3.8 V typ 1.3 V
Short circuit proof outputs	yes ²⁾

SSI Interface	
Singleturn resolution	10 ... 14 bit and 17 bit ³⁾
Code	Binary or Gray
SSI clock rate ≤ 14 bit ≥ 15 bit	50 kHz ... 2 MHz 50 kHz ... 125 kHz
Monoflop time	≤ 15 μs
Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.	
Data refresh rate ≤ 14 bit 15 ... 17 bit	< 1 μs 4 μs
Status and Parity bit	optional on request

Output SinCos (A / B) 2048 ppr (Optional incremental track)	
Max. frequency -3dB	400 kHz
Signal level	1 V _{pp} (± 20%)
Short circuit proof	yes

SET input or SET button	
Input	active high
Input type:	comparator
Signal level high low	min: 60 % of +V, max: +V max: 25 % of +V (Supply voltage)
Input current	< 0.5 mA
Min. pulse duration (SET)	10 ms
Timeout after SET signal	14 ms
Reaction Time (DIR input)	1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET button (with a pencil, ball-point pen or similar). Other preset values can be factory-programmed. The SET input has a signal delay time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the LED is ON.

DIR input
A HIGH signal switches the direction of rotation from the default CW to CCW. This function can also be factory-programmed to be inverted. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

1) Cable version: -30°C ... +90°C
2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied
3) Other options upon request

Absolute Encoders – Singleturn

Functional Safety, optical	Sendix 5853 SIL / 5873 SIL (Shaft / Hollow shaft)	SSI / BiSS + SinCos
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Power-ON delay
 After Power-ON the encoder requires a time of approx. 150 ms before valid data can be read.

LED
 The optional LED (red) serves to display various alarm or error messages. In normal operation the LED is OFF.
 If the LED is ON this indicates:
 - Sensor error, singleturn or multiturn (soiling, glass breakage etc.)
 - LED error, failure or ageing
 - Over- or under-temperature
 In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

Terminal assignment

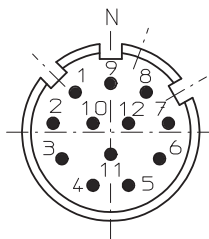
For output circuit 3 or 4 (2 control inputs, SinCos)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

- +V: Encoder Power Supply +V DC
- GND: Encoder Power Supply Ground (0V)
- +C, -C: Clock signal
- +D, -D: Data signal
- SET: Set input. The current position is set to zero
- DIR: Direction input: If this input is active, the output values are counted backwards (decrease) when the shaft is turning clockwise.

- Stat: Status output
- PE: Protective earth
- PH: Plug connector housing (shield)
- A, Ainv: Sine output (incremental)
- B, Binv: Cosine output (incremental)

Top view of mating side, male contact base



M23 connector, 12-pin

Absolute Encoders – Singleturn

Functional Safety, optical **Sendix 5853 SIL / 5873 SIL (Shaft / Hollow shaft)** **SSI / BiSS + SinCos**

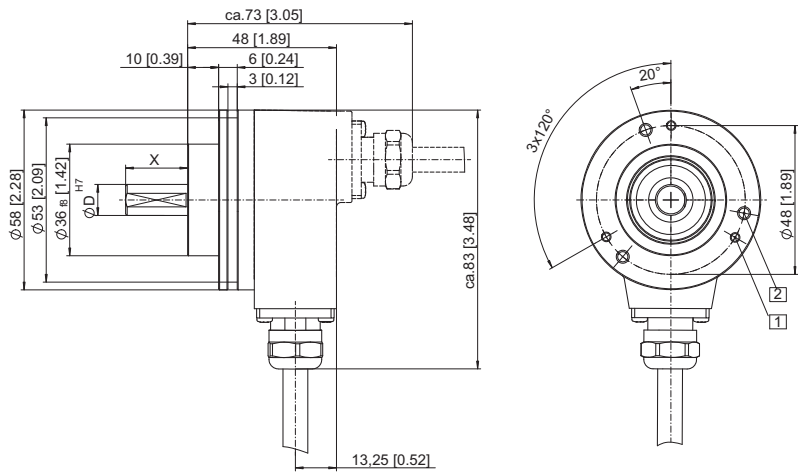
Dimensions shaft version

Clamping flange

Flange type 1 with shaft type 2

(Drawing with cable)

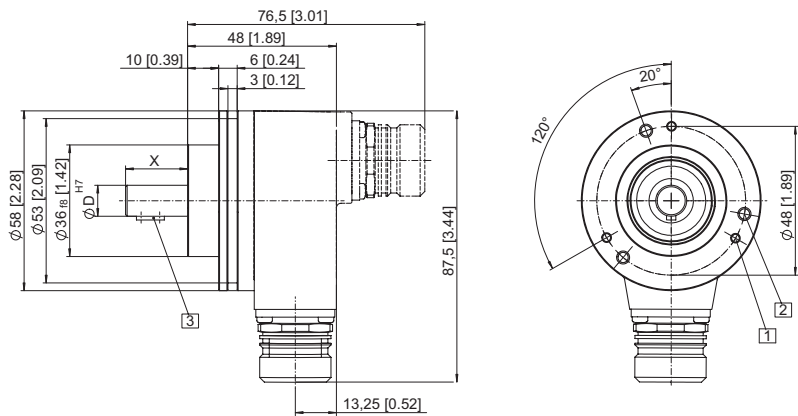
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



Flange type 1 with shaft type A

(Drawing with M23 connector)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep
- 3 Feather key DIN 6885 - A - 3x3x6
optional: Feather key DIN 6885 - A - 4x4x8



Absolute Encoders
Singleturn

Absolute Encoders – Singleturn

Functional Safety, optical

Sendix 5853 SIL / 5873 SIL (Shaft / Hollow shaft)

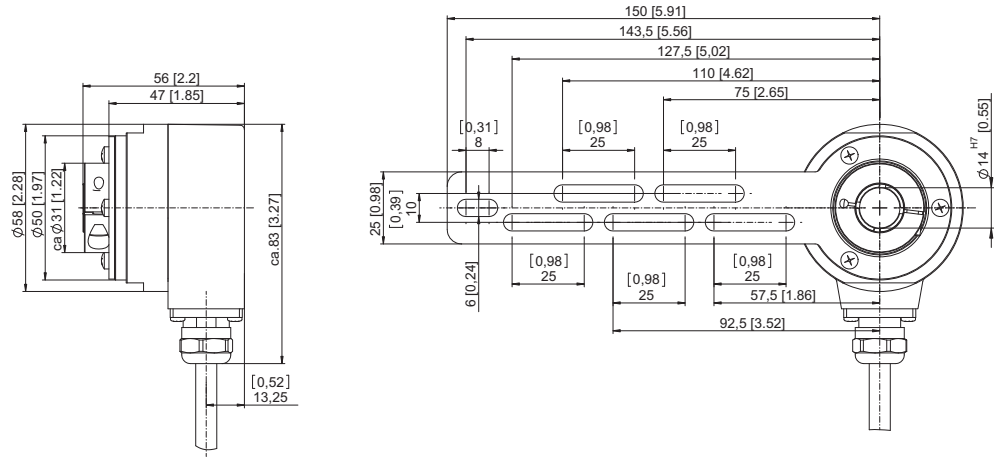
SSI / BiSS + SinCos

Dimensions hollow shaft version

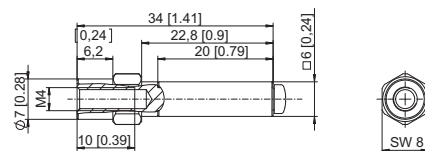
With torque stop set

Flange type A

(Drawing with cable)



Torque pin with rectangular sleeve
with M4 thread, 10 mm deep

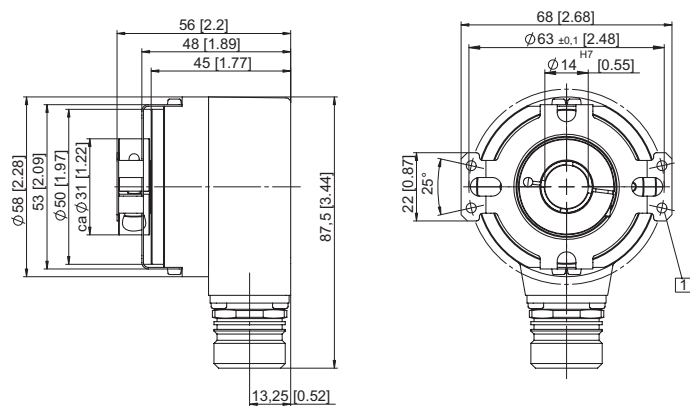


Flange with stator coupling and hollow shaft

Flange type B

(Drawing with M23 connector)

1 for (4x) M3 screw



Flange with stator coupling and tapered shaft

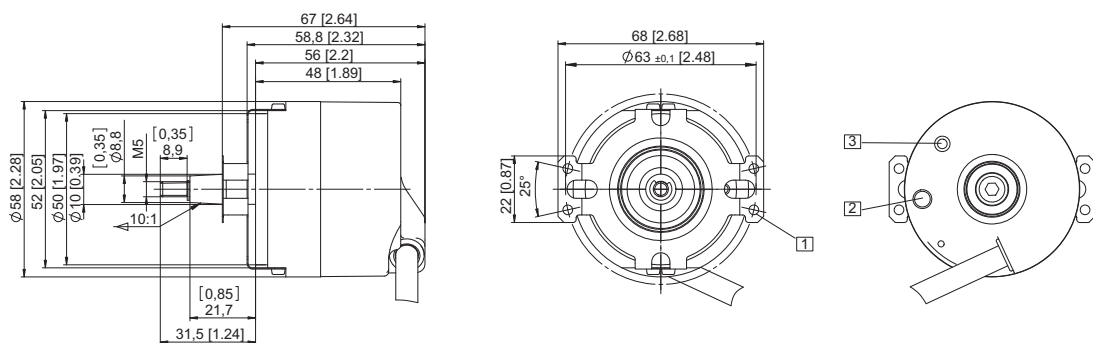
Flange type B

(Drawing with tangential cable outlet)

1 for (4x) M3 screw

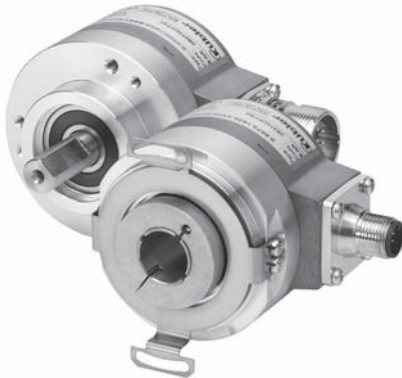
2 Status LED

3 SET button



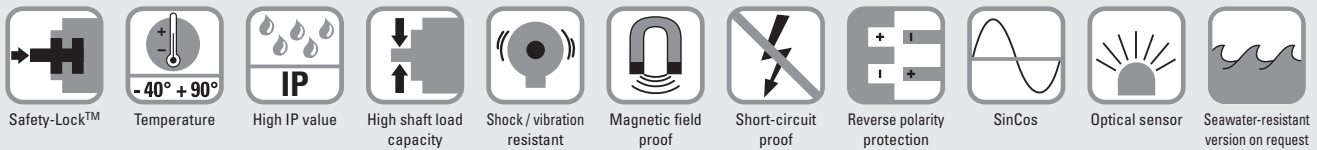
Absolute Encoders - Singleturn

Standard, optical **Sendix 5853 / 5873 (Shaft / Hollow shaft)** **SSI / BiSS**



The Sendix 5853 and Sendix 5873 singleturn encoders with SSI or BiSS interface and optical sensor technology can achieve a resolution of max. 17 bits.

These encoders are also available with an optional SinCos output or RS422 incremental track.



Reliable and magnetically insensitive

- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +90°C

Versatile

- High-precision with a data refresh rate of the position value $\leq 1\mu\text{s}$
- High-resolution feedback in real-time via incremental outputs SinCos and RS422
- Short control cycles, clock rate with SSI up to 2 MHz / with BiSS up to 10 MHz

Absolute Encoders Singleturn

Order code

8.5853 . XXXX . XX2X
 Type a b c d e f g h

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange</p> <p>1 = clamping flange, ø 58 mm, IP65
 2 = synchro flange, ø 58 mm, IP65
 3 = clamping flange, ø 58 mm, IP67
 4 = synchro flange, ø 58 mm, IP67
 5 = square flange, 63,5 mm (2,5"), IP65
 7 = square flange, 63,5 mm (2,5"), IP67</p> <p>b Shaft (ø x L), with flat</p> <p>1 = 6 x 10 mm¹⁾
 2 = 10 x 20 mm²⁾
 3 = 6,35 x 22,2 mm (1/4" x 7/8")
 4 = 9,5 x 22,2 mm (3/8" x 7/8")</p> | <p>c Interface / Power supply</p> <p>1 = SSI or BiSS / 5 V DC
 2 = SSI or BiSS / 10 ... 30 V DC
 3 = SSI or BiSS, 2048 ppr SinCos / 5 V DC
 4 = SSI or BiSS, 2048 ppr SinCos / 10 ... 30 V DC
 5 = SSI or BiSS / 5 V DC, with sensor output for monitoring the voltage on the encoder
 6 = SSI oder BiSS, 2048 ppr SinCos / 5 V DC, with sensor output for monitoring the voltage on the encoder
 7 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC
 8 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 10 ... 30 V DC
 9 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC, with sensor output for monitoring the voltage on the encoder</p> | <p>d Type of connection</p> <p>1 = axial cable (1 m PVC)
 2 = radial cable (1 m PVC)
 3 = M23 connector, 12-pin, axial
 4 = M23 connector, 12-pin, radial
 5 = M12 connector, 8-pin, axial⁴⁾
 6 = M12 connector, 8-pin, radial⁴⁾</p> <p>e Code</p> <p>B = SSI, Binary
 C = BiSS, Binary
 G = SSI, Gray</p> <p>f Resolution³⁾</p> <p>A = 10 bit ST
 1 = 11 bit ST
 2 = 12 bit ST
 3 = 13 bit ST
 4 = 14 bit ST
 7 = 17 bit ST</p> | <p>g Inputs / Outputs³⁾</p> <p>2 = SET, DIR input
 additional status output</p> <p>h Options (Service)</p> <p>1 = no option
 2 = Status LED
 3 = SET button and Status LED</p> <p><i>optional on request</i></p> <p>- Ex 2/22
 - seawater-resistant
 - special cable length</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

1) Preferred type only in conjunction with Flange type 2
 2) Preferred type only in conjunction with Flange type 1
 3) Resolution, preset value and counting direction factory-programmable
 4) Can be combined only with output circuits 1 and 2

Absolute Encoders - Singleturn

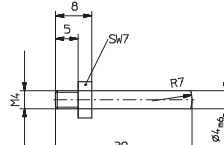
Standard, optical **Sendix 5853 / 5873 (Shaft / Hollow shaft)** **SSI / BiSS**

Order code Hollow shaft	8.5873 Type	. X X X X . X X 2 X a b c d e f g h	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	10 by 10
a Flange 1 = with torque stop set, IP65 2 = with torque stop set, IP67 3 = with stator coupling, ø 65, IP65 4 = with stator coupling, ø 65, IP67 5 = with stator coupling, ø 63, IP65 6 = with stator coupling, ø 63, IP67	c Output circuit / Power supply 1 = SSI or BiSS / 5 V DC 2 = SSI or BiSS / 10 ... 30 V DC 3 = SSI or BiSS, 2048 ppr SinCos / 5 V DC 4 = SSI or BiSS, 2048 ppr SinCos / 10 ... 30 V DC 5 = SSI or BiSS / 5 V DC, with sensor output for monitoring the voltage on the encoder 6 = SSI oder BiSS, 2048 ppr SinCos / 5 V DC, with sensor output for monitoring the voltage on the encoder 7 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC 8 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 10 ... 30 V DC 9 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC, with sensor output for monitoring the voltage on the encoder	d Type of connection 2 = radial cable (1 m PVC) 4 = M23 connector, 12-pin, radial 6 = M12 connector, 8-pin, radial ²⁾ E = tangential cable outlet cable length 1 m (PVC cable)	g Inputs / Outputs¹⁾ 2 = SET, DIR input additional status output	h Options (Service) 1 = no option 2 = Status LED 3 = SET button and Status LED
b Hollow shaft 3 = ø 10 mm 4 = ø 12 mm 5 = ø 14 mm 6 = ø 15 mm 8 = ø 9.52 mm [3/8"] 9 = ø 12.7 mm [1/2"]		e Code B = SSI, Binary C = BiSS, Binary G = SSI, Gray	f Resolution¹⁾ A = 10 bit ST 1 = 11 bit ST 2 = 12 bit ST 3 = 13 bit ST 4 = 14 bit ST 7 = 17 bit ST	<i>optional on request</i> - Ex 2/22 - seawater-resistant - special cable length

Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M12	05.CMB-8181-0
	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M12	05.WAKS8-2/P00
	M23	8.0000.6901.0002.0031

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) Resolution, preset value and counting direction factory-programmable
2) Can be combined only with output circuits 1 and 2

Absolute Encoders - Singleturn

Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS
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Mechanical characteristics		
Max. speed, shaft version		
without shaft seal (IP65) up to 70°C	12 000 min ⁻¹ , 10 000 min ⁻¹ (continuous)	
without shaft seal (IP65) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)	
with shaft seal (IP67) up to 70°C	11 000 min ⁻¹ , 9 000 min ⁻¹ (continuous)	
with shaft seal (IP67) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)	
Max. speed, hollow shaft version		
without shaft seal (IP65) up to 70°C	9 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)	
without shaft seal (IP65) up to T _{max}	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)	
with shaft seal (IP67) up to 70°C	8 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)	
with shaft seal (IP67) up to T _{max}	4 000 min ⁻¹ , 2 000 min ⁻¹ (continuous)	
Starting torque, shaft version		
without shaft seal (IP65)	< 0.01 Nm	
with shaft seal (IP67)	< 0.05 Nm	
Starting torque, hollow shaft version		
without shaft seal (IP65)	< 0.03 Nm	
Moment of inertia		
Shaft version	3.0 x 10 ⁻⁶ kgm ²	
Hollow shaft version	6.0 x 10 ⁻⁶ kgm ²	
Load capacity of shaft		
radial	80 N	
axial	40 N	
Weight		
	approx. 0.35 kg	
Protection EN 60 529		
housing side	IP67	
shaft side	IP65, opt. IP67	
EX approval for hazardous areas		
	optional Zone 2 and 22	
Working temperature range		
	40°C ... +90°C ¹⁾	
Materials		
shaft/hollow shaft	stainless steel	
flange	aluminium	
housing	zinc die-cast housing	
cable	PVC	
Shock resistance acc. EN 60068-2-27		
	2500 m/s ² , 6 ms	
Vibration resistance acc. EN 60068-2-6		
	100 m/s ² , 55 ... 2000 Hz	

General electrical characteristics		
Power supply		
	5 V DC + 5% or 10 ... 30 V DC	
Current consumption (no load)		
5 V DC	max. 70 mA	
10 ... 30 V DC	max. 45 mA	
Reverse connection of the supply voltage (U_B)		
	yes (at 10 ... 30 V DC)	
UL-certified		
	File 224618	
CE compliant acc. to		
	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to		
	EU guideline 2002/95/EG	

General interface characteristics		
Output driver		
	RS485 transceiver type	
Permissible load / channel		
	max. 20 mA	
Signal level		
high	typ. 3.8 V	
low at I _{Load} = 20 mA	typ. 1.3 V	
Short circuit proof outputs		
	yes ²⁾	

SSI Interface		
SSI resolution		
Singleturn resolution	10 ... 14 bit and 17 bit ³⁾	
Code		
	Binary or Gray	
SSI clock rate		
≤ 14 bit	50 kHz ... 2 MHz	
≥ 15 bit	50 kHz ... 125 kHz	
Monoflop time		
	≥ 15 μs	
Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.		
Data refresh rate		
< 1 μs	up to 14 bit	
4 μs	with 15 ... 17 bit	
Status and Parity bit		
	on request	

BiSS Interface		
BiSS resolution		
Singleturn resolution	10 ... 14 bit and 17 bit, Programmable at the customer ³⁾	
Code		
	Binary	
Clock rate		
	up to 10 MHz	
Max. update rate		
	< 10 μs, depends on the clock rate and the data length	
Data refresh rate		
	≤ 1 μs	
Note:		
	<ul style="list-style-type: none"> - Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings - CRC data verification 	

SET input or SET button		
Input		
	active high	
Input type		
	comparator	
Signal level		
high	min: 60 % of +V (supply voltage)	
	max: +V	
low	max: 25 % of +V (supply voltage)	
Input current		
	< 0.5 mA	
Min. pulse duration (SET)		
	10 ms	
Timeout after SET signal		
	14 ms	
Response time (DIR input)		
	1 ms	
The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET button (with a pencil, ball-point pen or similar). Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the status output is at LOW.		

Status output and LED		
Output driver		
	Open Collector, internal pull up resistor 22 kOhm	
Permissible load		
	max. 20 mA	
Signal level		
high	+V	
low	< 1 V	
Active		
	Low	
The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (Open Collector with int. pull-up 22k).		
An active status output (LOW) displays:		
	<ul style="list-style-type: none"> - Sensor error, singleturn or multturn (soiling, glass breakage etc.) - LED fault (failure or ageing) - over- or under-temperature 	
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.		

Absolute Encoders Singleturn

1) Cable version: -30°C ... + 75°C
 2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied
 3) Other options upon request

Absolute Encoders - Singleturn

Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS
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DIR input
 A HIGH signal switches the direction of rotation from the default CW to CCW. This function can also be factory-programmed to be inverted. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

Power-ON delay
 After Power-ON the encoder requires a time of approx. 150 ms before valid data can be read.

Option Incremental outputs (A/B), 2048 ppr		
	SinCos	RS422 TTL-compatible
Max. frequency -3dB	400 kHz	400 kHz
Signal level	1 Vpp (± 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof	yes	yes

Terminal assignment

For output circuit 1 or 2 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	N/C	N/C	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

For output circuit 5 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output, sensor outputs for voltage)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	0V sens	+U _B sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

For output circuit 3, 4, 7 or 8 and type of connection 1, 2, 3 or 4 (2 control inputs, incremental track RS422 or SinCos)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

For output circuit 6 or 9 and type of connection 1, 2, 3 or 4 (SinCos or Incremental track, sensor outputs for voltage)

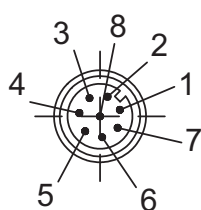
Signal:	GND	+V	+C	-C	+D	-D	A	A inv	B	B inv	0V sens	+U _B sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

For output circuit 1 or 2 and type of connection 5 or 6 (2 control inputs)

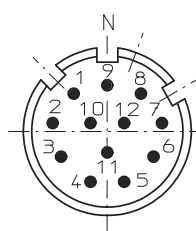
Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
M23 connector:	1	2	3	4	5	6	7	8	PH

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> +V: Encoder Power Supply +V DC GND: Encoder Power Supply Ground (0V) +C, -C: Clock signal +D, -D: Data signal SET: Set input. The current position is set to zero DIR: Direction input: If this input is active, the output values are counted backwards (decrease) when the shaft is turning clockwise. | <ul style="list-style-type: none"> Stat: Status output PE: Protective earth PH: Plug connector housing (shield) A, Ainv: Sine output (incremental) B, Binv: Cosine output (incremental) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin

Absolute Encoders - Singleturn

Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS
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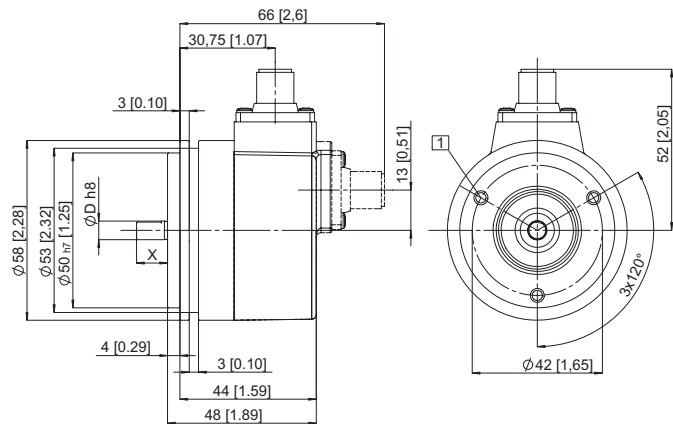
Dimensions shaft version

Synchro flange, ø 58 mm, M12, M23 connector, cable version

Flange type 2 and 4

(Drawing with M12 connector)

1 3 x M4, 6 [0.24] deep



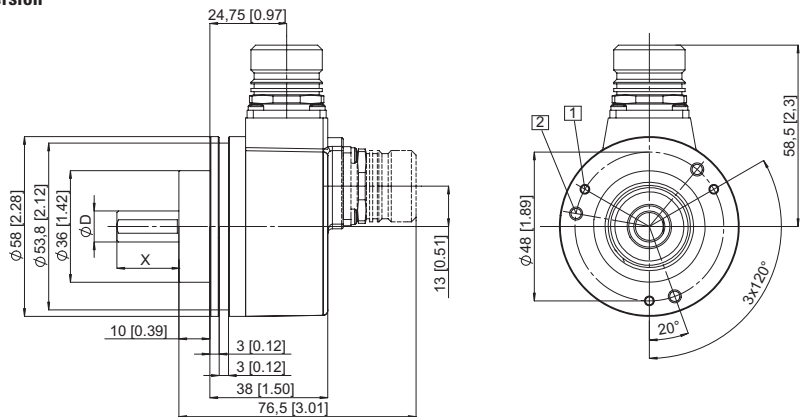
Clamping flange, ø 58 mm, M12, M23 connector, cable version

Flange type 1 and 3

(Drawing with M23 connector)

1 3 x M3, 6 [0.24] deep

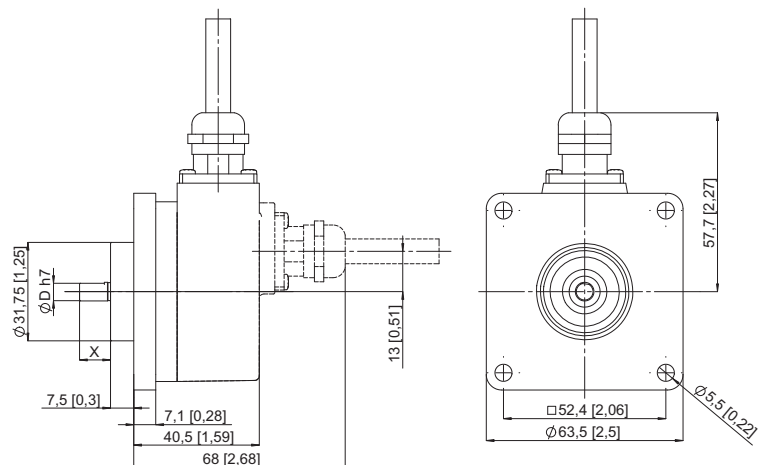
2 3 x M4, 8 [0.32] deep



Square flange, □ 63.5 mm, M12, M23 connector, cable version

Flange type 5 and 7

(Drawing with cable)



Absolute Encoders
Singleturn

Absolute Encoders - Singleturn

Standard, optical

Sendix 5853 / 5873 (Shaft / Hollow shaft)

SSI / BiSS

Dimensions hollow shaft version

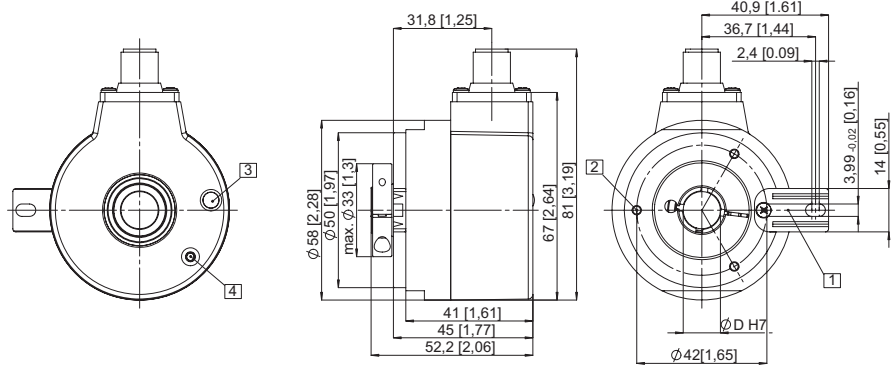
Flange with torque stop set, long, \varnothing 58 mm

M12, M23 connector, cable version

Flange type 1 and 2

(Drawing with M12 connector)

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 6 [0.24] deep
- 3 Status LED
- 4 SET button



Flange with stator coupling, \varnothing 58 mm

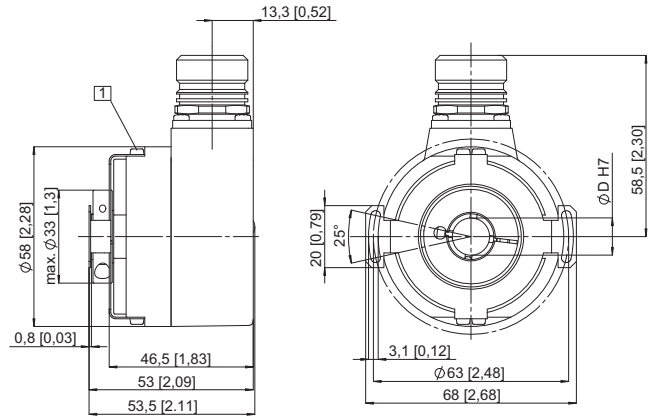
M12, M23 connector, cable version

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with M23 connector)

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)



Flange with stator coupling, \varnothing 58 mm

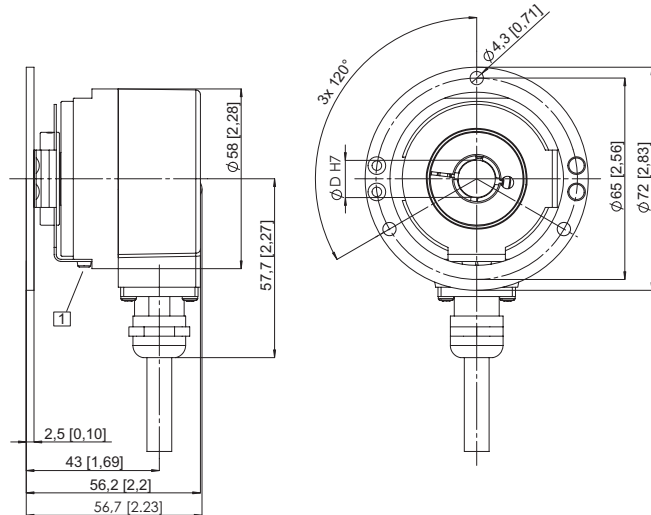
M12, M23 connector, cable version

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with cable)

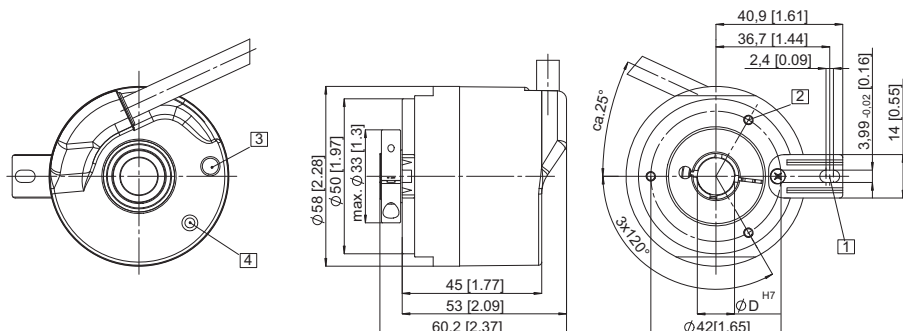
- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)



Flange with torque stop set, long, \varnothing 58 mm

tangential cable outlet

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 5.5 [0.21] deep
- 3 Status LED
- 4 SET button



Absolute Encoders - Singleturn

Standard, optical	5850 / 5870 (Shaft / Hollow shaft)	Parallel, Analogue
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The singleturn encoders 5850 and 5870 with parallel or analogue interface and optical sensor technology feature a refresh rate of the position data of 1.6 kHz.

With the parallel output a resolution of max. 14 bit can be achieved – with the analogue output the 4 ... 20 mA signals can achieve a resolution of 13 bits.



High rotational speed	Temperature -20° + 85°	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Optical sensor

Adaptable

- Power supply 5 V DC or 10 ... 30 V DC
- Cable or connector
- Gray code, Binary code or BCD code

Robust

- High shock resistance
- Temperature range from -20°C up to +85°C
- Protection rating up to max. IP66

Absolute Encoders
Singleturn

Order code Shaft version	8.5850	. XXXXX	. XXXX
	Type	a b c d	e f

<p>a Flange</p> <p>1 = clamping flange</p> <p>2 = synchro flange</p> <p>b Shaft (ø x L), with flat</p> <p>1 = 6 x 10 mm</p> <p>2 = 10 x 20 mm</p>	<p>c Output circuit/ Power supply</p> <p>3 = Parallel / 5 V</p> <p>4 = Parallel / 10 ... 30 V</p> <p>7 = 4 ... 20 mA / 5 V</p> <p>8 = 4 ... 20 mA / 10 ... 30 V</p>	<p>d Type of connection</p> <p>1 = axial cable (1 m PVC)</p> <p>2 = radial cable (1 m PVC)</p> <p>3 = M23 connector, axial, without mating connector</p> <p>5 = M23 connector, radial, without mating connector</p> <p>e Code type and Division</p> <p>G13 = 13 bit (for interface 7 and 8, 4 ... 20 mA)</p> <p>see Table 1 (for interface 3 and 4, Parallel)</p>	<p>f Options</p> <p>2 = SET¹⁾ and V/R</p> <p>3 = SET and Latch¹⁾</p> <p>4 = V/R¹⁾ and Latch</p>
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Order code Hollow shaft	8.5870	. XXXXX	. XXXX
	Type	a b c d	e f

<p>a Flange with torque stop set</p> <p>1 = and through hollow shaft</p> <p>2 = with blind hollow shaft</p> <p>Flange with stator coupling</p> <p>3 = and through hollow shaft</p> <p>4 = with blind hollow shaft</p>	<p>b Hollow shaft</p> <p>6 = ø 10 mm</p> <p>8 = ø 12 mm</p> <p>c Output circuit/ Power supply</p> <p>3 = Parallel / 5 V DC</p> <p>4 = Parallel / 10 ... 30 V DC</p>	<p>d Type of connection</p> <p>1 = radial cable (1 m PVC)</p> <p>2 = M23 connector, radial, without mating connector</p> <p>e Code type and Division</p> <p>see Table 1 (for interface 3 and 4, Parallel)</p>	<p>f Options</p> <p>2 = SET¹⁾ and V/R</p> <p>3 = SET and Latch¹⁾</p> <p>4 = V/R and Latch¹⁾</p>
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Table 1: Code type and Divisions for encoders with parallel output										Interface and Supply Voltage, version 3 or 4 (Parallel)										
Division	250	360	500	720	900	1000	1024 10 bit	1250	1440	1800	2000	2500	2880	3600	4000	4096 12 bit	5000	7200	8192 13 bit	16384 14 bit
Order code Gray/Gray- Excess	E02	E03	E05	E07	E09	E01	G10	E12	E14	E18	E20	E25	E28	E36	E40	G12	E50	E72	G13	G14
Order code Binary	B02	B03	B05	B07	B09	B01	B10	BA2	BA1	B18	B20	B25	B28	B36	B40	B12	B50	B72	B13	B14
Order code BCD	D02	D03	D05	D07	D09	D01	D10	DA2	DA1	D18	D20									

1) For Parallel version, 14 bit and 17 pin connector

Absolute Encoders - Singleturn

Standard, optical	5850 / 5870 (Shaft / Hollow shaft)	Parallel, Analogue
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M23, 12 pin for analogue interface	8.0000.5012.0000
	M23, 17 pin for parallel interface	8.0000.5042.0000
Cordset, pre-assembled with 2 m PVC cable	M23, for analogue interface	8.0000.6901.0002.0031
	M23, for parallel interface	8.0000.6741.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Max. speed	shaft version	max. 12000 min ⁻¹
	hollow shaft version	max. 6000 min ⁻¹ 1)
Rotor moment of inertia	shaft version	ca. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft version	ca. 6 x 10 ⁻⁶ kgm ²
Starting torque	shaft version	< 0.01 Nm
	hollow shaft version	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		ca. 0.4 kg
Protection acc. to EN 60 529	shaft version	IP65
	hollow shaft version	IP66
Working temperature range		-20°C ... +85°C 2) 3)
Material	shaft / hollow shaft	stainless steel
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10...2000 Hz

Electrical characteristics current interface 4 ... 20 mA		
(only shaft version)		
Sensor		
Interface type	4 ... 20 mA	4 ... 20 mA
Power supply (U_B)	10 ... 30 V DC	5 V DC
Power consumption (no load)	typ.	70 mA
	max.	84 mA
Current loop		
Power supply (U_S)	10 ... 30 V DC	
Analogue signal	4 ... 20 mA	
max. input resistance of the input circuit	200 W (U _S = 10 V), 1 kW (U _S = 30 V)	
Measuring range	0 ... 360°	
Max. error (25°C)	0.2°	
Resolution	13 bit	
Setting time	max. 2 ms	
Temperature coefficient	0.1°/10 K	
Current with scan error	≤ 3.5 mA	
Sensor component and current loop are galvanically isolated		
UL-certified	File 224618	
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to	EU-guideline 2002/95/EG	

Electrical characteristics Parallel interface		
Power supply (U_B)	5 V DC (± 5 %)	10 ... 30 V DC
Output driver	Push-Pull	Push-Pull
Power consumption (no load)	typ.	109 mA
	max.	169 mA
Permissible load / channel	max. +/- 10 mA	max. +/- 10 mA
Refresh rate of the position data	1.600/s	1.600/s
Signal level	high	min. 3.4 V
	low (I _{Load} = 10 mA)	max. 1.5 V
	low (I _{Load} = 1 mA)	max. 0.3 V
Rising edge time tr (without cable)		min. U _B - 2.8 V
		max. 1.8 V
Rising edge time tr (without cable)	max. 0.2 µs	max. 1 µs
Falling edge time tf (without cable)	max. 0.2 µs	max. 1 µs
Short circuit proof outputs	no	no
Reverse connection of the supply voltage	no	yes
UL-certified	File 224618	
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to	EU guideline 2002/95/EG	

1) For continuous operation max. 1500 min⁻¹
2) 80°C for shaft version and cable connection
3) 70°C for hollow shaft version and cable connection

Absolute Encoders - Singleturn

Standard, optical	5850 / 5870 (Shaft / Hollow shaft)	Parallel, Analogue
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Control inputs

Switching levels of the control inputs

Supply voltage	5 V DC	10 ... 30 V DC
Switching level	low	≤ 1.7 V
	high	≥ 3.4 V
		≤ 4.5 V
		≥ 8.7 V

Up/Down input to switch the counting direction

As a standard, absolute encoders deliver increasing code values when the shaft rotates clockwise (cw), when looking from the shaft side. When the shaft rotates counter-clockwise (ccw), the output delivers accordingly decreasing code values. The same applies to models with current interfaces. When the shaft rotates clockwise, the output delivers increasing current values, and decreasing values when it rotates counter-clockwise.

As long as the Up/Down input receives the corresponding signal (high), this feature is reversed. Clockwise rotation will deliver decreasing code/current values while counter-clockwise rotation will deliver increasing code/current values.

The response time is :

for 5 V DC supply voltage, 0.4 ms

for 10 ... 30 V DC supply voltage, 2 ms.

SET input

This input is used to reset (zero) the encoder. A control pulse (high) sent to this input allows the current position value to be saved as the new zero position in the encoder.

For models equipped with a current interface, the analogue output (4 ... 20 mA) will be set accordingly to the value 4 mA.

Note : After applying power to the encoder and before activating the SET input, a count direction (cw or ccw) must be clearly defined on the Up/Down input!

The response time is :

for 5 V DC supply voltage, 0.4 ms

for 10 ... 30 V DC supply voltage, 2 ms.

LATCH input

This input is used to "freeze" the current position value. The position value will be statically available on the parallel output as long as this input remains active (high).

The response time is :

for 5 V DC supply voltage, 140 µs,

for 10 ... 30 V DC supply voltage, 200 µs.

Terminal assignment

Parallel interface up to 13 bit and max. 2 options

Signal	0V	+U _B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/VR	VR/LH		⊥
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY		
Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		PH

Parallel interface, with cable, 14 bit and max. 2 options

Signal	0V	+U _B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/VR	VR/LH	14	⊥
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY	GY BN	

Parallel interface, with connector, 14 bit and 1 option

Signal	0V	+U _B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/VR/LH	14	⊥
Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	PH

Analogue interface 4 ... 20 mA with 12-pin connector

Signal	0V	+U _B	—	—	I+	I-	ST	VR					⊥						
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU							
Pin	1	2	3	4	5	6	7	8	9	10	11	12	PH						

Sig.: 1 = MSB; 2 = MSB-1; 3 = MSB-2 etc.

ST: SET input

Parallel: The current position value is stored as new zero position.
4 ... 20 mA: measured value set to 4 mA

VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning

+I: Current loop input

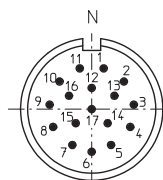
-I: Current loop output

LH: LATCH input. Active HIGH. The current position is saved and is statically available at the output.

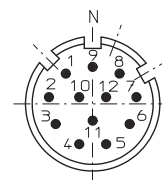
PH: Plug housing

Isolate unused outputs before initial start-up.

Top view of mating side, male contact base



M23 connector, 17 pin (parallel)



M23 connector, 12 pin (4... 20 mA)

Absolute Encoders - Singleturn

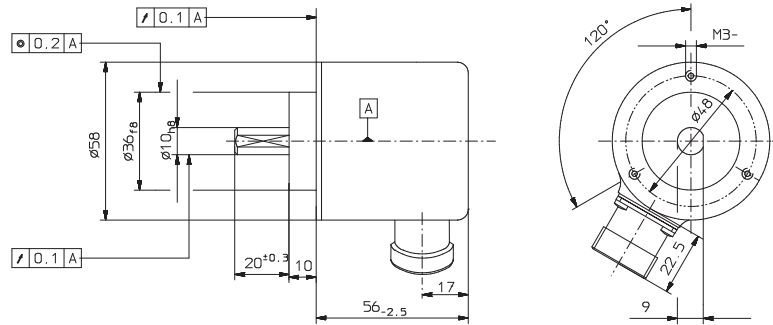
Standard, optical

5850 / 5870 (Shaft / Hollow shaft)

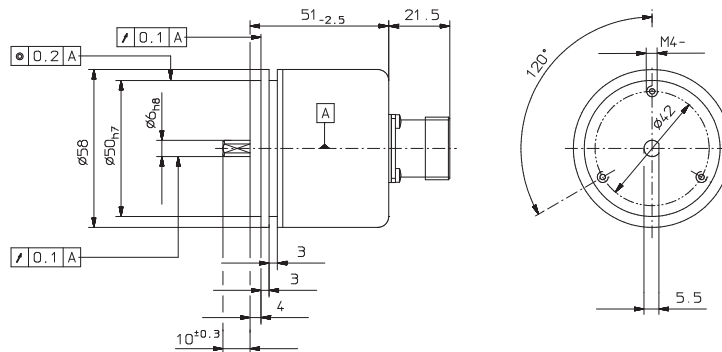
Parallel, Analogue

Dimensions shaft version

Clamping flange with shaft \varnothing 10 mm

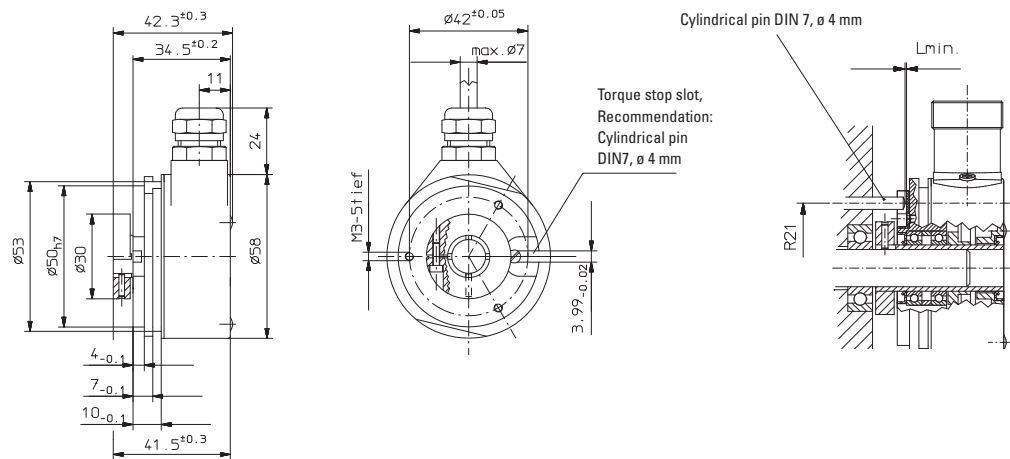


Synchro flange with shaft \varnothing 6 mm

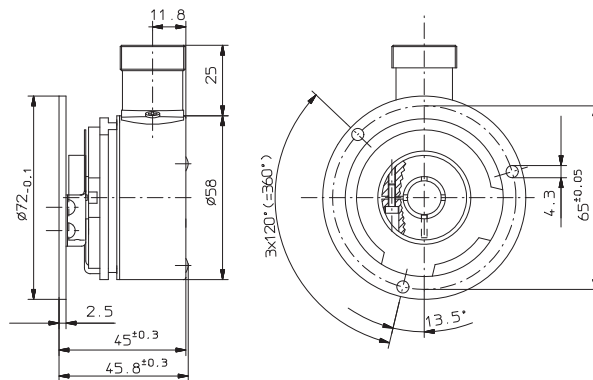


Dimensions hollow shaft version

With torque stop set
Flange type 1 and 2



With stator coupling
Flange Typ 3 and 4



Mounting advice

- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
- 2) When mounting a hollow shaft encoder, we recommend using the torque stop pin or a stator coupling.
- 3) When mounting the encoder ensure that the dimension L_{min.} is larger than the maximum axial play of the drive. Otherwise there is a danger that the device could mechanically seize up.

Absolute Encoders - Singleturn

Standard, optical	5852 / 5872 (Shaft / Hollow shaft)	Parallel, Highspeed
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The singleturn encoders 5852 and 5872 with parallel interface and optical technology achieve a very high refresh rate of the position data of 40 kHz with a resolution of max. 14 bits.



Absolute Encoders
Singleturn

High rotational speed	Temperature -20° + 85°	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Optical sensor

<p>Adaptable</p> <ul style="list-style-type: none"> • Power supply 5 V DC or 10 ... 30 V DC • Cable or connector 	<p>Fast</p> <ul style="list-style-type: none"> • Refresh rate of the position data 40 kHz
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Order code Shaft version	8.5852 <small>Type</small>	. XX <small>a</small>	XX <small>c d</small>	. XXX <small>e</small>	1
<p>a Flange, shaft</p> <p>12 = clamping flange with shaft ø 10 x 20 mm</p> <p>21 = synchro flange with shaft ø 6 x 10 mm</p>	<p>c Output circuit / Power supply</p> <p>1 = Parallel (CMOS-TTL) / 5 V DC</p> <p>3 = Parallel / 10 ... 30 V DC</p>	<p>d Type of connection</p> <p>1 = axial cable (1 m PVC)</p> <p>2 = radial cable (1 m PVC)</p> <p>3 = M23 connector, axial, without mating connector</p> <p>5 = M23 connector, radial, without mating connector</p>		<p>e Code type and Division</p> <p>E03 = 360 Gray-Excess</p> <p>E01 = 1000 Gray-Excess</p> <p>E14 = 1440 Gray-Excess</p> <p>E20 = 2000 Gray-Excess</p> <p>G10 = 1024 (10 bit) Gray</p> <p>G12 = 4096 (12 bit) Gray</p> <p>G13 = 8192 (13 bit) Gray</p> <p>G14 = 16384 (14 bit) Gray</p> <p>(Other divisions and code types on request)</p>	

Order code Hollow shaft	8.5872 <small>Type</small>	. XXXXX <small>a b c d</small>	. XXX <small>e</small>	1
<p>a Flange</p> <p>1 = with through hollow shaft</p> <p>3 = with stator coupling</p>	<p>c Output circuit / Power supply</p> <p>1 = Parallel (CMOS-TTL) / 5 V</p> <p>3 = Parallel / 10 ... 30 V</p>	<p>d Type of connection</p> <p>1 = radial cable (1 m PVC)</p> <p>2 = M23 connector, radial, without mating connector</p>		<p>e Code type and Division</p> <p>E03 = 360 Gray-Excess</p> <p>E01 = 1000 Gray-Excess</p> <p>E14 = 1440 Gray-Excess</p> <p>E20 = 2000 Gray-Excess</p> <p>G10 = 1024 (10 bit) Gray</p> <p>G12 = 4096 (12 bit) Gray</p> <p>G13 = 8192 (13 bit) Gray</p> <p>G14 = 16384 (14 bit) Gray</p> <p>(Other divisions and code types on request)</p>

Absolute Encoders - Singleturn

Standard, optical	5852 / 5872 (Shaft / Hollow shaft)	Parallel, Highspeed
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23, for parallel interface	8.0000.6741.0002

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Speed	shaft version	max. 12000 min ⁻¹
	hollow shaft version	max. 6000 min ⁻¹ 1)
Rotor moment of inertia	shaft version	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft version	approx. 6 x 10 ⁻⁶ kgm ²
Starting torque	shaft version	< 0.01 Nm
	hollow shaft version	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg
Protection acc. to EN 60 529	shaft version	IP65
	hollow shaft version	IP66
Working temperature range		-20°C ... +85°C 2)
Materials	shaft / hollow shaft	stainless steel
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10...2000 Hz

Electrical characteristics Parallel interface		
Power supply (U_B)	5 V DC (± 5 %)	10 ... 30 V DC
Output driver	CMOS-TTL	Push-Pull
Power consumption (no load)	typ.	40 mA
	max.	75 mA
Permissible load / channel	max. +0.5 / -2.0 mA	max. +/- 10 mA
Refresh rate of the position data	40.000/s	40.000/s
Signal level	high	min. 3.4 V
	low	max. 0.3 V
		min. U _B - 2.8 V
		max. 1.8 V
Falling edge time t_f (without cable)	max. 0.2 µs	max. 1µs
Rising edge time t_r (without cable)	max. 0.2 µs	max. 1µs
Short circuit proof outputs³⁾	yes	yes
Reverse connection of the supply voltage	no	yes
UL-certified	File 224618	
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to	EU guideline 2002/95/EG	

Reverse count direction

(Only with output type 3 and up to 13 bit Gray code available)

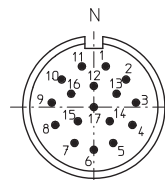
Normal operation:

Rising code values when shaft turning clockwise (cw). Falling code values when shaft turning counterclockwise (ccw)

Reverse operation:

Output MSB inverted (pin 16) instead of output MSB (pin 3) connected. Falling code values when shaft turning clockwise (cw). Rising code values when shaft turning counterclockwise (ccw), top view of shaft.

Top view of mating side, male contact base



M23 connector, 17-pin (parallel)

Terminal assignment

Signal	0V	+U _B	1	2	3	4	5	6	7	8	9	10	11	12	13	14 (V/R) ⁴⁾			
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN			
Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	PH	

Signal: 1 =MSB; 2 = MSB-1; 3 = MSB-2 etc.

PH: Plug housing

Isolate unused outputs before initial start-up.

1) For continuous operation max. 1500 min⁻¹
2) 70°C for 14 bit version

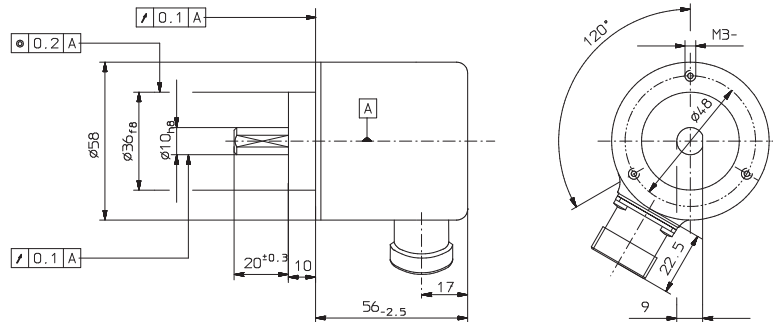
3) If supply voltage U_B correctly applied.
4) V/R only with output circuit 3 up to max. 13 bit. MSB to change the count direction

Absolute Encoders - Singleturn

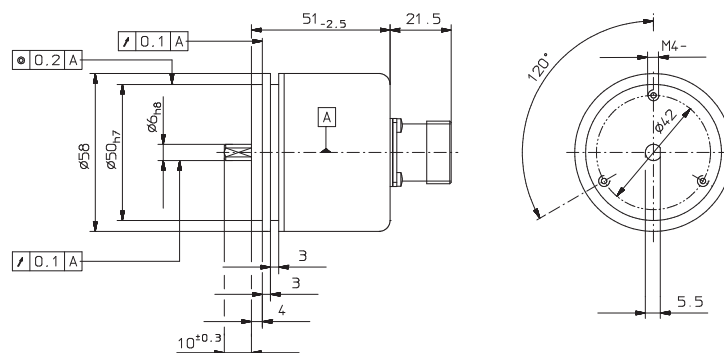
Standard, optical	5852 / 5872 (Shaft / Hollow shaft)	Parallel, Highspeed
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Dimensions shaft version

Clamping flange with shaft \varnothing 10 mm



Synchro flange with shaft \varnothing 6 mm

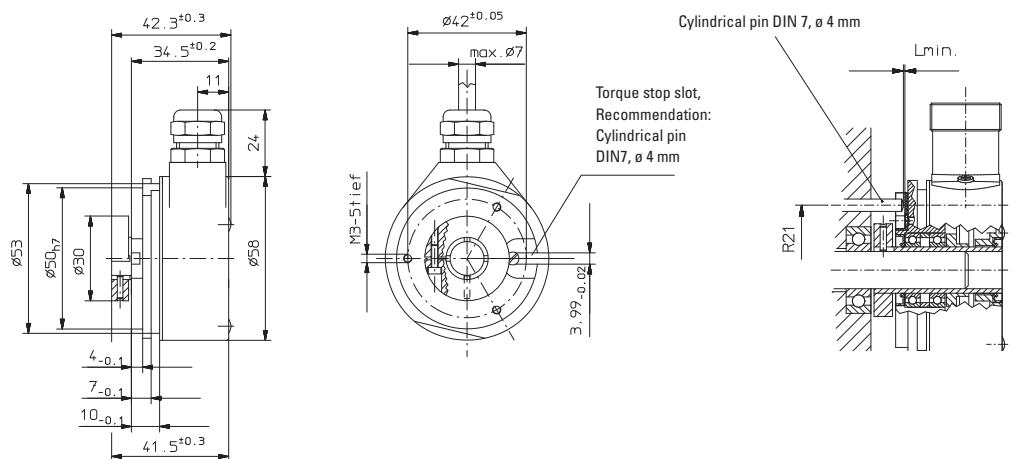


Mounting advice

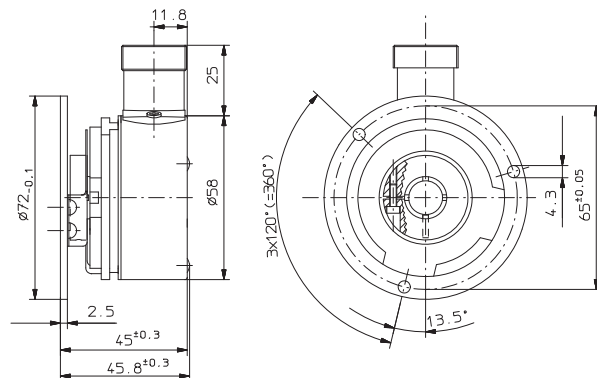
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Dimensions hollow shaft version

Flange type 1 with torque stop set



Flange type 3 with stator coupling



Mounting advice

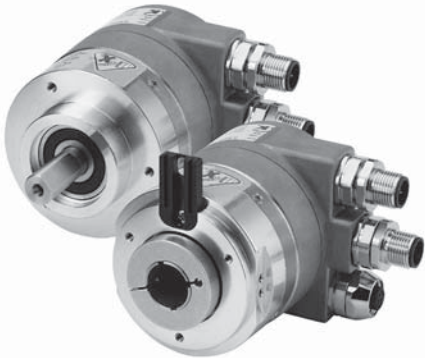
- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
- 2) When mounting a hollow shaft encoder, we recommend using the torque stop pin or a stator coupling.
- 3) When mounting the encoder ensure that the dimension Lmin. is larger than the maximum axial play of the drive. Otherwise there is a danger that the device could mechanically seize up.

Absolute Encoders - Singleturn

Standard, optical

Sendix 5858 / 5878 (Shaft / Hollow shaft)

Profibus-DP



The singleturn encoders 5858 and 5878 with Profibus interface and optical sensor technology are the ideal solution for all Profibus applications.

They offer a maximum resolution of 16 bits, divided over 360°. These encoders are available with blind hollow shaft up to 15 mm.



Reliable

- Tried-and-tested in applications with the highest demands, such as in wind energy or mobile automation.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +80°C

Flexible

- Fast, simple, error-free connection using versions with M12 connector
- Wide-ranging programming options thanks to latest encoder profile

Order code Shaft version

8.5858 . X X 3 X . 31 1 X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 1 = clamping flange, ø 58 mm, IP65
- 2 = synchro flange, ø 58 mm, IP65
- 3 = clamping flange, ø 58 mm, IP67
- 4 = synchro flange, ø 58 mm, IP67
- 5 = square flange, 63.5 mm (2.5"), IP65
- 7 = square flange, 63.5 mm (2.5"), IP67

b Shaft (ø x L), with flat

- 1 = 6 x 10 mm¹⁾
- 2 = 10 x 20 mm²⁾
- 3 = 6,35 x 22,2 mm (1/4" x 7/8")
- 4 = 9,5 x 22,2 mm (3/8" x 7/8")

d Type of connection

- 1 = removable bus terminal cover, with cable gland fitting, radial
- 2 = removable bus terminal cover, with 3 x M12 connectors, radial

f Options (Service)

- 2 = no option
- 3 = SET button

c Interface / Power supply

- 3 = Profibus-DP V0
Encoder profile V 1.1, 10 ... 30 V DC

e Fieldbus profile

- 31 = Profibus-DP V0
Encoder profile Class 2

- optional on request
- Ex 2/22
- seawater-resistant

Order code Hollow shaft

8.5878 . X X 3 X . 31 1 X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 1 = with torque stop set, IP65
- 2 = with torque stop set, IP67
- 3 = with stator coupling, ø 65, IP65
- 4 = with stator coupling, ø 65, IP67
- 5 = with stator coupling, ø 63, IP65
- 6 = with stator coupling, ø 63, IP67

b Blind hollow shaft

- 3 = ø 10 mm
- 4 = ø 12 mm
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8 = ø 9.5 mm (3/8")
- 9 = ø 12.7 mm (1/2")

d Type of connection

- 1 = removable bus terminal cover, with cable gland fitting, radial
- 2 = removable bus terminal cover, with 3 x M12 connectors, radial

f Options (Service)

- 2 = no option
- 3 = SET button

c Output circuit / Power supply

- 3 = Profibus-DP V0
Encoder profile V 1.1, 10 ... 30 V DC

e Fieldbus profile

- 31 = Profibus-DP V0
Encoder profile Class 2

- optional on request
- Ex 2/22
- seawater-resistant

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1

Absolute Encoders - Singleturn

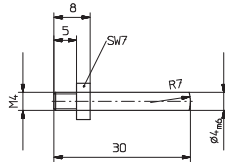
Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	Profibus-DP
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops	With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	Coupling M12 for Bus in	05.BMWS 8151-8.5
	Connector M12 for Bus out	05.BMSWS 8151-8.5
Cordset, pre-assembled with 2 m PUR cable	Connector M12 for supply voltage	05.B8141-0
	M12 cordset 6m for Bus in	05.00.6011.3211.006M
	M12 cordset 6m for Bus out	05.00.6011.3411.006M
	M12 cordset 2m for supply voltage	05.WAK4-2/S90

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Max. speed		
without shaft seal (IP65) up to 70°C		9 000 min ⁻¹ , 7 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		7 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		8 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Starting torque without shaft seal (IP65)		< 0.01 Nm
Starting torque with shaft seal (IP67)		
shaft version		< 0.05 Nm
hollow shaft version		< 0.03 Nm
Rotor moment of inertia		
shaft version		3.0 x 10 ⁻⁶ kgm ²
hollow shaft version		6.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	with bus terminal cover	approx. 0.53 kg
	with fixed connection	approx. 0.50 kg
Protection EN 60 529	housing side	IP67
	shaft side	IP65, opt. IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +80°C
Materials	shaft/hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PVC
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Power consumption (no load)	max. 110 mA
Reverse connection of the supply voltage (U_B)	yes
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

Interface characteristics Profibus-DP	
Singleturn resolution	1 ... 65536 (16 bit), scaleable
Default value	8192 (13 bit)
Code	Binary
Interface	Interface specification acc. to Profibus-DP 2.0 / Standard (DIN 19245 Part 3) / RS485 driver galvanically isolated
Protocol	Profibus Encoder Profile V1.1 Class1 and Class 2 with manufacturer-specific add-ons
Baud rate	max. 12 Mbit/s
Device address	1 ... 127 (set by rotary switches)
Termination switchable	set by DIP switches

SET button (Zero or defined value, option)
Protection against accidental activation. Button can only be operated with a ball-pen or pencil.

Diagnostic LED (yellow)
LED is ON with following errors Sensor error (Profibus error)

Profibus Encoder-Profile V1.1

The PROFIBUS-DP device profile describes the functionality of the communication and the user-specific component within the PROFIBUS field bus system. For encoders, the encoder profile is definitive. Here the individual objects are defined independent of the manufacturer. Furthermore, the profiles offer space for additional manufacturer-specific functions; this means that PROFIBUS-compliant device systems can be used now with the guarantee that they are ready for the future too.

The following parameters can be programmed

- Direction of rotation
- Scaling (Number of steps per revolution)
- Preset value
- Diagnostics mode

The following functionality is integrated

- Galvanic isolation of the bus stage with DC/DC converter
- Line driver acc. to RS485 max. 12 MB
- Address programmable via DIP switches
- Diagnostics LED
- Full Class 1 and Class 2 functionality

Absolute Encoders - Singleturn

Standard, optical

Sendix 5858 / 5878 (Shaft / Hollow shaft)

Profibus-DP

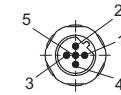
Terminal assignment terminal box

Signal	BUS IN				BUS OUT			
	B	A	0 V	+V	0 V	+V	B	A
Terminal	1	2	3	4	5	6	7	8

The shield of the connection cable must be connected over a large area via the cable gland.

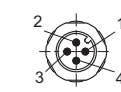
Terminal assignment M12 connector version

Bus in



Signal	-	BUS-B	-	BUS-B	shield
Pin	1	2	3	4	5

Supply voltage



Signal	U _B	-	0 V	-	
Pin	1	2	3	4	

Bus out



Signal	BUS_VDC ¹⁾	BUS-A	BUS_GND ¹⁾	BUS-B	shield
Pin	1	2	3	4	5

1) For supplying an external Profibus-DP termination resistor

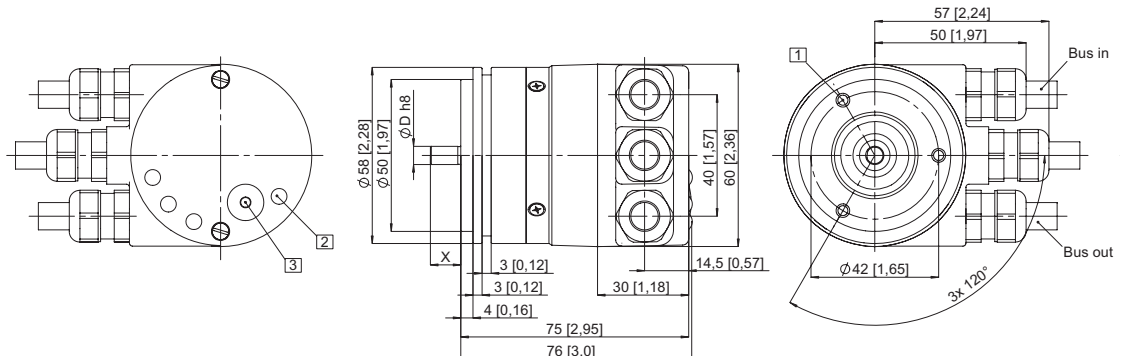
Dimensions shaft version, With removable bus terminal cover

Synchro flange, ø 58 mm

Flange type 2 and 4

(Drawing with cable)

- 1 3 x M4, 6 [0.24] deep
- 2 Status LED
- 3 SET button

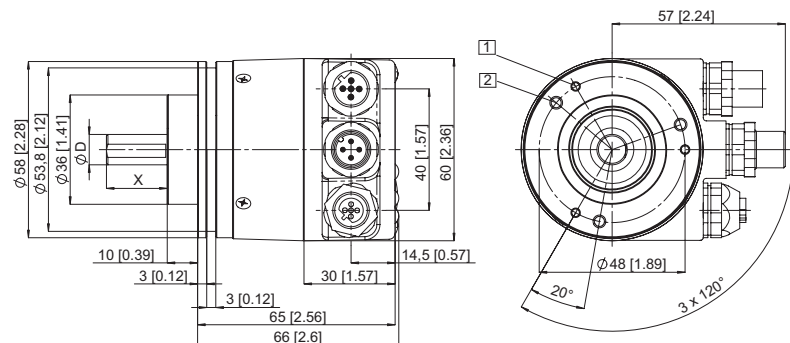


Clamping flange, ø 58 mm

Flange type 1 and 3

(Drawing with 2 x M12 connector)

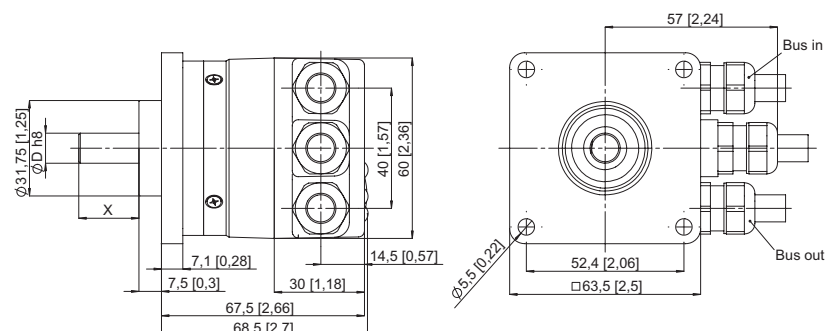
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



Square flange, □ 63.5 mm

Flange type 5 and 7

(Drawing with cable)



Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	Profibus-DP
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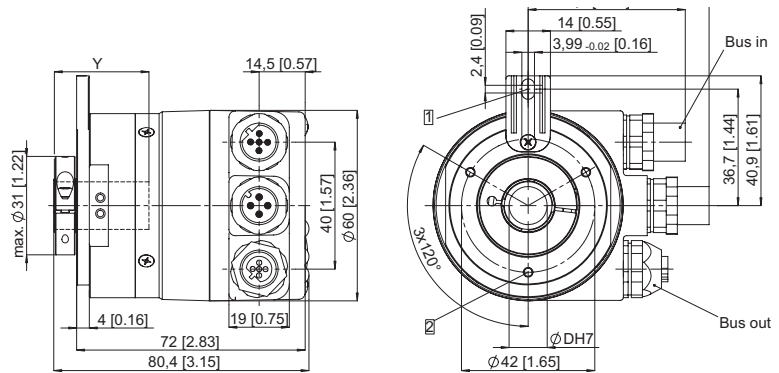
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set, long, ø 58 mm

Flange type 1 and 2

(Drawing with 2 x M12 connector)

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ø 4 mm
- 2 3 x M3, 5.5 [0.21] deep

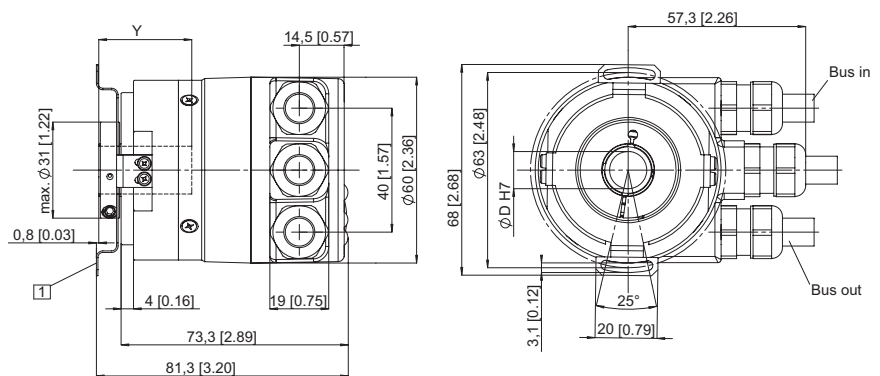


Flange with stator coupling, ø 58 mm

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm
(Drawing with cable)

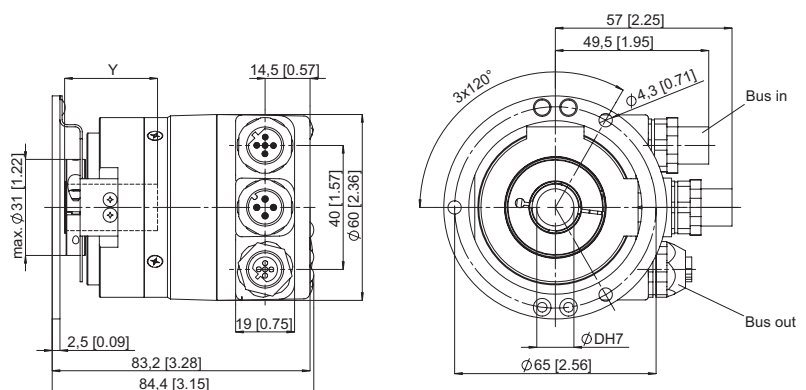
- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)



Flange with stator coupling, ø 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm
(Drawing with 3x M12 connector)



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders - Singleturn

Standard, optical

Sendix 5858 / 5878 (Shaft / Hollow shaft)

CANopen



The singleturn encoders 5858 and 5878 with CANopen interface and optical sensor technology are ideal for use in all CANopen applications.

They offer a maximum resolution of 16 bits, divided over 360°. These encoders are available with blind hollow shaft up to 15 mm.



Reliable

- Tried-and-tested in applications with the highest demands, such as in mobile automation or medical technology.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +80°C

Flexible

- Node address can be set via rotary switches or software
- Baud rate and termination can be set via DIP switches or software
- With bus terminal cover or fixed connection, as well as M12 connectors or cable connection

Order code Shaft version

8.5858 . X X 2 X . 21 1 X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a Flange**
1 = clamping flange, ø 58 mm, IP65
2 = synchro flange, ø 58 mm, IP65
 3 = clamping flange, ø 58 mm, IP67
 4 = synchro flange, ø 58 mm, IP67
 5 = square flange, 63.5 mm (2.5"), IP65
 7 = square flange, 63.5 mm (2.5"), IP67

- b Shaft (ø x L), with flat**
1 = 6 x 10 mm¹⁾
2 = 10 x 20 mm²⁾
 3 = 6,35 x 22,2 mm (1/4" x 7/8")
 4 = 9,5 x 22,2 mm (3/8" x 7/8")

- c Interface / Power supply**
2 = CANopen DS301 V4.02 /
10 ... 30 V DC

- d Type of connection**
removable bus terminal cover
 1 = cable gland radial
2 = 2 x M12 connectors
Fixed connection without bus terminal cover
 A = cable outlet PVC, radial, length 2m
 E = 1 x M12 connector, radial
 F = 2 x M12 connector, radial
 I = 1 x M23 connector, radial
 J = 2 x M23 connector, radial

- e Fieldbus profile³⁾**
21 = CANopen Encoder
profile DS406 V3.2
f Options (Service)
 2 = no options
3 = SET button
optional on request
 - Ex 2/22
 - seawater-resistant
 - special cable length

Order code Hollow shaft

8.5878 . X X 2 X . 21 1 X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a Flange**
 1 = with torque stop set, IP65
 2 = with torque stop set, IP67
 3 = with stator coupling, ø 65, IP65
 4 = with stator coupling, ø 65, IP67
5 = with stator coupling, ø 63, IP65
 6 = with stator coupling, ø 63, IP67

- b Blind hollow shaft**
 3 = ø 10 mm
4 = ø 12 mm
 5 = ø 14 mm
 6 = ø 15 mm
 8 = ø 9.5 mm (3/8")
 9 = ø 12.7 mm (1/2")

- c Interface / Power supply**
2 = CANopen DS301 V4.02 /
10 ... 30 V DC

- d Type of connection**
removable bus terminal cover
 1 = cable gland radial
2 = 2 x M12 connectors
Fixed connection without bus terminal cover
 A = cable outlet PVC, radial, length 2m
 E = 1 x M12 connector radial
 F = 2 x M12 connector radial
 I = 1 x M23 connector radial
 J = 2 x M23 connector radial

- e Fieldbus profile³⁾**
21 = CANopen Encoder
profile DS406 V3.2
f Options (Service)
 2 = no options
3 = SET button
optional on request
 - Ex 2/22
 - seawater-resistant
 - special cable length

1) Preferred type only in conjunction with Flange type 2
 2) Preferred type only in conjunction with Flange type 1

3) CAN parameters can also be factory pre-set

Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	CANopen
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	Coupling M12 for Bus in	8.0000.5116.0000
	Connector M12 for Bus out	8.0000.5111.0000
Cordset, pre-assembled with 2 m PVC cable	M12 for Bus in	8.0000.6V81.0005
	M12 for Bus out	8.0000.6V88.0005

Programming set

including:	<ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: WinXP SP3 or higher Win7 in preparation Processor: 1 GHz RAM: 512 MB Required disk space: 500 MB	8.0010.9000.0015
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Max. speed		
without shaft seal (IP65) up to 70°C		9 000 min ⁻¹ , 7 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		7 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		8 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Starting torque without shaft seal (IP65)		< 0.01 Nm
Starting torque with shaft seal (IP67)		
shaft version		< 0.05 Nm
hollow shaft version		< 0.03 Nm
Moment of inertia		
shaft version		3.0 x 10 ⁻⁶ kgm ²
hollow shaft version		6.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	with bus terminal cover	approx. 0.53 kg
	with fixed connection	approx. 0.50 kg
Protection EN 60 529	housing side	IP67
	shaft side	IP65, opt. IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +80°C ¹⁾
Materials	shaft / hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PVC
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Power consumption (no load)	max. 90 mA
Reverse connection of the supply voltage (U _B)	yes
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

Interface characteristics CANopen	
Singleturn resolution	1 ... 65536 (16 bit), scalable
Default value	8192 (13 bit)
Code	Binary
Interface	CAN High-Speed acc. to ISO 11898, Basic- and Full-CAN CAN Specification 2.0 B
Protocol	CANopen Profile DS406 V3.2 with manufacturer-specific add-ons
Baud rate	10 ... 1000 kbit/s (can be set via DIP switches / software configurable)
Node address	1 ... 127 (can be set via rotary switches / software configurable)
Termination switchable	can be set via DIP switches, software configurable

SET button (Zero or defined value, option)	
Protection against accidental activation. Button can only be operated with a ball-pen or pencil.	

Diagnostic LED (yellow)	
LED is ON with the following fault conditions	
Sensor error (internal code or LED error), too low voltage, over-temperature	

1) Cable version: -30°C ... +75°C

Absolute Encoders - Singleturn

Standard, optical

Sendix 5858 / 5878 (Shaft / Hollow shaft)

CANopen

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device specific profiles such as encoder profile DS406 V3.2 are available

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN bus.

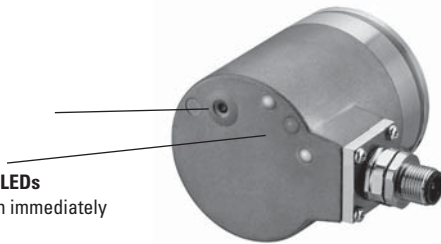
When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration** as well as the **status of the working area**.

As competitively priced alternatives, encoders are also available with a connector or a cable connection, where the device address and baud rate can be changed and configured by means of the software. The models with bus terminal cover and integrated T-coupler allow for extremely simple installation: the bus and supply voltage can be easily connected via M12 connectors. The device address can be set via 2 rotary hex switches. Furthermore, another DIP switch allows for the setting of the baud rate and switching on a termination resistor. Three LEDs located on the back indicate the operating or fault status of the CAN bus, as well as the status of an internal diagnostic.

SET button
for fast, simple on-site start-up

Green, red, yellow LEDs
Fault-free operation immediately visible on the bus.



CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated.

Class C2 functionality:

- NMT Slave
- Heartbeat Protocol
- High Resolution Sync Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus
- Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- Units for speed selectable (steps/sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 ... 32
- 2 working areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's
- Optional - 32 CAMs programmable
- Customer-specific memory - 16 Bytes

All profiles stated here: Key-features

The object 6003h "Preset" is assigned to an integrated key, accessible from the outside.

"Watchdog controlled" device

Terminal assignment

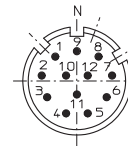
Bus terminal cover with terminal box (type of connection 1)

Direction	OUT					IN				
Signal	CAN Ground	CAN_Low (-)	CAN_High (+)	0 V power supply	+U _B power supply	0 V power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

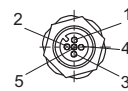
Cable connection (type of connection A)

Direction	IN				
Signal	0 V power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	0 V	+V	CL	CH	CG
Cable colour	WH	BN	YE	GN	GY

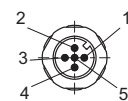
Bus in and out M23



Bus out



Bus in



Connector M23 (type of connection I) or M12 (type of connection E)

Direction	IN				
Signal	0 V power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	0 V	+V	CL	CH	CG
M23 PIN assignment	10	12	2	7	3
M12 PIN assignment	3	2	5	4	1

Bus terminal cover with Connectors 2 x M12 (type of connection 2, F or J)

Direction	OUT					IN				
Signal	CAN Ground	CAN_Low (-)	CAN_High (+)	0 V power supply	+U _B power supply	0 V power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
M23 PIN assignment	3	2	7	10	12	10	12	2	7	3
M12 PIN assignment	1	5	4	3	2	3	2	5	4	1

Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	CANopen
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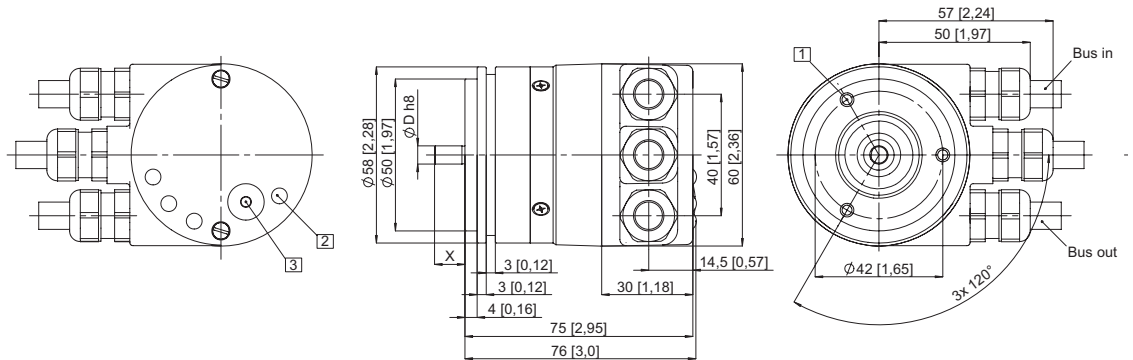
Dimensions shaft version, with removable bus terminal cover

Synchro flange, ø 58 mm

Flange type 2 and 4

(Drawing with cable)

- 1 3 x M4, 6 [0.24] deep
- 2 Status LED
- 3 SET button

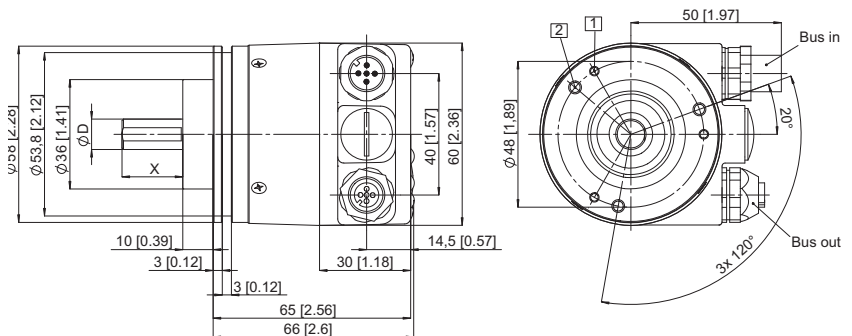


Clamping flange, ø 58 mm

Flange type 1 and 3

(Drawing with 2 x M12 connector)

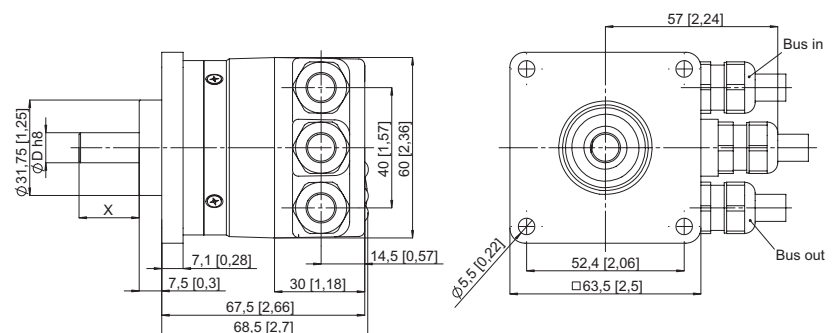
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



Square flange, □ 63.5 mm

Flange type 5 and 7

(Drawing with cable)



Absolute Encoders - Singleturn

Standard, optical

Sendix 5858 / 5878 (Shaft / Hollow shaft)

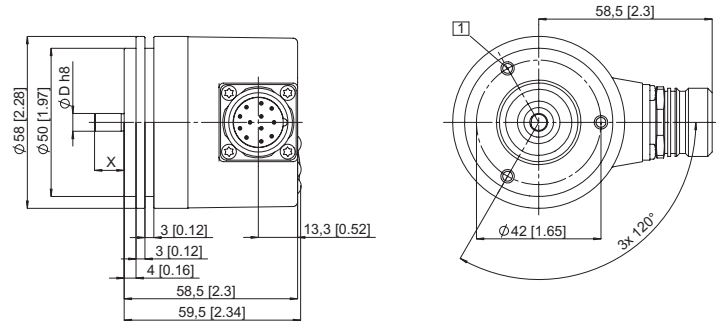
CANopen

Dimensions shaft version, with fixed connection

Synchro flange, \varnothing 58 mm

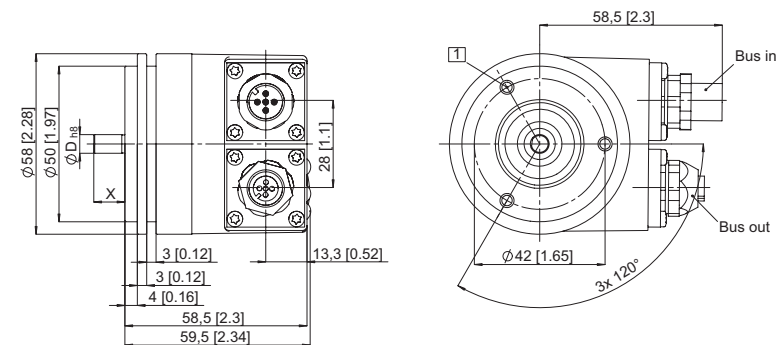
Flange type 2 and 4

(Drawing with M23 connector)



(Drawing with M12 connector)

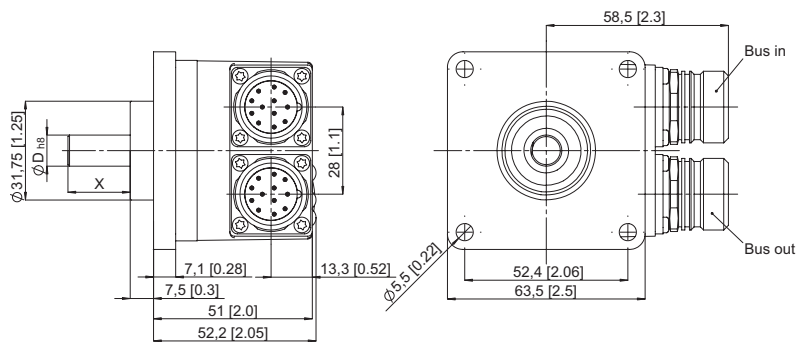
1 3 x M4, 6 [0.24] deep



Square flange, \square 63.5 mm

Flange type 5 and 7

(Drawing with 2 x M23 connector)



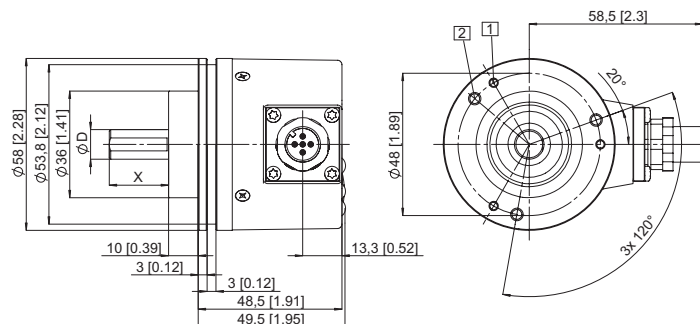
Clamping flange, \varnothing 58 mm

Flange type 1 and 3

(Drawing with M12 connector)

1 3 x M3, 6 [0.24] deep

2 3 x M4, 8 [0.32] deep



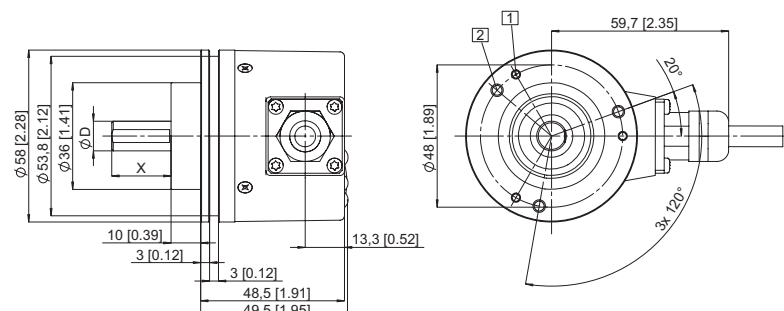
Clamping flange, \varnothing 58 mm

Flange type 1 and 3

(Drawing with cable)

1 3 x M3, 6 [0.24] deep

2 3 x M4, 8 [0.32] deep



Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	CANopen
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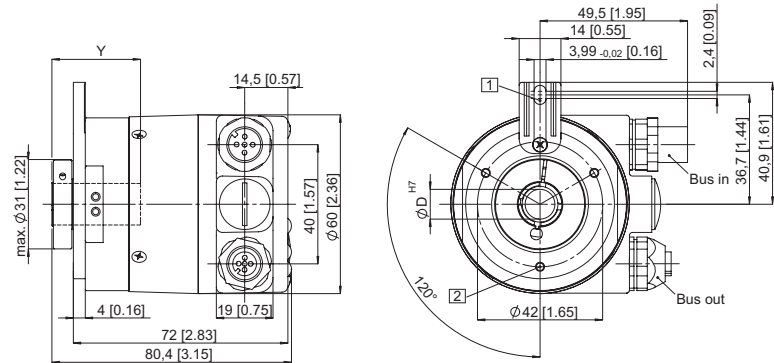
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set long, \varnothing 58 mm

Flange type 1 and 2

(Drawing with 2 x M12 connector)

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 5.5 [0.21] deep



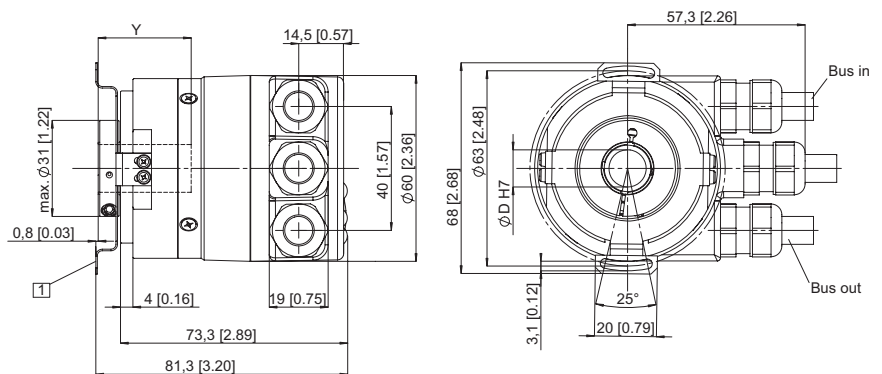
Flange with stator coupling, \varnothing 58 mm

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with cable)

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)

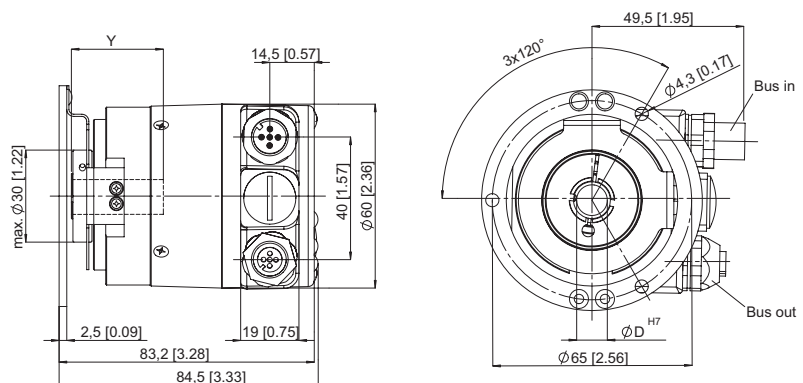


With stator coupling, \varnothing 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with 3x M12 connector)



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	CANopen
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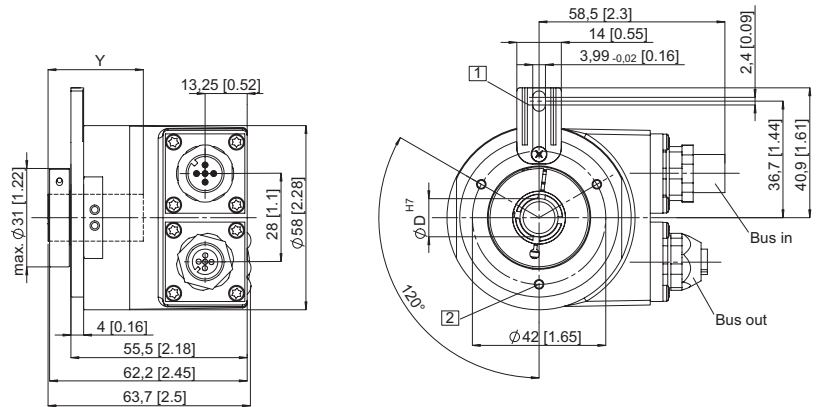
Dimensions hollow shaft version (blind hollow shaft), with fixed connection

Flange with torque stop set, long, \varnothing 58 mm

Flange type 1 and 2

(Drawing with 2 x M12 connector)

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 5.5 [0.21] deep

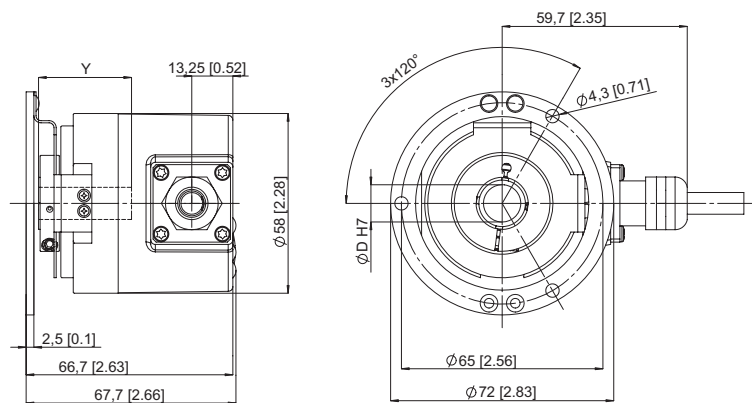


Flange with stator coupling, \varnothing 58 mm

Flange type 3 and 4

with Fixing screws 65 mm

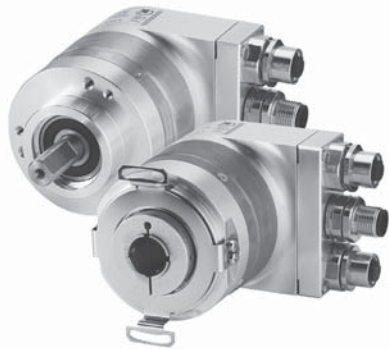
(Drawing with cable)



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	EtherCAT
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The singleturn encoders 5858 and 5878 with EtherCAT interface and optical sensor technology are ideal for use in all applications with an EtherCAT interface.

These encoders are ideally suited for use in real time applications and offer a maximum resolution of 16 bits. These encoders are available with blind hollow shaft up to 15 mm.



Safety-Lock™	High rotational speed	Temperature -40° +80°	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater-resistant version on request

Reliable

- Perfect for use in applications such as in wood and metal processing industries
- Ideally suited for use in harsh outdoor environments, thanks to IP67 protection and rugged housing construction

Flexible

- Use of CoE (CAN over EtherNet)
- Cycle time for Sync 0 pulse min. 125 µs or 62.5 µs
- Faster, easier error-free connection thanks to M12 connectors

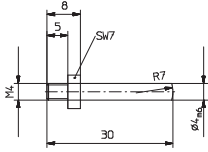
Absolute Encoders Singleturn

Order code Shaft version	8.5858 Type	. X X B 2 . B 1 12 a b c d e	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	10 by 10
a Flange	b Shaft (ø x L), with flat	c Interface / Power supply	d Type of connection	e Fieldbus profile
<u>1 = clamping flange, ø 58 mm, IP65</u> 2 = synchro flange, ø 58 mm, IP65 3 = clamping flange, ø 58 mm, IP67 4 = synchro flange, ø 58 mm, IP67 5 = square flange, 63.5 mm (2.5"), IP65 7 = square flange, 63.5 mm (2.5"), IP67	<u>1 = 6 x 10 mm¹⁾</u> <u>2 = 10 x 20 mm²⁾</u> 3 = 6,35 x 22,2 mm (1/4" x 7/8") 4 = 9,5 x 22,2 mm (3/8" x 7/8")	<u>B = EtherCAT / 10 ... 30 V DC</u>	<u>removable bus terminal cover</u> <u>2 = 3 x M12 connector</u>	<u>B1 = EtherCAT with CoE (CAN over EtherNet)</u> optional on request - Ex 2/22 - seawater-resistant

Order code Hollow shaft	8.5878 Type	. X X B 2 . B 1 12 a b c d e	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	10 by 10
a Flange	b Blind hollow shaft	c Interface / Power supply	d Type of connection	e Fieldbus profile
1 = with torque stop set, IP65 2 = with torque stop set, IP67 3 = with stator coupling, ø 65, IP65 4 = with stator coupling, ø 65, IP67 <u>5 = with stator coupling, ø 63, IP65</u> 6 = with stator coupling, ø 63, IP67	3 = ø 10 mm <u>4 = ø 12 mm</u> 5 = ø 14 mm 6 = ø 15 mm 8 = ø 9.5 mm (3/8") 9 = ø 12.7 mm (1/2")	<u>B = EtherCAT / 10 ... 30 V DC</u>	<u>removable bus terminal cover</u> <u>2 = 3 x M12 connector</u>	<u>B1 = EtherCAT with CoE (CAN over EtherNet)</u> optional on request - Ex 2/22 - seawater-resistant

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1

Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	EtherCAT
Mounting accessory for shaft encoders		
Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
Mounting accessory for hollow shaft encoders		
Cylindrical pin, long	With fixing thread	8.0010.4700.0000
for torque stops		
Connection Technology		
Connector, self-assembly (straight)	Coupling M12 for Port A and Port B Connector M12 for supply voltage	05.WASCSY4S 05.B8141-0
Cordset, pre-assembled with 2 m PUR cable	M12 for Port A and Port B M12 for power supply	05.00.6031.4411.002M 05.WAK4-2/S90

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Max. speed		
without shaft seal (IP65) up to 70°C		9 000 min ⁻¹ , 7 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		7 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		8 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Starting torque without shaft seal (IP65)		< 0.01 Nm
Starting torque with shaft seal (IP67)		
shaft version		< 0.05 Nm
hollow shaft version		< 0.03 Nm
Moment of inertia		
shaft version		3.0 x 10 ⁻⁶ kgm ²
hollow shaft version		6.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.50 kg
Protection EN 60 529	housing side	IP67
	shaft side	IP65, opt. IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +80°C
Materials	shaft / hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Power consumption (no load)	max. 110 mA
Reverse connection of the supply voltage (U _B)	yes
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

Device characteristics	
Singleturn resolution	1 ... 65535 (16 bit), (scaleable: 1 ... 65535)
Default value	8192 (13 bit)
Total resolution	scaleable from 1 up to 65535 (13 bit)
Code	binary
Protocol	EtherNet / EtherCAT

Diagnostic LED (red)
LED is ON with the following fault conditions: Sensor error (internal code or LED error), low voltage, over-temperature

Run LED (green)
LED is ON with the following conditions: Preop-, Safeop and Op-State (EtherCAT Status machine)

2 x Link LEDs (yellow)
LED is ON with the following conditions (Port A and B): Link detected

Modes
Freerun, Distributed Clock (cycle time for Sync 0 pulse min. 125 µs or 62.5 µs with restrictions), Sync-Mode

Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	EtherCAT
--------------------------	--------------------------------------------------	-----------------

General information about CoE (CAN over EtherNet)

The EtherCAT encoders support the CANopen communication profile according to DS301. In addition device-specific profiles like the encoder profile DS406 are available.

Scaling, preset values, limit switch values and many other parameters can be programmed via the EtherCAT bus.

When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration** and **temperature**, as well as the **status of the working area**.

CANopen Encoder Profile CoE (CAN over EtherNet)

The following parameters are programmable:

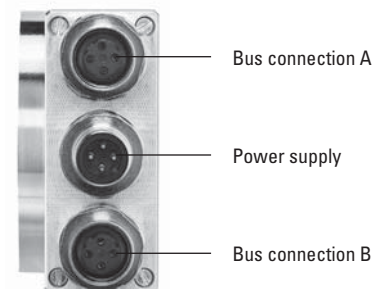
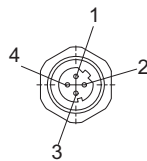
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 ... 32
- 2 working areas with 2 upper and lower limits and the corresponding output states
- PDO mapping of position, speed/velocity, acceleration and working area
- Extended error management for position sensing with integrated temperature control
- User interface with visual display of bus and fault status – 4 LEDs
- Alarm and warning messages

Terminal assignment bus

Type of connection 2, D-coded

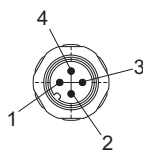
Direction	Port A				Port B			
Signal	Transmit data+	Receive data+	Transmit data -	Receive data -	Transmit data+	Receive data+	Transmit data-	Receive data-
Abbreviation	TxD+	RxD+	TxD-	RxD-	TxD+	RxD+	TxD-	RxD
M12 PIN assignment	1	2	3	4	1	2	3	4

Port A and B



Terminal assignment power supply

Signal	+U _B power supply	n.c.	0 V	n.c.
Abbreviation	+U _B	-	0 V	-
M12 PIN assignment	1	2	3	4



Absolute Encoders - Singleturn

Standard, optical

Sendix 5858 / 5878 (Shaft / Hollow shaft)

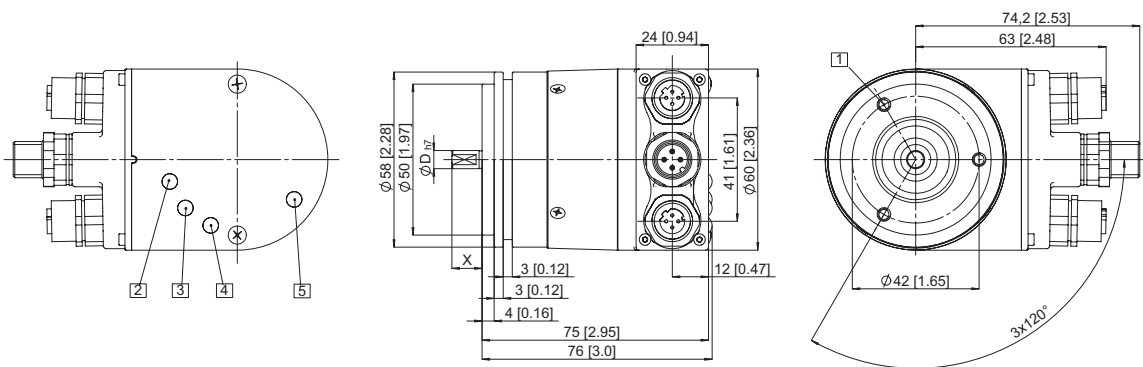
EtherCAT

Dimensions shaft version, with removable bus terminal cover

Synchro flange, ø 58 mm

Flange type 2 and 4

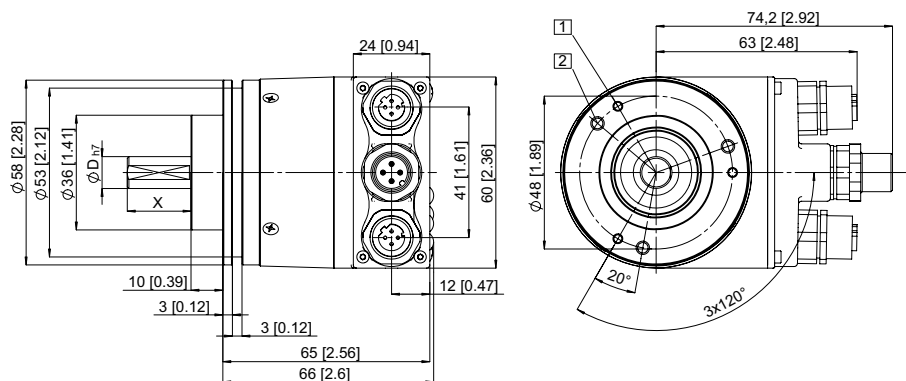
- 1 3 x M4, 6.0 [0.24] deep
- 2 LINK A, yellow LED
- 3 LINK B, yellow LED
- 4 RUN, green LED
- 5 ERR, red LED



Clamping flange, ø 58 mm

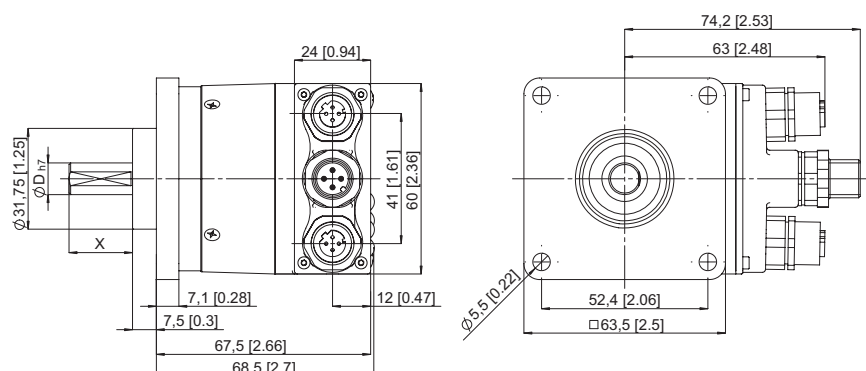
Flange type 1 and 3

- 1 3 x M3, 6.0 [0.24] deep
- 2 3 x M4, 8.0 [0.31] deep



Square flange, □ 63.5 mm

Flange type 5 and 7



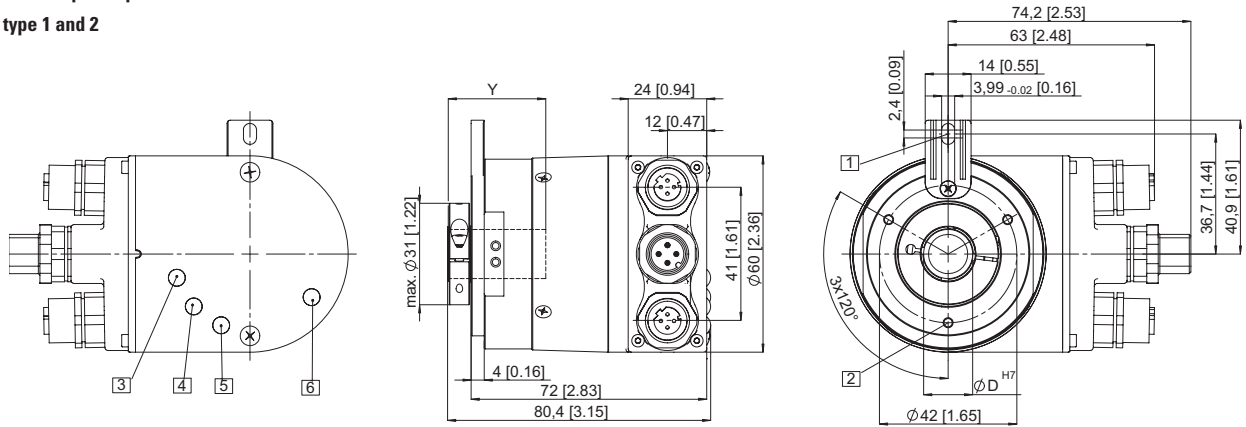
Absolute Encoders - Singleturn

Standard, optical	Sendix 5858 / 5878 (Shaft / Hollow shaft)	EtherCAT
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Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set, \varnothing 58 mm

Flange type 1 and 2

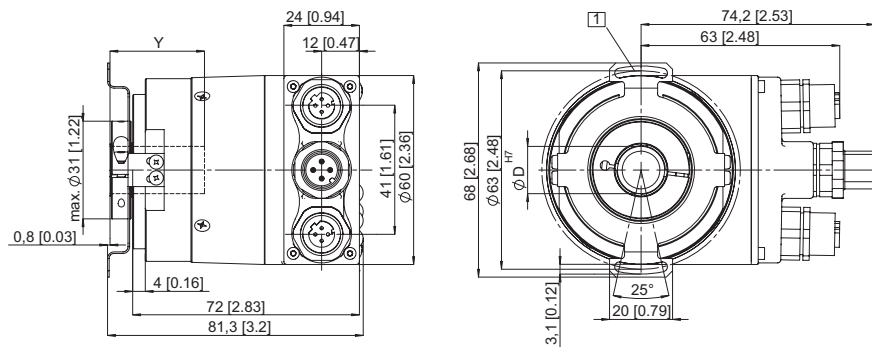


- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 5.5 [0.21] deep
- 3 LINK A, yellow LED
- 4 LINK B, yellow LED
- 5 RUN, green LED
- 6 ERR, red LED

Flange with stator coupling, \varnothing 58 mm

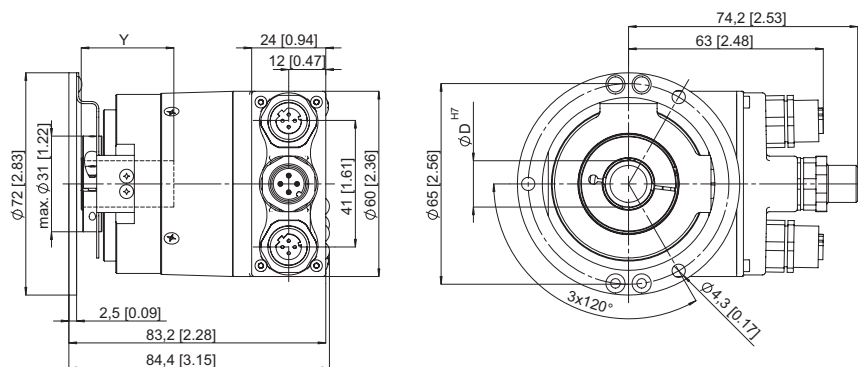
Flange type 5 and 6

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)



Flange with stator coupling, \varnothing 58 mm

Flange type 3 and 4



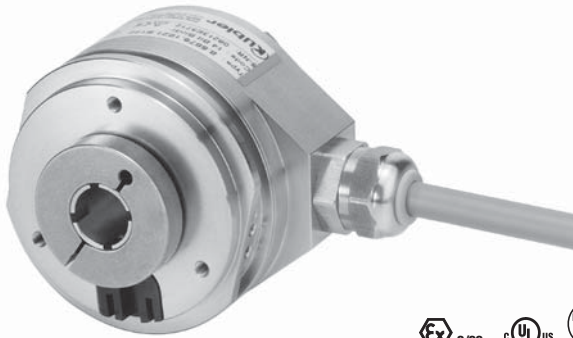
Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders - Singleturn

Stainless steel encoder, optical

5876 (Hollow shaft)

SSI, Parallel



The singleturn encoder 5876 with SSI or parallel interface and optical sensor technology boasts a hollow shaft of up to 12 mm. It offers a maximum resolution of 14 bits, divided over 360°.



Temperature



Shock / vibration resistant



Short-circuit proof



Reverse polarity protection



Optical sensor

Safe

- A protection level of IP67 as well as the wide temperature range of -20°C to +80°C allow error-free operation even under the toughest working conditions
- The stainless-steel (1.4305) housing withstands even the most extreme external influences.

Adaptable

- Available with a choice of M12 connector or as cable version
- Gray, Binary or BCD code for parallel interface
- Wide range of possible applications thanks to numerous input options

Order code

Shaft / Hollow shaft

8.5876 . **XXXXX** . **XXXX**
Type a b c d e f

a Flange

- 1 = flange with through hollow shaft
- 2 = flange with blind hollow shaft

b Hollow shaft

- 6 = ø 10 mm
- 8 = ø 12 mm

c Output circuit / Power supply

- 1 = SSI / 5 V DC
- 2 = SSI / 10 ... 30 V DC
- 3 = Parallel / 5 V DC
- 4 = Parallel / 10 ... 30 V DC

d Type of connection

- 1 = radial cable (1 m PVC cable) ¹⁾
- 2 = M12 connector radial, without mating connector ²⁾

e Code type and Division

see table 1 (at interface 3 and 4, Parallel)
 see table 2 (at interface 1 and 2, SSI)

f Options

- 2 = SET and V/R
- 3³⁾ = SET and Latch
- 4³⁾ = V/R and Latch

Table 1: Code type and divisions for encoders with parallel output

Interface and Supply Voltage, version 3 or 4 (Parallel)

Division	250	360	500	720	900	1000	1024 10 bit	1250	1440	1800	2000	2500	2880	3600	4000	4096 12 bit	5000	7200	8192 13 bit	16384 14 bit
Order code Gray / Gray-Excess	E02	E03	E05	E07	E09	E01	G10	E12	E14	E18	E20	E25	E28	E36	E40	G12	E50	E72	G13	G14
Order code Binary	B02	B03	B05	B07	B09	B01	B10	BA2	BA1	B18	B20	B25	B28	B36	B40	B12	B50	B72	B13	B14
Order code BCD	D02	D03	D05	D07	D09	D01	D10	DA2	DA1	D18	D20									

Table 2: Code type and SSI output

Interface / Supply Voltage, version 1 or 2

Division	1024 10 bit	4096 12 bit	8192 13 bit	16384 14 bit
Order code Gray	G10	G12	G13	G14
Order code Binary	B10	B12	B13	B14

1) In conjunction with parallel or SSI output

2) Only in conjunction with SSI output

3) Not with SSI interface

Absolute Encoders - Singleturn

Stainless steel encoder, optical	5876 (Hollow shaft)	SSI, Parallel
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Mechanical characteristics		
Speed ¹⁾	max. 6000 min ⁻¹	Protection acc. to EN 60 529
Rotor moment of inertia	approx. 6 x 10 ⁻⁶ kgm ²	Working temperature range
Starting torque	< 0.05 Nm	-20°C ... +80°C ²⁾
Weight	approx. 0.6 kg	Material
EX approval for hazardous areas	optional Zone 2 and 22	shaft / housing stainless steel
		Shock resistance acc. EN 60068-2-27
		2500 m/s ² , 6 ms
		Vibration resistance acc. EN 60068-2-6
		100 m/s ² , 10...2000 Hz

Electrical characteristics				
Interface type	Synchronous serial (SSI)	Synchronous serial (SSI)	Parallel	Parallel
Power supply (U _B)	5 V DC (± 5 %)	10 ... 30 V DC	5 V DC (± 5%)	10 ... 30 V DC
Output driver	RS485	RS485	Push-Pull	Push-Pull
Power consumption (no load)	typ. 89 mA max. 138 mA	89 mA 138 mA	109 mA 169 mA	109 mA 169 mA
Permissible load / channel	max. +/- 20 mA	max. +/- 20 mA	max. +/- 10 mA	max. +/-10 mA
Update rate	max. 15.000/s	max.15.000/s	40.000/s	40.000/s
SSI clock rate min./max.	100 kHz / 500 kHz	100 kHz / 500 kHz	–	–
Signal level high	typ. 3.8 V	typ. 3.8 V	min. 3.4 V	min. U _B - 2.8 V
Signal level low	(I _{Load} = 20 mA) typ. 1.3 V (I _{Load} = 10 mA) – (I _{Load} = 1 mA) –	typ. 1.3 V – –	– max. 1.5 V max. 0.3 V	– max. 1.8 V –
Rising edge time t _r (without cable)	max. 100 ns	max. 100 ns	max. 0.2 μs	max. 1 μs
Falling edge time t _f (without cable)	max. 100 ns	max. 100 ns	max. 0.2 μs	max. 1 μs
Short circuit proof outputs ³⁾	yes	yes ⁴⁾	yes	yes
Reverse connection of the supply voltage	no	yes	no	yes
UL-certified	File 224618			
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to	EU guideline 2002/95/EG			

Absolute Encoders
Singleturn

1) For continuous operation max. 1500 min-1
 2) 70°C cable version
 3) If supply voltage U_B correctly applied
 4) Only one channel allowed to be shorted-out:
 at U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted.
 at U_B = 5 ... 30 V short circuit to channel or 0 V is permitted.

Absolute Encoders - Singleturn

Stainless steel encoder, optical

5876 (Hollow shaft)

SSI, Parallel

Control inputs

Switching levels of the control inputs

Supply voltage		5 V DC	10 ... 30 V DC
Switching level	low	≤ 1.7 V	≤ 4.5 V
	high	≥ 3.4 V	≥ 8.7 V

Up/Down input to switch the counting direction

As a standard, absolute encoders deliver increasing code values when the shaft rotates clockwise (cw), when looking from the shaft side. When the shaft rotates counter-clockwise (ccw), the output delivers accordingly decreasing code values. The same applies to models with current interfaces. When the shaft rotates clockwise, the output delivers increasing current values, and decreasing values when it rotates counter-clockwise.

As long as the Up/Down input receives the corresponding signal (high), this feature is reversed. Clockwise rotation will deliver decreasing code/current values while counter-clockwise rotation will deliver increasing code/current values.

The response time is :

for 5 V DC supply voltage	0.4 ms
for 10 ... 30 V DC supply voltage	2 ms

SET input

This input is used to reset (zero) the encoder. A control pulse (high) sent to this input allows the current position value to be saved as the new zero position in the encoder.

For models equipped with a current interface, the analogue output (4..20 mA) will be set accordingly to the value 4 mA.

Note : After applying power to the encoder and before activating the SET input, a count direction (cw or ccw) must be clearly defined on the Up/Down input!

The response time is :

for 5 V DC supply voltage	0.4 ms
for 10 ... 30 V DC supply voltage	2 ms

LATCH input

This input is used to "freeze" the current position value. The position value will be statically available on the parallel output as long as this input remains active (high).

The response time is :

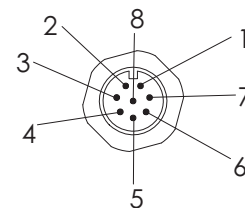
for 5 V DC supply voltage	140 µs
for 10 ... 30 V DC supply voltage	200 µs

Terminal assignment SSI with M12 connector (8-pin) or cable version

Signal	0V	+U _B	+T	-T	+D	-D	ST	VR
Pin	1	2	3	4	5	6	7	8
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD

Top view of mating side, male contact base

M12 connector, 8 pin



Terminal assignment cable version Parallel interface up to max. 14 bit and max. 2 options:

Signal	0V	+U _B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/ VR	VR/ LH	14	⏏
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY	GY BN	PH

T: Clock signal

D: Data signal

ST: Set input. The current position is set to zero

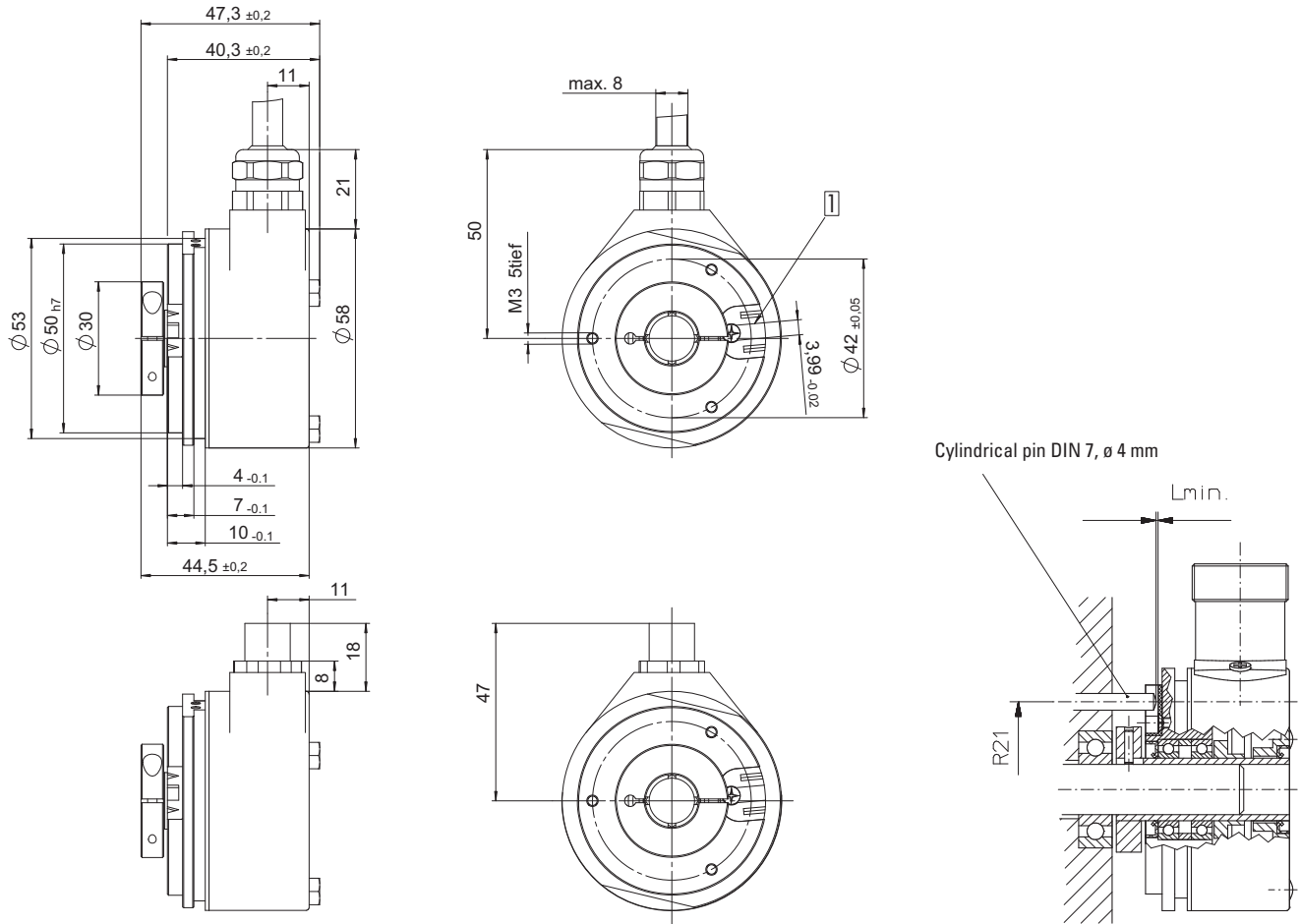
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.

Isolate unused outputs before initial start-up.

Absolute Encoders - Singleturn

Stainless steel encoder, optical	5876 (Hollow shaft)	SSI, Parallel
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Dimensions



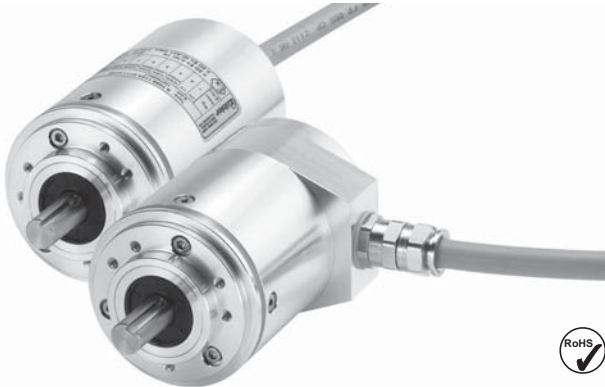
1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ø 4 mm

Mounting advice

- 1) When mounting a hollow shaft encoder, we recommend using the torque stop pin or a stator coupling.
- 2) When mounting the encoder ensure that the dimension L_{min.} is larger than the maximum axial play of the drive.
Otherwise there is a danger that the device could mechanically seize up.

Absolute Encoders - Singleturn

ATEX, optical	Sendix 7053 (Shaft)	SSI
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The Sendix 7053 Absolute Encoders – Singleturn offer Ex protection in a compact 70 mm seawater resistant housing, with an SSI interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 17 bits; they are also available with axial and radial cable outlets.



Ex approval	Safety-Lock™	High rotational speed	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater-resistant

Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:
 Ex II 2G Ex d IIC T6 and Ex II 2D Ex tD A21 IP6X T85°C
- Can be operated in marine environments – housing and flange manufactured from seawater-resistant aluminium
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns. IP67 protection

Compact

- Can be used even when space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet axial or radial

Order code 8.7053 . 1 X 2 X . X X 2 1 . XXXX
Shaft version Type a b c d e f g h i ¹⁾

<p>a Flange 1 = clamping-synchronous flange ø 70 mm, IP67</p> <p>b Shaft (ø x L) 1 = 12 x 25 mm, with keyway for 4 x 4 mm key 2 = 10 x 20 mm, with flat</p> <p>c Interface / Power supply 2 = SSI or BiSS / 10 ... 30 V DC</p> <p>d Type of connection 1 = axial cable (2 m PUR) 2 = radial cable (2 m PUR) A = axial cable (length > 2 m) B = radial cable (length > 2 m) (preferred lengths, see i, e.g.: 0100 = 10 m)</p>	<p>e Code B = SSI, Binary G = SSI, Gray</p> <p>f Resolution ²⁾ A = 10 bit ST 1 = 11 bit ST 2 = 12 bit ST 3 = 13 bit ST 4 = 14 bit ST 7 = 17 bit ST</p>	<p>g Inputs / Outputs ²⁾ 2 = SET, DIR input additional status output <i>optional on request - special cable length</i></p> <p>h Options 1 = no option</p> <p>i Cable length in dm ¹⁾ 0050 = 5 m 0100 = 10 m 0150 = 15 m</p>
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Mounting accessory for shaft encoders

Coupling

Bellows coupling ø19 mm for shaft 10 mm

8.0000.1101.1010

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

2) Not applicable with connection types 1 and 2
 1) Resolution, preset value and counting direction factory-programmable

Absolute Encoders - Singleturn

ATEX, optical		Sendix 7053 (Shaft)		SSI	
Explosion protection					
EC type-examination certificate		PTB09 ATEX 1106 X			
Category (gas)		II 2G Ex d IIC T6			
Category (dust)		II 2D Ex tD A21 IP6X T85°C			
Directive 94/9 EC		EN 60079-0; DIN EN 60079-1 EN 61241-0; DIN EN 61241-1			
Mechanical characteristics					
Max. speed		continuous 6 000 min ⁻¹			
Starting torque		< 0.05 Nm			
Moment of inertia		4.0 x 10 ⁻⁶ kgm ²			
Load capacity of shaft		radial	80 N		
		axial	40 N		
Weight		approx. 0.6 kg			
Protection EN 60 529		IP67			
Working temperature range		-40°C ... +60°C			
Materials		shaft	stainless steel		
		flange / housing	seawater-resistant Al, type AISiMgMn (EN AYW-6082) or stainless steel		
		cable	PUR		
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms			
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz			
General electrical characteristics					
Power supply		10 ... 30 V DC			
Current consumption (w/o output load)		max. 45 mA			
Reverse polarity protection for power supply (U_B)		yes			
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to		EU guideline 2002/95/EG			
SSI interface					
Output driver		RS485 Transceiver type			
Permissible load/channel		max. 20 mA			
Signal level		high	typ 3.8 V		
		low at I _{Load} = 20 mA	typ 1.3 V		
Short-circuit proof outputs		yes ¹⁾			
Singleturn resolution		10 ... 14 bit and 17 bit ²⁾			
Number of revolutions		4096 (12 bit)			
Code		Binary or Gray			
SSI clock rate		< 14 bit: 50 kHz ... 2 MHz			
Monoflop time		< 15 μs ²⁾			
Note: if clock starts cycling within monoflop time a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate depends on clock speed, data length and monoflop time.					
Data refresh rate		up to 14 bit	< 1 μ		
		for 15 ... 17 bit	< 4 μs		
Status and Parity bit		on request			
SET input					
Input		high active			
Input type		Comparator			
Signal level		high	min. 60 % of +V max. +V		
		low	max. 25 % of +V (+V = Power supply)		
Input current		< 0.5 mA			
Min. pulse duration (SET)		10 ms			
Timeout after SET signal		14 ms			
Response time (DIR input)		1 ms			
The encoder can be set to zero at any position by means of a High signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read.					
DIR input					
A High signal switches the direction of rotation from the default CW to CCW. The reverse function can also be factory-programmed. If DIR is reversed when the device is already switched on, this will be interpreted as an error. The status output switches to Low.					
Status output					
Output driver		Open Collector, internal pull-up resistor 22 kOhm			
Permissible load		max. 20 mA			
Signal level		high	+V		
		low	< 1 V		
Active at		low			
The status output serves to display various alarm or error messages. The status output is high (Open Collector with internal pull-up 22k) in normal operation.					
Power-ON delay					
After Power-ON, the device requires a time of approximately 150 ms before valid data can be read.					

1) Short-circuit with 0V or output, only one channel at a time, supply voltage correctly applied
2) Other options on request

Absolute Encoders - Singleturn

ATEX, optical	Sendix 7053 (Shaft)	SSI
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Terminal assignment

For output circuit 1 or 2

Signal	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	PE	PE
Cable marking	1	2	3	4	5	6	7	8	9	yellow/green	shield

+V: Encoder power supply +V DC

GND: Encoder Ground GND (0V)

+C, -C: Clock signal

+D, -D: Data signal

SET: Set input. The current position becomes defined as position zero.

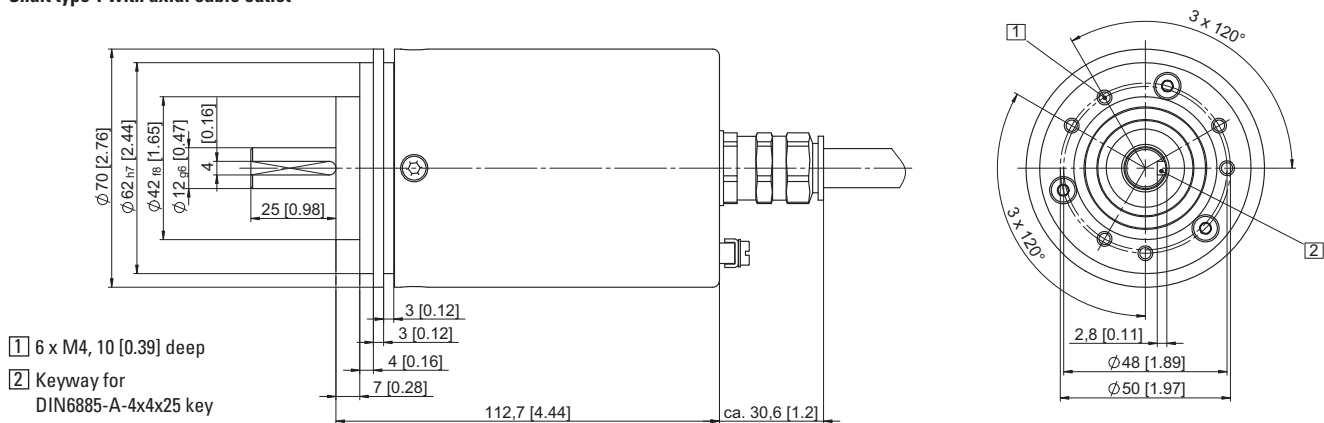
DIR: Direction input. If this input is active, output values are decreasing when shaft is turned clockwise

Stat: Status output

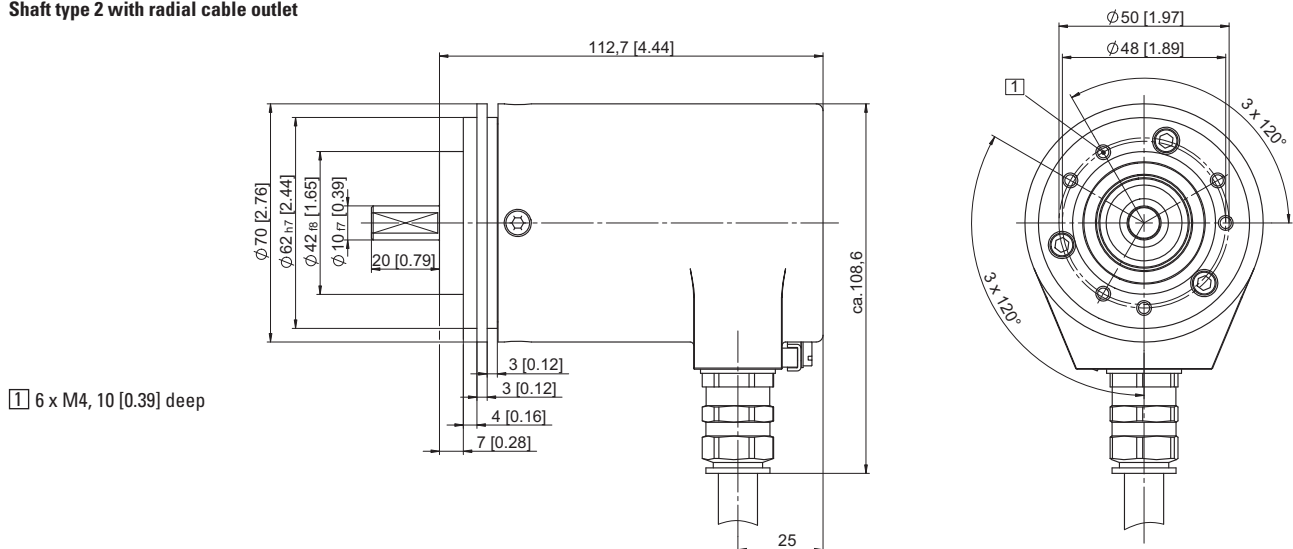
PE: Protective earth

Dimensions

Shaft type 1 with axial cable outlet

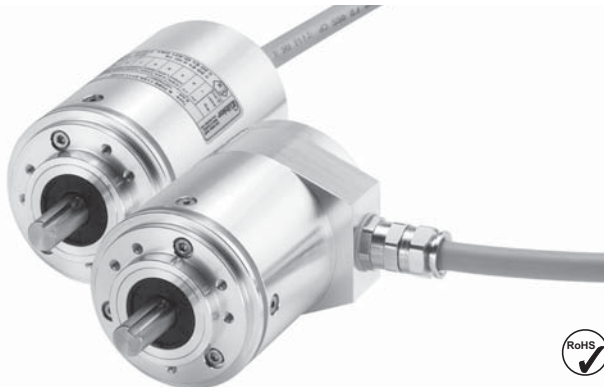


Shaft type 2 with radial cable outlet



Absolute Encoders - Singleturn

ATEX, optical	Sendix 7058 (Shaft)	Profibus-DP
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The Sendix 7058 absolute singleturn encoders offer Ex protection in a compact 70 mm seawater resistant housing, with a Profibus interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 16 bits; they are also available with axial and radial cable outlets.



Ex approval	Safety-Lock™	High rotational speed	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Short-circuit proof	Reverse polarity protection	Optical sensor	Seawater-resistant

Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:
 Ex II 2G Ex d IIC T6 and Ex II 2D Ex tD A21 IP6X T85°C
- Can be operated in marine environments – housing and flange manufactured from seawater-resistant aluminium
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns. IP67 protection

Compact

- Can be used even when space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet axial or radial

Absolute Encoders Singleturn

Order code	8.7058	.1	X	3	X	.31	11	.XXXX
Shaft version	Type	a	b	c	d	e	f ¹⁾	

a Flange
1 = clamping-synchronous flange ø 70 mm, IP67

b Shaft (ø x L)
1 = 12 x 25 mm, with keyway for 4 x 4 mm key
2 = 10 x 20 mm, with flat

c Interface / Power supply
3 = Profibus-DP V0 / 10 ... 30 V DC

d Type of connection
1 = axial cable (2 m PUR)
2 = radial cable (2 m PUR)
A = axial cable (length > 2 m)
B = radial cable (length > 2 m)
(preferred lengths, see **f**, e.g.: 0100 = 10 m)

e Fieldbus profile
31 = Profibus-DP V0 Encoder profile Class 2

f Cable length in dm ¹⁾
0050 = 5 m
0100 = 10 m
0150 = 15 m

*optional on request
- special cable length*

Mounting accessory for shaft encoders

Coupling

Bellows coupling ø19 mm for shaft 10 mm

8.0000.1101.1010

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) Not applicable with connection types 1 and 2

Absolute Encoders - Singleturn

ATEX, optical		Sendix 7058 (Shaft)		Profibus-DP	
Explosion protection					
EC type-examination certificate		PTB09 ATEX 1106 X			
Category (gas)		II 2G Ex d IIC T6			
Category (dust)		II 2D Ex tD A21 IP6X T85°C			
Directive 94/9 EC		EN 60079-0; DIN EN 60079-1 EN 61241-0; DIN EN 61241-1			
Mechanical characteristics					
Max. speed		6 000 min ⁻¹ continuous			
Starting torque		< 0.05 Nm			
Moment of inertia		4.0 x 10 ⁻⁶ kgm ²			
Load capacity of shaft		radial	80 N		
		axial	40 N		
Weight		approx. 0.6 kg			
Protection EN 60 529		IP67			
Working temperature range		-40°C ... +60°C			
Materials		shaft	stainless steel		
		flange / housing	seawater-resistant Al, type AISiMgMn (EN AW-6082) or stainless steel		
		cable	PUR		
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms			
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz			
General electrical characteristics					
Power supply		10 ... 30 V DC			
Current consumption (w/o output load)		max. 110 mA			
Reverse polarity protection for power supply (U_B)		yes			
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to		EU guideline 2002/95/EG			
Interface characteristics Profibus-DP					
Resolution Singleturn		1 ... 65536 (16 bit), scaleable			
Default value		8192 (13 bit)			
Code		Binary			
Interface		Specification according to Profibus-DP 2.0 / Standard (DIN 19245 Part 3) / RS485 galvanically isolated			
Protocol		Profibus Encoder Profile V1.1 Class1 and Class 2 with manufacturer-specific add-ons			
Baud rate		maximum 12 Mbit/s			
Device address		software controlled setting of the device address via the SSA-service with a CLASS 2-Master. Default address: 125			
Termination		active termination can only be switched on externally			

Profibus Encoder-Profile V1.1

The PROFIBUS-DP device profile describes the functionality of the communication and the manufacturer-specific component within the PROFIBUS Fieldbus system. The Encoder Profile applies to encoders and defines the individual objects independently of the manufacturer. In addition, the profile makes provision for additional extended functions specific to the manufacturer. The use of PROFIBUS compatible devices ensures that the systems of today are ready to meet the demands of the future.

The following parameters can be programmed

- Direction of rotation
- Scaling – number of steps per revolution
- Preset value
- Diagnostics mode

The following functionality is integrated

- Galvanic isolation of the Bus stage with DC/DC converter
- Line Driver acc. to RS485 max. 12 MB
- Full Class 1 and Class 2 functionality
- Speed value

Terminal assignment

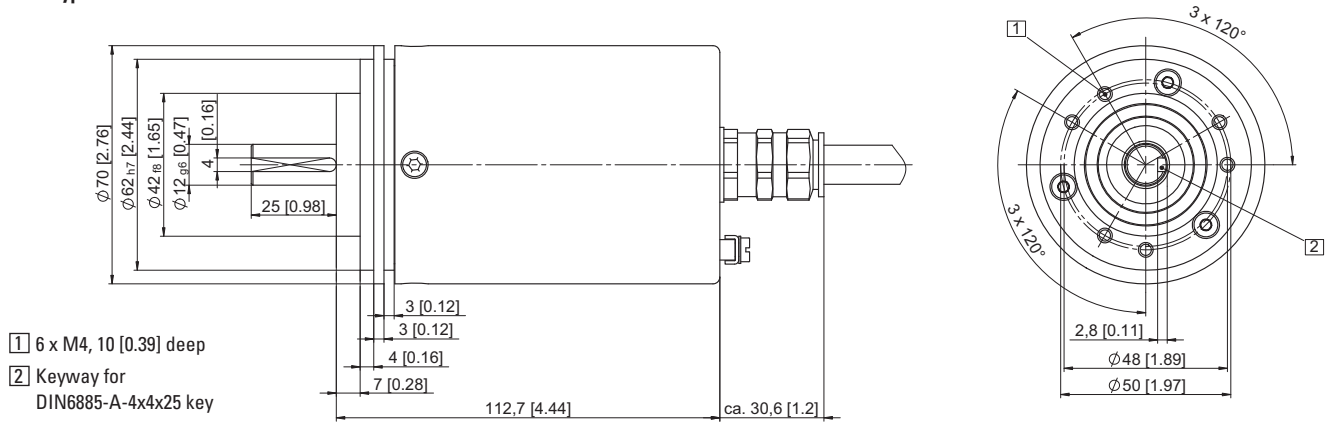
Signal	0 V	+V	BUS A IN	BUS B IN	BUS GND	BUS V DC	BUS A OUT	BUS B OUT
Cable marking	1	2	4	5	6	7	8	9

Absolute Encoders - Singleturn

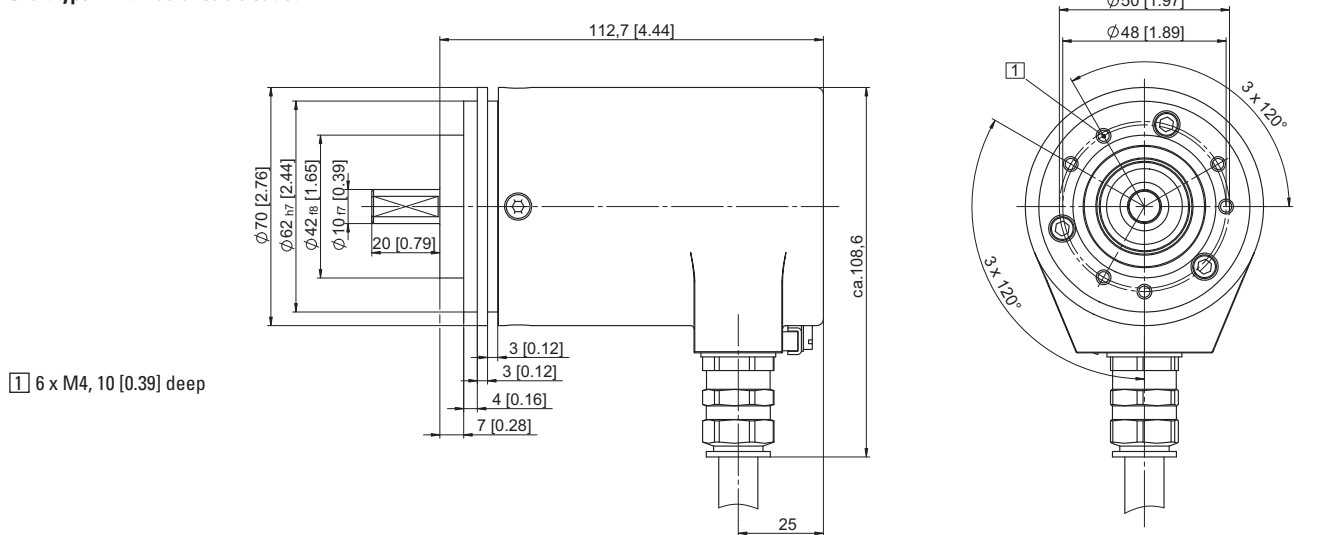
ATEX, optical	Sendix 7058 (Shaft)	Profibus-DP
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Dimensions

Shaft type 1 with axial cable outlet



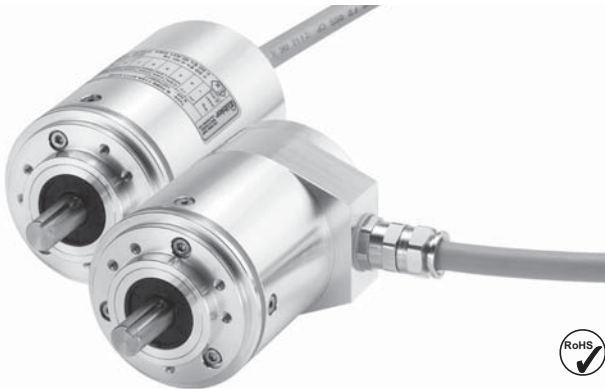
Shaft type 2 with radial cable outlet



Absolute Encoders Singleturn

Absolute Encoders - Singleturn

ATEX, optical	Sendix 7058 (Shaft)	CANopen
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The Sendix 7058 absolute singleturn encoders offer Ex protection in a compact 70 mm seawater resistant housing, with a CANopen interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 16 bits; they are also available with axial and radial cable outlets



Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:
- Can be operated in marine environments – housing and flange manufactured from seawater-resistant aluminium
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns – IP67 protection.

Compact

- Can be used even when space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet axial or radial

Order code	8.7058	.	1	X	2	X	.	21	11	.	XXXX
Shaft version	Type		a	b	c	d		e			f 1)

- a** Flange
1 = clamping-synchronous flange ø 70 mm, IP67
- b** Shaft (ø x L)
1 = 12 x 25 mm, with keyway for 4 x 4 mm key
2 = 10 x 20 mm, with flat
- c** Interface / Power supply
2 = CANopen DS301 V4.02 / 10 ... 30 V DC

- d** Type of connection
1 = axial cable (2 m PUR)
2 = radial cable (2 m PUR)
A = axial cable (length > 2 m)
B = radial cable (length > 2 m)
(preferred lengths, see **f**, e.g.: 0100 = 10 m)
- e** Fieldbus profile
21 = CANopen encoder profile DS406 V3.2

- f** Cable length in dm ¹⁾
0050 = 5 m
0100 = 10 m
0150 = 15 m
- optional on request
- special cable length*

Mounting accessory for shaft encoders

Coupling	Bellows coupling ø19 mm for shaft 10 mm	8.0000.1101.1010
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Programming set

including:	<ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: WinXP SP3 or higher Win7 in preparation Processor: 1 GHz RAM: 512 MB Required disk space: 500 MB	8.0010.9000.0015
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) Not applicable with connection types 1 and 2

Absolute Encoders - Singleturn

ATEX, optical	Sendix 7058 (Shaft)	CANopen
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Explosion protection	
EC type-examination certificate	PTB09 ATEX 1106 X
Category (gas)	II 2G Ex d IIC T6
Category (dust)	II 2D Ex tD A21 IP6X T85°C
Directive 94/9 EC	EN 60079-0; DIN EN 60079-1 EN 61241-0; DIN EN 61241-1

Mechanical characteristics	
Max. speed	6 000 min ⁻¹ continuous
Starting torque	< 0.05 Nm
Moment of inertia	4.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial 80 N axial 40 N
Weight	approx. 0.6 kg
Protection EN 60 529	IP67
Working temperature range	-40°C ... +60°C
Materials	shaft stainless steel flange / housing seawater-resistant Al, type AISiMgMn (EN AW-6082) or stainless steel cable PUR
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Current consumption (w/o output load)	max. 90 mA
Reverse polarity protection for power supply (U _B)	yes
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

Interface characteristics CANopen	
Resolution	1 ... 65536 (16 bit), (scalable: 1 ... 65536)
Default value	8192 (13 bit)
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	CANopen Profile DS406 V3.1 with manufacturer-specific add-ons
Baud rate	10 ... 1000 kbit/s (Software configurable)
Node address	1 ... 127 (Software configurable)
Switchable termination	Software configurable

 Absolute Encoders
Singleturn

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02 .

In addition, device-specific profiles like the encoder profile DS406 V3.2 are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CANbus. When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

As output values **position, speed, acceleration** as well as the **working area status** may be combined freely as PDO (PDO mapping)

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated:

Class C2 functionality

- NMT Slave
- Heartbeat Protocol
- High Resolution Sync Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. measuring wheel circumference)
Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping of position, speed, acceleration, working area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's
- Optional - 32 CAMs programmable
- Customer-specific memory - 16 Bytes

Terminal assignment

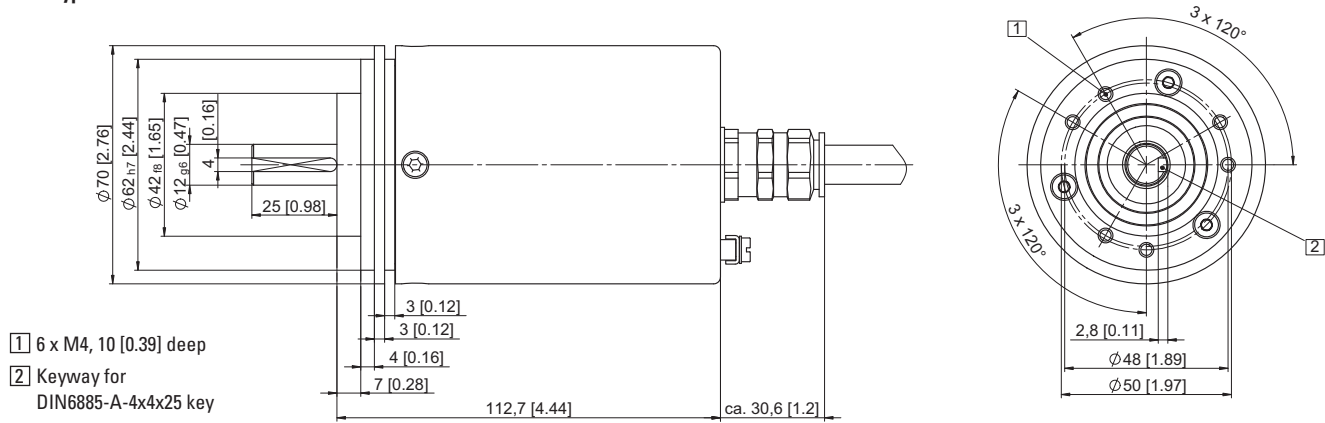
Signal	0 V	+V	CAN High	CAN Low	CAN GND	CAN High	CAN Low	CAN GND
Cable marking	1	2	4	5	6	7	8	9

Absolute Encoders - Singleturn

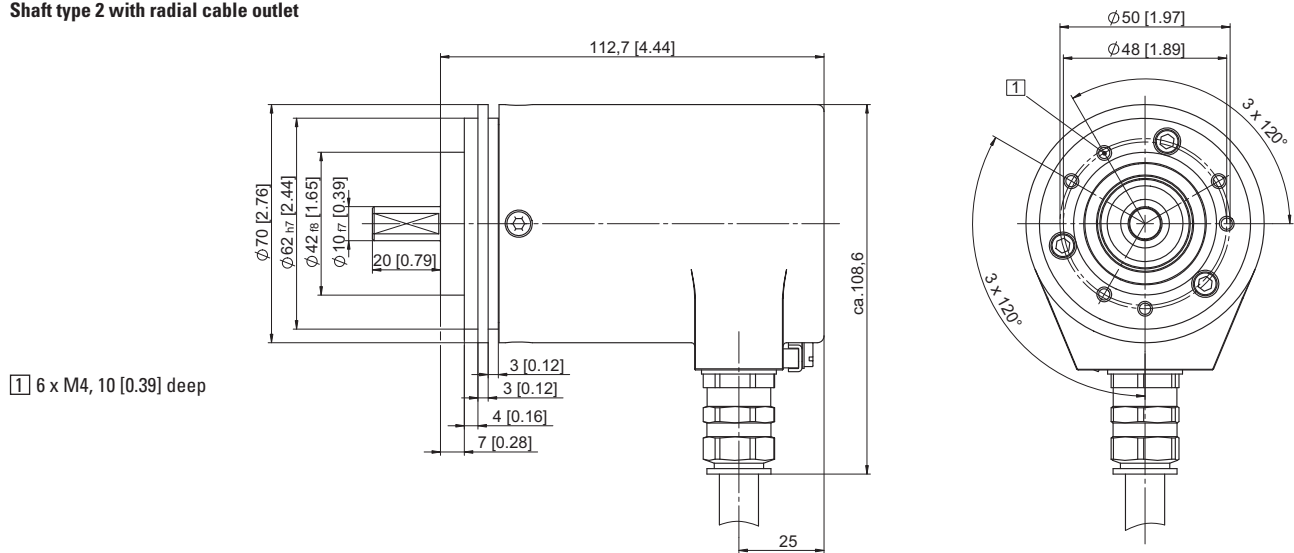
ATEX, optical	Sendix 7058 (Shaft)	CANopen
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Dimensions

Shaft type 1 with axial cable outlet

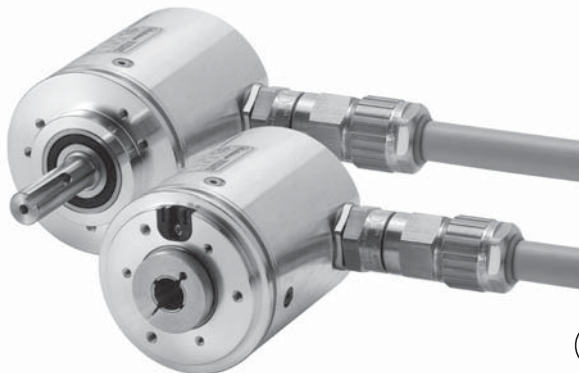


Shaft type 2 with radial cable outlet



Absolute Encoders - Singleturn

ATEX, optical	7031 (Shaft / Hollow shaft)	SSI, Parallel, Analogue
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The singleturn encoder 7031 with parallel, 4 ... 20 mA or SSI interface and optical sensor technology is available in both shaft and hollow shaft versions.

It offers a maximum resolution of 14 bits, divided over 360°.



Ex approval	Temperature -20° + 60°	Shock / vibration resistant	Short-circuit proof	Reverse polarity protection

Safe

- Version "flameproof-enclosure": approval zones 1, 2 and 21, 22
- Zones 1, 2 and 21, 22:

Adaptable

- Parallel, 4 ... 20 mA or SSI interface
- Gray, Binary or BCD code for parallel interface
- Various input options

Absolute Encoders Singleturn

Order code	8.7031	. XX X 2 . XXX X
Shaft / Hollow shaft	Type	<small>a b c d e</small>

- | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange and hollow shaft or shaft
 14 = synchro flange with hollow shaft ø 12 mm
 25 = clamping flange with shaft ø 12 mm
 26 = clamping flange with shaft ø 12 mm and screwed-on adapter</p> | <p>b Output circuit / Power supply
 1 = SSI / 5 V DC
 2 = SSI / 10 ... 30 V DC
 3 = Parallel / 5 V DC
 4 = Parallel / 10 ... 30 V DC
 7 = Analog 4 ... 20 mA / 5 V DC
 8 = Analog 4 ... 20 mA / 10 ... 30 V DC</p> | <p>d Code type and Division
 see table 1 (for interface 3 and 4, Parallel)
 see table 2 (for interface 1 and 2, SSI)
 see table 3 (for interface 7 and 8, Analogue 4 ... 20 mA)</p> |
| <p>c Cable length
 2 = radial cable (2 m PVC cable)
 other cable lengths on request</p> | <p>e Options
 2 = SET ¹⁾ and V/R
 3²⁾ = SET and Latch ¹⁾
 4²⁾ = V/R ¹⁾ and Latch</p> | |

Table 1: Code type and divisions for encoders with parallel output

Interface and Supply Voltage, version 3 or 4 (Parallel)

Division	250	360	500	720	900	1000	1024 10 bit	1250	1440	1800	2000	2500	2880	3600	4000	4096 12 bit	5000	7200	8192 13 bit	16384 14 bit
Order code Gray / Gray-Excess	E02	E03	E05	E07	E09	E01	G10	E12	E14	E18	E20	E25	E28	E36	E40	G12	E50	E72	G13	G14
Order code Binary	B02	B03	B05	B07	B09	B01	B10	BA2	BA1	B18	B20	B25	B28	B36	B40	B12	B50	B72	B13	B14
Order code BCD	D02	D03	D05	D07	D09	D01	D10	DA2	DA1	D18	D20									

Table 2: Code type and SSI output

Interface / Power supply 1 or 2

Division	1024 10 bit	4096 12 bit	8192 13 bit	16384 14 bit
Order code Gray	G10	G12	G13	G14
Order code Binary	B10	B12	B13	B14

Table 3: Code type and Analogue output

Interface / Power supply 7 or 8

Division	8192 13 bit
Order code	G13

1) For parallel version, 14 bit and pin connector
 2) Not with SSI interface

Absolute Encoders - Singleturn

ATEX, optical	7031 (Shaft / Hollow shaft)	SSI, Parallel, Analogue
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 12 mm	8.0000.1101.1212
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Further accessories can be found in the Accessories section of our main catalogue or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section of our main catalogue or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics				
Speed	max. 6000 min ⁻¹		Protection acc. to EN 60 529	IP65
Rotor moment of inertia	approx. 8 x 10 ⁻⁶ kgm ²		Working temperature range	-20°C ... +60°C ²⁾
Starting torque	< 0.05 Nm		Material	shaft stainless steel
Load capacity of shaft ¹⁾	radial	80 N	Shock resistance acc. EN 60068-2-27	5000 m/s ² , 6 ms
	axial	40 N	Vibration resistance acc. EN 60068-2-6	100 m/s ² , 10...2000 Hz
Weight	approx. 0.9 kg			

Electrical characteristics				
Interface type	Synchronous serial (SSI)		Parallel	Parallel
Power supply (U_B)	5 V DC (± 5 %)		10 ... 30 V DC	5 V DC (± 5%)
Output driver	RS485		RS485	Push-Pull
Power consumption (no load)	typ. 89 mA	max. 138 mA	89 mA	109 mA
			138 mA	169 mA
Permissible load / channel	max. +/- 20 mA		max. +/- 20 mA	max. +/- 10 mA
Update rate	max. 15.000/s		max. 15.000/s	40.000/s
SSI clock rate min./max.	100 kHz / 500 kHz		100 kHz / 500 kHz	–
Signal level high	typ. 3.8 V		typ. 3.8 V	min. 3.4 V
Signal level low	(I _{Load} = 20 mA)	typ. 1.3 V	typ. 1.3 V	–
	(I _{Load} = 10 mA)	–	–	max. 1.5 V
	(I _{Load} = 1 mA)	–	–	max. 0.3 V
Rising edge time t_r (without cable)	max. 100 ns		max. 100 ns	max. 0.2 µs
Falling edge time t_f (without cable)	max. 100 ns		max. 100 ns	max. 0.2 µs
Short circuit proof outputs ³⁾	yes		yes ⁴⁾	yes
Reverse connection of the supply voltage	no		yes	no
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to	EU guideline 2002/95/EG			

Electrical characteristics current loop interface 4 ... 20 mA

Sensor component			Current Loop	
Interface type	4 ... 20 mA	4 ... 20 mA	Power supply (current loop)	10 ... 30 V DC
Supply voltage (U_B)	0 ... 30 V DC	5 V DC	Analogue signal	4 ... 20 mA
Power consumption (no load)	typ. 70 mA	70 mA	max. input resistance of the input circuit	200 W
	max. 84 mA	84 mA	Measuring range	0 ... 360°
Update rate	max. 15.000/s		Max. error (25°C)	0.2°
			Resolution	13 bit
			Setting time	max. 2 ms
			Temperature coefficient	0.1°/10 K
			Current with scan error	≤ 3 mA

Note:
 All current standards for the installation of electrical systems in hazardous environments must be observed!
 Any manipulation of the encoder (opening, mechanical treatment etc.) will lead to the loss of the EX certification and warranty claims will not be accepted!
 The installer will be responsible for any consequential damages.

Resolution	13 bit	13 bit
Setting time	max. 2 ms	max. 2 ms
Temperature coefficient	0.1°/10 K	0.1°/10 K
Current with scan error	≤ 3 mA	≤ 3 mA
Sensor component and current loop are galvanically isolated		
CE compliant acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) For parallel version, 14 bit and 17pin connector
 2) Not with SSI interface
 3) If supply voltage U_B correctly applied.
 4) Only one channel allowed to be shorted-out:
 If U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted.
 If U_B = 5 ... 30 V short circuit to channel or 0 V is permitted.

Absolute Encoders - Singleturn

ATEX, optical	7031 (Shaft / Hollow shaft)	SSI, Parallel, Analogue
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Control inputs

Switching levels of the control inputs

Supply voltage	5 V DC	10 ... 30 V DC
Switching level	low	≤ 1.7 V
	high	≥ 3.4 V
		≤ 4.5 V
		≥ 8.7 V

Up/Down input to switch the counting direction

As a standard, absolute encoders deliver increasing code values when the shaft rotates clockwise (cw), when looking from the shaft side. When the shaft rotates counter-clockwise (ccw), the output delivers accordingly decreasing code values. The same applies to models with current interfaces. When the shaft rotates clockwise, the output delivers increasing current values, and decreasing values when it rotates counter-clockwise.

As long as the Up/Down input receives the corresponding signal (high), this feature is reversed. Clockwise rotation will deliver decreasing code/current values while counter-clockwise rotation will deliver increasing code/current values.

The response time is :

for 5 V DC supply voltage	0.4 ms
for 10 ... 30 V DC supply voltage	2 ms

SET input

This input is used to reset (zero) the encoder. A control pulse (high) sent to this input allows the current position value to be saved as the new zero position in the encoder.

For models equipped with a current interface, the analogue output (4...20 mA) will be set accordingly to the value 4 mA.

Note : After applying power to the encoder and before activating the SET input, a count direction (cw or ccw) must be clearly defined on the Up/Down input!

The response time is :

for 5 V DC supply voltage	0.4 ms
for 10 ... 30 V DC supply voltage	2 ms

LATCH input

This input is used to "freeze" the current position value. The position value will be statically available on the parallel output as long as this input remains active (high).

The response time is :

for 5 V DC supply voltage	140 μs
for 10 ... 30 V DC supply voltage	200 μs

Terminal assignment SSI - Synchronous serial interface

Signal	0V	+U _B	+T	-T	+D	-D	ST	VR					⊥
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	PH

Terminal assignment parallel interface 14 bit and max. 2 options

Signal	0V	+U _B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/VR	VR/LH	14	
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY	GY BN	PH

Terminal assignment analogue interface 4 ... 20 mA

Signal	0V	+U _B	I+	I-	ST	VR	⊥
Cable colour	WH	BN	GN	YE	GY	PK	PH

- T: Clock signal
- D: Data signal
- ST: SSI / Parallel interface: the current position value is stored as new zero position.
Analogue interface: measured value set to 4 mA
- VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
- Signal: 1 = MSB; 2 = MSB-1; 3 = MSB-2 etc.
- LH: LATCH input. Active HIGH. The current position is saved and is statically available at the output.
- +I: Current loop input
- I: Current loop output
- PH: Plug housing

Isolate unused outputs before initial start-up.

Absolute Encoders - Singleturn

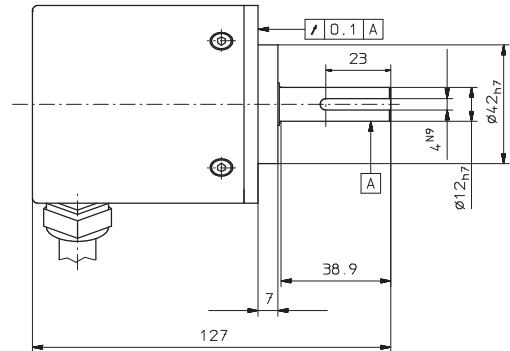
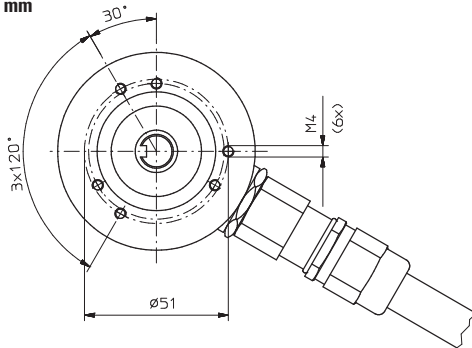
ATEX, optical

7031 (Shaft / Hollow shaft)

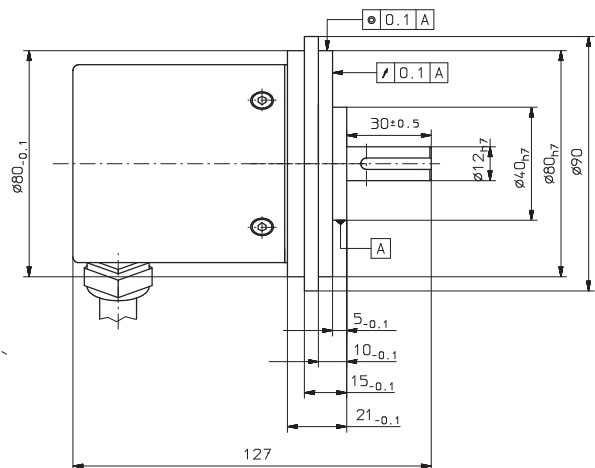
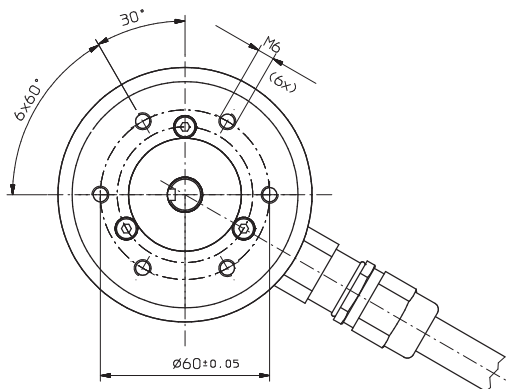
SSI, Parallel, Analogue

Dimensions shaft version

Clamping flange with shaft \varnothing 12 mm

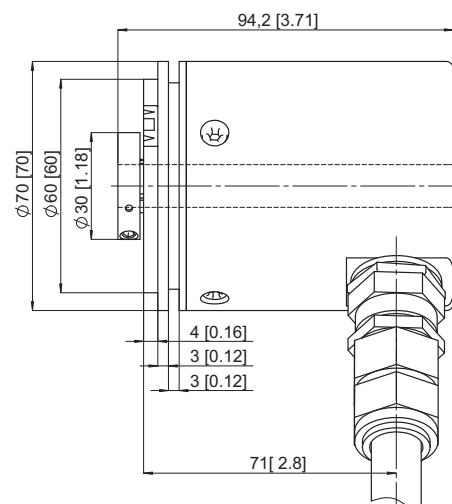
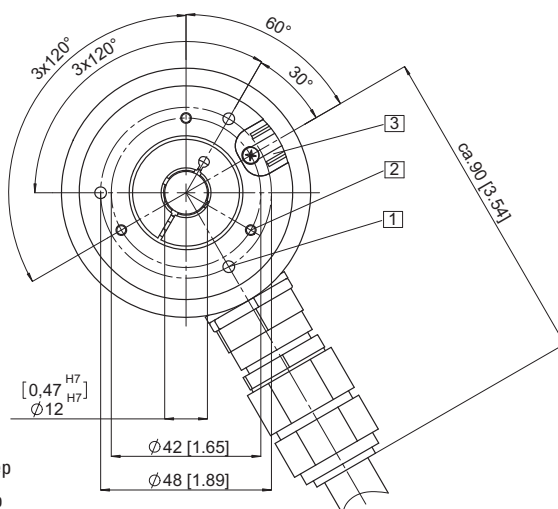


Clamping flange with shaft \varnothing 12 mm and screwed-on flange adapter



Dimensions hollow shaft version

Synchronous flange with hollow shaft \varnothing 12 mm



1 3 x M4, 6 [0.24] deep

2 3 x M3, 5 [0.2] deep

3 Torque stop slot,

Recommendation: Cylindrical pin DIN7, \varnothing 4 mm



Type: 8.F3683.1421.G222
10-30 VDC 50 mA
S-Nr: xxxxxxxxxxxx



Kübler

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Made in Germany
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GND	+V	AC
WH	BN	GN
DIR	SET	+
RD	BU	-

Absolute Encoders – Multiturn

Series	Type	Interface	Page
Compact, optical	Sendix F3663 / F3683 (Shaft / Hollow shaft)	SSI / BiSS	180
	Sendix F3668 / F3688 (Shaft / Hollow shaft)	CANopen	184
Functional Safety, optical	Sendix 5863 SIL / 5883 SIL (Shaft / Hollow shaft)	SSI / BiSS + SinCos	188
Standard, optical	Sendix 5863 / 5883 (Shaft / Hollow shaft)	SSI / BiSS	193
	Sendix 5868 / 5888 (Shaft / Hollow shaft)	Profibus-DP	199
	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen / CANlift	204
	Sendix 5868 / 5888 (Shaft / Hollow shaft)	EtherCAT	214
Standard, optical / magnetic	5862 / 5882 (Shaft / Hollow shaft)	SSI / RS485, programmable	219
	5860 (Shaft / Hollow shaft)	DeviceNet	224
	9081 (Large hollow shaft)	SSI / RS485, programmable	228
	9080 (Large hollow shaft)	Profibus-DP	232
	9080 (Large hollow shaft)	CANopen / DeviceNet	235
ATEX, optical	Sendix 7063 (Shaft)	SSI	239
	Sendix 7068 (Shaft)	Profibus-DP	242
	Sendix 7068 (Shaft)	CANopen	245

Absolute Encoders – Multiturn

Compact, optical

Sendix F3663 / F3683 (Shaft / Hollow shaft)

SSI / BiSS



The Sendix F36 multiturn is an optical multiturn encoder in miniature format, without gears and with 100% insensitivity to magnetic fields. With a size of just 36 x 42 mm it offers a through hollow shaft of up to 8 mm or a blind hollow shaft of up to 10 mm.



Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.



Safety-Lock™



High rotational speed



Temperature

-40° +90°



High IP value

IP67



High shaft load capacity



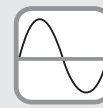
Shock / vibration resistant



Magnetic field proof



Reverse polarity protection



SinCos



Optical sensor



Seawater-resistant version on request

Reliable and insensitive

- Electronic multiturn with Intelligent Scan Technology™ 100 % magnetic-field resistant
- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Reduced number of components ensures magnetic insensitivity
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +90°C

Optimised performance

- High precision with data refresh rate of the position value ≤ 1µs
- High resolution feedback in real-time via incremental outputs SinCos and RS422
- Short control cycles, clock frequency with SSI up to 2 MHz / with BiSS up to 10 MHz

Order code Shaft version

8.F3663 . XXXX . XXX2

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, ø 36 mm
 1 = clamping flange, IP67
 2 = synchro flange, IP67
 3 = clamping flange, IP65
4 = synchro flange, IP65

- b** Shaft (ø x L), with flat
 1 = ø 6 x 12,5 mm
 2 = ø 6.35 (1/4") x 12.5 mm
3 = ø 8 x 15 mm
 4 = ø 9.5 x 15.875 mm (3/8" x 5/8")
 5 = ø 10 x 20 mm

- c** SSI or BiSS Interface / Power supply
 1 = 5 V DC
2 = 10 ... 30 V DC
 3 = 5 V DC and 2048 ppr SinCos track
 4 = 10 ... 30 V DC and 2048 ppr SinCos
 5 = 5 V DC, with sensor output for monitoring the voltage on the encoder
 6 = 5 V DC and 2048 ppr SinCos, with sensor output for monitoring the voltage on the encoder
 7 = 5 V DC and 2048 ppr incremental signals RS422
 8 = 10 ... 30 V DC and 2048 ppr incremental signals RS422

- d** Type of connection
1 = cable, tangential (1 m PUR)
 3 = cable, tangential (5 m PUR)
 5 = cable, tangential (1 m PUR) with M12 connector, 8-pin ¹⁾

- f** Resolution (Singleturn)
 A = 10 bit ST
2 = 12 bit ST
 3 = 13 bit ST
 4 = 14 bit ST
 7 = 17 bit ST

- g** Resolution (Multiturn)
2 = 12 bit MT
 6 = 16 bit MT
 4 = 24 bit MT

- e** Code
 B = SSI, Binary
 C = BiSS, Binary
G = SSI, Gray

optional on request
 - Ex 2/22
 - seawater-resistant
 - special cable length

Order code Hollow shaft

8.F3683 . XXXX . XXX2

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, ø 36 mm, IP65
 1 = with torque stop, short
2 = with stator coupling
 3 = with torque stop, long

- b** Hollow shaft
 1 = ø 6 mm
 2 = ø 6.35 mm (1/4")
 3 = ø 8 mm
4 = ø 10 mm
 (Blind hollow shaft)

- c** SSI or BiSS Interface / Power supply
 1 = 5 V DC
2 = 10 ... 30 V DC
 3 = 5 V DC and 2048 ppr SinCos track
 4 = 10 ... 30 V DC and 2048 ppr SinCos
 5 = 5 V DC, with sensor output for monitoring the voltage on the encoder
 6 = 5 V DC and 2048 ppr SinCos, with sensor output for monitoring the voltage on the encoder
 7 = 5 V DC and 2048 ppr incremental signals RS422
 8 = 10 ... 30 V DC and 2048 ppr incremental signals RS422

- d** Type of connection
1 = cable, tangential (1 m PUR)
 3 = cable, tangential (5 m PUR)
 5 = cable, tangential (1 m PUR) with M12 connector, 8-pin ¹⁾

- f** Resolution (Singleturn)
 A = 10 bit ST
2 = 12 bit ST
 3 = 13 bit ST
 4 = 14 bit ST
 7 = 17 bit ST

- g** Resolution (Multiturn)
2 = 12 bit MT
 6 = 16 bit MT
 4 = 24 bit MT

- e** Code
 B = SSI, Binary
 C = BiSS, Binary
G = SSI, Gray

optional on request
 - Ex 2/22
 - seawater-resistant
 - special cable length

1) Only with output circuits 1 and 2

Absolute Encoders – Multiturn

Compact, optical	Sendix F3663 / F3683 (Shaft / Hollow shaft)	SSI / BiSS
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0808
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	M12, suitable for connection type 8	05.CMB 8181-0
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Maximum speed		
Shaft- or blind hollow shaft version without shaft seal (IP65)		12 000 min ⁻¹ 10 000 min ⁻¹ (continuous op.)
Shaft version (IP67) or hollow shaft version (IP65) with shaft seal		10 000 min ⁻¹ 8 000 min ⁻¹ (continuous op.)
Starting torque	without shaft seal with shaft seal (IP67)	< 0.007 Nm < 0.01 Nm
Shaft load capacity	radial axial	40 N 20 N
Weight		ca. 0.2 kg
Protection to EN 60 529	housing side shaft side	IP 67 IP 65 (solid shaft version opt. IP67)
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +90°C
Materials	shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast PUR
Shock resistance acc. to EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics		
Supply voltage		5 V DC ± 5% or 10 ... 30 V DC
Current consumption (no load)	5 V DC 10 ... 30 V DC	max. 60 mA max. 30 mA
Reverse connection of the supply voltage		yes
CE compliant acc. to		EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3
RoHS compliant acc. to		EU guideline 2002/95/EG

Interfaces

General interface characteristics	
Output driver	RS485 transceiver type
Permissible load/channel	max. ± 30 mA
Signal level	high typ 3.8 V low with I _{Load} = 20 mA typ 1.3 V
Short-circuit proof outputs	yes ¹⁾

SSI Interface	
Resolution, singleturn	10 ... 17 bit
Number of revolutions	max. 24 bit
Code	Binary or Gray
SSI clock rate	≤ 14 bit 50 kHz ... 2 MHz ≥ 15 bit 50 kHz ... 125 kHz
Monoflop time	≤ 15 µs
Note: If the clock cycle starts within the monoflop time a second data transfer begins with the same data. If the clock cycle starts after the monoflop time the cycle begins with the new values. The update rate is dependent on the clock speed, data length and monoflop time.	
Data refresh rate	up to 14 bit ≤ 1 µs up to 15 ... 17 bit 4 µs
Status and Parity bit	on request

BiSS Interface	
Resolution, singleturn	10 ... 17 bit
Number of revolutions	max. 24 bit
Code	Binary
BiSS Clock rate	up to 10 MHz
Max. update rate	< 10 µs, depends on the clock rate and the data length
Data refresh rate	≤ 1 µs
Note:	
– Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings	
– Multi-cyclic data output, e.g. for temperature	
– CRC data verification	

Incremental outputs (A/B), 2048 ppr		
	SinCos	RS422 TTL-compatible
Max. frequency -3dB	400 kHz	400 kHz
Signal level	1 V _{pp} (± 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof	yes ¹⁾	yes ¹⁾

1) Short circuit proof to 0V or to output when supply voltage correctly applied

Absolute Encoders – Multiturn

Compact, optical	Sendix F3663 / F3683 (Shaft / Hollow shaft)	SSI / BiSS
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SET input

Input	active high	
Input type	comparator	
Signal level (+V = supply voltage)	high	min. 60 % of +V, max: +V
	low	max. 30 % of +V
Input current	< 0.5 mA	
Min. pulse duration (SET)	10 ms	
Input Delay	1 ms	
New position data readable after	1 ms	
Internal processing time	200 ms	

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms, after which the new position data can be read via SSI or BiSS. Once the SET function has been triggered, the encoder requires an internal processing time of typ. 200 ms; during this time the supply voltage must not be switched off.

The SET function should be carried out whilst the encoder is at rest.

Power-on delay

After Power-ON the device requires a time of approx. 150 ms before valid data can be read. Hot plugging of the encoder should be avoided.

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The status output will switch to LOW.

Response time (DIR input)	1 ms
----------------------------------	------

Status output

Output driver	Open Collector, internal pull up resistor 22 kOhm
----------------------	---------------------------------------------------

Permissible load	max. 20 mA
-------------------------	------------

Signal level	high +V
	low < 1 V

Active	low
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The status output serves to display various alarm or error messages. In normal operation the status output is HIGH (Open Collector with int. pull-up 22 kOhm).

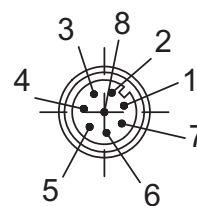
An active status output (LOW) displays:
LED fault (failure or ageing) – over-temperature – undervoltage
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

Terminal assignment

Interface	Type of connection	Features	Cable
1, 2	1, 3	SSI or BiSS, SET, DIR, Status	Signal: GND +V +C -C +D -D SET DIR Stat PE
			Cable colour: WH BN GN YE GY PK BU RD VT Shield
1, 2	5	SSI or BiSS, SET, DIR	M12 connector
			Signal: GND +V +C -C +D -D SET DIR Shield/PE
			M12 connector: 1 2 3 4 5 6 7 8 PH
3, 4	1, 3	SSI or BiSS, SET, DIR, 2048 SinCos	Signal: GND +V +C -C +D -D SET DIR A A inv B B inv PE
			Cable colour: WH BN GN YE GY PK BU RD BK VT GY-PK RD-BU Shield
5	1, 3	SSI or BiSS, SET, DIR, Sensor outputs	Signal: GND +V +C -C +D -D SET DIR GND _{sens} +V _{sens} PE
			Cable colour: WH BN GN YE GY PK BU RD VT RD-BU Shield
6	1, 3	SSI or BiSS, 2048 SinCos Sensor outputs	Signal: GND +V +C -C +D -D GND _{sens} +V _{sens} A A inv B B inv PE
			Cable colour: WH BN GN YE GY PK BU RD BK VT GY-PK RD-BU Shield
7, 8	1, 3	SSI or BiSS, 2048 incr. RS422	Signal: GND +V +C -C +D -D A A inv B B inv PE
			Cable colour: WH BN GN YE GY PK BK VT GY-PK RD-BU Shield

- +V: Encoder power supply +V DC
- GND: Encoder power supply ground GND (0V)
- +C, -C: Clock signal
- +D, -D: Data signal
- SET: Set input. The current position becomes defined as position zero.
- DIR: Direction input: If this input is active, output values are counted backwards (decrease) when the shaft is turning clockwise.
- Stat: Status output
- PE: Protective earth
- PH: Plug connector housing (Shield)
- A, A inv: Incremental output channel A
- B, B inv: Incremental output channel B

Top view of mating side, male contact base



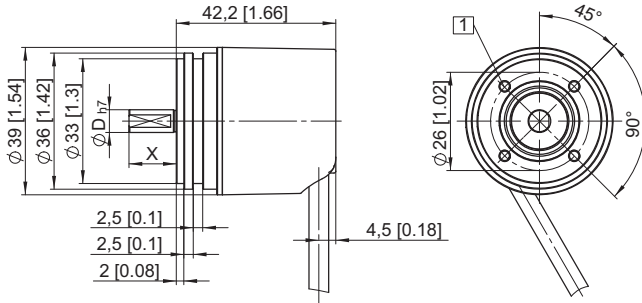
M12 connector, 8-pin

Absolute Encoders – Multiturn

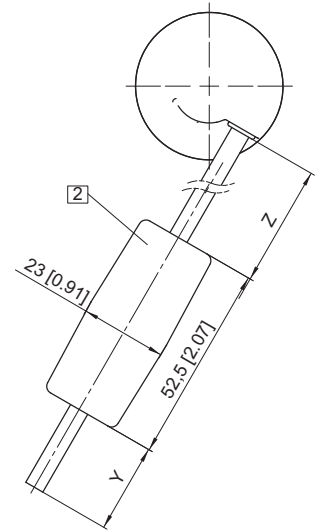
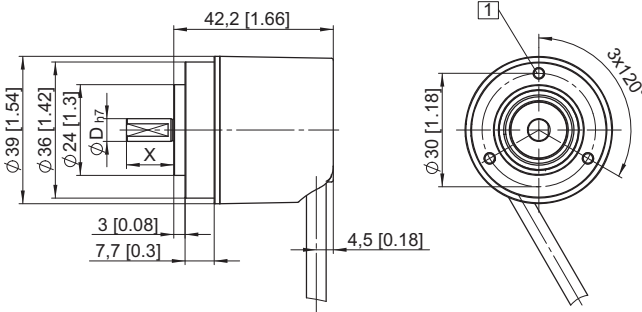
Compact, optical	Sendix F3663 / F3683 (Shaft / Hollow shaft)	SSI / BiSS
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Dimensions shaft version

Synchro flange, ø 36 mm



Clamping flange, ø 36 mm



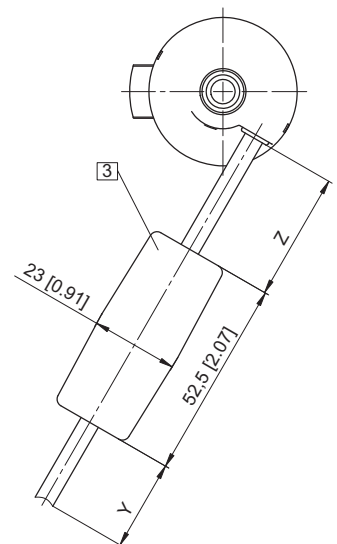
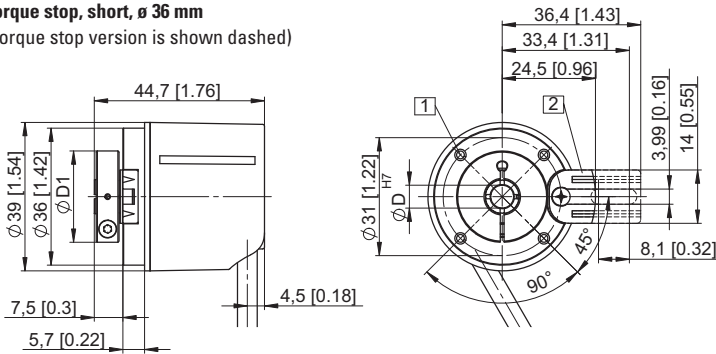
- 1 M3, 6 [0.24] deep
- 2 Battery (in the cable)

Y	Z
1 m	150 mm
5 m	150 mm

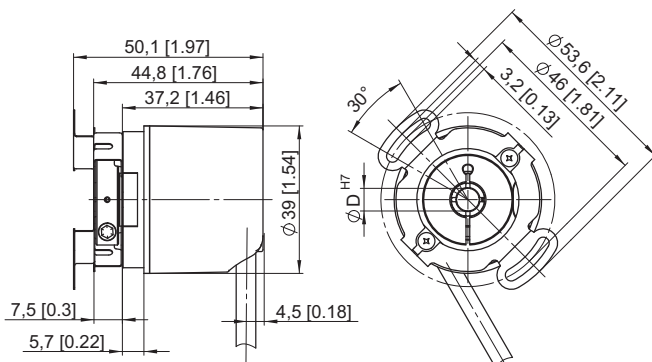
Dimensions hollow shaft version:

With torque stop, short, ø 36 mm

(Long torque stop version is shown dashed)



With stator coupling, ø 36 mm



- 1 M2.5 5 [0.2] deep
- 2 Torque stop slot
Recommendation:
cylindrical pin DIN 7, ø 4 mm
- 3 Battery (in the cable)

Hollow shaft acc. to order code	D1
1	ø 24 mm
2	ø 24 mm
3	ø 25.5 mm
4	ø 25.5 mm

Y	Z
1 m	150 mm
5 m	150 mm

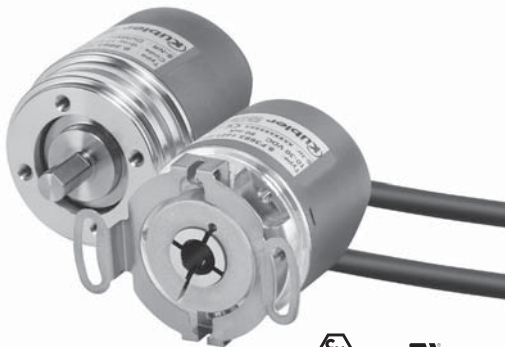
Insertion depth for blind hollow shaft 14,5 mm

Absolute Encoders – Multiturn

Compact, optical

Sendix F3668 / F3688 (Shaft / Hollow shaft)

CANopen



The Sendix F36 multiturn is an optical multiturn encoder in miniature format, without gears and with 100% insensitivity to magnetic fields. With a size of just 36 x 42 mm it offers a shaft or a blind hollow shaft of up to 10 mm.



Recipients of the MessTec & Sensor Master 2010 Award and the Golden Mousetrap Award 2009.



Safety-Lock™



High rotational speed



Temperature

-40° +85°



High IP value



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Short-circuit proof



Reverse polarity protection



Optical sensor



Seawater-resistant version on request

Reliable and magnetically insensitive

- Electronic multiturn with Intelligent Scan Technology™ 100 % magnetic-field resistant
- Sturdy bearing construction in Safety Lock™ Design for resistance against vibration and installation errors
- Reduced number of components ensures magnetic insensitivity
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +85°C

Up-to-the-minute Fieldbus performance

- CANopen with current encoder profile
- LSS services for configuration of the node address and baud rate
- Variable PDO mapping in the memory

Order code

Shaft version

8.F3668 . XX2X . 2112

Type

a

b

c

d

e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Uts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, ø 36 mm
- 1 = clamping flange, IP67
 - 2 = synchro flange, IP67
 - 3 = clamping flange, IP65
 - 4 = synchro flange, IP65

- b** Shaft (ø x L), with flat
- 1 = ø 6 x 12,5 mm
 - 2 = ø 6,35 (1/4") x 12,5 mm
 - 3 = ø 8 x 15 mm
 - 4 = ø 9,5 x 15,875 mm (3/8" x 5/8")
 - 5 = ø 10 x 20 mm

- c** Interface / Power supply
- 2 = CANopen DS301 V4.02 / 10 ... 30 V DC

optional on request

- Ex 2/22
- seawater-resistant
- special cable length

- d** Type of connection
- 1 = cable, tangential (1 m PUR)
 - 3 = cable, tangential (5 m PUR)

- e** Fieldbus profile
- 21 = CANopen Encoder profile DS406 V3.2

Order code

Hollow shaft

8.F3688 . XX2X . 2112

Type

a

b

c

d

e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Uts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange, ø 36 mm, IP65
- 1 = with torque stop, short
 - 2 = with stator coupling
 - 3 = with torque stop, long

- b** Blind hollow shaft
- 4 = ø 10 mm
 - 5 = ø 6 mm
 - 6 = ø 6,35 mm (1/4")
 - 7 = ø 8 mm

- c** Interface / Power supply
- 2 = CANopen DS301 V4.02 / 10 ... 30 V DC

optional on request

- Ex 2/22
- seawater-resistant
- special cable length

- d** Type of connection
- 1 = cable, tangential (1 m PUR)
 - 3 = cable, tangential (5 m PUR)

- e** Fieldbus profile
- 21 = CANopen Encoder profile DS406 V3.2

Absolute Encoders – Multiturn

Compact, optical		Sendix F3668 / F3688 (Shaft / Hollow shaft)	CANopen
Mounting accessory for shaft encoders			
Coupling	Bellows coupling ø 19 mm for shaft 6 mm		8.0000.1101.0808
Mounting accessory for hollow shaft encoders			
Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
Connection Technology			
Connector, self-assembly (straight)	M12		8.0000.5111.0000
Programming set			
including:	<ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0015

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Maximum speed		
Shaft- or blind hollow shaft version without shaft seal (IP65)		12 000 min ⁻¹ 10 000 min ⁻¹ (continuous op.)
Shaft version (IP67) or hollow shaft version (IP65) with shaft seal		10 000 min ⁻¹ 8 000 min ⁻¹ (continuous op.)
Starting torque	without shaft seal with shaft seal (IP67)	< 0.007 Nm < 0.01 Nm
Shaft load capacity	radial axial	40 N 20 N
Weight		ca. 0.2 kg
Protection to EN 60 529	housing side shaft side	IP 67 IP 65 (solid shaft version opt. IP67)
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +85°C
Materials	shaft / hollow shaft flange housing cable	stainless steel aluminium zinc die-cast PUR
Shock resistance acc. to EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

Diagnostic LED (two-colour, red/green)		
LED ON or blinking	red green	Error display Status display

General electrical characteristics	
Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 80 mA
Reverse connection of the supply voltage (U_B)	yes
RoHS compliant acc. to	EU guideline 2002/95/EG
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, and EN 61000-6-3

Interface characteristics CANopen	
Resolution Singleturn	1 ... 65536 (16 bit), scaleable:: 1 ... 65536
Default value Singleturn	8192 (13 bit)
Total resolution	1 ... 4.294.967.296 (32 bit) Default: 25 bit
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	CANopen profile DS406 V3.2 with manufacturer-specific add-ons LSS-Service DS305 V2.0
Baud rate	10 ... 1000 kbit/s (Software configurable)
Node address	1 ... 127 (Software configurable)
Termination switchable	Software configurable
LSS Protocol	CIA LSS protocol DS305 Global command support for node address and baud rate. Selective commands via attributes of the identity object

Absolute Encoders – Multiturn

Compact, optical

Sendix F3668 / F3688 (Shaft / Hollow shaft)

CANopen

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device-specific profiles like the encoder profile DS406 V3.2 are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN-Bus. When switching the device on, all parameters, which have been saved on a flash memory to protect them against power failure, are loaded again.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed** as well as the **status of the working area**.

The encoders are available with a connector or a cable connection.

The device address and baud rate can be set/modified by means of the software.

The two-colour LED located on the back indicates the operating or fault status of the CAN bus, as well as the status of the internal diagnostics.

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated. Class C2 functionality:

- NMT Slave
- Heartbeat Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus / Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- 1 work area with upper and lower limit and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing
- User interface with visual display of bus and failure status 1 LED two colours
- Customer-specific memory - 16 Bytes
- Customer-specific protocol

"Watchdog controlled" device

LSS Layer Setting Services DS305 V2.0

- Global support of Node-ID and baud rate
- Selective protocol via identity object (1018h)

CAN bus connection

The CANopen encoders are equipped with a Bus trunk line in various lengths and can be terminated in the device.

The devices do not have an integrated T-coupler nor they are looped internally and must therefore only be used as end devices.

If possible, drop lines should be avoided, as in principle they lead to signal reflections. As a rule the reflections caused by the drop lines are not critical, if they have completely decayed before the point in time when the scanning occurs.

The sum of all the drop lines should not, for a particular baud rate, exceed the maximum length L_u .

$L_u < 5$ m cable length for 125 Kbit

$L_u < 2$ m cable length for 250 Kbit

$L_u < 1$ m cable length for 1 Mbit

When used as a drop line, the termination resistor should not be activated.

For a network with 3 encoders and 250 Kbit the maximum length of the drop line/encoder must not exceed 70 cm.

Terminal assignment

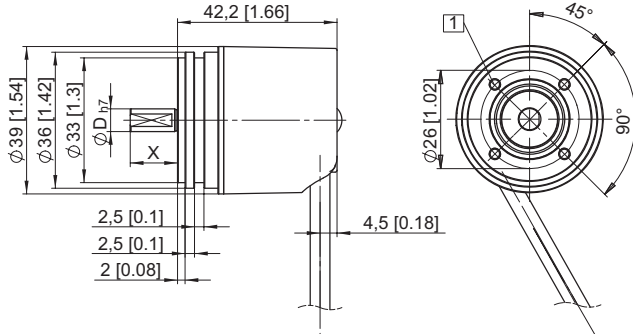
Signal:	+U _B	0 V	CAN GND	CAN High	CAN Low
Cable colour:	BN	WH	GY	GN	YE

Absolute Encoders – Multiturn

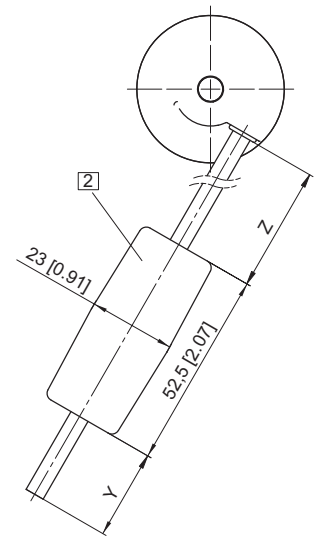
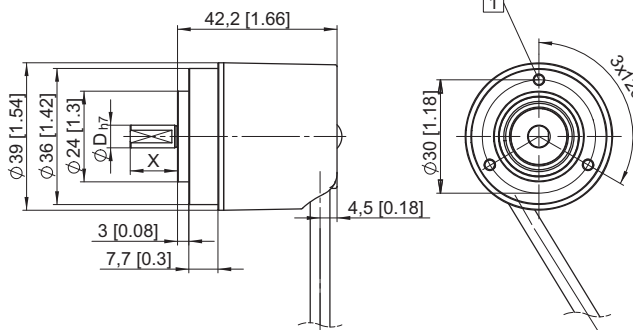
Compact, optical	Sendix F3668 / F3688 (Shaft / Hollow shaft)	CANopen
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Dimensions shaft version:

Synchro flange, ø 36 mm



Clamping flange, ø 36 mm



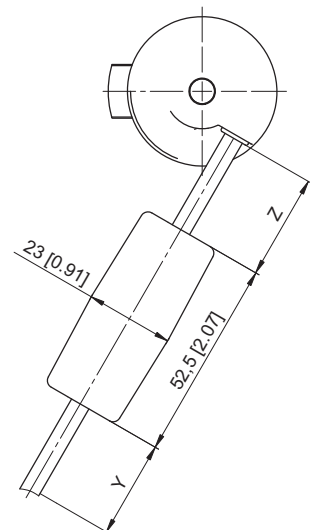
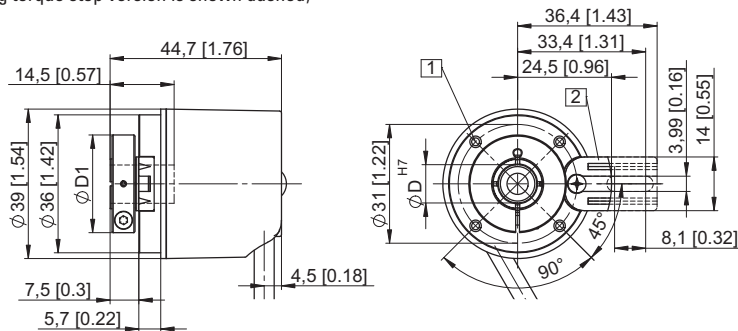
- 1 M3, 6 [0.24] deep
- 2 Battery (in the cable)

Y	Z
1 m	150 mm
5 m	150 mm

Dimensions hollow shaft version:

With torque stop, short, ø 36 mm

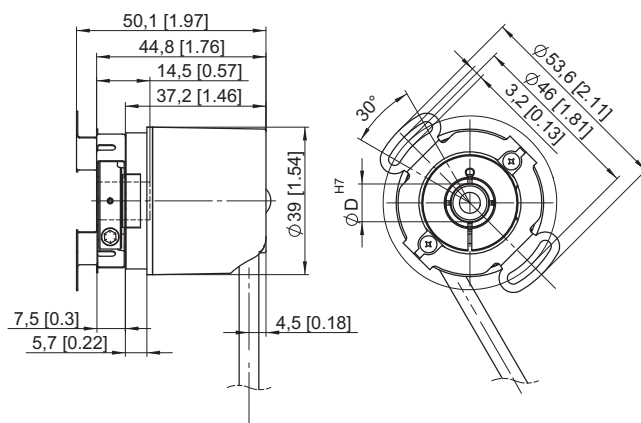
(Long torque stop version is shown dashed)



- 1 M2.5 [0.2] deep
- 2 Torque stop slot
Recommendation:
cylindrical pin DIN 7, ø 4 mm
- 3 Battery (in the cable)

Hollow shaft acc. to order code	D1
1	ø 24 mm
2	ø 24 mm
3	ø 25.5 mm
4	ø 25.5 mm

With stator coupling, ø 36 mm



- 1 M2.5 [0.2] deep
- 2 Torque stop slot
Recommendation:
cylindrical pin DIN 7, ø 4 mm
- 3 Battery (in the cable)

Y	Z
1 m	150 mm
5 m	150 mm

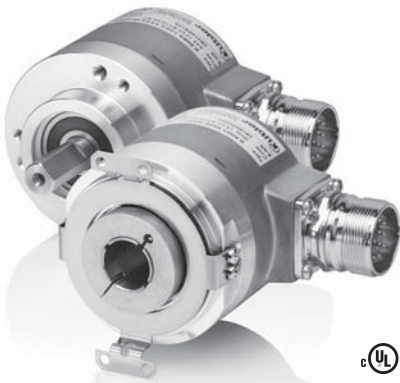
Insertion depth for blind hollow shaft 14,5 mm

Absolute Encoders – Multiturn

Functional Safety, optical

Sendix 5863 SIL / 5883 SIL (Shaft / Hollow shaft)

SSI / BiSS + SinCos



The absolute multiturn encoders Sendix 5863 SIL and 5883 SIL are perfectly suited for use in safety-related applications up to SIL3 according to DIN EN ISO 61800-5-2 or PLe to DIN EN ISO 13849.

The extra strong Safety-Lock™ Design interlocked bearings, the high integration density of the components based on OptoASIC technology and the rugged die-cast housing make these devices ideal also for demanding applications outdoors.



Mechanical drive



Safety-Lock™



High rotational speed



Temperature



High IP value



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Reverse polarity protection



SinCos



Seawater-resistant version on request

Certified Safety

- Certified by the BGIA - Institute for Occupational Safety and Health
- Suitable for SIL3 applications acc. to DIN EN ISO 61800-5-2
- Suitable for PLe applications acc. to DIN EN ISO 13849
- SSI or BiSS interface with incremental SinCos tracks

Flexible

- Shaft and Hollow shaft versions
- Cable and connector variants
- Various mounting options available

Order code Shaft version

8.5863SIL . 1 X X X . X X 2 X
Type a b c d e f g h

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

1 = clamping flange, ø 58 mm, IP65

b Shaft (ø x L)

2 = 10 x 20 mm, with flat
A = 10 x 20 mm, with feather key shaft slot

c Output circuit / Power supply

3 = SSI/BiSS + 2048 ppr SinCos track / 5 V DC
4 = SSI/BiSS + 2048 ppr SinCos track / 10 ... 30 V DC

d Type of connection

1 = axial cable (1 m PVC)
2 = radial cable (1 m PVC)
3 = M23 connector, 12-pin, axial
4 = M23 connector, 12-pin, radial

e Code

B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

f Resolution ¹⁾

A = 10 bit ST + 12 bit MT
1 = 11 bit ST + 12 bit MT
2 = 12 bit ST + 12 bit MT
3 = 13 bit ST + 12 bit MT
4 = 14 bit ST + 12 bit MT
7 = 17 bit ST + 12 bit MT

g Input / output ¹⁾

2 = SET, DIR inputs
additional status output

h Options (Service)

1 = No Option
2 = status-LED
3 = SET button and status LED

optional on request
- seawater-resistant
- special cable length

Order code Hollow shaft

8.5883SIL . X X X X . X X 2 X
Type a b c d e f g h

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

A = with torque stop set, IP65
B = with stator coupling, IP65

b Hollow shaft

3 = ø 10 mm
4 = ø 12 mm
5 = ø 14 mm
K = ø 10 mm, tapered shaft

c Output circuit / Power supply

3 = SSI/BiSS + 2048 ppr SinCos track / 5 V DC
4 = SSI/BiSS + 2048 ppr SinCos track / 10 ... 30 V DC

d Type of connection

2 = radial cable (1 m PVC)
4 = M23 connector, 12-pin, radial
E = tangential cable outlet
cable length 1 m (PVC cable)

e Code

B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

f Resolution ¹⁾

A = 10 bit ST + 12 bit MT
1 = 11 bit ST + 12 bit MT
2 = 12 bit ST + 12 bit MT
3 = 13 bit ST + 12 bit MT
4 = 14 bit ST + 12 bit MT
7 = 17 bit ST + 12 bit MT

g Input / output ¹⁾

2 = SET, DIR inputs
additional status output

h Options (Service)

1 = No Option
2 = status-LED
3 = SET button and status LED

optional on request
- seawater-resistant
- special cable length

1) Resolution, preset value and count direction are factory-programmable

Absolute Encoders – Multiturn

Functional Safety, optical	Sendix 5863 SIL / 5883 SIL (Shaft / Hollow shaft)	SSI / BiSS + SinCos
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Connection Technology		
Connector, self-assembly (straight)	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002.0031

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL3 to DIN EN ISO 61800-5-2 and PLe to DIN EN ISO 13849 in conjunction with controllers or evaluation units, which possess the necessary functionality. Additional functions can be found in the operating manual.

Mechanical characteristics	
Max. speed, shaft version	
without shaft seal (IP65) up to 70°C	12 000 min ⁻¹ , 10 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C	11 000 min ⁻¹ , 9 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}	8 000 min ⁻¹ , 5 000 min ⁻¹ (continuous)
Max. speed, hollow shaft version	
without shaft seal (IP65) up to 70°C	9 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C	8 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}	4 000 min ⁻¹ , 2 000 min ⁻¹ (continuous)
Starting torque, shaft version	
without shaft seal (IP65)	< 0.01 Nm
with shaft seal (IP67)	< 0.05 Nm
Starting torque, hollow shaft version	
without shaft seal (IP65)	< 0.03 Nm
Moment of inertia	
Shaft version	4.0 x 10 ⁻⁶ kgm ²
Hollow shaft version	7.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft radial / axial	80 N / 40 N
Weight	approx. 0.45 kg
Protection EN 60 529 housing side / shaft side	IP67 / IP65, opt. IP67
Working temperature range	-40°C ... +90°C ¹⁾
Materials shaft/hollow shaft / flange / housing / cable	stainless steel / aluminium / zinc die-cast housing / PVC
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

Electrical characteristics	
Supply voltage	5 V DC ± 5% or 10 ... 30 V DC
Current consumption (w/o output load)	5 V DC: max. 80 mA 10 ... 30 V DC: max. 50 mA
Reverse polarity protection of the power supply (U_B)	yes
UL certified	File 224618
Conforms to CE requirements acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU-guideline 2002/95/EG

General Interface characteristics	
Output driver	RS485 transceiver type
Permissible load / channel	max. 20 mA
Signal level	high: typ 3.8 V low at I _{Load} = 20 mA: typ 1.3 V
Short circuit proof outputs	yes ²⁾

SSI Interface	
Singleturn resolution	10 ... 14 bits and 17 bit ³⁾
Number of revolutions	4096 (12 bit)
Code	Binary or Gray
SSI clock rate	≤ 14 bit: 50 kHz ... 2 MHz ≥ 15 bit: 50 kHz ... 125 kHz
Monoflop time	≤ 15 μs
Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.	
Data refresh rate	≤ 14 bit: < 1 μs 15 ... 17 bit: 4 μs
Status and Parity bit	optional on request

Output SinCos (A / B) 2048 ppr (Optional incremental track)	
Max. frequency -3dB	400 kHz
Signal level	1 V _{pp} (± 20%)
Short circuit proof	yes

SET input or SET button	
Input	active high
Input type:	comparator
Signal level	high: min: 60 % of +V, max: +V low: max: 25 % of +V (Supply voltage)
Input current	< 0.5 mA
Min. pulse duration (SET)	10 ms
Timeout after SET signal	14 ms
Reaction Time (DIR input)	1 ms
The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET button (with a pencil, ball-point pen or similar). Other preset values can be factory-programmed. The SET input has a signal delay time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the LED is ON.	

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This function can also be factory-programmed to be inverted. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

1) Cable version: -30°C ... +90°C
2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied
3) Other options upon request

Absolute Encoders
Multiturn

Absolute Encoders – Multiturn

Functional Safety, optical	Sendix 5863 SIL / 5883 SIL (Shaft / Hollow shaft)	SSI / BiSS + SinCos
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Power-ON delay
 After Power-ON the encoder requires a time of approx. 150 ms before valid data can be read.

LED
 The optional LED (red) serves to display various alarm or error messages. In normal operation the LED is OFF.
 If the LED is ON this indicates:
 - Sensor error, singleturn or multiturn (soiling, glass breakage etc.)
 - LED error, failure or ageing
 - Over- or under-temperature
 In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

Terminal assignment

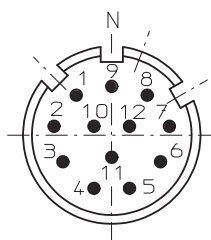
For output circuit 3 or 4 (2 control inputs, SinCos)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

- +V: Encoder Power Supply +V DC
- GND: Encoder Power Supply Ground (0V)
- +C, -C: Clock signal
- +D, -D: Data signal
- SET: Set input. The current position is set to zero
- DIR: Direction input: If this input is active, the output values are counted backwards (decrease) when the shaft is turning clockwise.

- Stat: Status output
- PE: Protective earth
- PH: Plug connector housing (shield)
- A, Ainv: Sin output (incremental)
- B, Binv: Cos output (incremental)

Top view of mating side, male contact base



M23 connector, 12-pin

Absolute Encoders – Multiturn

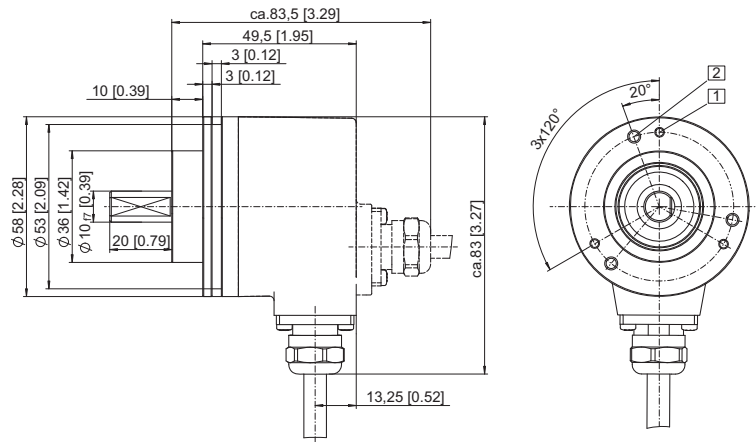
Functional Safety, optical **Sendix 5863 SIL / 5883 SIL (Shaft / Hollow shaft)** **SSI / BiSS + SinCos**

Dimensions shaft version

Clamping flange

Flange type 1 with shaft type 2

(Drawing with cable)

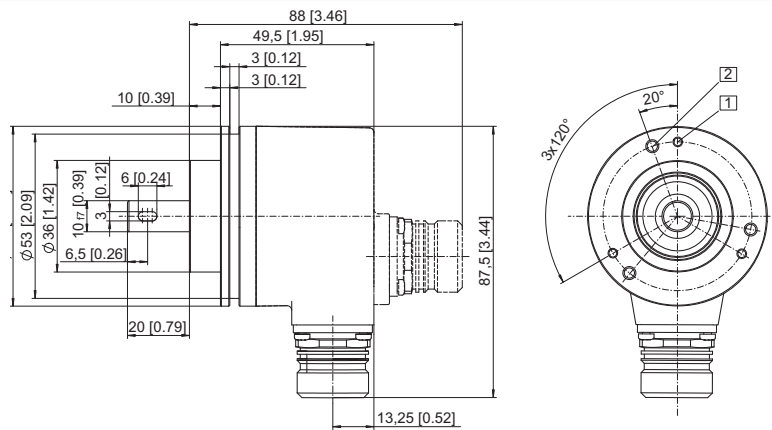


Flange type 1 with shaft type A

(Drawing with M23 connector)

1 3 x M3, 6 [0.24] deep

2 3 x M4, 8 [0.32] deep



Absolute Encoders
Multiturn

Absolute Encoders – Multiturn

Functional Safety, optical

Sendix 5863 SIL / 5883 SIL (Shaft / Hollow shaft)

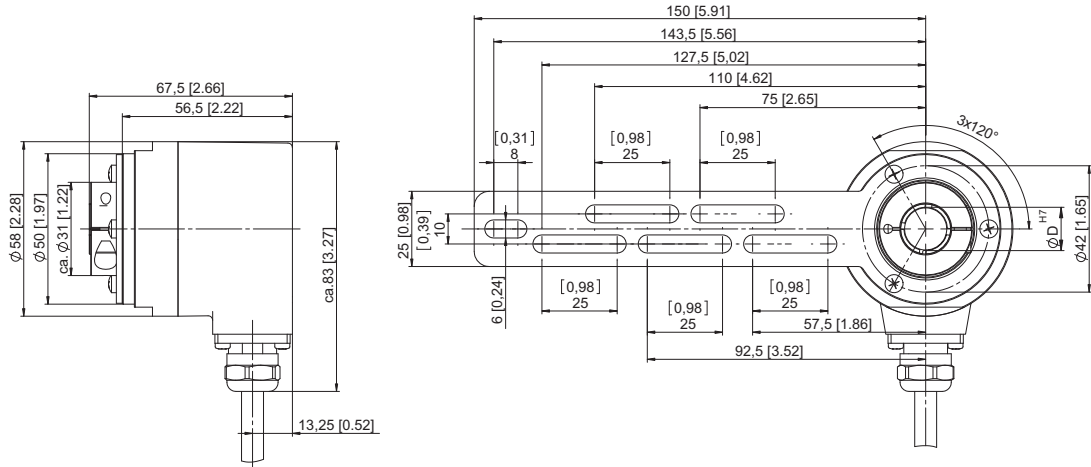
SSI / BiSS + SinCos

Dimensions hollow shaft version

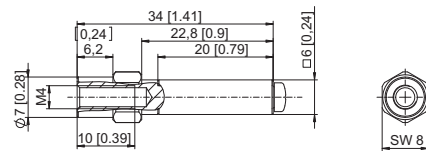
With torque stop set

Flange type A

(Drawing with cable)



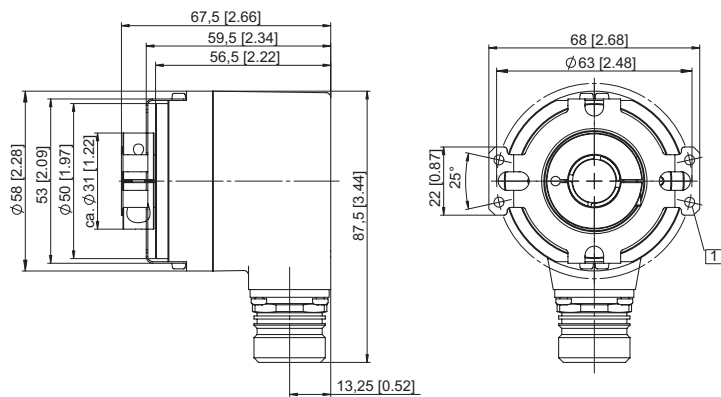
Torque pin with rectangular sleeve
with M4 thread, 10 deep



Flange with stator coupling and hollow shaft

Flange type B

(Drawing with M23 connector)

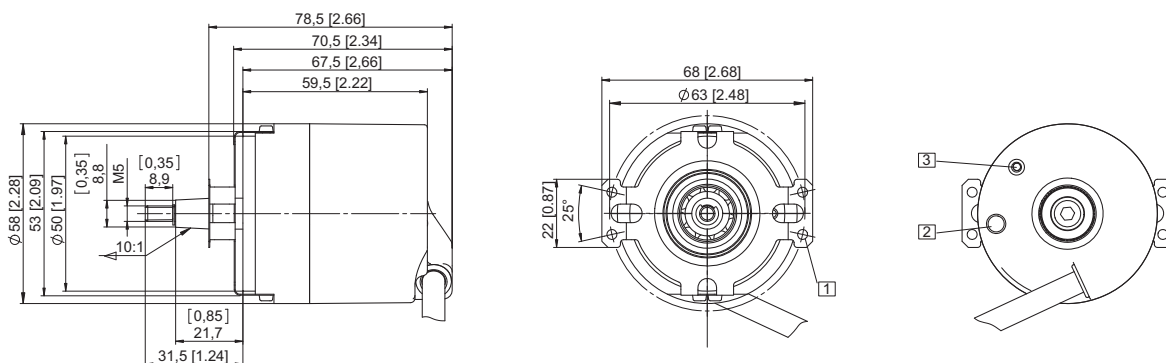


1 for (4x) M3 screw

Flange with stator coupling and tapered shaft

Flange type B

(Drawing with tangential cable outlet)



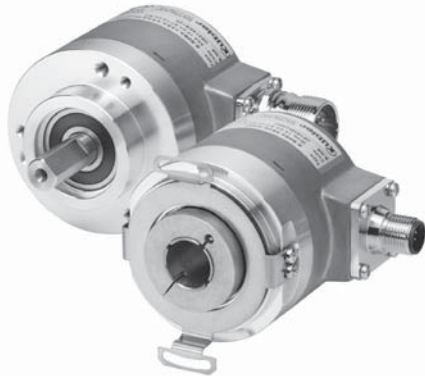
1 for (4x) M3 screw

2 Status LED

3 SET button

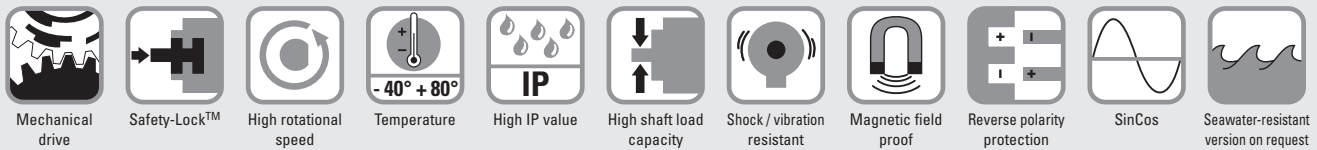
Absolute Encoders – Multiturn

Standard, optical **Sendix 5863 / 5883 (Shaft / Hollow shaft)** **SSI / BiSS**



The Sendix 5863 and 5883 multiturn encoders with SSI or BiSS interface and optical sensor technology can achieve a resolution of max. 29 bits.

A through hollow shaft up to 14 mm and a blind hollow shaft up to 15 mm are available, as well as versions with additional SinCos or RS422 incremental track.



Reliable

- Tried-and-tested in applications with the highest demands, such as in wind energy or mobile automation
- Absolutely reliable operation in areas with strong magnetic fields, thanks to mechanical gear with optical sensor technology
- Rugged die-cast housing, remains sealed even in harsh every-day use
- -40°C up to +90°C: use in wide temperature range. Protection IP67

Versatile

- Available with SSI or BiSS interface and combined with SinCos incremental signals
- The right fixing solution or type of connection available for every application.
- SET button and LED for simple start-up

Absolute Encoders
Multiturn

Order code

8.5863

Type

. X X X X . X X 2 X

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 1 = clamping flange, ø 58 mm, IP65**
- 2 = synchro flange, ø 58 mm, IP65**
- 3 = clamping flange, ø 58 mm, IP67
- 4 = synchro flange, ø 58 mm, IP67
- 5 = square flange, 63,5 mm (2,5"), IP65
- 7 = square flange, 63,5 mm (2,5"), IP67

b Shaft (ø x L), with flat

- 1 = 6 x 10 mm¹⁾**
- 2 = 10 x 20 mm²⁾**
- 3 = 6,35 x 22,2 mm (1/4" x 7/8")
- 4 = 9,5 x 22,2 mm (3/8" x 7/8")

c Interface / Power supply

- 1 = SSI or BiSS / 5 V DC
- 2 = SSI or BiSS / 10 ... 30 V DC**
- 3 = SSI or BiSS, 2048 ppr SinCos / 5 V DC
- 4 = SSI or BiSS, 2048 ppr SinCos / 10 ... 30 V DC
- 5 = SSI or BiSS / 5 V DC, with sensor output for monitoring the voltage on the encoder
- 6 = SSI or BiSS, 2048 ppr SinCos / 5 V DC, with sensor output for monitoring the voltage on the encoder
- 7 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC
- 8 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 10 ... 30 V DC
- 9 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC, with sensor output for monitoring the voltage on the encoder

d Type of connection

- 1 = axial cable (1 m PVC)
- 2 = radial cable (1 m PVC)**
- 3 = M23 connector, 12-pin, axial
- 4 = M23 connector, 12-pin, radial**
- 5 = M12 connector, 8-pin, axial³⁾
- 6 = M12 connector, 8-pin, radial³⁾

e Code

- B = SSI, Binary
- C = BiSS, Binary
- G = SSI, Gray**

f Resolution⁴⁾

- A = 10 bit ST + 12 bit MT
- 1 = 11 bit ST + 12 bit MT
- 2 = 12 bit ST + 12 bit MT
- 3 = 13 bit ST + 12 bit MT**
- 4 = 14 bit ST + 12 bit MT
- 7 = 17 bit ST + 12 bit MT

g Inputs / Outputs⁴⁾

- 2 = SET, DIR input** additional status output

h Options (Service)

- 1 = no option
- 2 = status LED
- 3 = SET button and status LED**

optional on request
- Ex 2/22
- seawater-resistant
- special cable length

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1
3) Can be combined only with output circuits 1 and 2
4) Resolution, preset value and counting direction factory-programmable

Absolute Encoders – Multiturn

Standard, optical Sendix 5863 / 5883 (Shaft / Hollow shaft) SSI / BiSS

General electrical characteristics	
Power supply	5 V DC + 5% or 10 ... 30 V DC
Current consumption (no load) 5 V DC	max. 80 mA
10 ... 30 V DC	max. 50 mA
Reverse connection of the supply voltage (U_B)	yes (at 10 ... 30 V DC)
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

General interface characteristics	
Output driver	RS485 transceiver type
Permissible load / channel	max. 20 mA
Signal level	high typ. 3.8 V low at I _{Load} = 20 mA typ. 1.3 V
Short circuit proof outputs	yes ¹⁾

SSI Interface	
Singleturn resolution	10 ... 14 bit and 17 bit ²⁾
Number of revolutions	4096 (12 bit)
Code	Binary or Gray
SSI clock rate	≤ 14 bit 50 kHz ... 2 MHz ≥ 15 bit 50 kHz ... 125 kHz
Monoflop time	≥ 15 μs
Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.	
Data refresh rate	< 1 μs up to 14 bit 4 μs for 15 ... 17 bit
Status and Parity bit	on request

BiSS Interface	
Singleturn resolution	10 ... 14 bit and 17 bit, Programmable at the customer ²⁾
Number of revolutions	4096 (12 bit)
Code	Binary
Clock rate	up to 10 MHz
Max. update rate	< 10 μs, depends on the clock rate and the data length
Data refresh rate	≤ 1 μs
Note::	<ul style="list-style-type: none"> - Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings - Multi-cyclic data output, e.g. for temperature - CRC data verification

SET input or SET button	
Input	active high
Input type	comparator
Signal level	high min: 60 % of +V (supply voltage) max: +V low max: 25 % of +V (supply voltage)
Input current	< 0.5 mA
Min. pulse duration (SET)	10 ms
Timeout after SET signal	14 ms
Response time (DIR input)	1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET button (with a pencil, ball-point pen or similar). Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the status output is at LOW.

Status output and LED	
Output driver	Open Collector, internal pull up resistor 22 kOhm
Permissible load	max. 20 mA
Signal level	high +V low < 1 V
Active	low
The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (Open Collector with int. pull-up 22k).	
An active status output (LOW) displays: <ul style="list-style-type: none"> - Sensor error, singleturn or multiturn (soiling, glass breakage etc.) - LED fault (failure or ageing) - over- or under-temperature 	
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.	

DIR input	
A HIGH signal switches the direction of rotation from the default CW to CCW. This function can also be factory-programmed to be inverted. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.	

Power-on delay	
After Power-ON the encoder requires a time of approx. 150 ms before valid data can be read.	

Option Incremental outputs (A/B), 2048 ppr		
	SinCos	RS422 TTL-compatible
Max. frequency -3dB	400 kHz	400 kHz
Signal level	1 V _{pp} (± 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof	yes	yes

Absolute Encoders
Multiturn

1) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied
2) Other options upon request

Absolute Encoders – Multiturn

Standard, optical	Sendix 5863 / 5883 (Shaft / Hollow shaft)	SSI / BiSS
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Terminal assignment

for output circuit 1 or 2 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	N/C	N/C	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 5 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output, sensor outputs for voltage)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	0V sens	+U _B sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 3, 4, 7 or 8 and type of connection 1, 2, 3 or 4 (2 control inputs, incremental track RS422 or SinCos)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	B inv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 6 or 9 and type of connection 1, 2, 3 or 4 (SinCos or incremental track, sensor outputs for voltage)

Signal:	GND	+V	+C	-C	+D	-D	A	A inv	B	B inv	0V sens	+U _B sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 connector:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 1 or 2 and type of connection 5 or 6 (2 control inputs)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
M12 connector:	1	2	3	4	5	6	7	8	PH

+V: Encoder Power Supply +V DC

GND: Encoder Power Supply Ground (0V)

+C, -C: Clock signal

+D, -D: Data signal

SET: Set input. The current position is set to zero

DIR: Direction input: If this input is active, the output values are counted backwards (decrease) when the shaft is turning clockwise.

Stat: Status output

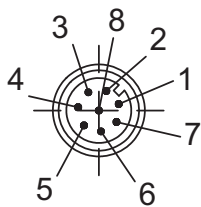
PE: Protective earth

PH: Plug connector housing (shield)

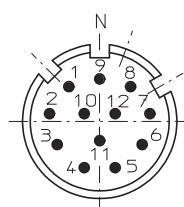
A, A inv: Sin output (incremental)

B, B inv: Cos output (incremental)

Top view of mating side, male contact base



M12 connector, 8-pin



M23 connector, 12-pin

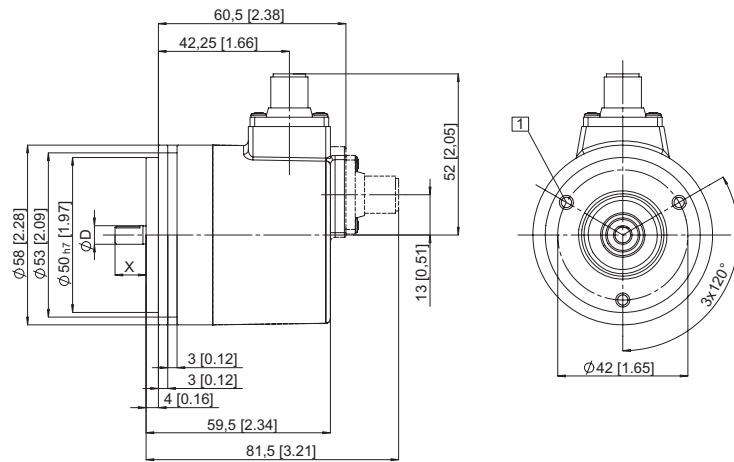
Absolute Encoders – Multiturn

Standard, optical **Sendix 5863 / 5883 (Shaft / Hollow shaft)** **SSI / BiSS**

Dimensions shaft version

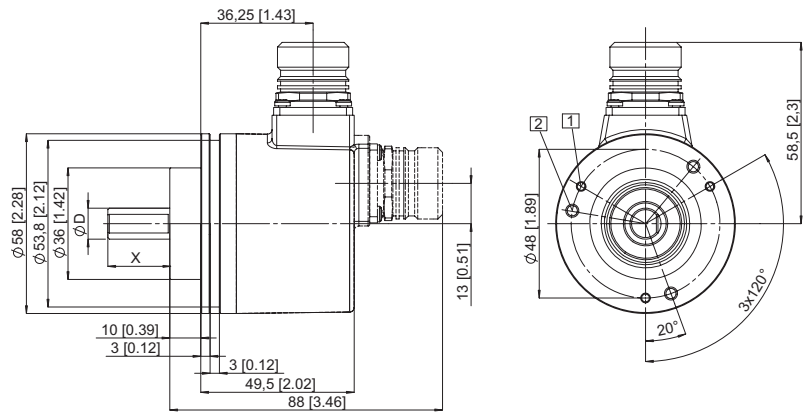
Synchro flange, \varnothing 58 mm
M12, M23 connector, cable version
Flange type 2 and 4
 (Drawing with M12 connector)

1 3 x M4, 6 [0.24] deep

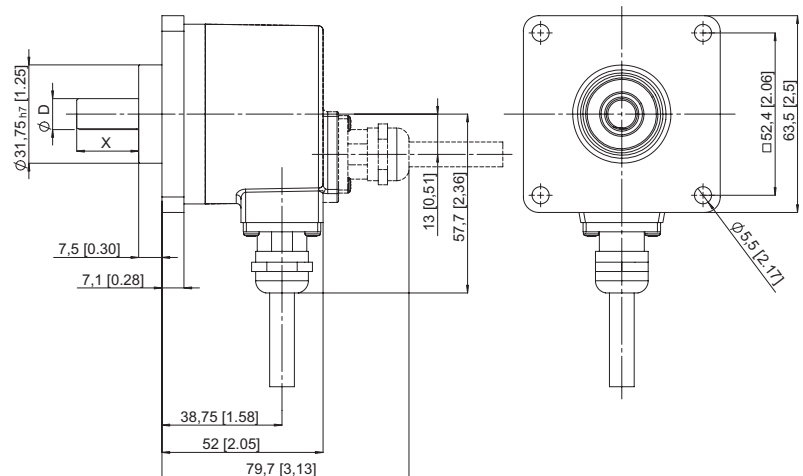


Clamping flange, \varnothing 58 mm
M12, M23 connector, cable version
Flange type 1 and 3
 (Drawing with M23 connector)

1 3 x M3, 6 [0.24] deep
 2 3 x M4, 8 [0.32] deep



Square flange, \square 63.5 mm
M12, M23 connector, cable version
Flange type 5 and 7
 (Drawing with cable)



Absolute Encoders
 Multiturn

Absolute Encoders – Multiturn

Standard, optical

Sendix 5863 / 5883 (Shaft / Hollow shaft)

SSI / BiSS

Dimensions hollow shaft version

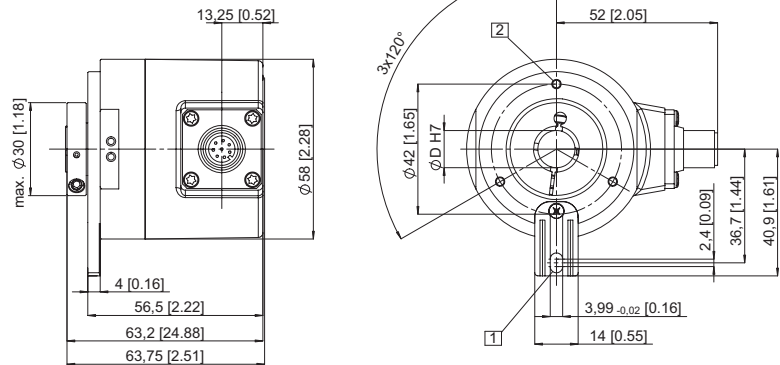
Flange with torque stop set, long, \varnothing 58 mm

M12, M23 connector, cable version

Flange type 1 and 2

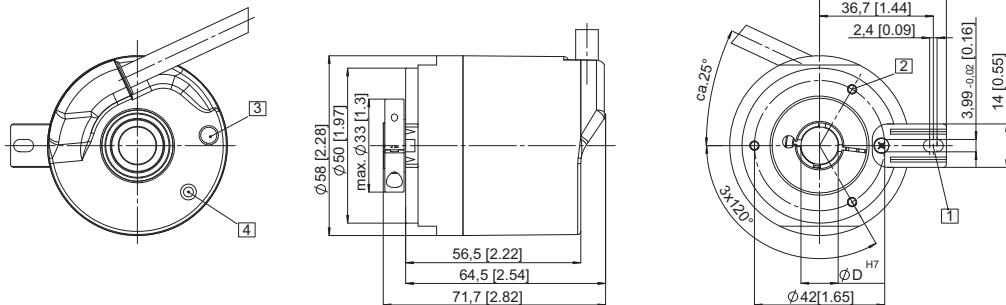
(Drawing with M12 connector)

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 6 [0.24] deep



M12, M23 connector, cable version
tangential cable outlet

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, \varnothing 4 mm
- 2 M3, 5.5 [0.21] deep
- 3 Status LED
- 4 4 SET button



Flange with stator coupling, \varnothing 58 mm

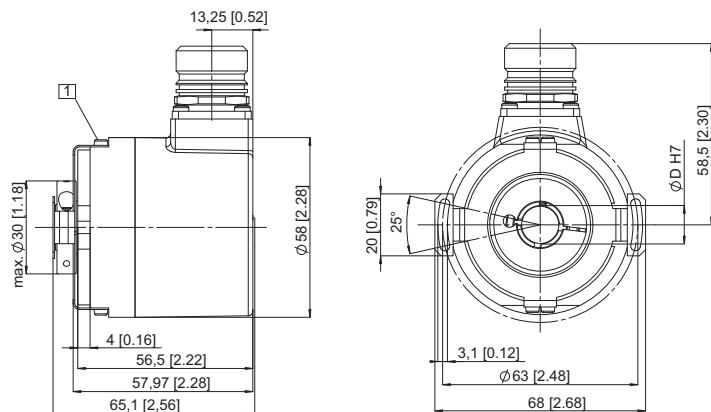
M12-, M23-connector, cable version

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with M23 connector)

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)

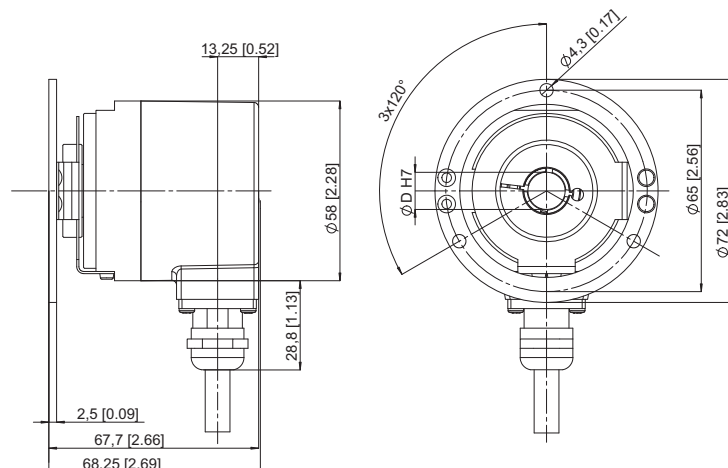


Flange with stator coupling, \varnothing 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with cable)



Absolute Encoders – Multiturn

Standard, optical **Sendix 5868 / 5888 (Shaft / Hollow shaft)** **Profibus-DP**



The singleturn encoders 5868 and 5888 with Profibus interface and optical sensor technology are the ideal solution for all Profibus applications.

With a maximum resolution of 28 bits these encoders are available with blind hollow shaft up to 15 mm.



Mechanical drive	Safety-Lock™	High rotational speed	Temperature -40° + 80°	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Reverse polarity protection	Optical sensor	Seawater-resistant version on request

Reliable

- Tried-and-tested in applications with the highest demands, such as in wind energy or mobile automation.
- Absolutely reliable operation in areas with strong magnetic fields, thanks to mechanical gear with optical sensor technology

Flexible

- Fast, simple, error-free connection using versions with M12 connector
- Wide-ranging programming options thanks to latest encoder profile

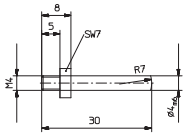
Absolute Encoders
Multiturn

Order code Shaft version	8.5868 Type	. X X 3 X . 31 1 X a b c d e f	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	10 by 10
a Flange	b Shaft (ø x L), with flat	d Type of connection		
<u>1 = clamping flange, ø 58 mm, IP65</u> 2 = synchro flange, ø 58 mm, IP65 3 = clamping flange, ø 58 mm, IP67 4 = synchro flange, ø 58 mm, IP67 5 = square flange, 63,5 mm (2,5"), IP65 7 = square flange, 63,5 mm (2,5"), IP67	<u>1 = 6 mm x 10 mm ¹⁾</u> <u>2 = 10 mm x 20 mm ²⁾</u> 3 = 6,35 x 22,2 mm (1/4" x 7/8") 4 = 9,5 x 22,2 mm (3/8" x 7/8")	1 = removable bus terminal cover, with cable gland fitting, radial <u>2 = removable bus terminal cover, with 3 x M12 connectors, radial</u>		
	c Interface / Power supply	e Fieldbus profile	f Options (Service)	
	<u>3 = Profibus-DP V0</u> encoder profile V 1.1, 10 ... 30 V DC	<u>31 = Profibus-DP V0</u> encoder profile Class 2	2 = no option <u>3 = SET button</u> optional on request - Ex 2/22 - seawater-resistant	

Order code Hollow shaft	8.5888 Type	. X X 3 X . 31 1 X a b c d e f	If for each parameter of an encoder the <u>underlined preferred option</u> is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.	10 by 10
a Flange	b Blind hollow shaft	d Type of connection		
1 = with torque stop set, IP65 2 = with torque stop set, IP67 3 = with stator coupling, ø 65, IP65 4 = with stator coupling, ø 65, IP67 <u>5 = with stator coupling, ø 63, IP65</u> 6 = with stator coupling, ø 63, IP67	3 = ø 10 mm <u>4 = ø 12 mm</u> 5 = ø 14 mm 6 = ø 15 mm 8 = ø 9.5 mm [3/8"] 9 = ø 12.7 mm [1/2"]	1 = removable bus terminal cover, with cable gland fitting, radial <u>2 = removable bus terminal cover, with 3 x M12 connectors, radial</u>		
	c Output circuit / Power supply	e Fieldbus profile	f Options (Service)	
	<u>3 = Profibus-DP V0</u> encoder profile V 1.1, 10 ... 30 V DC	<u>31 = Profibus-DP V0</u> encoder profile Class 2	2 = no option <u>3 = SET button</u> optional on request - Ex 2/22 - seawater-resistant	

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1

Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	Profibus-DP
Mounting accessory for shaft encoders		
Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
Mounting accessory for hollow shaft encoders		
Cylindrical pin, long for torque stops		With fixing thread 8.0010.4700.0000
Connection Technology		
Connector, self-assembly (straight)	Coupling M12 for Bus in	05.BMWS 8151-8.5
	Connector M12 for Bus out	05.BMSWS 8151-8.5
	Connector M12 for supply voltage	05.B8141-0
Cordset, pre-assembled, PUR cable	M12 cordset 6 m for Bus in	05.00.6011.3211.006M
	M12 cordset 6 m for Bus out	05.00.6011.3411.006M
	M12 cordset 2 m for supply voltage	05.WAK4-2/S90

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Max. speed	without shaft seal (IP65) up to 70°C	9 000 min ⁻¹ , 7 000 min ⁻¹ (continuous)
	without shaft seal (IP65) up to T _{max}	7 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
	with shaft seal (IP67) up to 70°C	8 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
	with shaft seal (IP67) up to T _{max}	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Starting torque	without shaft seal (IP65)	< 0.01 Nm
	with shaft seal (IP67)	< 0.03 Nm
Rotor moment of inertia	shaft version	4.0 x 10 ⁻⁶ kgm ²
	hollow shaft version	7.5 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	with bus terminal cover	ca. 0.57 kg
	with fixed connection	ca. 0.52 kg
Protection EN 60 529	housing side	IP67
	shaft side	IP65, opt. IP67
EX approval for hazardous areas	optional Zone 2 and 22	
Working temperature range	-40°C ... +80°C	
Materials	shaft/hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PVC
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms	
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz	

General electrical characteristics	
Power supply	10 ... 30 V DC
Power consumption (no load)	max. 120 mA
Reverse connection of the supply voltage (U_B)	yes
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU-guideline 2002/95/EG

Interface characteristics Profibus-DP	
Singleturn resolution	1 ... 65536 (16 bit), scaleable
Default value	8192 (13 bit)
Total resolution	28 bit (scaleable 1 ... 2 ²⁸ steps)
Number of revolutions	4096 (12 bit), scaleable: 1 ... 4096
Code	Binary
Interface	Interface specification acc. to Profibus-DP 2.0 / Standard (DIN 19245 Part 3) / RS485 driver galvanically isolated
Protocol	Profibus Encoder Profile V1.1 Class1 and Class 2 with manufacturer-specific add-ons
Baud rate	max. 12 Mbit/s
Device address	1 ... 127 (set by rotary switches)
Termination switchable	set by DIP switches

SET button (Zero or defined value, option)
Protection against accidental activation. Button can only be operated with a ball-pen or pencil.

Diagnostic LED (yellow)	
LED is ON with following errors	Sensor error (Profibus error)

Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	Profibus-DP
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Profibus Encoder-Profile V1.1

The PROFIBUS-DP device profile describes the functionality of the communication and the user-specific component within the PROFIBUS field bus system. For encoders, the encoder profile is definitive. Here the individual objects are defined independent of the manufacturer. Furthermore, the profiles offer space for additional manufacturer-specific functions; this means that PROFIBUS-compliant device systems can be used now with the guarantee that they are ready for the future too.

The following parameters can be programmed

- Direction of rotation
- Scaling
 - Number of steps per revolution
 - Number of revolutions
 - Total resolution over Singleturn/Multiturn
- Preset value
- Diagnostics mode
- Position 16/32 bit
- Speed RPM or Unit/s (16/32) bit

The following functionality is integrated

- Galvanic isolation of the bus stage with DC/DC converter
- Line driver acc. to RS485 max. 12 MB
- Address programmable via DIP switches
- Diagnostics LED
- Full Class 1 and Class 2 functionality

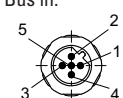
Terminal assignment terminal box

Signal :	BUS IN				BUS OUT			
	B	A	0 V	+ V	0 V	+ V	B	A
Terminal :	1	2	3	4	5	6	7	8

The shield of the connection cable must be connected over a large area via the cable gland.

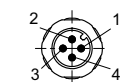
Terminal assignment M12 connector version

Bus in:



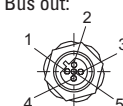
Signal:	–	BUS-B	–	BUS-B	Shield
Pin:	1	2	3	4	5

Supply voltage:



Signal:	U _B	–	0 V	–	
Pin:	1	2	3	4	

Bus out:



Signal:	BUS_VDC ¹⁾	BUS-A	BUS_GND ¹⁾	BUS-B	Shield
Pin:	1	2	3	4	5

1) For supplying an external Profibus-DP termination resistor

Absolute Encoders – Multiturn

Standard, optical

Sendix 5868 / 5888 (Shaft / Hollow shaft)

Profibus-DP

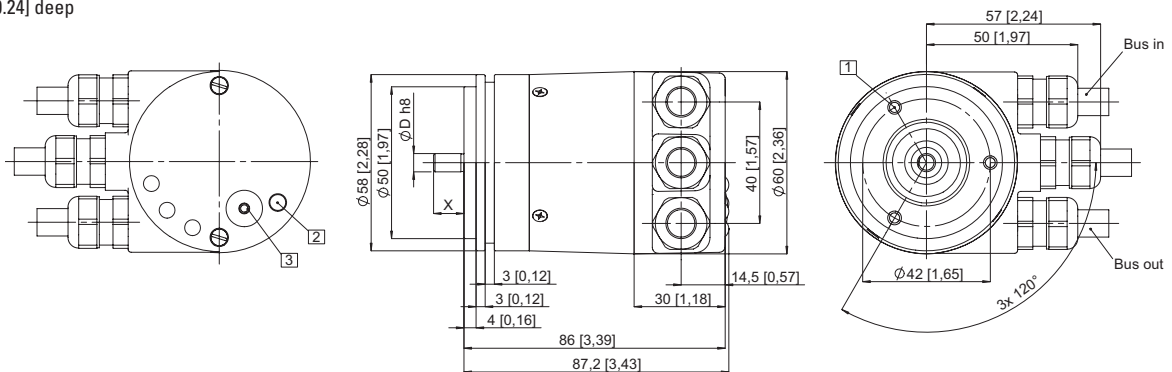
Dimensions shaft version, with removable bus terminal cover

Synchro flange, \varnothing 58 mm

Flange type 2 and 4

(Drawing with cable)

- 1 3 x M4, 6 [0.24] deep
- 2 Status LED
- 3 SET button

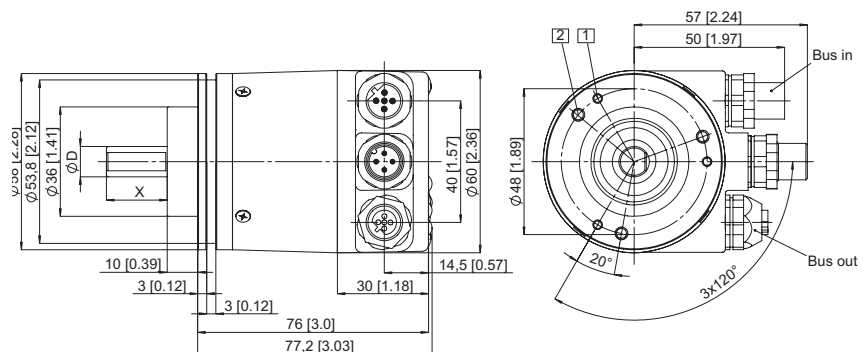


Clamping flange, \varnothing 58 mm

Flange type 1 and 3

(Drawing with 3 x M12-connector)

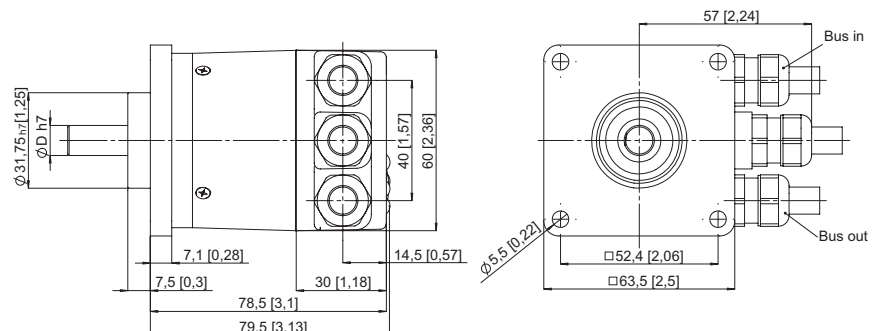
- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



Square flange, \square 63.5 mm

Flange type 5 and 7

(Drawing with cable)



Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	Profibus-DP
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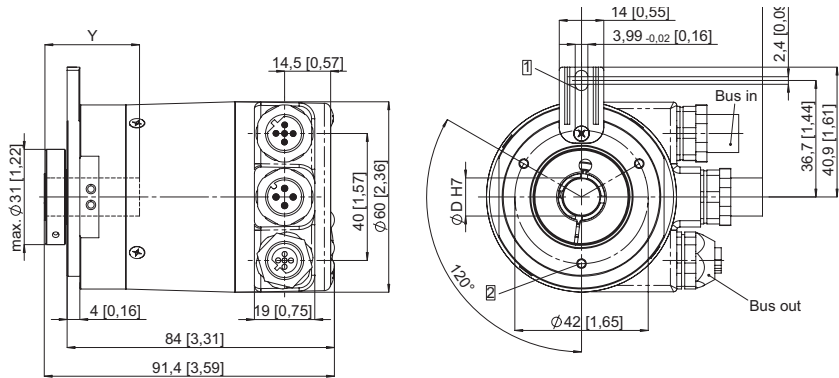
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set, long, ø 58 mm

Flange type 1 and 2

(Drawing with 3 x M12 connector)

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, ø 4 mm
- 2 3 x M3, 5.5 [0.21] deep



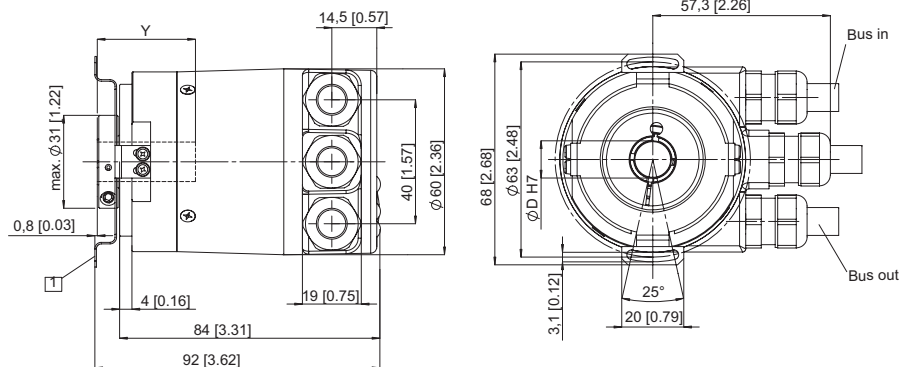
Flange with stator coupling, ø 58 mm

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with cable)

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)

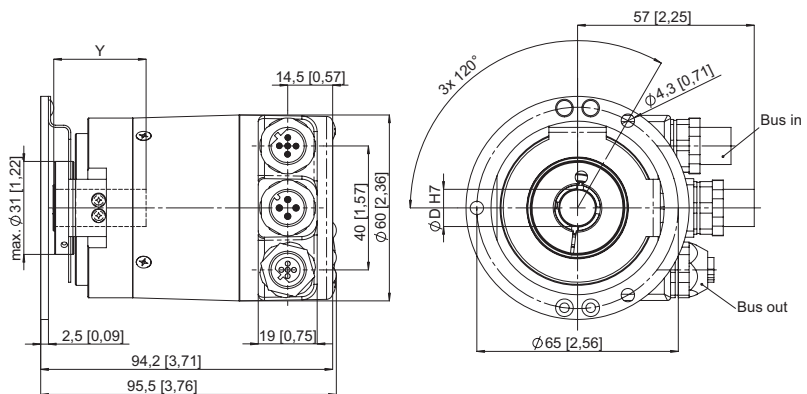


Flange with stator coupling, ø 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with 3x M12 connector)



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders – Multiturn

Standard, optical

Sendix 5868 / 5888 (Shaft / Hollow shaft)

CANopen/CANlift



The Sendix multiturn encoders 5868 and 5888 with CANopen or CANlift interface and optical sensor technology are the right encoders for all CANopen or CANlift applications.

With a maximum resolution of 28 bits these encoders offer an optional additional RS422 incremental track with 2048 pulses.



CANopen



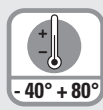
Mechanical drive



Safety-Lock™



High rotational speed



Temperature
-40° + 80°



High IP value



High shaft load capacity



Shock / vibration resistant



Magnetic field proof



Reverse polarity protection



Optical sensor



Seawater-resistant version on request

Reliable

- Tried-and-tested in applications with the highest demands, such as in mobile automation or medical technology.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40°C up to +80°C

Flexible

- Node address can be set via rotary switches or software
- Baud rate and termination can be set via DIP switches or software
- With bus terminal cover or fixed connection, as well as M12 connectors or cable connection

Order code Shaft version

8.5868 . X X X X . XX 1 X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 1 = clamping flange, ø 58 mm, IP65
- 2 = synchro flange, ø 58 mm, IP65
- 3 = clamping flange, ø 58 mm, IP67
- 4 = synchro flange, ø 58 mm, IP67
- 5 = square flange, 63.5 mm (2.5"), IP65
- 7 = square flange, 63.5 mm (2.5"), IP67

b Shaft (ø x L), with flat

- 1 = 6 x 10 mm ¹⁾
- 2 = 10 x 20 mm ²⁾
- 3 = 6,35 x 22,2 mm (1/4" x 7/8")
- 4 = 9,5 x 22,2 mm (3/8" x 7/8")

c Interface / Power supply

- 2 = CANopen DS301 V4.02 / 10 ... 30 V DC
- 5 = CANopen DS301 V4.02 / 10 ... 30 V DC
mit 2048 ppr incremental track
(TTL-compatible) ³⁾

d Type of connection

- removable bus terminal cover
- 1 = cable gland radial
- 2 = 2 x M12 connectors
- Fixed connection without bus terminal cover
- A = cable outlet PVC, radial, 2m
- E = 1 x M12 connector, radial
- F = 2 x M12 connector, radial
- I = 1 x M23 connector, radial
- J = 2 x M23 connector, radial
- K = 1 x SUB-D connector, 9 pin

e Fieldbus profile ⁴⁾

- 21 = CANopen encoder profile DS406 V3.2
- 22 = CANlift DS417 V1.01

f Options (Service)

- 2 = no options
- 3 = SET button
- optional on request
- Ex 2/22
- seawater-resistant
- special cable length

Order code Hollow shaft

8.5888 . X X X X . XX 1 X
Type a b c d e f

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



a Flange

- 1 = with torque stop set, IP65
- 2 = with torque stop set, IP67
- 3 = with stator coupling, ø 65, IP65
- 4 = with stator coupling, ø 65, IP67
- 5 = with stator coupling, ø 63, IP65
- 6 = with stator coupling, ø 63, IP67

b Blind hollow shaft

- 3 = ø 10 mm
- 4 = ø 12 mm
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8 = ø 9.5 mm [3/8"]
- 9 = ø 12.7 mm [1/2"]

c Interface / Power supply

- 2 = CANopen DS301 V4.02 / 10 ... 30 V DC
- 5 = CANopen DS301 V4.02 / 10 ... 30 V DC
with 2048 ppr incremental track
(TTL-compatible) ³⁾

d Type of connection

- removable bus terminal cover
- 1 = cable gland radial
- 2 = 2 x M12 connectors
- Fixed connection without bus terminal cover
- A = cable outlet PVC, radial, 2m
- E = 1 x M12 connector, radial
- F = 2 x M12 connector, radial
- I = 1 x M23 connector, radial
- J = 2 x M23 connector, radial
- K = 1 x SUB-D connector, 9 pin

e Fieldbus profile ⁴⁾

- 21 = CANopen encoder profile DS406 V3.2
- 22 = CANlift DS417 V1.01

f Options (Service)

- 2 = no options
- 3 = SET button
- optional on request
- Ex 2/22
- seawater-resistant
- special cable length

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1

3) Only in conjunction with connection type 2 2
4) CAN parameters can also be factory pre-set

Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	Coupling M12 for Bus in	8.0000.5116.0000
	Connector M12 for Bus out	8.0000.5111.0000

Cordset, pre-assembled with 2 m PVC cable	M12 for Bus in	8.0000.6V81.0005
	M12 for Bus out	8.0000.6V88.0005

Programming set

including:	<ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0015
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

 Absolute Encoders
Multiturn

Mechanical characteristics		
Max. speed		
without shaft seal (IP65) up to 70°C		9 000 min ⁻¹ , 7 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		7 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		8 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Starting torque		
without shaft seal (IP65)		< 0.01 Nm
with shaft seal (IP67)		< 0.03 Nm
Rotor moment of inertia		
shaft version		4.0 x 10 ⁻⁶ kgm ²
hollow shaft version		7.5 x 10 ⁻⁶ kgm ²
Load capacity of shaft		
radial		80 N
axial		40 N
Weight		
with bus terminal cover		ca. 0.57 kg
with fixed connection		ca. 0.52 kg
Protection EN 60 529		
housing side		IP67
shaft side		IP65, opt. IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +80°C ¹⁾
Materials		
shaft/hollow shaft		stainless steel
flange		aluminium
housing		zinc die-cast housing
cable		PVC
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Power consumption (no load)	max. 100 mA
Reverse connection of the supply voltage (U _B)	yes
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU-guideline 2002/95/EG

SET button (Zero or defined value, option)
Protection against accidental activation. Button can only be operated with a ball-pen or pencil.

Diagnostic LED (yellow)
LED is ON with the following fault conditions
Sensor error (internal code or LED error), too low voltage, over-temperature

Incremental track characteristics	
Output driver	RS422 (TTL-compatible)
Permissible load / channel	max. 20 mA
Signal level	high typ. 3.8 V low typ. 1.3 V
Short circuit proof outputs	yes ²⁾
Resolution	2048 ppr

1) Cable version: -30°C ... +75°C
 2) Short circuit to 0 V or to output, only one channel at a time, supply voltage correctly applied

Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
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Interface characteristics CANopen/CANlift:	
Singleturn resolution	1 ... 65536 (16 bit), scaleable
Default value	8192 (13 bit)
Total resolution	1 ... 268 435 456 (28 bit) Default: 25 bit
Code	Binary
Interface	CAN High-Speed acc. to ISO 11898, Basic- and Full-CAN CAN Specification 2.0 B
Protocol	CANopen Profile DS406 V3.2 with manufacturer-specific add-ons or CANlift Profile DS417 V1.1
Baud rate	10 ... 1000 kbit/s (can be set via DIP switches / software configurable)
Node address	1 ... 127 (can be set via rotary switches / software configurable)
Termination switchable	can be set via DIP switches, software configurable

General information about CAN/CANlift

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02. In addition, device specific profiles such as encoder profile DS406 V3.2 and DS417 V1.1 (for lift applications) are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN bus.

When switching the device on, all parameters, which have been saved on an EEPROM to protect them against power failure, are loaded again.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration** as well as the **status of the working area**.

As competitively priced alternatives, encoders are also available with a connector or a cable connection, where the device address and baud rate can be changed and configured by means of the software. The models with bus terminal cover and integrated T-coupler allow for extremely simple installation: the bus and supply voltage can be easily connected via M12 connectors. The device address can be set via 2 rotary hex switches. Furthermore, another DIP switch allows for the setting of the baud rate and switching on a termination resistor. Three LEDs located on the back indicate the operating or fault status of the CAN bus, as well as the status of an internal diagnostic.

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated.

Class C2 functionality:

- NMT Slave
- Heartbeat Protocol
- High Resolution Sync Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping
- Self-start programmable (Power on to operational)
- 3 Sending PDO's
- Node address, baud rate and CANbus
- Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- Units for speed selectable (steps/sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 ... 32
- 2 working areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's
- Optional - 32 CAMs programmable
- Customer-specific memory - 16 Bytes

CANopen Lift Profile DS417 V1.1

Among others, the following functionality is integrated:

- Car Position Unit
- 2 virtual devices
- 1 virtual device delivers the position in absolute measuring steps (steps)
- 1 virtual device delivers the position as an absolute travel information in mm
- Lift number programmable
- Independent setting of the node address in relation with the CAN identifier
- Factor for speed calculation (e.g. measuring wheel periphery)
- Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, acceleration, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's

All profiles stated here: Key-features

The object 6003h "Preset" is assigned to an integrated key, accessible from the outside
"Watchdog controlled" device

Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
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Terminal assignment

Bus terminal cover with terminal box (type of connection 1)

Direction	OUT					IN				
Signal	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+U _B power supply	0 V power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

Cable connection (type of connection A) and SUB-D-9 connector (type of connection K)

Direction	IN				
Signal	0 Volt power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	0 V	+V	CL	CH	CG
Cable colour	WH	BN	YE	GN	GY
SUB-D 9:	6	9	2	7	3

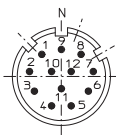
Bus terminal cover with Connectors 2 x M12 (type of connection 2, F or J)

Direction	OUT					IN				
Signal	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+U power supply	0 V power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG
M23 PIN assignment	3	2	7	10	12	10	12	2	7	3
M12 PIN-assignment	1	5	4	3	2	3	2	5	4	1

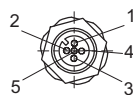
Connector M23 (type of connection I) or M12 (type of connection E)

Direction	IN				
Signal	0 Volt power supply	+U _B power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation	0 V	+V	CL	CH	CG
M23 PIN assignment	10	12	2	7	3
M12 PIN assignment	3	2	5	4	1

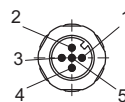
Bus in and out M23:



Bus out M12:

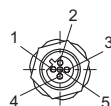


Bus in M12:



Terminal assignment incremental track

Signal	A	\bar{A}	B	\bar{B}	0 V
PIN-	1	2	3	4	5



Absolute Encoders – Multiturn

Standard, optical

Sendix 5868 / 5888 (Shaft / Hollow shaft)

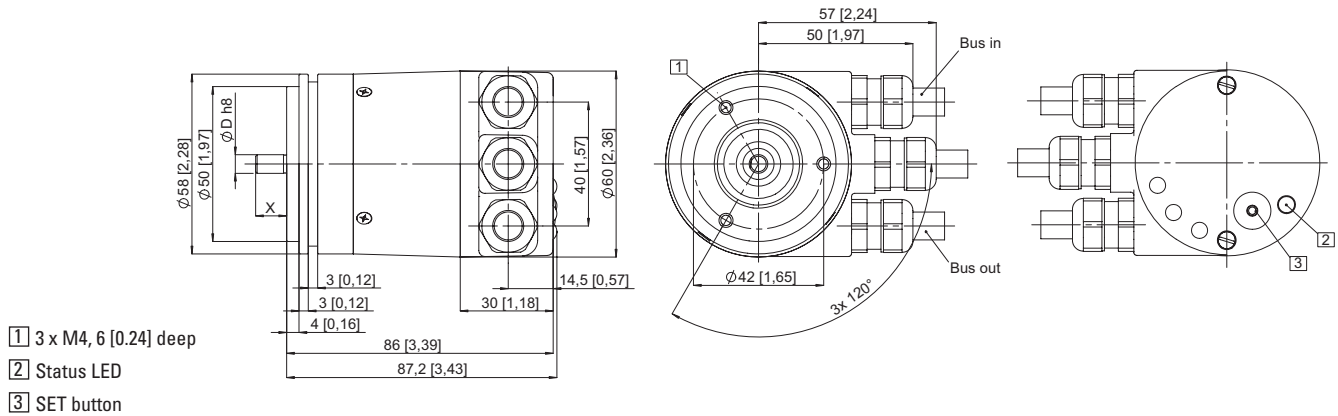
CANopen/CANlift

Dimensions shaft version, with removable bus terminal cover

Synchro flange, ø 58 mm

Flange type 2 and 4

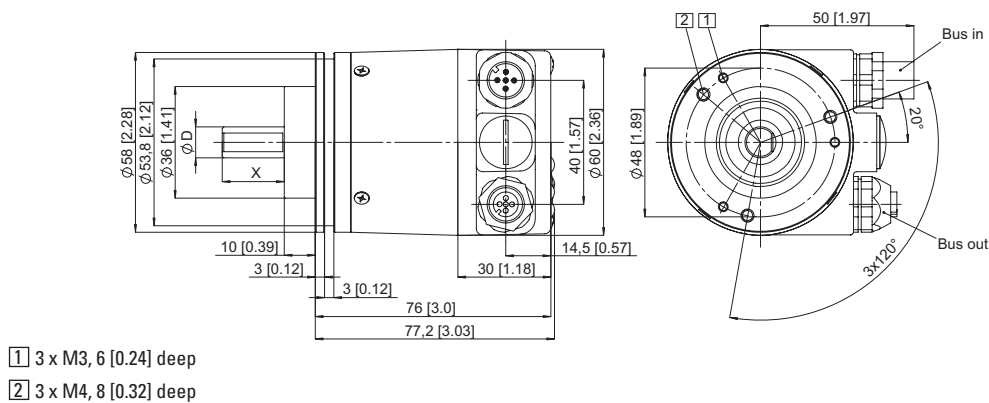
(Drawing with cable)



Clamping flange, ø 58 mm

Flange type 1 and 3

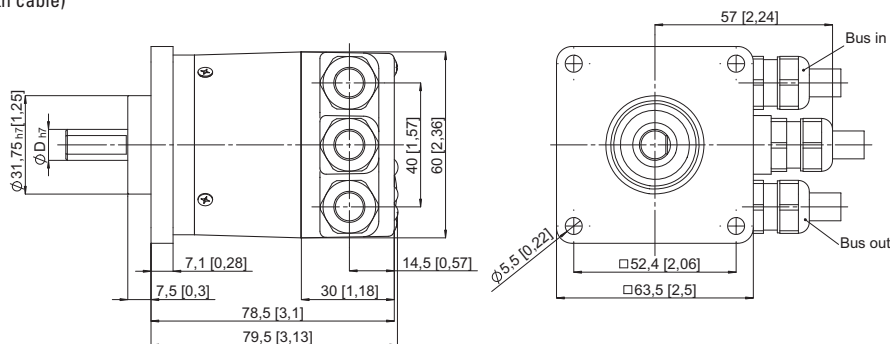
(Drawing with 2 x M12 connector)



Square flange, □ 63.5 mm

Flange type 5 and 7

(Drawing with cable)



Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
--------------------------	--------------------------------------------------	------------------------

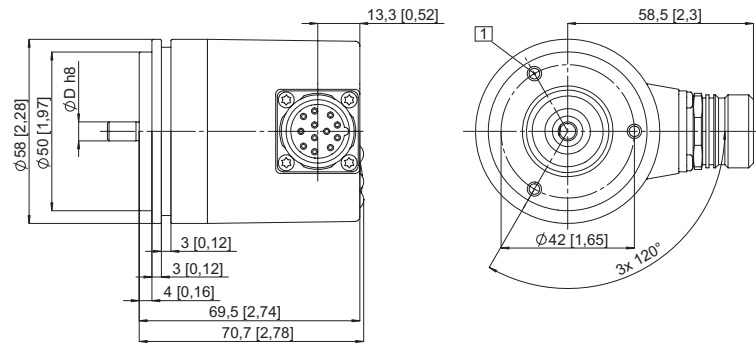
Dimensions shaft version, with fixed connection

Synchro flange, \varnothing 58 mm

Flange type 2 and 4

(Drawing with M23 connector)

1 3 x M4, 6 [0.24] deep



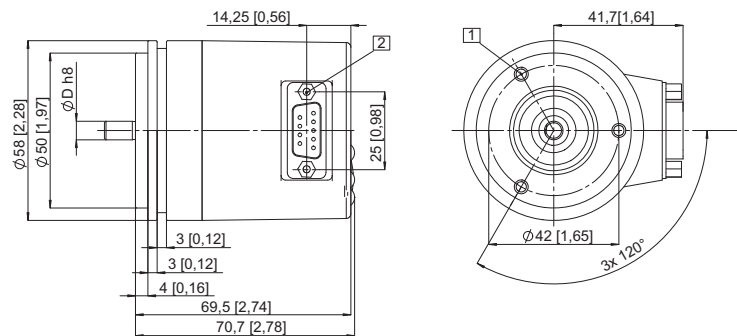
Synchro flange, \varnothing 58 mm

Flange type 2 and 4

(Drawing with SUB-D connector)

1 3 x M4, 8 [0.32] deep

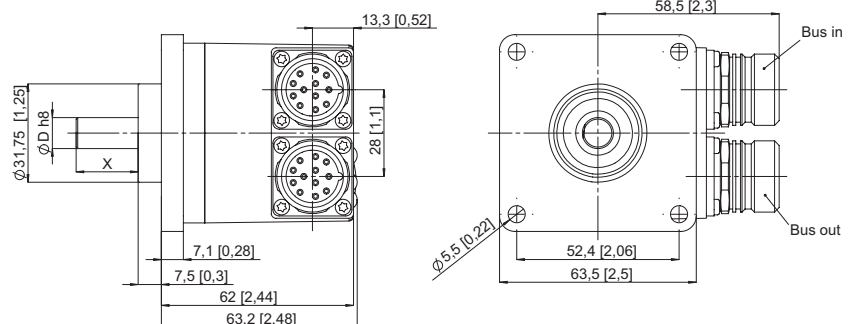
2 2 x 4/40 UNC; 3.0 [0.12] deep



Square flange, \square 63.5 mm

Flange type 5 and 7

(Drawing with 2 x M23 connector)



Absolute Encoders – Multiturn

Standard, optical

Sendix 5868 / 5888 (Shaft / Hollow shaft)

CANopen/CANlift

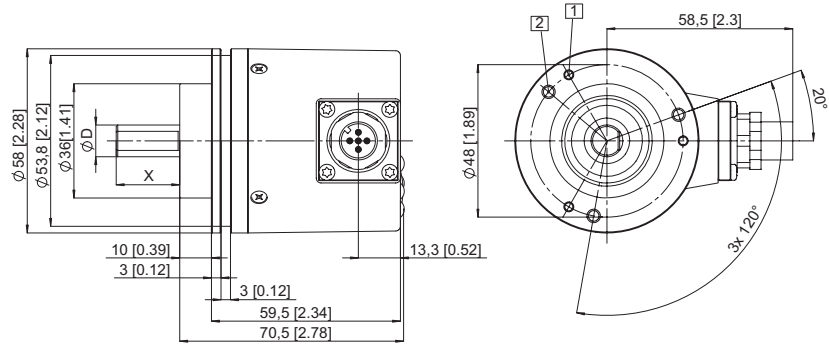
Dimensions shaft version, with fixed connection

Clamping flange, ø 58 mm

Flange type 1 and 3

(Drawing with M12 connector)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep

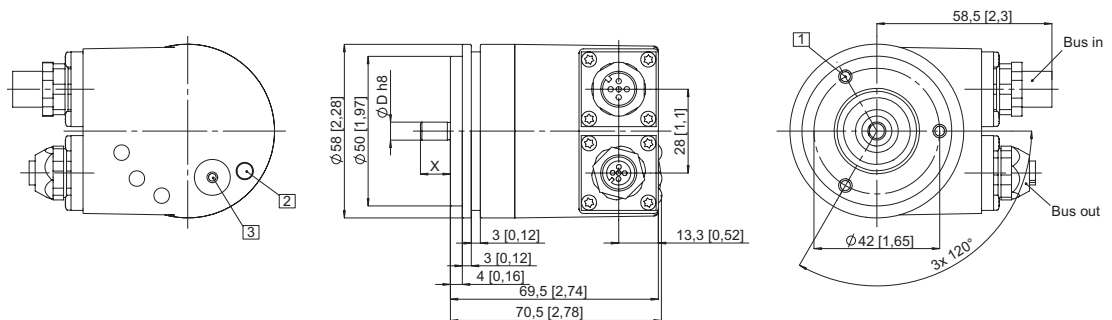


Synchro flange, ø 58 mm

Flange type 2 and 4

(Drawing with M12 connector)

- 1 3 x M4, 6 [0.24] deep
- 2 Status LED
- 3 SET button

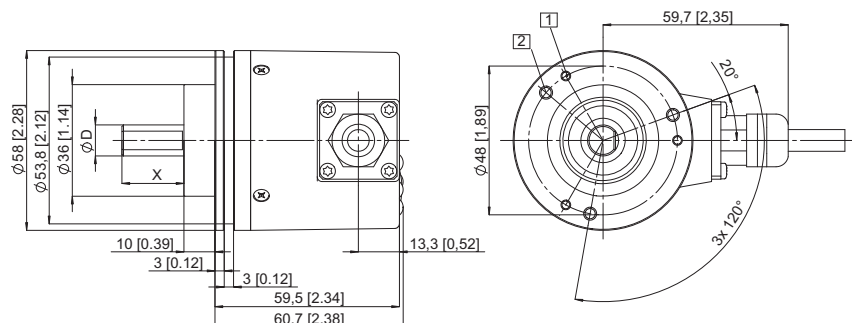


Clamping flange, ø 58 mm

Flange type 1 and 3

(Drawing with cable)

- 1 3 x M3, 6 [0.24] deep
- 2 3 x M4, 8 [0.32] deep



Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
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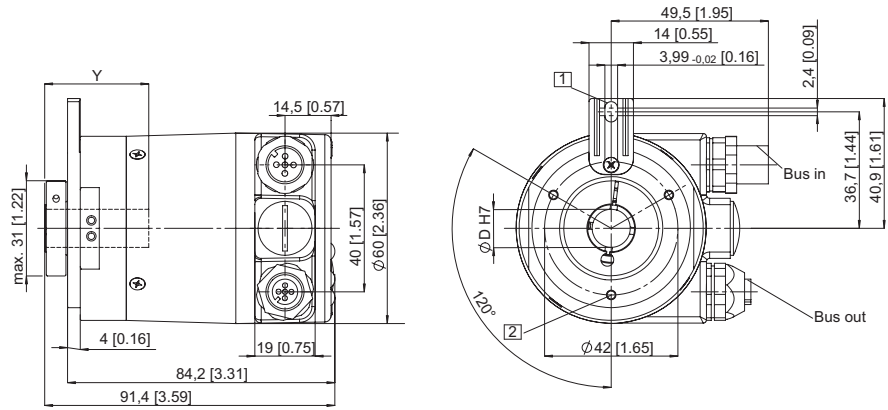
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set long, ø 58 mm

Flange type 1 and 2

(Drawing with 2 x M12 connector)

- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ø 4 mm
- 2 3 x M3, 5.5 [0.21] deep



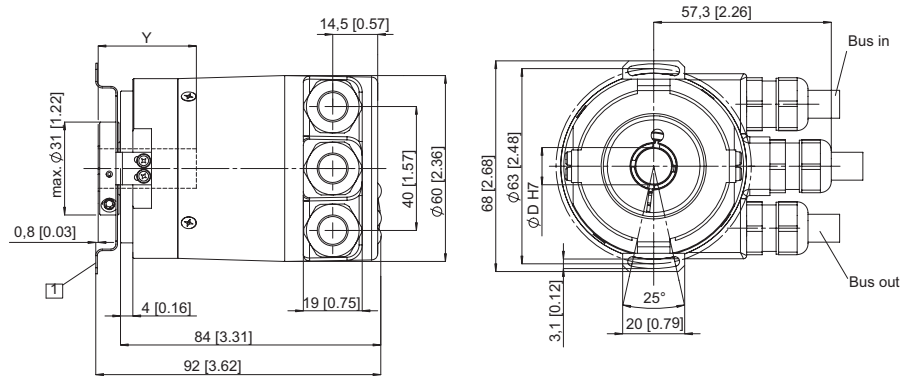
Flange with stator coupling, ø 58 mm

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm

(Drawing with cable)

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)

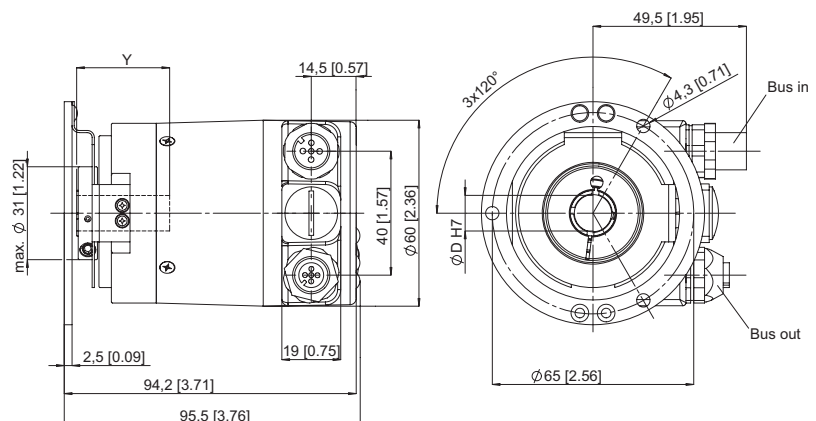


With stator coupling, ø 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with 2 x M12 connector)



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders – Multiturn

Standard, optical

Sendix 5868 / 5888 (Shaft / Hollow shaft)

CANopen/CANlift

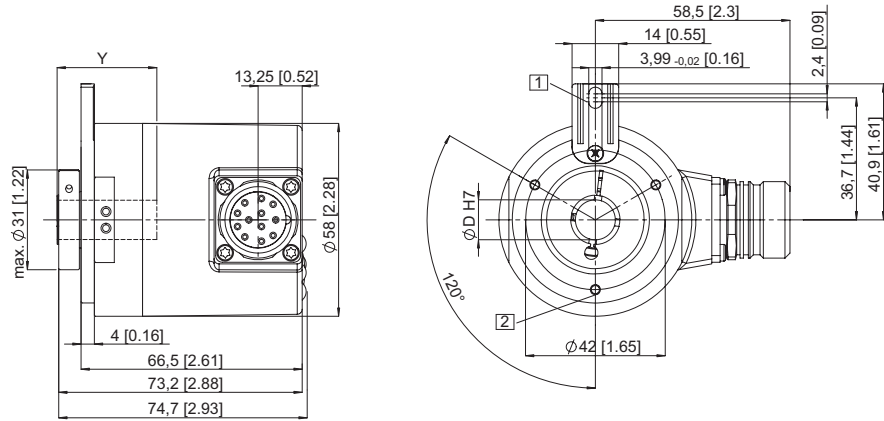
Dimensions hollow shaft version (blind hollow shaft), with fixed connection

Flange with torque stop set long, ø 58 mm

Flange type 1 and 2

(Drawing with M23 connector)

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, ø 4 mm
- 2 3 x M3, 5.5 [0.21] deep

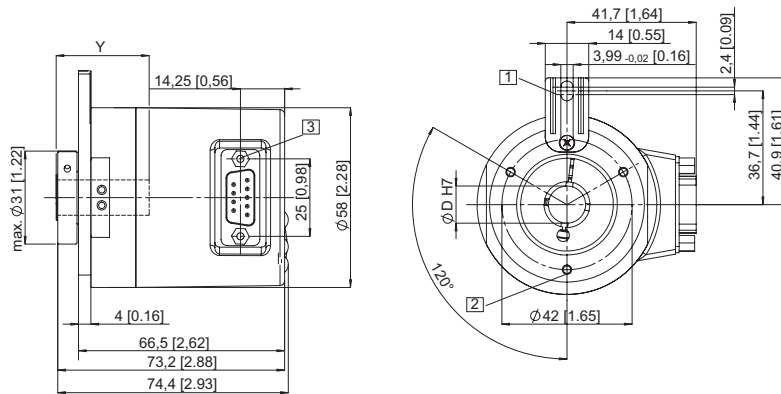


Flange with torque stop set long, ø 58 mm

Flange type 1 and 2

(Drawing with SUB-D connector)

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, ø 4 mm
- 2 3xM3, 6 [0.24] deep
- 3 2 x 4/40 UNC; 3.0 [0.21] deep

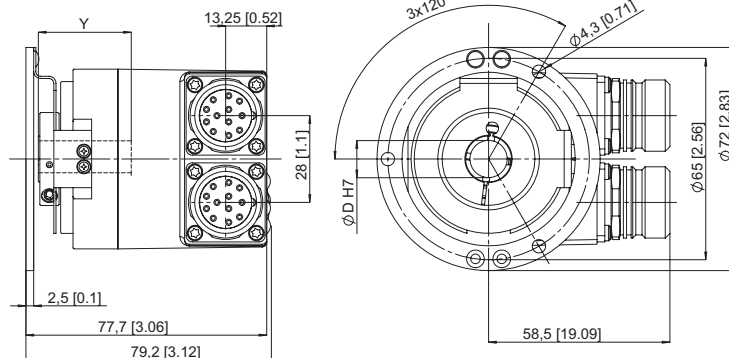


Flange with stator coupling, ø 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm

(Drawing with 2x M23-connectors)



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders – Multiturn

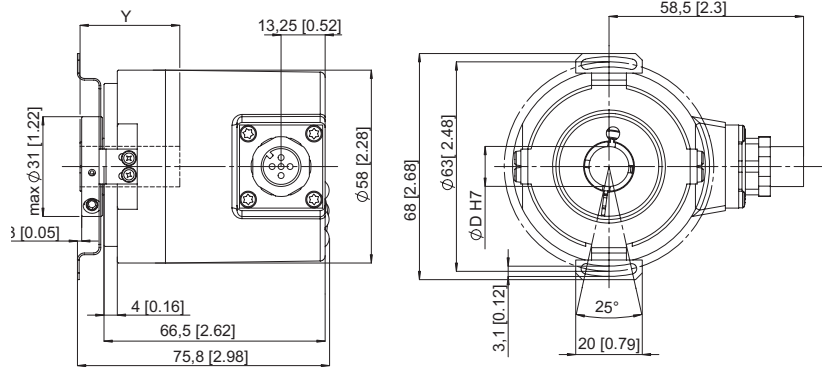
Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	CANopen/CANlift
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Dimensions hollow shaft version (blind hollow shaft), with fixed connection

Flange with stator coupling, ø 58 mm

Flange type 5 and 6

Pitch circle diameter for fixing screws 63 mm
(Drawing with M12 connector)

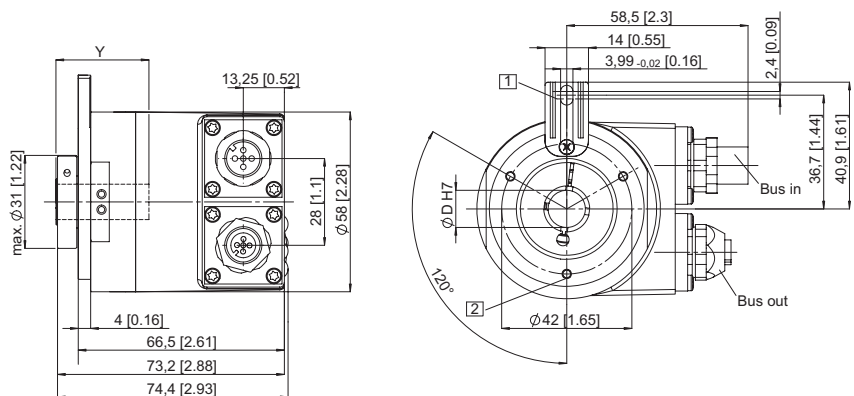


Flange with torque stop set long, ø 58 mm

Flange type 1 and 2

(Drawing with 2 x M12 connector)

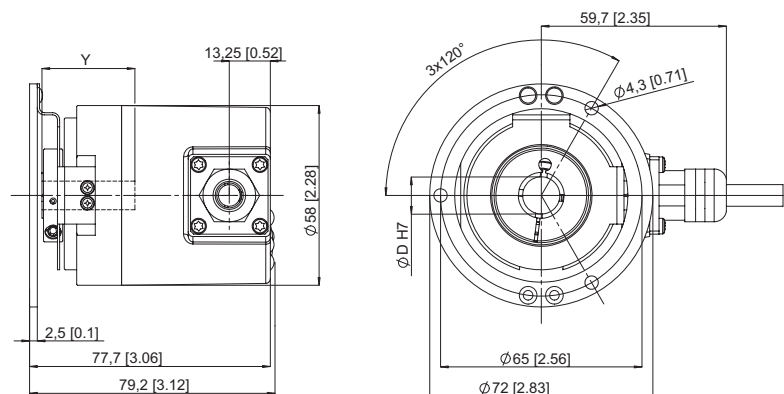
- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, ø 4 mm
- 2 3xM3, 6 [0.24] deep



Flange with stator coupling, ø 58 mm

Flange type 3 and 4

Pitch circle diameter for fixing screws 65 mm
(Drawing with cable)



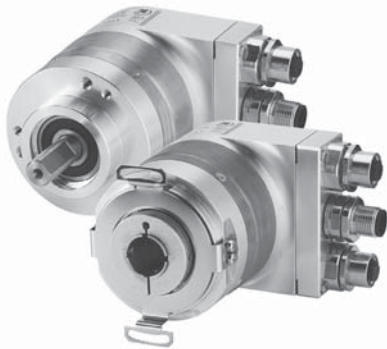
Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders – Multiturn

Standard, optical

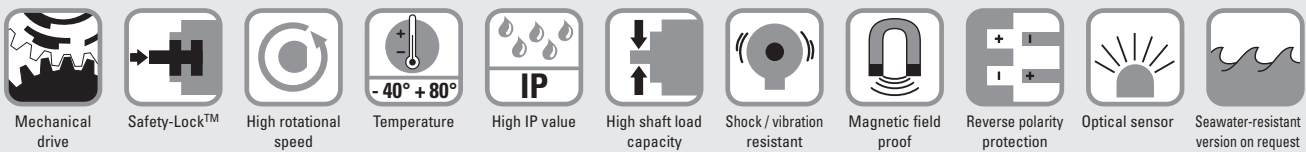
Sendix 5868 / 5888 (Shaft / Hollow shaft)

EtherCAT



The multiturn encoders 5868 and 5888 with EtherCAT interface and optical sensor technology are ideal for use in all applications with an EtherCAT interface. The data communication is based on CAN over EtherNet.

These encoders are available with a solid shaft up to a maximum of 10 mm or a blind hollow shaft up to 15 mm.



Reliable

- Perfect for use in applications such as in wood and metal processing industries
- Ideally suited for use in harsh outdoor environments, thanks to IP67 protection and rugged housing construction

Flexible

- Use of CoE (CAN over EtherNet)
- Cycle time for Sync 0 pulse min. 125 µs or 62.5 µs
- Faster, easier error-free connection thanks to M12 connectors

Order code Shaft version

8.5868 . X X B 2 . B1 12
Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange
- 1 = clamping flange, ø 58 mm, IP65
 - 2 = synchro flange, ø 58 mm, IP65
 - 3 = clamping flange, ø 58 mm, IP67
 - 4 = synchro flange, ø 58 mm, IP67
 - 5 = square flange, 63,5 mm (2,5"), IP65
 - 7 = square flange, 63,5 mm (2,5"), IP67

- b** Shaft (ø x L), with flat
- 1 = 6 mm x 10 mm ¹⁾
 - 2 = 10 mm x 20 mm ²⁾
 - 3 = 6,35 x 22,2 mm (1/4" x 7/8")
 - 4 = 9,5 x 22,2 mm (3/8" x 7/8")

- c** Interface / Power supply
- B = EtherCAT / 10 ... 30 V DC
- d** Type of connection
- 2 = 3 x M12 connector

- e** Fieldbus profile
- B1 = EtherCAT with CoE (CAN over EtherNet)
- optional on request
- Ex 2/22
- seawater-resistant

Order code Hollow shaft

8.5888 . X X B 2 . B1 12
Type a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- a** Flange
- 1 = with torque stop set, IP65
 - 2 = with torque stop set, IP67
 - 3 = with stator coupling, ø 65, IP65
 - 4 = with stator coupling, ø 65, IP67
 - 5 = with stator coupling, ø 63, IP65
 - 6 = with stator coupling, ø 63, IP67

- b** Blind hollow shaft
- 3 = ø 10 mm
 - 4 = ø 12 mm
 - 5 = ø 14 mm
 - 6 = ø 15 mm
 - 8 = ø 9.5 mm [3/8"]
 - 9 = ø 12.7 mm [1/2"]

- c** Interface / Power supply
- B = EtherCAT / 10 ... 30 V DC
- d** Type of connection
- 2 = 3 x M12 connector

- e** Fieldbus profile
- B1 = EtherCAT with CoE (CAN over EtherNet)
- optional on request
- Ex 2/22
- seawater-resistant

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1

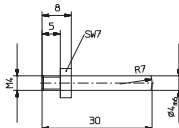
Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	EtherCAT
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	Coupling M12 for Port A and Port B Connector M12 for supply voltage	05.WASCSY4S 05.B8141-0
Cordset, pre-assembled with 2 m PUR cable	M12 for Port A and Port B M12 for power supply	05.00.6031.4411.002M 05.WAK4-2/S90

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Max. speed		
without shaft seal (IP65) up to 70°C		9 000 min ⁻¹ , 7 000 min ⁻¹ (continuous)
without shaft seal (IP65) up to T _{max}		7 000 min ⁻¹ , 4 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to 70°C		8 000 min ⁻¹ , 6 000 min ⁻¹ (continuous)
with shaft seal (IP67) up to T _{max}		6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Starting torque without shaft seal (IP65)		< 0.01 Nm
Starting torque with shaft seal (IP67)		
shaft version		< 0.05 Nm
hollow shaft version		< 0.03 Nm
Rotor moment of inertia		
shaft version		3.0 x 10 ⁻⁶ kgm ²
hollow shaft version		7.5 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.54 kg
Protection EN 60 529	housing side	IP67
	shaft side	IP65, opt. IP67
EX approval for hazardous areas		optional Zone 2 and 22
Working temperature range		-40°C ... +80°C
Materials	shaft / hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Power consumption (no load)	max. 120 mA
Reverse connection of the supply voltage (U_B)	yes
UL-certified	File 224618
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
RoHS compliant acc. to	EU-guideline 2002/95/EG

Device characteristics	
Singleturn resolution	1 ... 65535 (16 bit), (scaleable: 1 ... 65535)
Default value	8192 (13 bit)
Total resolution	scaleable from 1 up to 268435456 (28 bit) 12 bit multiturn
Code	binary
Protocol	EtherNet / EtherCAT

Diagnostic LED (red)
LED is ON with the following fault conditions: Sensor error (internal code or LED error), low voltage, over-temperature

Run LED (green)
LED is ON with the following conditions: Preop-, Safeop and Op-State (EtherCAT Status machine)

2 x Link LEDs (yellow)
LED is ON with the following conditions (Port A and B): Link detected

Modes
Freerun, Distributed Clock (cycle time for Sync 0 pulse min. 125 µs or 62.5 µs with restrictions), Sync-Mode

Absolute Encoders
Multiturn

Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	EtherCAT
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General information about CoE (CAN over EtherNet)

The EtherCAT encoders support the CANopen communication profile according to DS301. In addition device-specific profiles like the encoder profile DS406 are available.

Scaling, preset values, limit switch values and many other parameters can be programmed via the EtherCAT bus.

When switching the device on, all parameters, which have been saved on an EEPROM to protect them against power failure, are loaded again.

The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration and temperature**, as well as the **status of the working area**.

CANopen Encoder Profile CoE (CAN over EtherNet)

The following parameters are programmable:

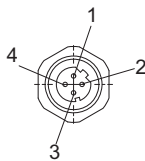
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 ... 32
- 2 working area with 2 upper and lower limits and the corresponding output states
- PDO mapping of position, speed/velocity, acceleration and working area
- Extended error management for position sensing with integrated temperature control
- User interface with visual display of bus and fault status – 4 LEDs
- Alarm and warning messages

Terminal assignment bus

Type of connection 2, D-coded

Direction	Port A				Port B			
	Transmit data+	Receive data+	Transmit data -	Receive data -	Transmit data+	Receive data+	Transmit data-	Receive data-
Abbreviation	TxD+	RxD+	TxD-	RxD-	TxD+	RxD+	TxD-	RxD
M12 PIN assignment	1	2	3	4	1	2	3	4

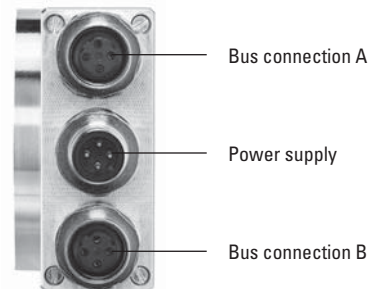
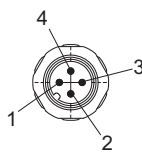
Port A and B



Terminal assignment power supply

Signal	+U _B power supply	n.c.	0 V	n.c.
Abbreviation	+U _B	-	0 V	-
M12 PIN assignment	1	2	3	4

Port A and B



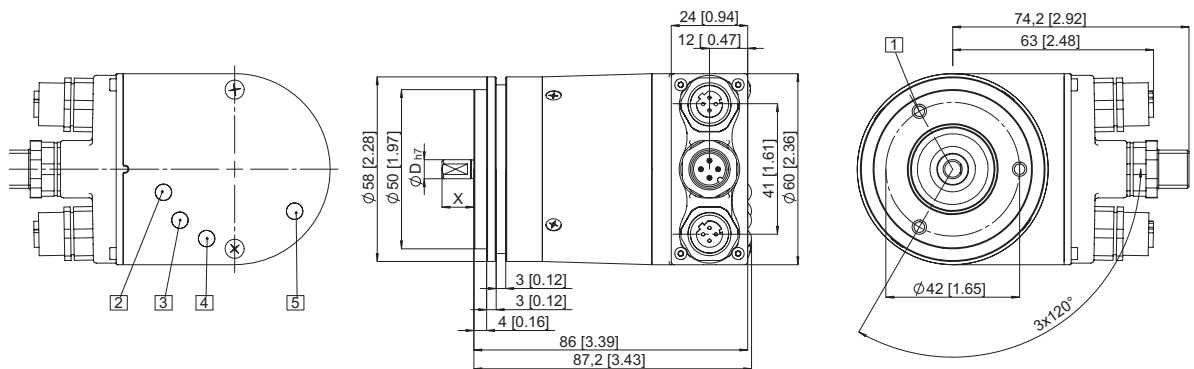
Absolute Encoders – Multiturn

Standard, optical	Sendix 5868 / 5888 (Shaft / Hollow shaft)	EtherCAT
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Dimensions shaft version, with removable bus terminal cover

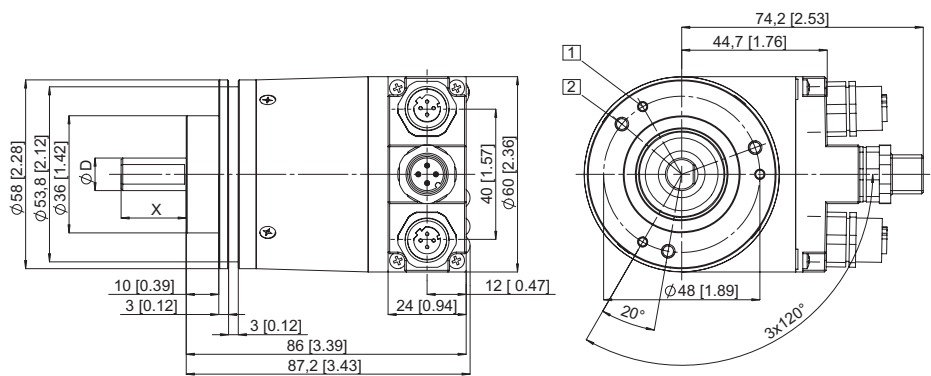
Synchro flange, \varnothing 58 mm
Flange type 2 and 4

- 1 3 x M4, 6.0 [0.24] deep
- 2 LINK A, yellow LED
- 3 INK B, yellow LED
- 4 RUN, green LED
- 5 ERR, red LED

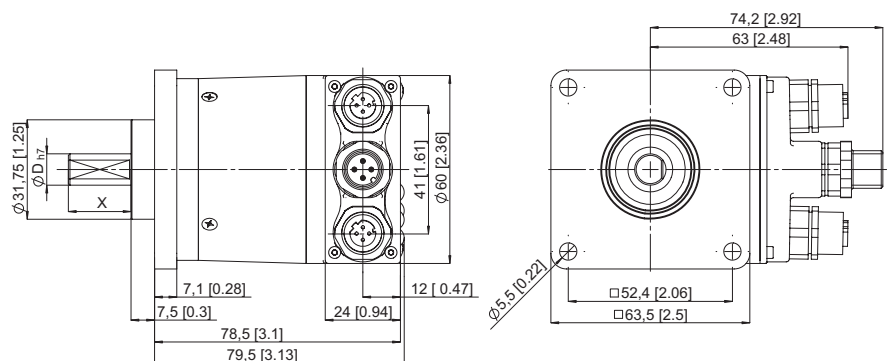


Clamping flange, \varnothing 58 mm
Flange type 1 and 3

- 1 3 x M3, 6.0 [0.24] deep
- 2 3 x M4, 8.0 [0.31] deep



Square flange, \square 63.5 mm
Flange type 5 and 7



Absolute Encoders – Multiturn

Standard, optical

Sendix 5868 / 5888 (Shaft / Hollow shaft)

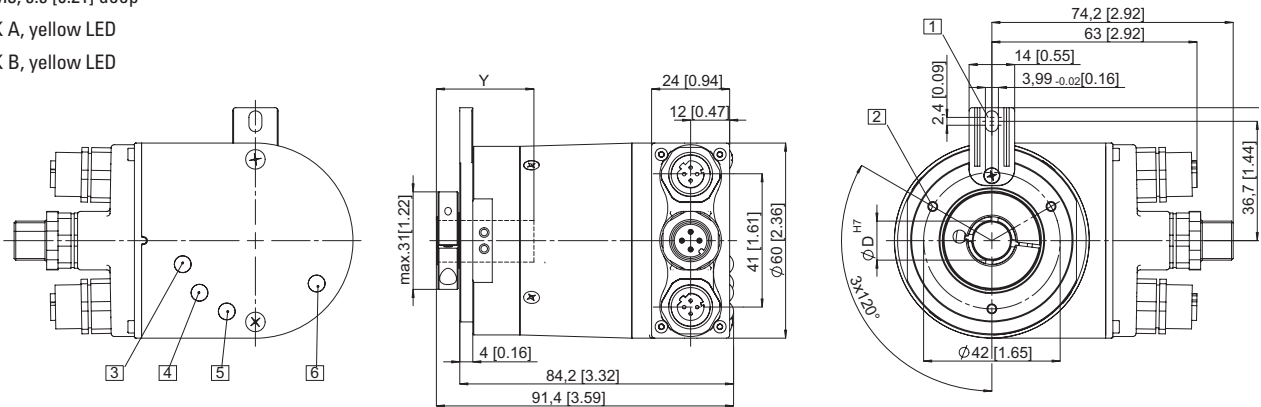
EtherCAT

Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Flange with torque stop set, \varnothing 58 mm
Flange type 1 and 2

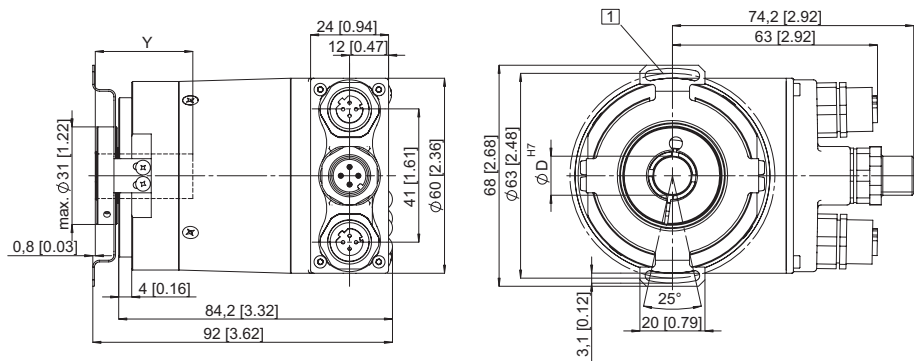
- 1 Torque stop slot,
Recommendation: Cylindrical pin DIN7, \varnothing 4 mm
- 2 3 x M3, 5.5 [0.21] deep
- 3 LINK A, yellow LED
- 4 LINK B, yellow LED

- 5 RUN, green LED
- 6 ERR, red LED

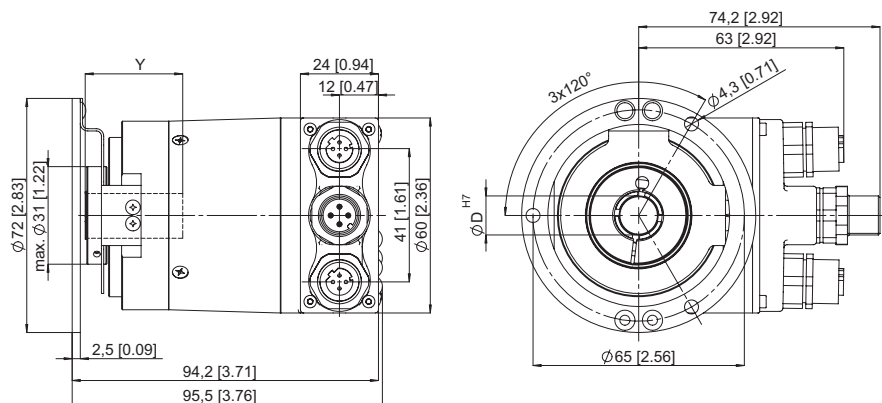


Flange with stator coupling, \varnothing 58 mm
Flange type 5 and 6

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)



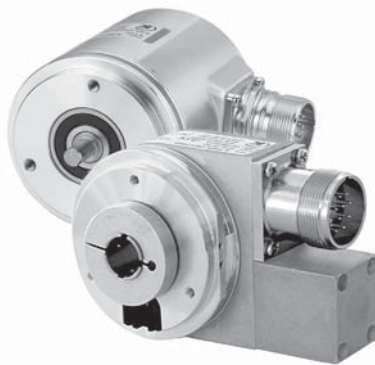
Flange with stator coupling, \varnothing 58 mm
Flange type 3 and 4



Y: Insertion depth for blind hollow shaft: 30 mm

Absolute Encoders – Multiturn

Standard, optical / magnetic **5862 / 5882 (Shaft / Hollow shaft)** **SSI / RS485, programmable**



The Sendix multiturn encoders 5862 and 5882, with SSI or RS485 interface and combined optical and magnetic sensor technology, offer a maximum resolution of 25 bits.

These encoders are programmable via the Ezturn software.

The hollow shaft version boasts a minimal installation depth, facilitating use where space is tight.



High rotational speed	Temperature -20° + 85°	High IP value	High shaft load capacity	Shock / vibration resistant	Short circuit proof	Reverse polarity protection

Compact

- Hollow shaft version with just 43 mm installation depth
- Hollow shaft version up to 12 mm diameter

Flexible

- With SSI or RS485 interface
- Programmable via Ezturn
- Numerous connection options due to wide range of connection types

Absolute Encoders
Multiturn

Order code
Shaft version

8.5862	.	X	X	X	X	.	XXXX
Type		a	b	c	d		e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange
1 = clamping flange
2 = synchro flange</p> <p>b Shaft (ø x L), with flat
1 = ø 6 x 10 mm
2 = ø 10 x 20 mm</p> | <p>c Interface / Power supply
2 = SSI / 5 ... 30 V DC, with 4 status outputs
3 = RS485, half-duplex / 5 ... 30 V DC, internal termination
5 = SSI / 5 ... 30 V DC, with incremental track A, B, \bar{A}, \bar{B}, 2048 PPR
7 = RS485, half-duplex / 5 ... 30 V DC, external termination
9 = SSI / 4.75 ... 30 V DC, with 2 status outputs and 2 sensor outputs for monitoring the voltage on the encoder</p> | <p>d Type of connection
1 = axial cable (1 m PVC)
2 = radial cable (1 m PVC)
3 = M23 connector axial, mating connector
4 = M23 connector, radial, without mating connector</p> | <p>i SSI interface ¹⁾
2001 = 4096 x 4096 (24 bit), Binary
2002 = 8192 x 4096 (25 bit), Binary
2003 = 4096 x 4096 (24 bit), Gray
2004 = 8192 x 4096 (25 bit), Gray</p> <p><i>RS485 interface, half-duplex</i>
3001 = ESC Protocol, max. 38400 Baud</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Order code
Hollow shaft

8.5882	.	X	X	X	X	.	XXXX
Type		a	b	c	d		e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces. Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



- | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a Flange
1 = through hollow shaft torque stop, clamping side flange ²⁾
3 = through hollow shaft torque stop, clamping side flange ²⁾</p> <p>b Hollow shaft
6 = ø 10 mm
8 = ø 12 mm</p> | <p>c Interface / Power supply
2 = SSI / 5 ... 30 V DC, with 4 status outputs
3 = RS485, half-duplex / 5 ... 30 V DC, internal termination
5 = SSI / 5 ... 30 V DC, with incremental track A, B, \bar{A}, \bar{B}, 2048 PPR
7 = RS485, half-duplex / 5 ... 30 V DC, external termination
9 = SSI / 4.75 ... 30 V DC, with 2 status outputs and 2 sensor outputs for monitoring the voltage on the encoder</p> | <p>d Type of connection
1 = radial cable (1 m PVC)
2 = M23 connector, radial, without mating connector</p> | <p>i SSI interface ¹⁾
2001 = 4096 x 4096 (24 bit), Binary
2002 = 8192 x 4096 (25 bit), Binary
2003 = 4096 x 4096 (24 bit), Gray
2004 = 8192 x 4096 (25 bit), Gray</p> <p><i>RS485 interface, half-duplex</i>
3001 = ESC Protocol, max. 38400 Baud</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

1) This factory set (default) resolution (25 bit, Gray, cw) can be changed by using the Ezturn programming software.
2) Clamping side cover available on request

Absolute Encoders – Multiturn

Standard, optical / magnetic	5862 / 5882 (Shaft / Hollow shaft)	SSI / RS485, programmable
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002.0031

Programming set

including:	<ul style="list-style-type: none"> - Interface converter - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0004
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Speed		max. 6.000 min ⁻¹ 1)
Rotor moment of inertia	shaft version	approx. 1.8 x 10 ⁻⁶ kgm ²
	hollow shaft version	approx. 6 x 10 ⁻⁶ kgm ²
Starting torque	shaft version	< 0.01 Nm
	hollow shaft version	< 0.05 Nm
Load capacity of shaft	radial 2)	80 N
	axial 2)	40 N
Weight		ca. 0.4 kg
Protection acc. to EN 60 529		IP65
Temperature range		-20°C ... +85°C
Materials	shaft / hollow shaft	stainless steel h8
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 10...2000 Hz

General electrical characteristics		
Power supply (U_B)		5.0 ... 30 V DC 5)
Power consumption (no load)	typ.	89 mA
	max.	138 mA
Short circuit proof outputs 3)		yes 4)
Reverse connection at U_B		yes
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
Behaviour under magnetic influence acc. to EN 61000-4-8, Severity level 5		
UL-certified	File 224618	
RoHS compliant acc. to	EU-guideline 2002/95/EG	

1) Hollow shaft version: For continuous operation max. 3000 min⁻¹
 2) At shaft end
 3) If supply voltage U_B correctly applied
 4) Only one channel allowed to be shorted-out:
 at U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted.
 at U_B = 5 ... 30 V short circuit to channel or 0 V is permitted.
 5) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)

SSI Interface		
Output driver		RS485
Permissible load / channel		max. +/- 20 mA
Update rate for position data		approx. 1600/s
SSI clock rate		100 kHz / 500 kHz
Signal level	high	typ. 3.8 V
	low (I _{Load} = 20 mA)	typ. 1.3 V
Rising edge time t_r (without cable)		max. 100 ns
Falling edge time t_f (without cable)		max. 100 ns

Control inputs (V/R, SET)		
Voltage		5 ... 30 V DC = U _B
Response time		10 ms
Switching level	low	max. 25% U _B
	high	min. 60% U _B , max. U _B
Max. Input current		≤ 0.5 mA

Control outputs		
Output driver		Push-Pull
Max. Output current		± 9.0 mA
Signal level	high	min. U _B - 3.0 V
	low	max. 1.5 V
Rising edge time t_r		max. 240 µs
Falling edge time t_f		max. 300 µs

Incremental outputs (A/B)		
Output driver		RS422 compatible
SSI clock rate min. / max. / pulse frequency		200 kHz
Signal level	high	4.5 V
	low (I _{Load} = 20 mA)	0.5 V
Rising edge time t_r (without cable)		max. 200 ns
Falling edge time t_f (without cable)		max. 200 ns

Absolute Encoders – Multiturn

Standard, optical / magnetic	5862 / 5882 (Shaft / Hollow shaft)	SSI / RS485, programmable
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Control inputs

Up/Down input to switch the counting direction

The encoder can output increasing code values when the shaft is rotated either clockwise or counter-clockwise (when looking from the shaft side).

There are two methods for selecting the appropriate option:

1. Via a hardware configuration of the V/R input BEFORE powering up the encoder
2. By programming the device using the Kübler „Ezturn®“ programming tool.

The following table shows the choice of functions determined by the hardware and software settings:

Hardware configuration of the V/R input	Programmed selection using the EzTurn® programming tool	Function: increasing code value when the shaft is in the following direction:
„low“ (0V) on the V/R-input (=cw)	cw	cw
„high“ (+U _B) on the V/R-input (= ccw)	cw	ccw
„low“ (0V) on the V/R-input (=cw)	ccw	ccw
„high“ (+U _B) on the V/R-input (= ccw)	ccw	ccw

SET input

This input is used for a one-time alignment (zeroing) of the encoder immediately after installation. A high control pulse (+U_B) applied to this input for a minimum of 10 ms will reset the current encoder position to the pre-programmed setpoint value.

The programming of the setpoint can be carried out with Kübler's Ezturn® programming software or can, on request, be done in advance at the factory. The default value is zero. However any value within the encoder's measuring range can be defined.

Outputs ¹⁾

Output	Default-function ²⁾
A1	battery control
A2	not activated
A3	not activated ³⁾
A4	not activated ³⁾

Functionality of the Ezturn® software

- | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> - Configuration function - Setting of the communication parameters - Setting of a drive factor by means of the modification of the resolution per revolution, the number of revolutions and the total resolution - Programming of the direction of rotation and code type - Setting of a preset/electronic zero point | <ul style="list-style-type: none"> - Setting of diagnostic functions - Setting of the outputs A1 ... A4 <ul style="list-style-type: none"> - Limit switch values, max. 2 - Alarm and status information - Battery monitoring - Limiting max. number of bit to interface with PLCs - Diagnostics and information for the set-up operation | <ul style="list-style-type: none"> - Data transmission from the PC to the encoder and inversely, also during operation - Print-out of the current data and set parameters - Convenient position output with the current set data - Terminal operation for direct instructions via the keyboard - Diagnostics of the encoder connected |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

1) Not available for versions with incremental track
 2) Programmable with the optional programming software Ezturn®
 3) With the order code Interface 9 assigned to the sense outputs.

Notes:

- Any hardware configuration of the V/R input must take place BEFORE powering up the encoder!
- If the V/R input is not configured, then a 0 V configuration will apply (default condition)!
- If the direction of rotation is changed due to the V/R configuration, without activating the SET function again, and if the encoder is also then powered up again, a new position value may be outputted, even if the physical shaft position of the encoder has not moved! This is due to internal conversion processes.
- The start-up procedure for the encoder should therefore follow this sequence:
 1. Determine the count direction of the encoder either via the V/R input or via programming
 2. Apply power to the encoder
 3. Activate the SET function, if desired (see SET input below)
- If using a cable wire to configure the V/R input, then for EMC reasons the wire should not remain open but should be tied either to 0 V or U_B!
- The response time of the V/R input with U_B = 5 ... 30 V DC power supply is 10 ms.

Notes:

- The SET function should only be implemented when the encoder shaft is at rest.
- For the duration of the SET pulse the SSI interface does not function and therefore does not output any valid position values! In order to avoid malfunctions, no SSI clock pulse should occur during the SET pulse.
- If a cable wire is used to configure the SET input, then for EMC reasons the wire should not remain open but should if at all possible be tied to 0 V, provided no SET pulse is triggered!
- The response time of the SET input with +U_B = 5 ... 30 V DC power supply is 10 ms.

The outputs are not activated in the factory setting (default). They can be activated and defined with the optional Ezturn® programming software e.g. limit switch, overspeed and temperature control etc.

Absolute Encoders – Multiturn

Standard, optical / magnetic	5862 / 5882 (Shaft / Hollow shaft)	SSI / RS485, programmable
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Terminal assignment (SSI Synchronous Serial Interface with 12 pin connector)

Signal	0V	+U _B	+T	-T	+D	-D	ST	VR	A1	A2	A3 ¹⁾	A4 ¹⁾	⊥
Interface 9											0 V sense	+U _B sense	
Pin	1	2	3	4	5	6	7	8	9	10	11	12	PH
Colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY / PK	RD / BU	

- T: Clock signal
- D: Data signal
- ST: SET input. The current position value is stored as new zero position.
- VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
- PH: Plug housing

A1, A2, A3, A4: outputs, can be modified using Ezturn®

Isolate unused outputs before initial start-up.

1) With the order code Interface 9 these outputs are assigned to the sense outputs. The sensor circuits are internally tied to the power supply. Special power supply units control the voltage drop in long cable runs via the voltage feedback. If the circuits are not being used, then they should be individually isolated and not connected.

Terminal assignment (RS485 interface 12 pin connector)

Signal	0V	+U _B	T/R-	T/R+	Term ³⁾	Term ³⁾		VR					⊥
Pin	1	2	3	4	5	6	7 ²⁾	8	9	10	11	12	PH
Colour	WH	BN	GN	YE				RD					

- R: Receive channel
- T: Transmit channel
- VR: Up/down input. As long as this input (High-Level = + U_B) is active, decreasing code values are transmitted when shaft turning clockwise.
- PH: Plug housing

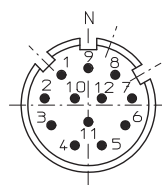
2) There is no SET input for the P3001 version but it can likewise be implemented using the command „<ESC> QP“ (Write preset).

3) For the version with external termination:
If the termination is desired (terminating resistor 120 Ohm), then both connections are to be tied together by means of a jumper (0 Ohm).

Terminal assignment (SSI interface with incremental track (A/B))

Signal	0V	+U _B	+T	-T	+D	-D	ST	VR	\bar{B}	B	\bar{A}	A	⊥
Pin	1	2	3	4	5	6	7	8	9	10	11	12	PH

Top view of mating side, male contact base



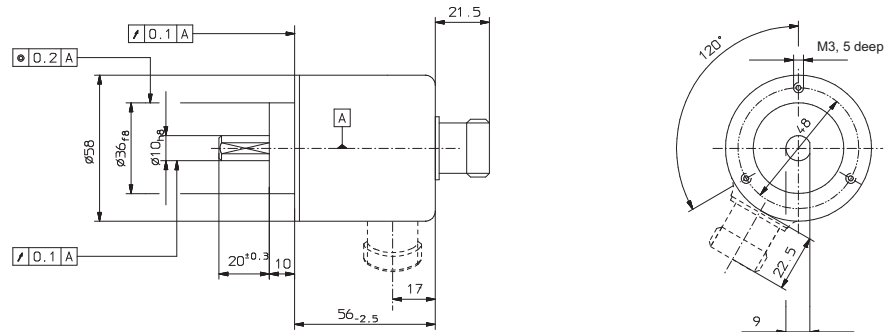
M23 connector, 12-pin

Absolute Encoders – Multiturn

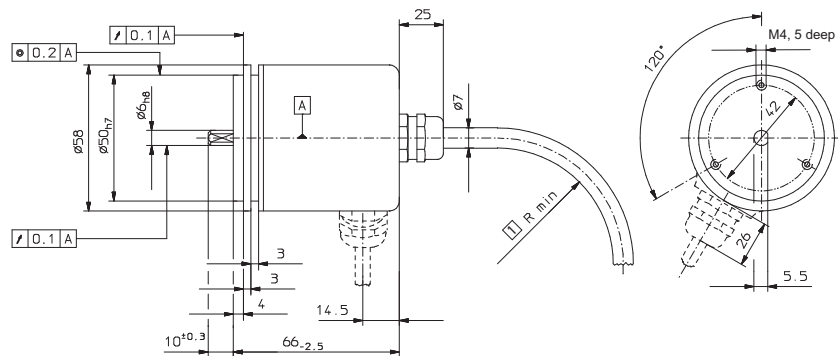
Standard, optical / magnetic	5862 / 5882 (Shaft / Hollow shaft)	SSI / RS485, programmable
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Dimensions shaft version

Clamping flange



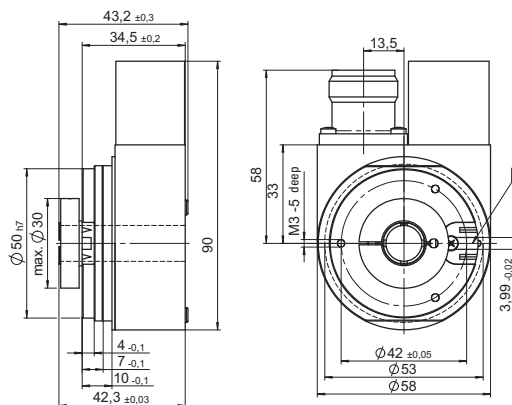
Syncro flange



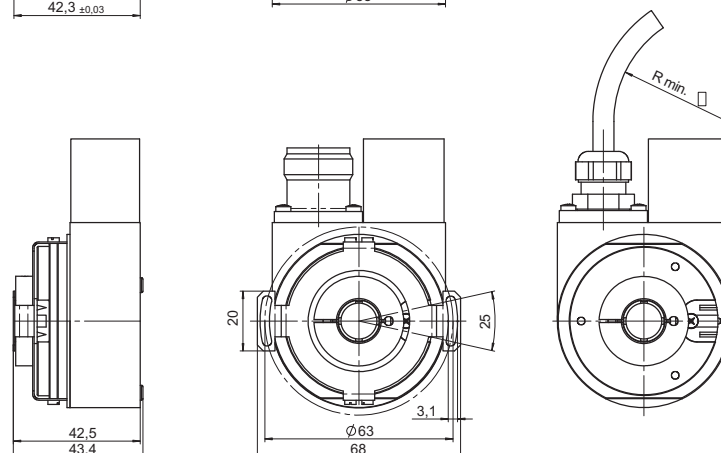
- 1 Cable,
 – securely installed: 55 mm
 – flexibly installed: 70 mm

Dimensions hollow shaft version

Flange type 1



Flange type 13 with stator coupling



- 1 Torque stop slot,
 Recommendation:
 Cylindrical pin DIN7, ø 4 mm
- 2 Cable,
 – securely installed: 55 mm
 – flexibly installed: 70 mm

Absolute Encoders – Multiturn

Standard, optical / magnetic	5860 (Shaft / Hollow shaft)	DeviceNet
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The multiturn encoder 5860 with DeviceNet interface and combined optical/magnetic sensor technology is the right solution for all applications in DeviceNet networks.

These encoders are available with a solid shaft up to max. 10 mm diameter or a blind hollow shaft up to 15 mm.



High rotational speed	Temperature -20° + 80°	High IP value	High shaft load capacity	Shock / vibration resistant	Short-circuit proof	Reverse polarity protection

Adaptable

- Variants with shaft or blind hollow shaft
- Programmable via Bus

User-friendly

- M12 connector
- Programmability of all relevant parameters

Order code Shaft version	8.5860 . XX 1 2 . 1001
	<div style="display: flex; justify-content: space-around; font-size: small;"> Type a b c d e </div>
a Flange	b Shaft (ø x L), with flat
1 = clamping flange 2 = synchro flange	1 = ø 6 x 10 mm 2 = ø 10 x 20 mm
	c Interface / Power supply
	1 = DeviceNet / 10 ... 30 V DC
	d Type of connection
	2 = M12 connector
	e Fieldbus profile
	1001 = DeviceNet 2.0

Order code Hollow shaft	8.5860 . XX 1 2 . 1001
	<div style="display: flex; justify-content: space-around; font-size: small;"> Type a b c d e </div>
a Flange	b Blind hollow shaft
A = with spring element B = with double-winged stator coupling	A = ø 10 mm B = ø 12 mm C = ø 14 mm D = ø 15 mm E = ø 9.5 mm (3/8") F = ø 12.7 mm (1/2")
	c Interface / Power supply
	1 = DeviceNet / 10 ... 30 V DC
	d Type of connection
	2 = M12 connector
	e Fieldbus profile
	1001 = DeviceNet 2.0

Delivery includes: EDS file and manual on CD.

Absolute Encoders – Multiturn

Standard, optical / magnetic	5860 (Shaft / Hollow shaft)	DeviceNet
Mounting accessory for shaft encoders		
Coupling	Bellows coupling ø 19 mm for shaft 6 mm	8.0000.1101.0606
	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
Mounting accessory for hollow shaft encoders		
Cylindrical pin, long for torque stops		8.0010.4700.0000
Connection Technology		
Connector, self-assembly (straight)	Coupling M12 for Bus in	8.0000.5116.0000
	Connector M12 for Bus out	8.0000.5111.0000
Cordset, pre-assembled with 2 m PVC cable	M12 for Bus in	8.0000.6V81.0005
	M12 for Bus out	8.0000.6V88.0005

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics		
Speed ¹⁾		max. 6000 min ⁻¹
Rotor moment of inertia		approx. 1.8 x 10 ⁻⁶ kgm ²
Starting torque		< 0.01 Nm
Load capacity of shaft at shaft extension ²⁾	adial	80 N
	axial	40 N
Weight		approx. 0.7 kg
Protection EN 60 529		IP65
Working temperature range		-20°C ... +80°C
Materials	shaft	stainless steel
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz

Electrical characteristics		
Power supply (U _B)		10 ... 30 V DC
Power consumption		max. 0.29 A
Recommended fuse		T 0.315 A
Divisions		up to 8192 (13 bit) per revolution, 4096 (12 bit) revolutions
Linearity		± 1/2 LSB (±1 LSB at resolution 13, 14, 25 bit)
Code		Binary
Interface		CAN HIGH-Speed acc. to ISO/DIS 11898, Basic and Full-CAN; CAN specification 2.0 B (11 and 29 bit Identifier)
DeviceNet Profile for Encoder Release V 2.0		
Baud rate		programmable via DIP switches 10 ... 1000 Kbit/s CAN DNET 125/250/500 kbit/s
Basic identifier/node number		programmable via DIP switches
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
Performance against magnetic influence acc. to		EN 61000-4-8, severity of inspection 5
UL-certified		File 224618
RoHS compliant acc. to		EU guideline 2002/95/EG

DeviceNet Encoder profile

General description

The DeviceNet Device Profile describes the functionality of the communication and of that part of the DeviceNet fieldbus system specific to the manufacturer. The Encoder Profile applies to encoders and defines the individual objects independently of the manufacturer. In addition the profile makes provision for additional extended functions specific to the manufacturer.

The following parameters can be programmed:

- Direction of rotation
- Scaling factor
- Number of pulses/rotation 1 ... 8192
- Total resolution
- Number of revolutions 1 ... 4096
- Preset value
- Diagnostics mode

The following functionality is integrated:

- Galvanic isolation of the Fieldbus-stage with DC/DC converter
- Line Driver acc. to RS485
- Addressing via DIP switches or software
- Diagnostics LED network and mode
- Baud rate 125, 250 and 500 kbit/s programmable via DIP switches
- Node address 0 ... 63 and baud rate programmable via DIP switches
- Baud rate and node address programmable
- Polled mode
- Cyclic mode
- Change of state mode (COS)
- Combination of Polled mode and Cyclic mode
- Combination of Polled mode and COS mode
- Offline connection set
- Device heartbeat

"Out of box" Configuration:

- MAC-ID and Baud rate preset value, MAC-ID = 63
- Baud rate = 125 kbit/s
- 2 I/O Assembly: Position value / Position value and status

Fieldbus encoders can be used in the following applications:

Elevators, construction machines, cranes, agricultural vehicles, special-purposes vehicles, industrial automation.

1) For continuous operation 3000 min⁻¹ at the max. temperature
2) Solid shaft version

Absolute Encoders – Multiturn

Standard, optical / magnetic

5860 (Shaft / Hollow shaft)

DeviceNet

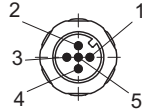
Terminal assignment M12

Signal	DRAIN	+ V DC	- V DC	CAN_H	CAN_L
Pin	1	2	3	4	5
Colour	GY	RD	BK	WH	BU

Bus out



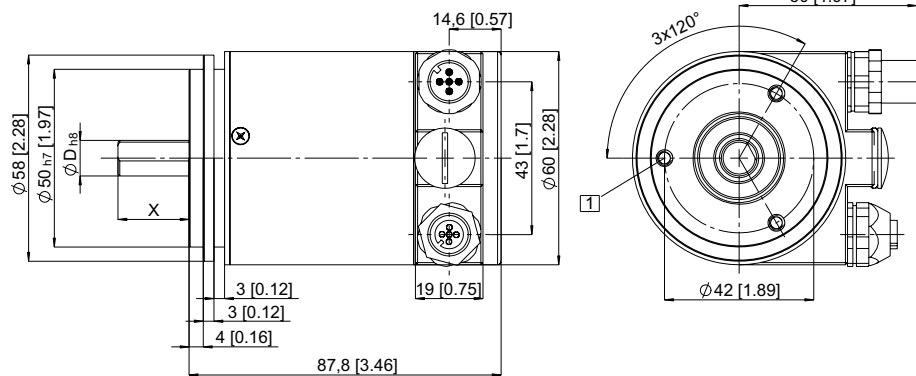
Bus in



Dimensions shaft version

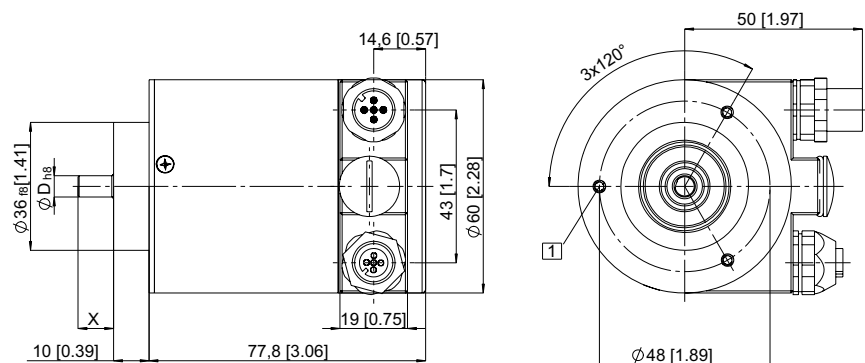
Synchro flange

1 3 x M4, 6 deep



Clamping flange

1 3 x M3, 6 deep



Suitable cable diameters

Supply voltage \varnothing 4.5 ... 6.5 mm
 Data transmission line \varnothing 8 ... 10 mm

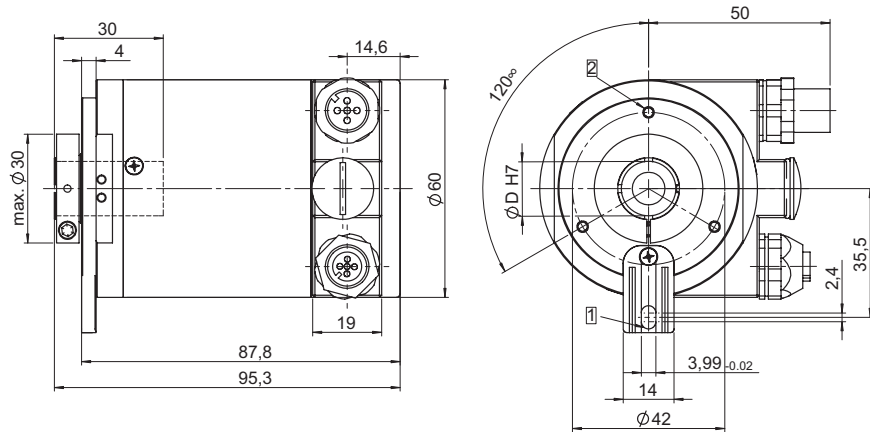
Absolute Encoders – Multiturn

Standard, optical / magnetic	5860 (Shaft / Hollow shaft)	DeviceNet
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Dimensions hollow shaft version (blind hollow shaft)

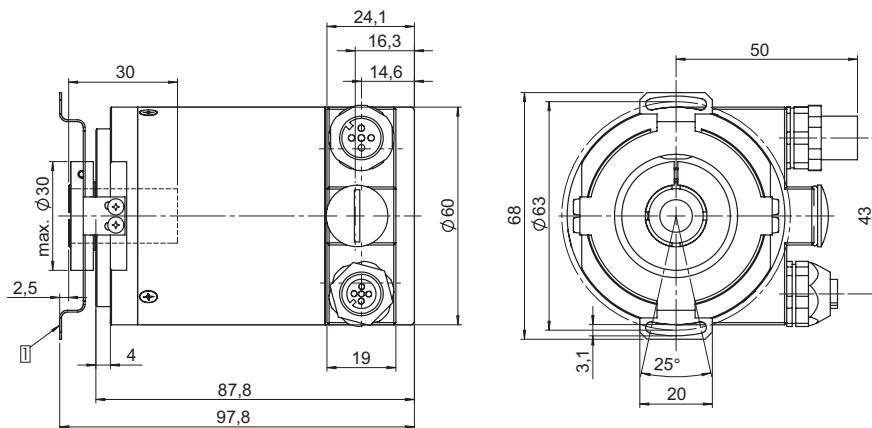
Flange with torque stop set long, ø 58 mm

- 1 Torque stop slot,
Recommendation:
Cylindrical pin DIN 7, ø 4 mm
- 2 M3, 6 deep



Flange with stator coupling, ø 58 mm

- 1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)



Absolute Encoders
Multiturn

Absolute Encoders – Multiturn

Standard, optical / magnetic

9081 (Large hollow shaft)

SSI / RS485, programmable



The multiturn encoder 9081, with SSI interface and combined optical/ mechanical sensor technology, is also available with additional incremental track or RS485 interface.

This encoder has a through hollow shaft with a diameter up to 28 mm and offers resolutions up to 25 bits.



High rotational speed



Temperature



High IP value



Shock / vibration resistant



Short-circuit proof



Reverse polarity protection

Optimised dimensions

- Hollow shaft up to max. 28 mm with an installation depth of just 47 mm
- Outer diameter 90 mm

Flexible

- Various torque stops available
- Large selection of hollow shafts, interfaces and resolutions

Order code Hollow shaft

8.9081 . XXXX 2 . XXXX
Type a b c d e

a Flange

- 1 = without mounting aid
- 2 = with short spring device
- 3 = with long spring device
- 4 = with mounting flange
- 5 = with tether arm long

b Hollow shaft

- 1 = ø 12 mm
- 2 = ø 15 mm
- 3 = ø 20 mm
- 4 = ø 24 mm
- 5 = ø 28 mm
- 6 = ø 15,875 mm (5/8")
- 7 = ø 25,4 mm (1")

Further hollow shafts on request

c Interface / Power supply

- 2 = SSI / 5 ... 30 V DC with 4 status outputs
- 3 = RS485, half-duplex / 5 ... 30 V DC internal termination
- 5 = SSI / 5 ... 30 V DC, with incremental tracks A, B, A, B 2048 PPR
- 7 = RS485, half-duplex / 5 ... 30 V DC external termination
- 9 = SSI / 4.75 ... 30 V DC with 2 status outputs and 2 sensor outputs for monitoring the supply voltage on the encoder.

d Type of connection

- 2 = M23 connector, 12 pin, radial without mating connector

e SSI interface ¹⁾

- 2001 = 4096 x 4096 (24 bit), Binary
- 2002 = 8192 x 4096 (25 bit), Binary
- 2003 = 4096 x 4096 (24 bit), Gray
- 2004 = 8192 x 4096 (25 bit), Gray
- RS485-Interface, half-duplex mode
- 3001 = ESC-protocol max. 38400 baud

¹⁾ This factory set (default) resolution can be re-programmed by using the Ezturn® software.

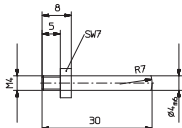
Absolute Encoders – Multiturn

Standard, optical / magnetic	9081 (Large hollow shaft)	SSI / RS485, programmable
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Mounting accessory for shaft encoders

Coupling	Bellows coupling \varnothing 19 mm for shaft 12 mm	8.0000.1101.1212
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Mounting accessory for hollow shaft encoders

Cylindrical pin, long for torque stops		With fixing thread	8.0010.4700.0000
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Connection Technology

Connector, self-assembly (straight)	M23	8.0000.5012.0000
Cordset, pre-assembled with 2 m PVC cable	M23	8.0000.6901.0002.0031

Programming set

including:	<ul style="list-style-type: none"> - Interface converter - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn[®] software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0004
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics	
Max. speed	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Rotor moment of inertia	approx. 65 x 10 ⁻⁶ kgm ²
Starting torque	< 0.2 Nm
Weight	approx. 0.7 kg
Protection EN 60 529	IP65
Working temperature range	-20°C ... +70°C
Materials	hollow shaft stainless steel H7
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply (U_B)	5.0 ... 30 V DC ⁴⁾
Power consumption	typ 89 mA (no load) max 138 mA
Short circuit proof outputs ²⁾	yes ³⁾
Reverse connection U_B	yes
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
Performance against magnetic influence acc. to	EN 61000-4-8, Severity level 5
UL-certified	File 224618
RoHS compliant acc. to	EU guideline 2002/95/EG

SSI-Interface	
Output driver	RS485
Permissible load/channel	max. +/- 20 mA
Update rate for position data	ca. 1600/s
SSI clock rate	100 kHz / 500 kHz
Signal level	high typ. 3.8 V low (I _{Load} = 20 mA) typ. 1.3 V
Falling edge time t_f (without cable)	max. 100 ns
Rising edge time t_r (without cable)	max. 100 ns

Control inputs (V/R, SET)	
Voltage	5 ... 30 V DC = U _B
Response time	10 ms
Switching level	low max. 25% U _B high min. 60% U _B , max. U _B
Max. current load	≤ 0.5 mA

Control outputs	
Output driver	Push-Pull
max. current output	± 10.0 mA
Signal level	high min. U _B - 2.8 V low max. 1.8 V
Falling edge time t_f (without cable)	max. 1 μs
Rising edge time t_r (without cable)	max. 1 μs

Incremental outputs (A/B)	
Output driver	RS422-compatible
SSI clock rate min. / max. / Pulse frequency	200 kHz
Signal level	high 4.5 V low (I _{Load} = 20 mA) 0.5 V
Falling edge time t_f (without cable)	max. 200 ns
Rising edge time t_r (without cable)	max. 200 ns

1) For shaft version only (at shaft end)
 2) If supply voltage U_B correctly applied
 3) Only one channel allowed to be shorted-out:
 at U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted.
 at U_B = 5 ... 30 V short circuit to channel or 0 V is permitted.
 4) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)

Absolute Encoders – Multiturn

Standard, optical / magnetic

9081 (Large hollow shaft)

SSI / RS485, programmable

Control inputs

V/R input for change of direction

The encoder can output increasing code values when the shaft is rotated either clockwise or counter-clockwise (when looking from the shaft side).

There are two methods for selecting the appropriate option:

1. Via a hardware configuration of the V/R input BEFORE powering up the encoder
2. By programming the device using the Kübler „EzTurn®“ programming tool.

The following table shows the function selection dependent on hardware and software settings:

Hardware configuration of the V/R input:	Programmed selection using the „EzTurn“ programming tool	Function: increasing code value when the shaft is in the following direction
„low“ (0V) on the V/R input (=cw)	cw	cw
„high“ (+U _B) on the V/R input (= ccw)	cw	ccw
„low“ (0V) on the V/R input (=cw)	ccw	ccw
„high“ (+U _B) on the V/R input (= ccw)	ccw	ccw

Note:

- Any hardware configuration of the V/R input must take place BEFORE powering up the encoder!
- If the V/R input is not configured, then a 0 V configuration will apply (default condition)!
- If the direction of rotation is changed due to the V/R configuration, without activating the SET function again, and if the encoder is also then powered up again, a new position value may be outputted, even if the physical shaft position of the encoder has not moved! This is due to internal conversion processes.
- The start-up procedure for the encoder should therefore follow this sequence:
 1. Determine the count direction of the encoder either via the V/R input or via programming
 2. Apply power to the encoder
 3. Activate the SET function, if desired (see SET input below)
- If using a cable wire to configure the V/R input, then for EMC reasons the wire should not remain open but should be tied either to 0 V or U_B!
- The response time of the V/R input with U_B = 5 ... 30 V DC power supply is 10 ms.

SET input

This input is used for a one-time alignment (zeroing) of the encoder immediately after installation. A high control pulse (+UB) applied to this input for a minimum of 10 ms will reset the current encoder position to the pre-programmed setpoint value.

The programming of the setpoint can be carried out with Kübler's Ezturn® programming software or can, on request, be done in advance at the factory. The default value is zero. However any value within the encoder's measuring range can be defined.

Notes:

- The SET function should only be implemented when the encoder shaft is at rest.
- For the duration of the SET pulse the SSI interface does not function and therefore does not output any valid position values! In order to avoid malfunctions, no SSI clock pulse should occur during the SET pulse.
- If a cable wire is used to configure the SET input, then for EMC reasons the wire should not remain open but should if at all possible be tied to 0 V, provided no SET pulse is triggered!
- The response time of the SET input with +U_B = 5 ... 30 V DC power supply is 10 ms.

Encoder outputs ¹⁾

Output	Default-function ²⁾
A1	battery control
A2	not activated
A3	not activated ³⁾
A4	not activated ³⁾

The outputs are not activated in the factory setting (default). They can be activated and defined with the optional Ezturn® programming software e.g. limit switch, overspeed and temperature control etc.

Functionality of the Ezturn® software

- Setting of the communication parameters
- RS232 encoder/PC interface
- Setting of a drive factor by means of the modification of the resolution per revolution, the number of revolutions and the total resolution
- Programming of the direction of rotation and code type
- Setting of a preset/electronic zero point
- Setting of diagnostic functions
- Setting of the outputs A1 ... A4
 - Limit switch values, max. 2
 - Alarm and status information
 - Battery monitoring
- Limiting max. number of bit to interface with PLCs
- Diagnostics and information for the set-up operation
- Data transmission from the PC to the encoder and inversely, also during operation
- Print-out of the current data and set parameters
- Convenient position output with the current set data
- Terminal operation for direct instructions via the keyboard
- Diagnostics of the encoder connected

1) Not available for versions with incremental track

2) Programmable with the optional programming software Ezturn®

3) With the order code Interface 9 assigned to the sense outputs.

Absolute Encoders – Multiturn

Standard, optical / magnetic

9081 (Large hollow shaft)

SSI / RS485, programmable

Terminal assignment (SSI Synchronous Serial interface with 12 pin connector)

Signal	0V	+U _B	+T	-T	+D	-D	ST	VR	A1	A2	A3 ¹⁾	A4 ¹⁾	⊥
Interface 9											0 V sense	+U _B sense	
Pin	1	2	3	4	5	6	7	8	9	10	11	12	PH
Colour	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY / PK	RD / BU	

T: Clock signal

D: Data signal

ST: Set input. The current position is set to zero

VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft

PH: Plug connector housing

A1, A2, A3, A4: outputs, can be modified using Ezturn

Isolate unused outputs before initial start-up.

¹⁾ With the order code Interface 9 these outputs are assigned to the sense outputs. The sensor circuits are internally tied to the power supply. Special power supply units control the voltage drop in long cable runs via the voltage feedback. If the circuits are not being used, then they should be individually isolated and not connected.

Terminal assignment (RS485 interface 12 pin connector)

Signal	0V	+U _B	T/R-	T/R+	Term ³⁾	Term ³⁾		VR					⊥
Pin	1	2	3	4	5	6	7 ²⁾	8	9	10	11	12	PH
Colour	WH	BN	GN	YE				RD					

R: Receive channel

T: Transmit channel

VR: Up/down input. As long as this input (High-Level = + U_B) is active, decreasing code values are transmitted when shaft turning clockwise.

PH: Plug connector housing

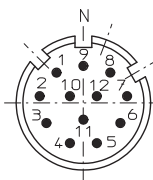
²⁾ There is no SET input for the P3001 version but it can likewise be implemented using the command „<ESC> QP“ (Write preset).

³⁾ For the version with external termination: if the termination is desired (terminating resistor 120 Ohm), then both connections are to be tied together by means of a jumper (0 Ohm).

Terminal assignment (SSI interface with incremental track (A/B))

Signal	0V	+U _B	+T	-T	+D	-D	ST	VR	\bar{B}	B	\bar{A}	A	⊥
Pin	1	2	3	4	5	6	7	8	9	10	11	12	PH

Top view of mating side, male contact base



M23 connector, 12 pin

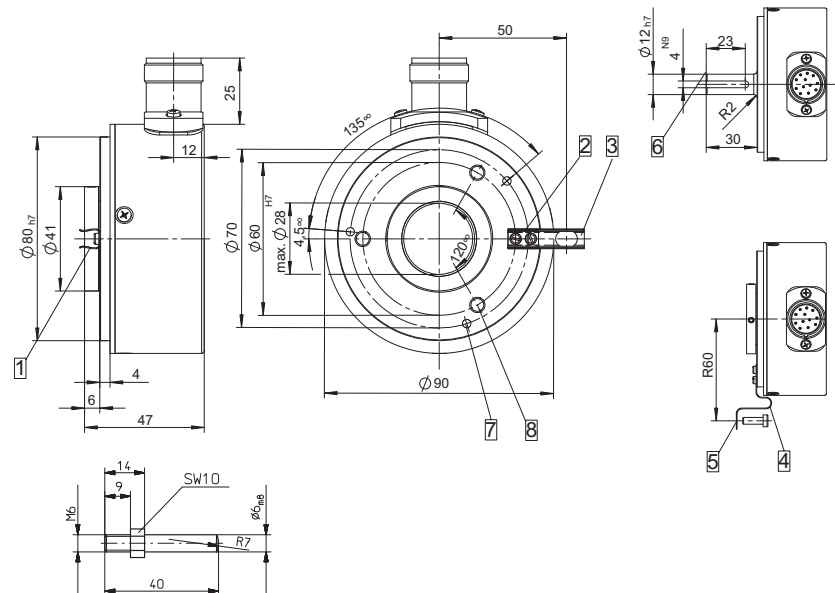
Dimensions

Version with solid shaft $\varnothing 12 \times 30$ mm

- 1 Spring element for cyl. pin DIN 6325, $\varnothing 6$ mm
- 2 Spring element short (flange Nr.2)
- 3 Spring element long (flange Nr.3)
- 4 Mounting flange (flange Nr.4)
- 5 Slotted hole for screw M4
- 6 2.5 mm deep
- 7 M4 - 7 mm deep
- 8 M6 - 10 mm deep

Mounting advice

- 1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!
- 2) Delivery includes a corresponding cylindrical pin (see drawing), when the encoder is ordered with flange type 2 (short spring device) or type 3 (long spring device).



Absolute Encoders – Multiturn

Standard, optical / magnetic

9080 (Large hollow shaft)

Profibus-DP

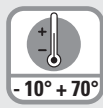


The multiturn encoder 9080 with Profibus interface and combined optical / mechanical sensor technology is perfect for Profibus applications, where a large hollow shaft is required.

This through hollow shaft is available with a diameter up to 28 mm. The maximum resolution of the 9080 is 25 bits.



High rotational speed



Temperature
-10° + 70°



High IP value



High shaft load capacity



Shock / vibration resistant



Short-circuit proof



Reverse polarity protection

Adaptable

- With cable gland or M12 connector
- Hollow shaft of 12 up to 28 mm
- Programmable over the bus

User-friendly

- All relevant parameters programmable
- Wide selection of shafts and fixing options

Order code Hollow shaft

8.9080 . XX3X . 3001
Type a b c d e

a Flange

- 1 = without mounting aid
- 2 = with short spring device
- 3 = with long spring device
- 4 = with mounting flange
- 5 = with tether arm long

b Hollow shaft

- 1 = ø 12 mm
- 2 = ø 15 mm
- 3 = ø 20 mm
- 4 = ø 24 mm
- 5 = ø 28 mm
- 6 = ø 15,875 mm (5/8")
- 7 = ø 25,4 mm (1")
- 9 = ø 16 mm
- C = ø 25 mm

c Interface / Power supply

- 3 = Profibus-DP / 10 ... 30 V DC

e Fieldbus profile

- 3001 = Profibus Class 2

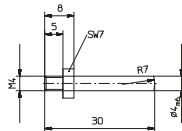
d Type of connection

- 1 = terminal box with cable gland fitting M16
- 2 = M12 Profibus connector

Mounting accessory for hollow shaft encoders

Cylindrical pin, long

for torque stops



With fixing thread

8.0010.4700.0000

Connection Technology

Connector, self-assembly (straight)

Coupling M12 for Bus in
Connector M12 for Bus out
Connector M12 for supply voltage

05.BMWS 8151-8.5
05.BMSWS 8151-8.5
05.B8141-0

Cordset, pre-assembled, PUR cable

M12 cordset 6 m for Bus in
M12 cordset 6 m for Bus out
M12 cordset 2 m for supply voltage

05.00.6011.3211.006M
05.00.6011.3411.006M
05.WAK4-2/S90

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Absolute Encoders – Multiturn

Standard, optical / magnetic	9080 (Large hollow shaft)	Profibus-DP
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Mechanical characteristics	
Max. speed	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Rotor moment of inertia	ca. 72 x 10 ⁻⁶ kgm ²
Starting torque	< 0.05 Nm
Weight	approx. 0.9 kg
Protection EN 60 529	IP65
EX approval for hazardous areas	optional Zone 2 and 22
Working temperature range	-10°C ... +70°C
Materials	hollow shaft stainless steel H7
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 10 ... 2000 Hz

General electrical characteristics	
Power supply (U_B)	10 ... 30 V DC
Power consumption	290 mA
Recommended fuse	T 0.315 A
Linearity	± 1/2 LSB (±1 LSB at 13, 14, 25 bit resolution)
Code	Binary
Interface	RS485
Protocol	Profibus-DP, encoder profile class 2
Baud rate	max. 12 Mbit/s
Device address	adjustable with DIP-switches
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
Performance against magnetic influence acc. to	EN 61000-4-8, Severity level 5
UL-certified	File 224618
RoHS compliant acc. to	EU guideline 2002/95/EG

Profibus Encoder-Profile V1.1

Profibus Encoder-Profile V1.1 The PROFIBUS-DP device profile describes the functionality of the communication and the user-specific component within the PROFIBUS field bus system. For encoders, the encoder profile is definitive. Here the individual objects are defined independent of the manufacturer.

Furthermore, the profiles offer space for additional manufacturer-specific functions; this means that PROFIBUS-compliant device systems can be used now with the guarantee that they are ready for the future too.

The following parameters can be programmed:

- Direction of rotation
- Scaling factor
 - number of pulse/rotation
 - total resolution
- Preset value
- Diagnostics mode

The following functionality is integrated:

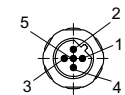
- Galvanic isolation of the Fieldbus stage with DC/DC converter
- Line driver according to RS485 max. 12 MB
- Addressing by means of rotary switches
- Diagnostics LED
- Full Class 1 and Class2 functionality

Terminal assignment terminal box

Signal	ENC.		BUS IN			BUS OUT			ENC.		Shield	
	+V DC	GND	GND	B	A	A	B	GND	GND	+V DC		
Terminal	1	2	3	4	5	6	7	8	9	10	11	12

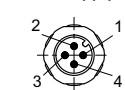
Terminal assignment M12 connector

Bus in:



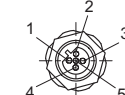
Signal:	–	BUS-A	–	BUS-B	–
Pin:	1	2	3	4	5

Power supply:



Signal:	U _B	–	0 V	–	
Pin:	1	2	3	4	

Bus out:



Signal:	BUS_VDC	BUS-A	BUS_GND	BUS-B	Shield
Pin:	1	2	3	4	5

1) For shaft version only (at shaft end)

Absolute Encoders – Multiturn

Standard, optical / magnetic

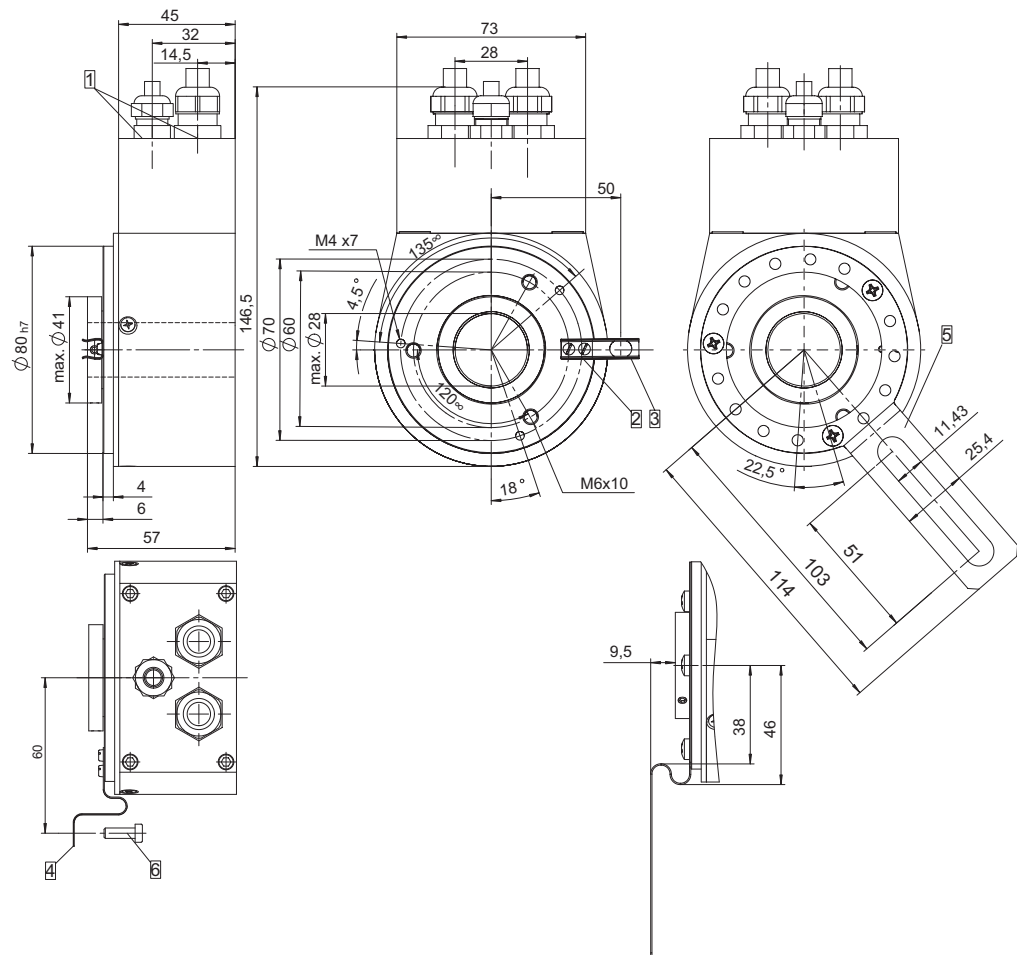
9080 (Large hollow shaft)

Profibus-DP

Dimensions

Cable connection

- 1 Cable gland fitting
- 2 Spring device short (flange Nr. 2)
for cyl. pin DIN 6325, \varnothing 6 mm
- 3 Spring device long (flange Nr. 3)
for cyl. pin DIN 6325, \varnothing 6 mm
- 4 Mounting flange (flange Nr. 4)
- 5 Tether arm long (flange Nr. 5)
- 6 Slotted hole for screw M4



Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!

Absolute Encoders – Multiturn

Standard, optical / magnetic

9080 (Large hollow shaft)

CANopen / DeviceNet



The multiturn encoder 9080 with CANopen interface and combined optical / mechanical sensor technology is perfect for CANopen applications, where a large hollow shaft is required.

This through hollow shaft is available with a diameter up to 28 mm. The maximum resolution of the 9080 is 25 bits.

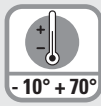


DeviceNet

CANopen



High rotational speed



Temperature
-10° + 70°



High IP value



High shaft load capacity



Shock / vibration resistant



Short circuit proof



Reverse polarity protection

Adaptable

- With cable gland or M12 connector
- Hollow shaft of 12 up to 28 mm
- Programmable over the bus

User-friendly

- All relevant parameters programmable
- Wide selection of shafts and fixing options

Order code Hollow shaft

8.9080 . XXXX . XXXX
Type a b c d e

a Flange

- 1 = without mounting aid
- 2 = with short spring device
- 3 = with long spring device
- 4 = with mounting flange
- 5 = with tether arm long

b Hollow shaft

- 1 = ø 12 mm
- 2 = ø 15 mm
- 3 = ø 20 mm
- 4 = ø 24 mm
- 5 = ø 28 mm
- 6 = ø 15,875 mm (5/8")
- 7 = ø 25,4 mm (1")
- 9 = ø 16 mm
- C = ø 25 mm

c Interface / Power supply

- 1 = DeviceNet / 10 ... 30 V DC
- 2 = CANopen / 10 ... 30 V DC

d Type of connection

- 1 = terminal box with cable gland fitting M16 ¹⁾
- 2 = M12 connector

e Fieldbus profile

- 1001 = DeviceNet
- 2001 = CANopen
Encoder Profile DSP 406

Includes EDS-file and documentation on CD

Use **couplings** for the **BUS-IN** connection and **connectors** for the **BUS-OUT** connection.

1) Only in conjunction with CANopen

Absolute Encoders – Multiturn

Standard, optical / magnetic	9080 (Large hollow shaft)	CANopen / DeviceNet
Mounting accessory for hollow shaft encoders		
Cylindrical pin, long for torque stops		With fixing thread 8.0010.4700.0000
Connection Technology		
Connector, self-assembly (straight)	M12 for Bus in	8.0000.5116.0000
	M12 for Bus out	8.0000.5111.0000
Cordset, pre-assembled with 5 m PVC cable	Bus in	8.0000.6V81.0005
	Bus out	8.0000.6V88.0005
Programming set		
Including: <ul style="list-style-type: none"> - Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software 	Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM : 512 MB Required disk space: 500 MB	8.0010.9000.0015

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Mechanical characteristics	
Max. speed	6 000 min ⁻¹ , 3 000 min ⁻¹ (continuous)
Rotor moment of inertia	approx. 72 x 10 ⁻⁶ kgm ²
Starting torque	< 0.05 Nm
Weight	approx. 0.9 kg
Protection EN 60 529	IP65
Working temperature range	-10°C ... +70°C
Materials	hollow shaft stainless steel H7
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply (U_B)	10 ... 30 V DC
Power consumption	290 mA
Recommended fuse	T 0.315 A
Linearity	± 1/2 LSB (±1 LSB at 13, 14, 25 bit resolution)
Code	Binary
Interface	CAN HIGH-Speed acc. to ISO/DIS 11898, Basic and Full-CAN; CAN specification 2.0 B (11 and 29 bit Identifier)
Protocol	CANopen according to profile DSP 406 with additional functions. DeviceNet Profile for Encoder Release V 2.0
Baud rate	programmable via DIP switches 10 ... 1000 Kbit/s
Basic identifier/node	programmable via DIP switches
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3
Performance against magnetic influence acc. to	EN 61000-4-8, Severity level 5
UL-certified	File 224618
RoHS compliant acc. to	EU guideline 2002/95/EG

1) At shaft version only (at shaft end)

Absolute Encoders – Multiturn

Standard, optical / magnetic

9080 (Large hollow shaft)

CANopen / DeviceNet

CANopen - Device Profile

General description

The CANopen Device Profiles describe the functionality of the communication and of that part of the CANopen fieldbus system specific to the manufacturer. Device Profile 406 applies to encoders and defines the individual objects independently of the manufacturer. In addition the profile makes provision for additional extended functions specific to the manufacturer; using devices that interface with CANopen offers the advantage of acquiring systems today that are prepared for the needs of the future.

The following functionality is integrated:

- Class C2 functionality
- NMT Slave
- Diagnostics (internal) 2 bit
- CAN-LED for Bus status
- CAN-LED for operating mode

The following parameters can be programmed::

- Polling mode or auto mode with adjustable time
- Code sequence (Direction)
- Number of pulses/rotation 1 ... 8192
- Number of revolutions 1 ... 4096
- Total resolution
- Preset
- Offset
- Number of revolutions

DeviceNet Encoder profile

General description

The DeviceNet Device Profile describes the functionality of the communication and of that part of the DeviceNet fieldbus system specific to the manufacturer. The Encoder Profile applies to encoders and defines the individual objects independently of the manufacturer. In addition the profile makes provision for additional extended functions specific to the manufacturer.

The following parameters can be programmed:

- Direction of rotation
- Scaling factor
 - Number of pulses/rotation
 - Total resolution
- Number of revolutions
- Preset value
- Diagnostics mode
- Resolution

The following functionality is integrated:

- Galvanic isolation of the Fieldbus-stage with DC/DC converter
- Addressing via DIP switches or software
- Diagnostic LED for network and mode
- Baud rate 125, 250 and 500 kbit/s programmable via DIP switches
- Node address 0 ... 63 and baud rate programmable via DIP switches
- Polled mode
- Cyclic mode
- Change of state mode (COS)
- Combination of Polled mode and Cyclic mode
- Combination of Polled mode and COS mode
- Offline connection set
- Device heartbeat
- "Out of box" Configuration
- MAC-ID and Baud rate preset value, MAC-ID = 63
- Baud rate = 125 kbit/s
- 2 I/O Assembly: Position value / Position value and status

Fieldbus encoders can be used in following applications:

CANopen

- Elevators
- Construction plant
- Cranes
- Agricultural vehicles
- Mobile plant
- Special-purposes vehicles

DeviceNet

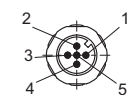
Especially suitable for applications in the USA.

Terminal assignment terminal box

Signal	ENC.		BUS IN			BUS OUT			ENC.		Shield	
	+V DC	GND	GND	B	A	A	B	GND	GND	+V DC		
Terminal	1	2	3	4	5	6	7	8	9	10	11	12

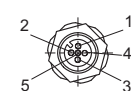
Terminal assignment M12 connector

Bus in:



Signal	DRAIN	+ V DC	- V DC	CAN_H	CAN_L
Pin	1	2	3	4	5
Colour	GY	RD	BK	WH	BU

Bus out:



Signal	DRAIN	+ V DC	- V DC	CAN_H	CAN_L
Pin	1	2	3	4	5
Colour	GY	RD	BK	WH	BU

Absolute Encoders – Multiturn

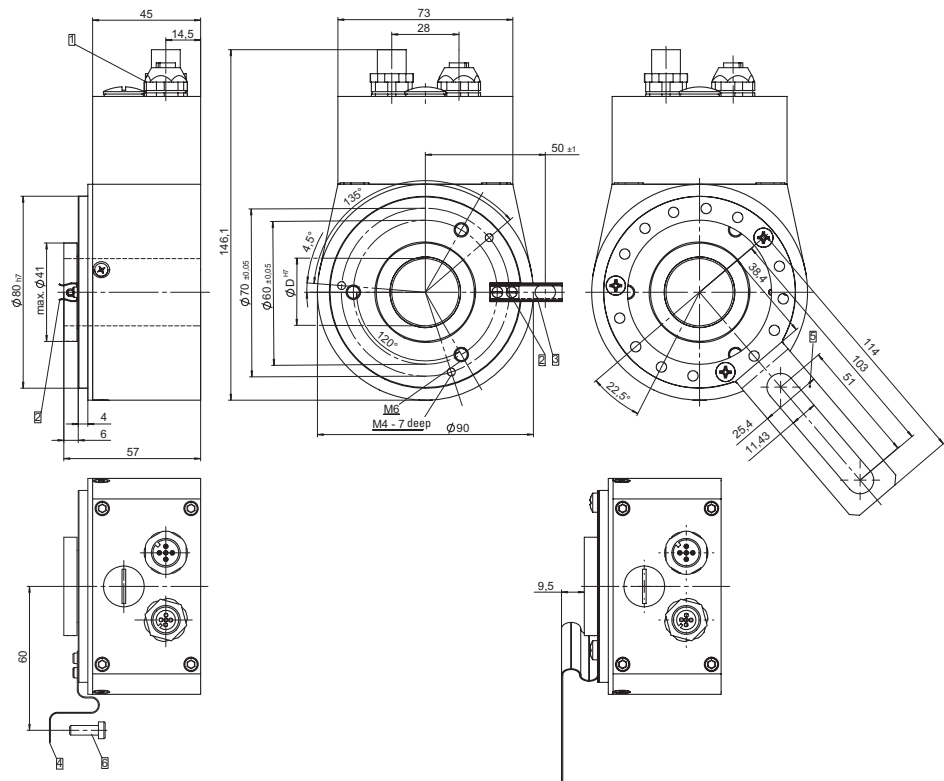
Standard, optical / magnetic

9080 (Large hollow shaft)

CANopen / DeviceNet

Dimensions hollow shaft version

- 1 Cable gland fitting
- 2 Spring device short (flange Nr. 2)
for cyl. pin DIN 6325, \varnothing 6 mm
- 3 Spring device long (flange Nr. 3)
for cyl. pin DIN 6325, \varnothing 6 mm
- 4 Mounting flange (flange Nr. 4)
- 5 Tether arm long (flange Nr. 5)
- 6 Slotted hole for screw M4
- 7 2.5 mm deep

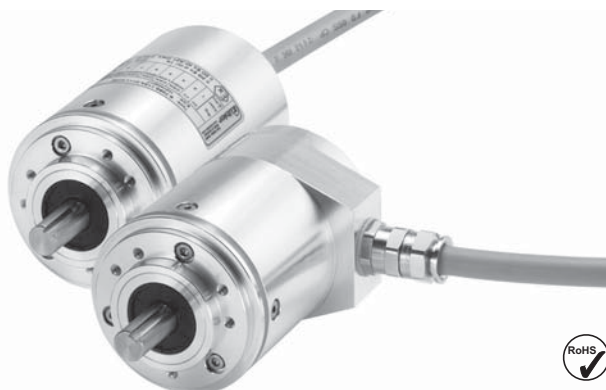


Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!

Absolute Encoders – Multiturn

ATEX, optical	Sendix 7063 (Shaft)	SSI
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The Sendix 7063 absolute singleturn encoders offer Ex protection in a compact 70 mm seawater resistant housing, with an SSI interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 29 bits; they are also available with axial and radial cable outlets.



Ex approval	Mechanical drive	Safety-Lock™	High rotational speed	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Reverse polarity protection	Optical sensor	Seawater-resistant

Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:
 Ex II 2G Ex d IIC T6 and Ex II 2D Ex tD A21 IP6X T85°C
- Can be operated in marine environments – housing and flange manufactured from seawater-resistant aluminium
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns. IP67 protection

Compact

- Can be used even when space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet axial or radial

Absolute Encoders
Multiturn

Order code	8.7063 . 1 X 2 X . X X 2 1 . XXXX									
Shaft version	Type	a	b	c	d	e	f	g	h	i ¹⁾
<p>a Flange 1 = clamping-synchronous flange ø 70 mm, IP67</p> <p>b Shaft (ø x L) 1 = 12 x 25 mm, with keyway for 4 x 4 mm key 2 = 10 x 20 mm, with flat</p> <p>c Interface / Power supply 2 = SSI or BiSS / 10 ... 30 V DC</p> <p>d Type of connection 1 = axial cable (2 m PUR) 2 = radial cable (2 m PUR) A = axial cable (length > 2 m) B = radial cable (length > 2 m) (preferred lengths, see i, e.g.: 0100 = 10 m)</p>	<p>e Code B = SSI, Binary G = SSI, Gray</p> <p>f Resolution ²⁾ A = 10 bit ST 1 = 11 bit ST 2 = 12 bit ST 3 = 13 bit ST 4 = 14 bit ST 7 = 17 bit ST</p>	<p>g Inputs / Outputs ²⁾ 2 = SET, DIR input additional status output</p> <p>h Options 1 = no option</p> <p>i Cable length in dm ¹⁾ 0050 = 5 m 0100 = 10 m 0150 = 15 m</p> <p style="text-align: right;">optional on request - special cable length</p>								

Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
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Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Absolute Encoders – Multiturn

ATEX, optical		Sendix 7063 (Shaft)		SSI	
Explosion protection					
EC type-examination certificate		PTB09 ATEX 1106 X			
Category (gas)		II 2G Ex d IIC T6			
Category (dust)		II 2D Ex tD A21 IP6X T85°C			
Directive 94/9 EC		EN 60079-0; DIN EN 60079-1 EN 61241-0; DIN EN 61241-1			
Mechanical characteristics					
Max. speed		continuous 6 000 min ⁻¹			
Starting torque		< 0.05 Nm			
Rotor moment of inertia		4.0 x 10 ⁻⁶ kgm ²			
Load capacity of shaft		radial	80 N		
		axial	40 N		
Weight		approx. 0.6 kg			
Protection EN 60 529		IP67			
Working temperature range		-40°C ... +60°C			
Materials		shaft	stainless steel		
		flange / housing	seawater-resistant Al, type AISiMgMn (EN AW-6082) or stainless steel		
		cable	PUR		
Shock resistance acc. EN 60068-2-27		2500 m/s ² , 6 ms			
Vibration resistance acc. EN 60068-2-6		100 m/s ² , 55 ... 2000 Hz			
General electrical characteristics					
Power supply		10 ... 30 V DC			
Current consumption (w/o output load)		max. 50 mA			
Reverse polarity protection for power supply (U_B)		yes			
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to		EU guideline 2002/95/EG			
SSI Interface					
Output driver		RS485 Transceiver type			
Permissible load/channel		max. 20 mA			
Signal level		high	typ 3.8 V		
		low at I _{Load} = 20 mA	typ 1.3 V		
Short-circuit proof outputs		yes ¹⁾			
Singleturn resolution		10 ... 14 bit and 17 bit ²⁾			
Number of revolutions		4096 (12 bit)			
Code		Binary or Gray			
SSI clock rate		< 14 bit: 50 kHz ... 2 MHz			
Monoflop time		< 15 μs ²⁾			
Note: if clock starts cycling within monoflop time a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate depends on clock speed, data length and monoflop time.					
Data refresh rate		up to 14 bit	< 1 μ		
		for 15 ... 17 bit	< 4 μs		
Status and Parity bit		upon request			
SET Input					
Input		high active			
Input type		Comparator			
Signal level		high	min. 60 % of +V max. +V		
		low	max. 25 % of +V (+V = Power supply)		
Input current		< 0.5 mA			
Min. pulse duration (SET)		10 ms			
Timeout after SET signal		14 ms			
Response time (DIR input)		1 ms			
The encoder can be set to zero at any position by means of a High signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read.					
DIR Input					
A High signal switches the direction of rotation from the default cw to ccw. The reverse function can also be factory-programmed.					
If DIR is reversed when the device is already switched on, this will be interpreted as an error. The status output switches to Low.					
Status output					
Output driver		Open Collector, internal pull-up resistor 22 kOhm			
Permissible load		max. 20 mA			
Signal level		high	+V		
		low	< 1 V		
Active at		low			
The status output serves to display various alarm or error messages. The status output is high (Open Collector with internal pull-up 22k) in normal operation.					
Power-ON delay					
After Power-On, the device requires a time of approximately 150 ms before valid data can be read.					

1) Short-circuit with 0V or output, only one channel at a time, supply voltage correctly applied

2) Other options upon request

Absolute Encoders – Multiturn

ATEX, optical	Sendix 7063 (Shaft)						SSI				
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Terminal assignment

for output circuit 1 or 2

Signal	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	PE	PE
Cable marking	1	2	3	4	5	6	7	8	9	yellow/green	shield

+V: Encoder power supply +V DC

GND: Encoder Ground GND (0V)

+C, -C: Clock signal

+D, -D: Data signal

SET: Set input. The current position becomes defined as position zero.

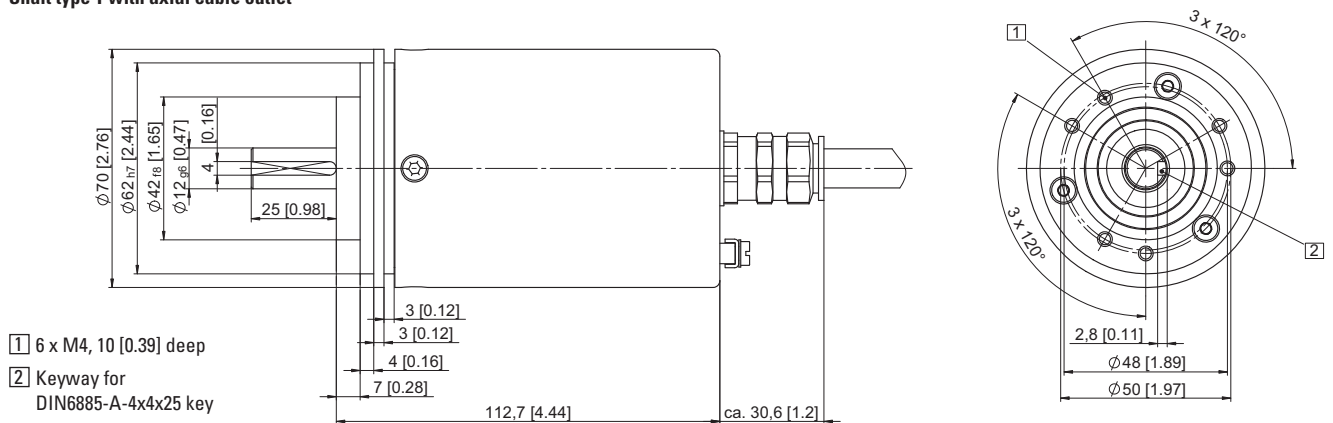
DIR: Direction input. If this input is active, output values are decreasing when shaft is turned clockwise

Stat: Status output

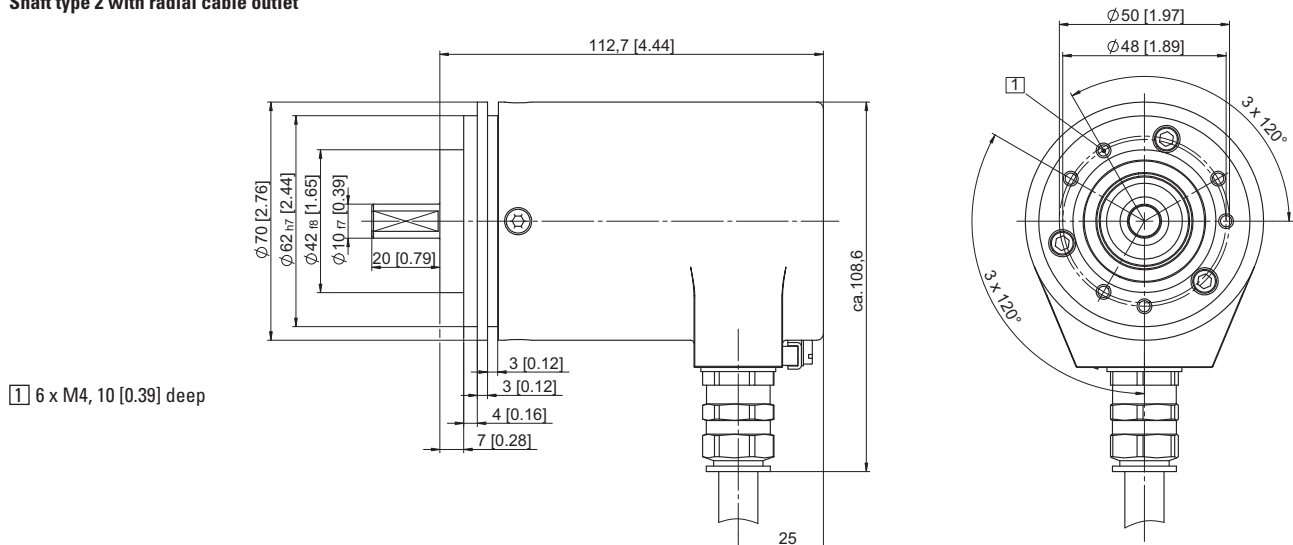
PE: Protective earth

Dimensions

Shaft type 1 with axial cable outlet



Shaft type 2 with radial cable outlet



Absolute Encoders
Multiturn

Absolute Encoders – Multiturn

ATEX, optical	Sendix 7068 (Shaft)	Profibus-DP
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The Sendix 7068 absolute singleturn encoders offer Ex protection in a compact 70 mm seawater resistant housing, with a Profibus interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 28 bits; they are also available with axial and radial cable outlets.



Ex approval	Mechanical drive	Safety-Lock™	High rotational speed	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Reverse polarity protection	Optical sensor	Seawater-resistant

Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:
 Ex II 2G Ex d IIC T6 and Ex II 2D Ex tD A21 IP6X T85°C
- Can be operated in marine environments – housing and flange manufactured from seawater-resistant aluminium
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns. IP67 protection

Compact

- Can be used even when space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet axial or radial

Order code	8.7068 . 1 X 3 X . 31 11 . XXXX						
Shaft version	Type	a	b	c	d	e	f ¹⁾
a Flange		1 = clamping-synchronous flange ø 70 mm, IP67					
b Shaft (ø x L)		1 = 12 x 25 mm, with keyway for 4 x 4 mm key					
		2 = 10 x 20 mm, with flat					
c Interface / Power supply		3 = Profibus-DP V0 / 10 ... 30 V DC					
d Type of connection				1 = axial cable (2 m PUR)			
				2 = radial cable (2 m PUR)			
				A = axial cable (length > 2 m)			
				B = radial cable (length > 2 m)			
				(preferred lengths, see f , e.g.: 0100 = 10 m)			
e Fieldbus profile					31 = Profibus-DP V0 encoder profile Class 2		
						optional on request	
						- special cable length	

Mounting accessory for shaft encoders		
Coupling	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) Not applicable with connection types 1 and 2

Absolute Encoders – Multiturn

ATEX, optical	Sendix 7068 (Shaft)	Profibus-DP
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Explosion protection	
EC type-examination certificate	PTB09 ATEX 1106 X
Category (gas)	II 2G Ex d IIC T6
Category (dust)	II 2D Ex tD A21 IP6X T85°C
Directive 94/9 EC	EN 60079-0; DIN EN 60079-1 EN 61241-0; DIN EN 61241-1

Mechanical characteristics	
Max. speed	6 000 min ⁻¹ continuous
Starting torque	< 0.05 Nm
Rotor moment of inertia	4.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial 80 N axial 40 N
Weight	approx. 0.6 kg
Protection EN 60 529	IP67
Working temperature range	-40°C ... +60°C
Materials	shaft stainless steel flange / housing seawater-resistant Al, type AISiMgMn (EN AW-6082) or stainless steel cable PUR
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Current consumption (w/o output load)	max. 120 mA
Reverse polarity protection for power supply (U_B)	yes
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

Interface characteristics Profibus-DP	
Resolution Singleturn	1 ... 65536 (16 bit), scaleable 1 ... 65536 Default value: 8192 (13 bit)
Total resolution	28 bit (scaleable 1 ... 2 ²⁸ steps), Default: 25 bit
Number of revolutions	4096 (12 bit), scaleable 1 ... 4096
Code	Binary
Interface	Specification according to Profibus-DP 2.0 / Standard (DIN 19245 Part 3) / RS485 galvanically isolated
Protocol	Profibus Encoder Profile V1.1 Class1 and Class 2 with manufacturer-specific add-ons
Baud rate	maximum 12 Mbit/s
Device address	software controlled setting of the device address via the SSA-service with a CLASS 2-Master. Default address: 125
Termination	active termination can only be switched on externally

Profibus Encoder-Profile V1.1

The PROFIBUS-DP device profile describes the functionality of the communication and the manufacturer-specific component within the PROFIBUS Fieldbus system. The Encoder Profile applies to encoders and defines the individual objects independently of the manufacturer. In addition, the profile makes provision for additional extended functions specific to the manufacturer. The use of PROFIBUS compatible devices ensures that the systems of today are ready to meet the demands of the future.

The following parameters can be programmed

- Direction of rotation
- Scaling – number of steps per revolution
- Preset value
- Diagnostics mode

The following functionality is integrated

- Galvanic isolation of the Bus stage with DC/DC converter
- Line Driver acc. to RS485 max. 12 MB
- Full Class 1 and Class 2 functionality
- Speed value

Terminal assignment

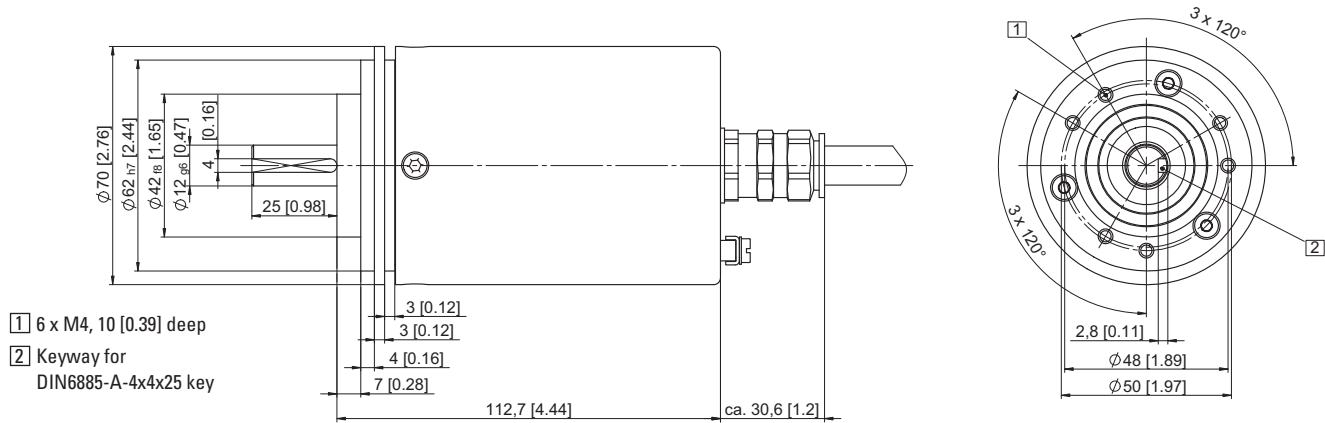
Signal	0 V	+V	BUS A IN	BUS B IN	BUS GND	BUS V DC	BUS A OUT	BUS B OUT
Cable marking	1	2	4	5	6	7	8	9

Absolute Encoders – Multiturn

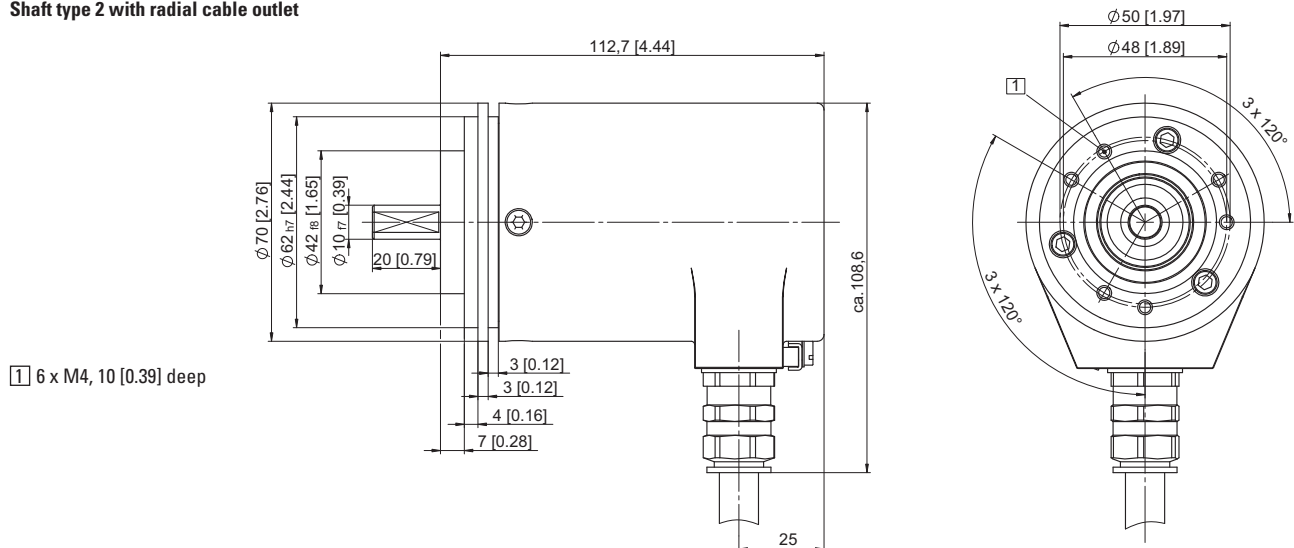
ATEX, optical	Sendix 7068 (Shaft)	Profibus-DP
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Dimensions

Shaft type 1 with axial cable outlet

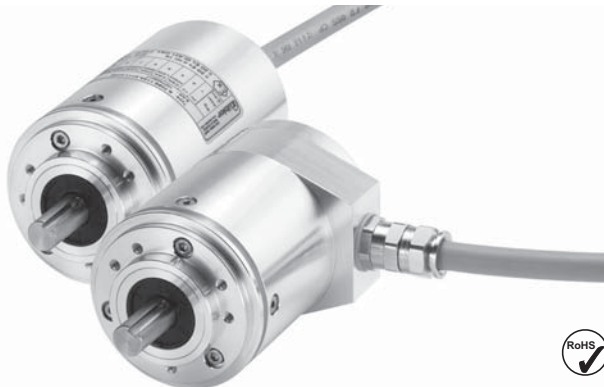


Shaft type 2 with radial cable outlet



Absolute Encoders – Multiturn

ATEX, optical	Sendix 7068 (Shaft)	CANopen
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The Sendix 7068 absolute singleturn encoders offer Ex protection in a compact 70 mm seawater resistant housing, with a CANopen interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 28 bits; they are also available with axial and radial cable outlets



Ex approval	Mechanical drive	Safety-Lock™	High rotational speed	High IP value	High shaft load capacity	Shock / vibration resistant	Magnetic field proof	Reverse polarity protection	Optical sensor	Seawater-resistant

Safe

- “Flameproof-enclosure” version: approved for zone 1, 2 and 21, 22
- Zone 1, 2 and 21, 22:
 Ex II 2G Ex d IIC T6 and Ex II 2D Ex tD A21 IP6X T85°C
- Can be operated in marine environments – housing and flange manufactured from seawater-resistant aluminium
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns. IP67 protection

Compact

- Can be used even when space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet axial or radial

 Absolute Encoders
Multiturn

Order code	8.7068	. 1 X 2 X . 21 11 . XXXX
Shaft version	Type	a b c d e f ¹⁾

<p>a Flange 1 = clamping-synchronous flange ø 70 mm, IP67</p> <p>b Shaft (ø x L) 1 = 12 x 25 mm, with keyway for 4 x 4 mm key 2 = 10 x 20 mm, with flat</p> <p>c Interface / Power supply 2 = CANopen DS301 V4.02 / 10 ... 30 V DC</p>	<p>d Type of connection 1 = axial cable (2 m PUR) 2 = radial cable (2 m PUR) A = axial cable (length > 2 m) B = radial cable (length > 2 m) (preferred lengths, see f, e.g.: 0100 = 10 m)</p> <p>e Fieldbus profile 21 = CANopen encoder profile DS406 V3.2</p>	<p>f Cable length in dm ¹⁾ 0050 = 5 m 0100 = 10 m 0150 = 15 m</p> <p>optional on request - special cable length</p>
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Mounting accessory for shaft encoders

Coupling	Bellows coupling ø 19 mm for shaft 10 mm	8.0000.1101.1010
Programming set		
including:	- Interface converter USB-CAN - Connection cable from interface converter to encoder - Power supply 90 ... 250 V AC - DVD with Ezturn® software	8.0010.9000.0015 Minimum System Requirements: Operating system: Windows XP SP3 or higher Win7 in preparation Processor: 1 GHz RAM: 512 MB Required disk space: 500 MB

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
 Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) Not applicable with connection types 1 and 2

Absolute Encoders – Multiturn

ATEX, optical	Sendix 7068 (Shaft)	CANopen
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Explosion protection	
EC type-examination certificate	PTB09 ATEX 1106 X
Category (gas)	Ex II 2G Ex d IIC T6
Category (dust)	Ex II 2D Ex tD A21 IP6X T85°C
Directive 94/9 EC	EN 60079-0; DIN EN 60079-1 EN 61241-0; DIN EN 61241-1

Mechanical characteristics	
Max. speed	6 000 min ⁻¹ continuous
Starting torque	< 0.05 Nm
Rotor moment of inertia	4.0 x 10 ⁻⁶ kgm ²
Load capacity of shaft	radial 80 N axial 40 N
Weight	approx. 0.6 kg
Protection EN 60 529	IP67
Working temperature range	-40°C ... +60°C
Materials	shaft stainless steel flange / housing seawater-resistant Al, type AISiMgMn (EN AW-6082) or stainless steel cable PUR
Shock resistance acc. EN 60068-2-27	2500 m/s ² , 6 ms
Vibration resistance acc. EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

General electrical characteristics	
Power supply	10 ... 30 V DC
Current consumption (w/o output load)	max. 100 mA
Reverse polarity protection for power supply (U _B)	yes
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3
RoHS compliant acc. to	EU guideline 2002/95/EG

Interface characteristics CANopen	
Resolution Singleturn	1 ... 65536 (16 bit), scalable 1 ... 65536 Default value: 8192 (13 bit)
Total resolution	28 bit (scalable 1 ... 2 ²⁸ steps), Default: 25 bit
Code	Binary
Interface	CAN High-Speed according to ISO 11898, Basic- and Full-CAN, CAN Specification 2.0 B
Protocol	CANopen Profile DS406 V3.2 with manufacturer-specific add-ons
Baud rate	10 ... 1000 kbit/s (Software configurable)
Node address	1 ... 127 (Software configurable)
Switchable termination	Software configurable

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02 .

In addition, device-specific profiles like the encoder profile DS406 V3.2 are available.

The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN-Bus. When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

As output values **position, speed, acceleration** as well as the **working area status** may be combined freely as PDO (PDO mapping)

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated:

Class C2 functionality

- NMT Slave
- Heartbeat Protocol
- High Resolution Sync Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus Programmable termination

CANopen Encoder Profile DS406 V3.2

The following parameters can be programmed:

- Event mode
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. measuring wheel circumference)
Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping of position, speed, acceleration, working area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's
- Optional - 32 CAMs programmable
- Customer-specific memory - 16 Bytes

Terminal assignment

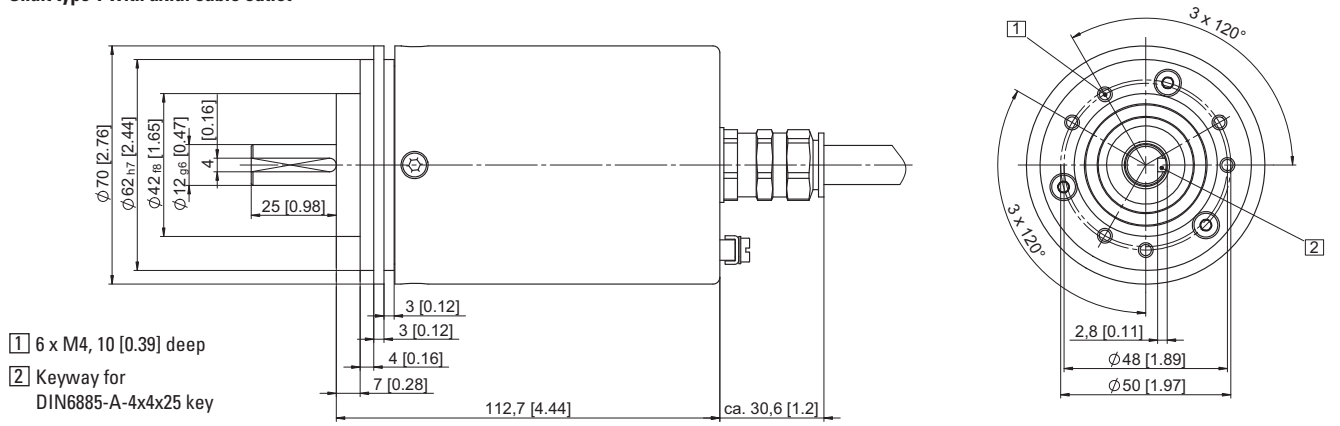
Signal	0 V	+V	CAN High	CAN Low	CAN GND	CAN High	CAN Low	CAN GND
Cable marking	1	2	4	5	6	7	8	9

Absolute Encoders – Multiturn

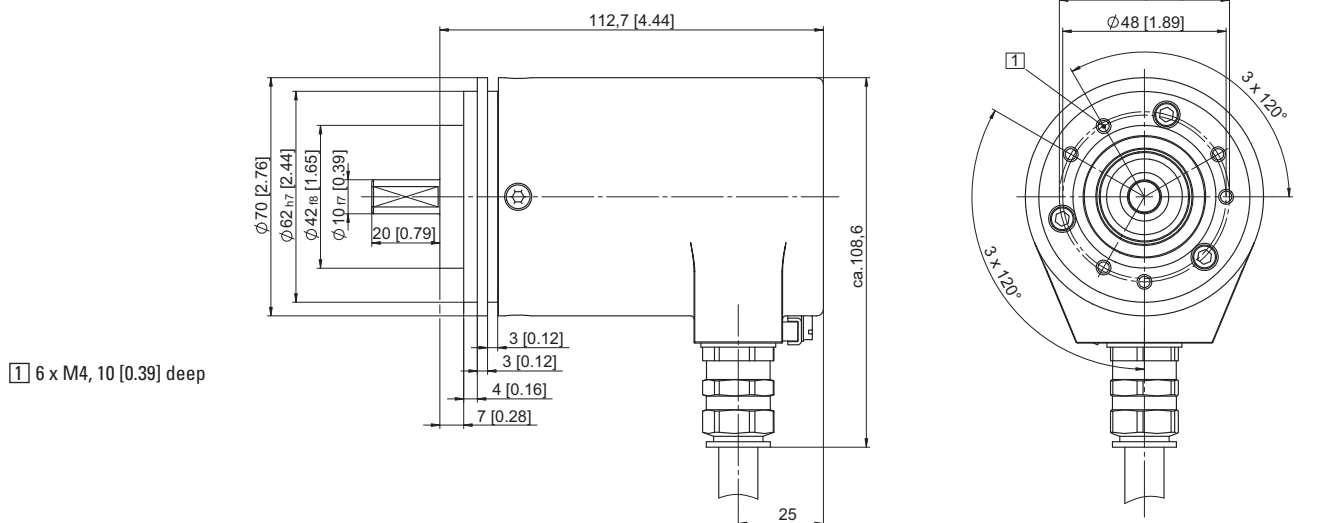
ATEX, optical	Sendix 7068 (Shaft)	CANopen
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Dimensions

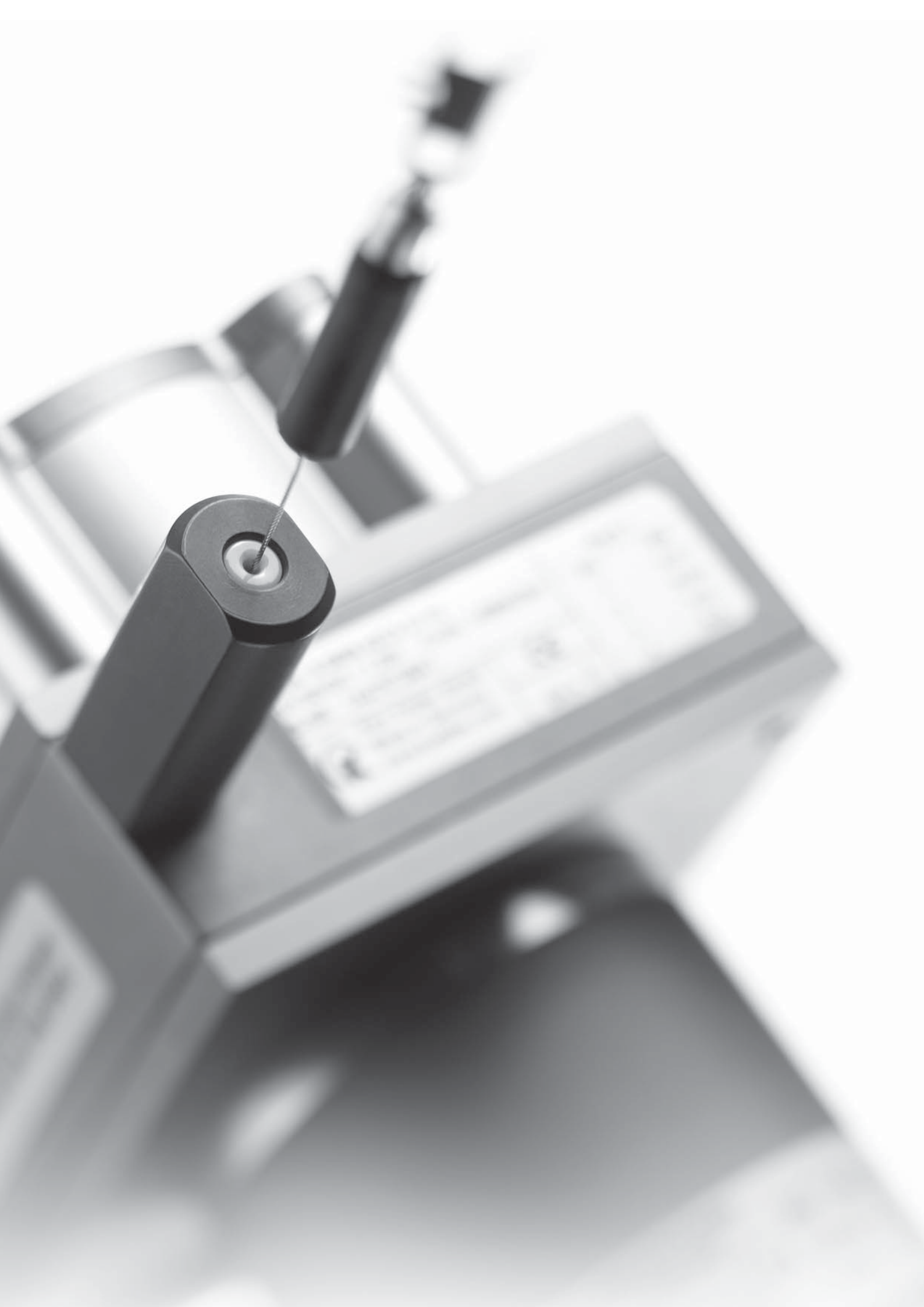
Shaft type 1 with axial cable outlet



Shaft type 2 with radial cable outlet



Absolute Encoders
 Multiturn



Linear Measuring Technology

	Type	Description	Page
Magnetic measurement systems	Limes LI20 / B1	Resolution min. 10 µm	250
	Limes LI50 / B2	Resolution min. 5 µm	253
Draw wire mechanics with encoder or analogue sensor	Draw wire encoder A50	Measuring length max. 1.25 m	256
	Draw wire encoder B80	Measuring length max. 3 m	259
	Draw wire encoder C120	Measuring length max. 6 m	262
	Draw wire encoder D135	Measuring length max. 40 m	265
	Miniature, analogue	Measuring length max. 2 m	270
	Miniature, incremental	Measuring length max. 2 m	272
Draw wire mechanics with encoder	Draw wire encoder, Standard	Measuring length max. 6 m	274
Elevator Measuring System for Shaft-copying	Encoder mounting fixture, guided-belt, LM2	Max. height 120 m	276
	Encoder mounting fixture, guided-belt, LM3	Max. height 28 m	278
	Encoder mounting fixture, circumferential, LM5	Max. height 120 m	280
Mini Measurement System	Measuring wheel system, incl. encoder	Incremental	282
Length measuring kits	Displacement measuring device	Incl. rack	283
	Length measuring kits	Incl. measuring wheel	284
Accessories	Measuring wheels		285
	Spring encoder arm		286

Linear Measuring Technology

Magnetic measurement system

Limes LI20 / B1

Resolution min. 10 µm



The incremental magnetic linear measurement system LI20 / B1 - made up of the sensor head LI20 and of the magnetic band B1 - reaches a resolution up to 10 µm with a maximum distance of 1 mm between the sensor and the band.



Temperature



High IP value



Shock / vibration resistant



Reverse polarity protection

Robust

- Sturdy housing with IP67 protection
- Non-contact measuring technology – thus no wear
- Masking tape protecting the magnetic band

Easy installation

- Simple glued assembly of the magnetic band
- Large mounting tolerances
- Warning signals via LED if the magnetic field is too weak

Order code

Magnetic sensor Limes LI20

8.LI20 . 1 1 X 1 . 2 XXX
Type a b c d e f

a Model
1 = Standard

c Output circuit / Power supply
1 = RS422 / 4.8 ... 26 V DC
2 = Push-Pull / 4.8 ... 30 V DC

e Reference signal
2 = index periodic

Standard stock types:

8.LI20.1111.2005

8.LI20.1111.2020

8.LI20.1111.2050

8.LI20.1121.2005

8.LI20.1121.2020

8.LI20.1121.2050

b Pulse edge interval
1 = Standard

d Type of connection
1 = cable PUR, 2 m length

f Code (resolution)¹⁾
005 = 100 µm
020 = 25 µm
050 = 10 µm

Order code

Magnetic band Limes B1

8.B1 . 10 . 010 . XXXX
Type a b

a Width
10 = 10 mm

b Length
0010 = 1 m 0060 = 6 m
0020 = 2 m 0100 = 10 m
0040 = 4 m 0200 = 20 m
0050 = 5 m Other lengths up to 50 m on request

Standard stock types:

8.B1.10.010.0010

8.B1.10.010.0020

8.B1.10.010.0050

8.B1.10.010.0100

¹⁾ With quadruple evaluation (only connected with magnetic band Limes B1)

Magnetic measurement system **Limes LI20 / B1** **Resolution min. 10 µm**

Display Type 572 for LIMES LI20



Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, A, B, B for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel (at TTL-input)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory, reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/- 10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Position display, 6-digit with 4 fast switch outputs and serial interface:

6.572.0116.D05

with 4 fast switch outputs and serial interface and scalable analogue output

6.572.0116.D95

Position display, 8-digit with 4 fast switch outputs and serial interface:

6.572.0118.D05

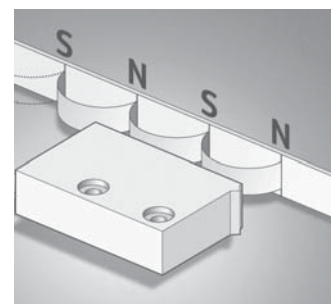
with 4 fast switch outputs and serial interface and scalable analogue output

6.572.0118.D95

Technical data – Magnetic sensor Limes LI20		
Output circuit	Push-Pull	RS422
Supply voltage	4.8 ... 30 V DC	4.8 ... 26 V DC
Permissible load / channel	±20 mA	120 Ohm
Max cable length	max. 30 m	RS422 Standard
Power consumption (no load)	typ. 25 mA, max. 60 mA	
Short circuit proof ¹⁾	yes	yes ²⁾
Min. pulse edge interval	1 µs (edge interval) corresponds to 4 ms/cycle (see signal figures below)	
Output signal	A, \bar{A} , B, \bar{B} , I, \bar{I}	
Reference signal	index periodical	
Accuracy		
System Accuracy:	typ. +200 µm, max. ± (0.04 + 0.04 x L) mm, (L in [m], up to L = 50 m, at T = 20°C)	
Repeat accuracy	±1 increment	
Resolution and speed ³⁾	100 µm (quadruple), max. 25 m/s 25 µm (quadruple), max. 4 m/s 10 µm (quadruple), max. 6.5 m/s	
Permissible alignment tolerance (see draft „Mounting tolerances“)		
Gap sensor / magnetic band	0.1 ... 1.0 mm (recommended 0.4 mm)	
Offset	max. ±1 mm	
Tilting	max. 3°	
Torsion	max. 3°	
General data		
Working temperature	-20°C ... +80°C	
Shock resistance	500 g/1 ms	
Vibration strength	30 g/10 ... 2000 Hz	
Protection	IP67 acc. to DIN 60 529 (housing)	
Humidity	100 %, condensation possible	
Housing	Zinc die-cast	
Cable	2 m long, PUR 8 x 0.14 mm ² , shielded, may be used in trailing cable installations	
Status LED	Green	pulse-index
	Red	Error; Speed too high or magnetic fields too weak (8.LI20.XXXX.X020 and 8.LI20.XXXX.X050)
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	
RoHS compliant acc. to	EG guideline 2002/95/EG	

Technical data – Magnetic band Limes B1	
Pole gap	2 mm from pole to pole
Dimensions	width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient	(11 ±1) x 10 ⁻⁶ /K
Working temperature	-20°C ... +80°C
Storage temperature	-40°C ... +80°C
Mounting	adhesive joint
Measuring	0.1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius	≥ 50 mm

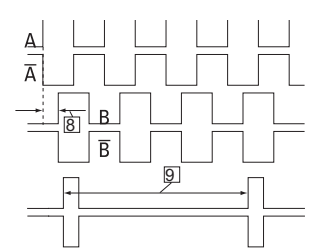
Function principle



Signal figures

For a rotation of the magnetic ring in the CW direction (see the Mounting Tolerances drawing)

- ⑨ Periodic index signal (every 2 mm); the logical assignment A, B and I-Signal can change
- ⑧ Pulse edge interval: Pay attention to the instructions in the technical data



1) If supply voltage correctly applied
 2) Only one channel allowed to be shorted-out
 If $U_B = 5$ V, short-circuit to channel, 0 V, or + U_B is permitted
 If $U_B = 5 \dots 30$ V, short-circuit to channel or 0 V is permitted
 3) At the listed rotational speed the min. pulse edge interval is 1 µs, this corresponds to 250 kHz.
 For the max. rotational speed range a counter with a count input frequency of not less than 250 kHz should be provided.

Linear Measuring Technology

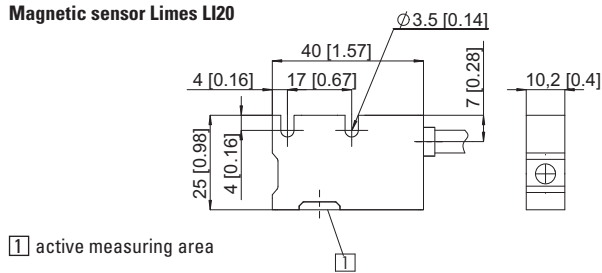
Magnetic measurement system	Limes LI20 / B1	Resolution min. 10 µm
------------------------------------	------------------------	------------------------------

Terminal assignment

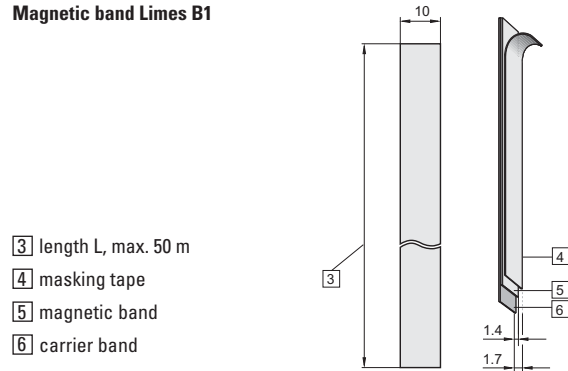
Signal	0 V	U _B	A	\bar{A}	B	\bar{B}	I	\bar{T}	shield
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	shield is on the housing

Dimensions

Magnetic sensor Limes LI20

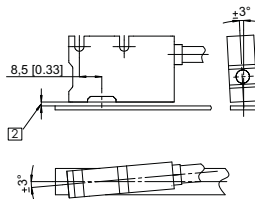


Magnetic band Limes B1

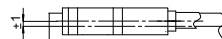


Permissible Mounting tolerances

Tilting



Torsion



Offset

2 Abstand Sensor / Magneband: 0.1 ... 1.0mm (empfohlen 0.4mm)

2 Distance Sensor / Magnetic band:
0.1 ... 1.0 mm (0.4 mm recommended)

Linear Measuring Technology

Magnetic measurement system	Limes LI50 / B2	Resolution min. 5 µm
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The incremental magnetic linear measurement system LI50 / B2 - made up of the sensor head LI50 and of the magnetic band B2 - reaches a resolution up to 5 µm with a maximum distance of 2 mm between the sensor and the band.

Temperature -20° + 80°	High IP value IP	Shock / vibration resistant	Reverse polarity protection

Robust

- Sturdy housing with IP67 protection
- Non-contact measuring technology – thus no wear
- Masking tape protecting the magnetic band

Easy installation

- Simple glued assembly of the magnetic tape
- Large mounting tolerances
- Warning signals via Status LED if the magnetic field is too weak

Order code	8.LI50 . 1 1 X 1 . 2 XXX
Magnetic sensor Limes LI50	Type a b c d e f

a Model 1 = Standard	c Output circuit / Power supply 1 = RS422 / 4.8 ... 26 V DC 2 = Push-Pull / 4.8 ... 30 V DC	e Reference signal 2 = index periodic	<i>Standard stock types</i> 8.LI50.1111.2050 8.LI50.1111.2250
b Pulse edge interval 1 = Standard	d Type of connection 1 = cable PUR, 2 m length	f Code (resolution) ¹⁾ 050 = 25 µm 250 = 5 µm	8.LI50.1121.2050 8.LI50.1121.2250

Order code	8.B2 . 10 . 010 . XXXX
Magnetic band Limes B2	Type a b

a Width 10 = 10 mm	b Length 0010 = 1 m 0060 = 6 m 0020 = 2 m 0100 = 10 m 0040 = 4 m 0200 = 20 m 0050 = 5 m Other lengths up to 50 m on request	<i>Standard stock types</i> 8.B2.10.010.0010 8.B2.10.010.0020 8.B2.10.010.0050 8.B2.10.010.0100
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¹⁾ With quadruple evaluation (only connected with magnetic band Limes B2)

Linear Measuring Technology

Magnetic measurement system

Limes LI50 / B2

Resolution min. 5 µm

Display Type 572 for LIMES LI50



Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, A, B, B for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel (at TTL-input)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory, reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Position display, 6-digit with 4 fast switch outputs and serial interface:

6.572.0116.D05

with 4 fast switch outputs and serial interface and scalable analogue output

6.572.0116.D95

Position display, 8-digit with 4 fast switch outputs and serial interface:

6.572.0118.D05

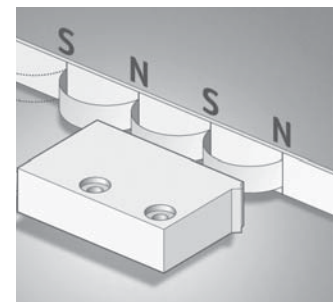
with 4 fast switch outputs and serial interface and scalable analogue output

6.572.0118.D95

Technical data – Magnetic sensor Limes LI50		
Output circuit	Push-Pull	RS422
Supply voltage	4.8 ... 30 V DC	4.8 ... 26 V DC
Permissible load / channel	±20 mA	120 Ohm
Max cable length	max. 30 m	RS422 Standard
Power consumption (no load)	typ. 25 mA, max. 60 mA	
Short circuit proof ¹⁾	yes	yes ²⁾
Min. pulse edge interval	1 µs (edge interval) corresponds to 4 ms/cycle (see signal figures below)	
Output signal	A, \bar{A} , B, \bar{B} , I, \bar{I}	
Reference signal	index periodical	
Accuracy		
System Accuracy	typ. +200 µm, max. ± (0.04 + 0.04 x L) mm, (L in [m], up to L = 50 m, at T = 20°C)	
Repeat accuracy	±1 increment	
Resolution and speed ³⁾	25 µm (quadruple), max. 16.25 m/s 5 µm (quadruple), max. 3.25 m/s	
Permissible alignment tolerance (see draft „Mounting tolerances“)		
Gap sensor / magnetic band	0.1 ... 2.0 mm (1.0 mm recommended)	
Offset	max. ±1 mm	
Tilting	max. 3°	
Torsion	max. 3°	
General data		
Working temperature	-20°C ... +80°C	
Shock resistance	500 g/1 ms	
Vibration strength	30 g/10 ... 2000 Hz	
Protection	IP67 acc. to DIN 60 529 (housing)	
Humidity	100 %, condensation possible	
Housing	zinc die-cast	
Cable	2 m long, PUR 8 x 0.14 mm ² , shielded, may be used in trailing cable installations	
Status-LED:	Green	pulse-index
	Red	Error; Speed too high or magnetic fields too weak (8.LI50.XXXX.X050 and 8.LI50.XXXX.X250)
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	
RoHS compliant acc. to	EG guideline 2002/95/EG	

Technical data – Magnetic band Limes B2	
Pole gap	5 mm from pole to pole
Dimensions	width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient	(11 ±1) x 10 ⁻⁶ /K
Working temperature	-20°C ... +80°C
Storage temperature	-40°C ... +80°C
Mounting	adhesive joint
Measuring	0.1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius	≥ 50 mm

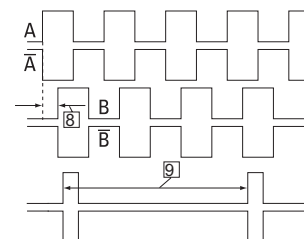
Function principle



Signal figures

For a rotation of the magnetic ring in the cw direction (see the Mounting Tolerances drawing)

- ⑨ Periodic index signal (every 2 mm); the logical assignment A, B and I-Signal can change
- ⑧ Pulse edge interval: Pay attention to the instructions in the technical data



1) If supply voltage correctly applied
 2) Only one channel allowed to be shorted-out
 If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted
 If U_B = 5 ... 30 V, short-circuit to channel or 0 V is permitted
 3) At the listed rotational speed the min. pulse edge interval is 1 µs, this corresponds to 250 kHz.
 For the max. rotational speed range a counter with a count input frequency of not less than 250 kHz should be provided.

Linear Measuring Technology

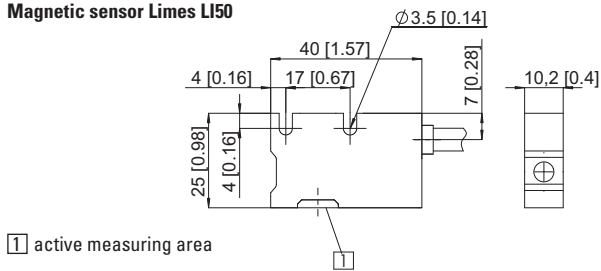
Magnetic measurement system	Limes LI50 / B2	Resolution min. 5 µm
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Terminal assignment

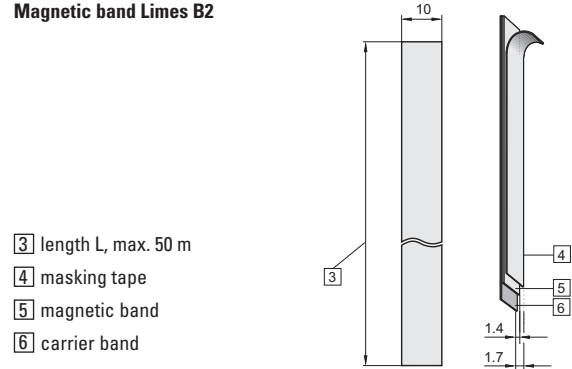
Signal	0 V GND	U _B	A	Ā	B	B̄	I	T	shield
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	shield is on the housing

Dimensions

Magnetic sensor Limes LI50

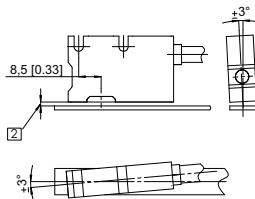


Magnetic band Limes B2

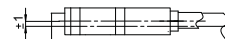


Permissible Mounting tolerances

Tilting



Torsion



Offset

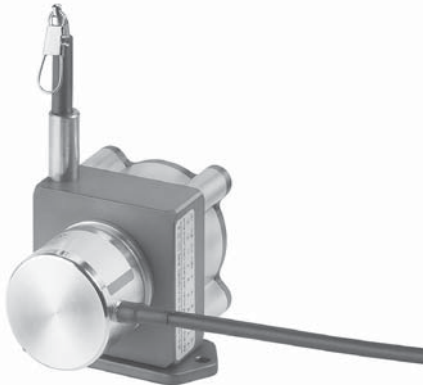
[2] Abstand Sensor / Magneband: 0.1 ... 1.0mm (empfohlen 0.4mm)

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor

Draw wire encoder A50

Measuring length max. 1.25 m



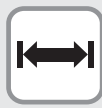
The draw-wire mechanics A50 boast both a compact design and high dynamics.

The draw-wire mechanics may be equipped with encoders with an analogue, incremental or absolute output.

The maximum measuring length is 1.25 m.



Max. acceleration



Long service life



Wide temperature range



High IP value



Reverse polarity protection

Robust

- The titanium-anodised aluminium housing and the stainless steel wires allow for using the mechanics even in harsh conditions
- Wear-free wire exit thanks to diamond- polished ceramic guide

Versatile

- High traverse speed, up to 10 m/s
- High acceleration, up to 300 m/s²
- Quick fastening by means of 2 screws
- Various connection possibilities available

Order code with encoder

D8.6A1 . XXXX . XX XX . XXXX
Type a b c d e

a Measuring range

0025 = 250 mm
 0050 = 500 mm
 0125 = 1250 mm
 other measuring ranges on request

b Encoder used

36 = Sendix incremental 3610
 F3 = Sendix absolute F3663, SSI
 F8 = Sendix absolute F3668, CANopen

c Output circuit

depends on the encoder used

e Resolution / Protocol / Options

depends on the encoder used

d Type of connection

depends on the encoder used

Standard resolutions for draw wire with incremental encoder Sendix 3610, drum circumference 125 mm

	125	1250	2500
Pulses / revolution			
Pulses / mm	1	10	20
Resolution (mm)	1	0.1	0.05

Standard resolutions for draw wire with absolute encoder Sendix F3663 or F3668 CANopen, drum circumference 125 mm

Absolute encoder	F3663	F3668 CANopen
Pulses / revolution	4096 / 12 bit	4096, programmable via the bus / 12 bit
Pulses / mm	32.8	32.8
Resolution (mm)	~ 0.03	~ 0.03

Recommended standard device:

D8.6A1.XXXX.3642.1250

Draw wire with mounted encoder type 3610 incremental (8.3610.2342.1250)

- Push-pull with inverted signals
- Supply voltage 8...30 V DC
- Cable radial 2m
- 1250 PPR

D8.6A1.XXXX.F321.G222

Draw wire with mounted encoder Sendix F3663 (8.F3663.4121.G222)

- SSI Interface
- Supply voltage 10...30 V DC
- SSI Gray Code
- Cable tangential 1m
- Resolution 4096 PPR

D8.6A1.XXXX.F821.2112

Draw wire with mounted encoder Sendix F3668 (8.F3668.4121.2112)

- CANopen Interface
- Supply voltage 10...30 V DC
- Cable tangential 1m
- CANopen Encoder profile V3.2

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor Draw wire encoder A50 Measuring length max. 1.25 m

Order code with analogue sensor D8.3A1 . XXXX . XXX X . 0000

Type a b c

- a** *Measuring range*
0025 = 250 mm
0050 = 500 mm
0125 = 1250 mm
other measuring ranges on request
- b** *Analogue sensor output / Power supply*
A11 = 4 ... 20 mA / 12 ... 30 V DC
A22 = 0 ... 10 V / 12 ... 30 V DC
A33 = Potentiometer 1 kOhm / max. 30 V DC
- c** *Type of connection*
1 = cable axial (2 m PVC cable)
3 = M12 connector, 4-pin, axial

Guide pulley for draw-wire encoder

Order code for the set:

- Guide pulley (anodised aluminium)
- 2 x countersunk screws for lateral fixing
- 2 x hexagonal screws for fixing on a flat surface

8.0000.7000.0045

Mechanical characteristics (draw wire mechanics):			
Measuring range	250 mm	500 mm	1250 mm
Extension force	F _{min}	6.8 N	3.4 N
	F _{max}	7.9 N	4.0 N
Max. speed	8 m/s	8 m/s	10 m/s
Max. acceleration	200 m/s ²	200 m/s ²	300 m/s ²
Linearity (of the measuring range)	analogue output	0.15 %	0.15 %
	encoder	0.05 %	0.05 %
		0.1 %	0.05 %
Weight	approx. 330 g (depending on the sensor / encoder used)		
Materials	housing	titanium-anodised aluminium	
	wire	stainless steel ø 0.5 mm	
Protection (sensor)	IP65 (IP67 on request for encoders)		

Operating principle

Construction
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note
Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

Electrical characteristics (digital output)

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders

Electrical characteristics (analogue output)			
Analogue output	0 ... 10 V	4 ... 20 mA	Potentiometer
Output	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current	–	–	< 1 µA
Max. current consumption	22.5 mA (no load)	50 mA	–
Reverse polarity protection	yes	yes	–
Operating temperature	-20°C ... +60°C	-20°C ... +60°C	-20°C ... +85°C
Connection diagrams			
CE compliant acc. to	EN 61000-6-2, EN 61000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

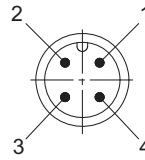
Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor **Draw wire encoder A50** Measuring length max. 1.25 m

Terminal assignment (analogue output)

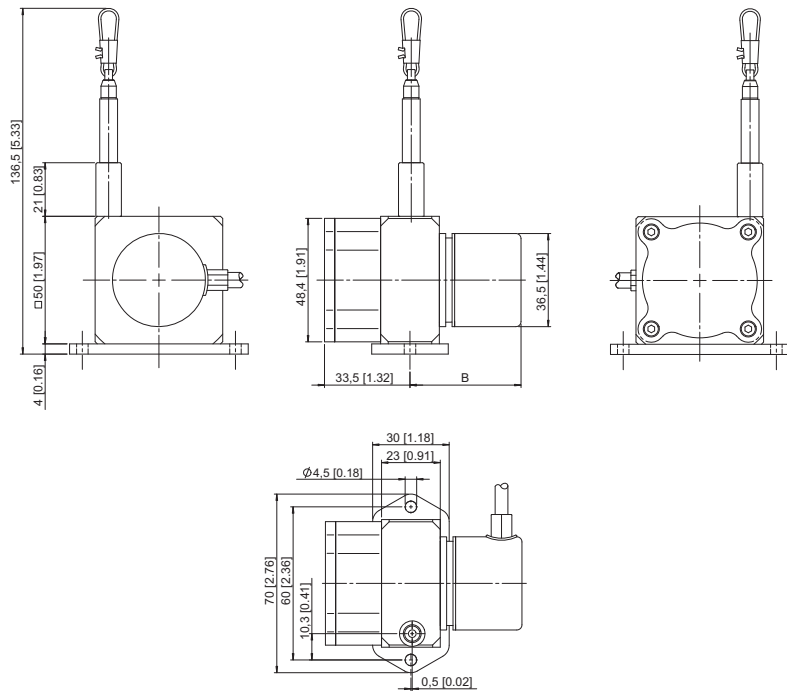
Pin	1	2	3	4
Cable colour	brown	white	blue	black
0 ... 10 V	V+	Signal	GND	GND Sig.
4 ... 20 mA	V+	n. c.	Signal	n. c.
1 kOhm	V+	Slider	GND	n. c.

Connector (analogue output)



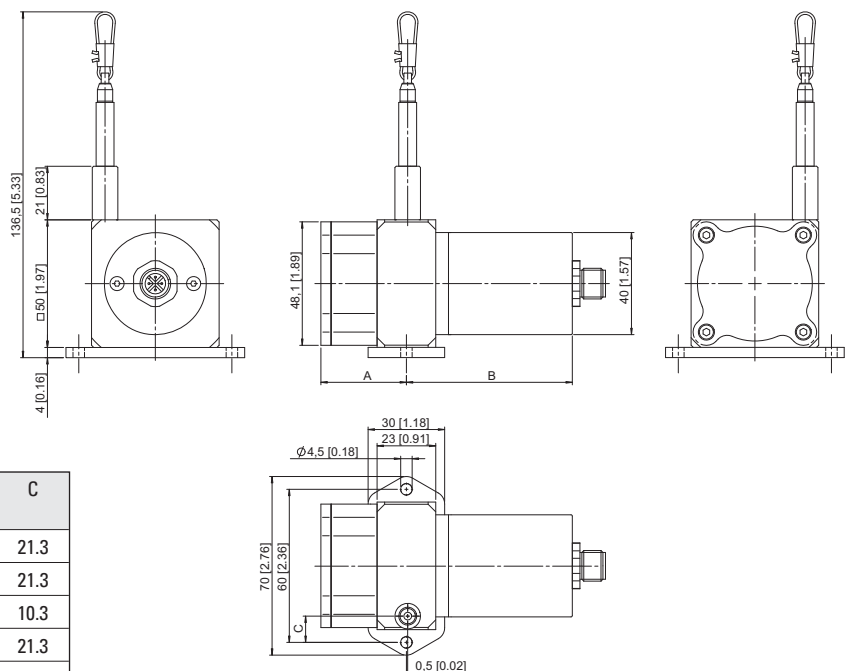
Dimensions

Draw wire mechanics with encoder



Encoder type	Measuring length [mm]	B [mm]
Incremental	250 ... 1250	43
Absolute	250 ... 1250	53.7

Draw wire mechanics with analogue sensor



Sensor type	Measuring length [mm]	A	B	C
Potentiometer	250	26.5	65	21.3
	500	26.5	65	21.3
	1250	33.5	65	10.3
4 ... 20 mA 0 ... 10 V	250	26.5	78.5	21.3
	500	26.5	78.5	21.3
	1250	33.5	78.5	10.3

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor **Draw wire encoder B80** Measuring length max. 3 m

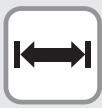


The draw-wire mechanics B80 can be used up to a measuring length of 3 metres.

These draw-wire mechanics may be combined with the proven Kübler Sendix encoders with incremental or absolute interface, as well as with analogue sensors.



Max. acceleration



Long service life



Wide temperature range



High IP value



Reverse polarity protection

Robust

- The titanium-anodised aluminium housing and the stainless steel wires allow for using the mechanics even in harsh conditions
- Wear-free wire exit thanks to diamond-polished ceramic guide

Versatile

- High traverse speed, up to 10 m/s
- High acceleration, up to 140 m/s²
- Quick fastening by means of 2 screws
- Various connection possibilities available

Order code with encoder

D8.4B1 . XXXX . XX XX . XXXX
Type a b c d e

a Measuring range

0100 = 1000 mm
 0200 = 2000 mm
 0300 = 3000 mm
 other measuring ranges on request

b Encoder used

00 = Sendix incremental 5000
 63 = Sendix absolute 5863
 68 = Sendix absolute 5868

c Output circuit

depends on the encoder used

e Resolution / Protocol / Options

depends on the encoder used

d Type of connection

depends on the encoder used

Standard resolutions for draw wire with incremental encoder Sendix 5000, drum circumference 200 mm

	200	2000	4000
Pulses / revolution			
Pulses / mm	1	10	20
Resolution (mm)	1	0.1	0.05

Standard resolutions for draw wire with absolute encoder Sendix 5863 or 5868, drum circumference 200 mm

Absolute encoder	5863	5868
Pulses / revolution	2048 / 11 bit	4096, programmable via the bus / 12 bit
Pulses / mm	10.24	20.48
Resolution (mm)	-0.1	~ 0.05

Recommended standard device:

D8.4B1.XXXX.0054.2000

Draw wire with mounted encoder Sendix 5000 incremental (8.5000.8354.2000)

- Push-pull with inverted signals
- Supply voltage 10...30 V DC
- M23 connector, 8-pin, radial
- 2000 pulses per revolution

D8.4B1.XXXX.6324.G123

Draw wire with mounted encoder Sendix 5863 (8.5863.1224.G123)

- SSI Interface
- Supply voltage 10...30 V DC
- SSI Gray Code
- M23 connector, 12-pin, radial
- Resolution 2048 PPR
- SET button and status LED

D8.4B1.XXXX.6822.2113

Draw wire with mounted encoder Sendix 5868 (8.5868.1222.2113)

- CANopen Interface
- Supply voltage 10...30 V DC
- M12 connector
- CANopen Encoder profile V3.2
- SET button

D8.4B1.XXXX.6832.3113

Draw wire with mounted encoder Sendix 5868 (8.5868.1232.3113)

- Profibus Interface
- Supply voltage 10...30 V DC
- M12 connector
- Profibus Encoder profile Class2
- SET button

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor

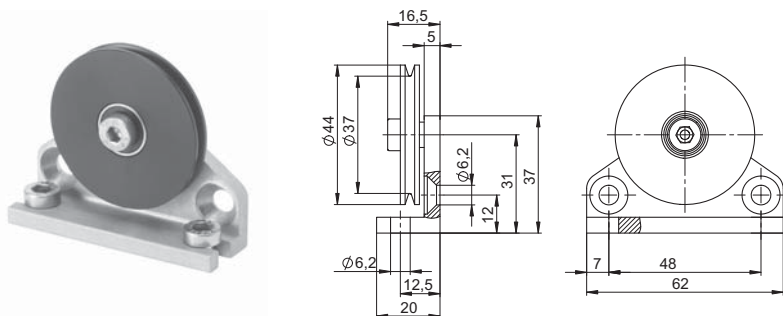
Draw wire encoder B80

Measuring length max. 3 m

Order code with analogue sensor **D8.3B1 . XXXX . XXX X . 0000**

- a** *Measuring range*
0100 = 1000 mm
0200 = 2000 mm
0300 = 3000 mm
other measuring ranges on request
- b** *Analogue sensor output / Supply voltage*
A11 = 4 ... 20 mA / 12 ... 30 V DC
A22 = 0 ... 10 V / 12 ... 30 V DC
A33 = Potentiometer 1 kOhm / max. 30 V DC
- c** *Type of connection*
1 = cable axial (2 m PVC cable)
3 = M12 connector, 4-pin

Guide pulley for draw-wire encoder



- Order code for the set:
- Guide pulley (anodised aluminium)
 - 2x countersunk screws for lateral fixing
 - 2x hexagonal screws for fixing on a flat surface

8.0000.7000.0045

Mechanical characteristics (draw wire mechanics):

Measuring range	1000 mm	2000 mm	3000 mm	
Extension force	F _{min}	6.9 N	6.4 N	6.9 N
	F _{max}	8.3 N	7.8 N	9.8 N
Max. speed	10 m/s	10 m/s	10 m/s	
Max. acceleration	140 m/s ²	140 m/s ²	140 m/s ²	
Linearity (of the measuring range)	analogue output	0.15 %	0.1 %	0.1 %
	encoder	0.05 %	0.05 %	0.05 %
Weight	approx. 750 g (depending on the sensor/encoder used)			
Materials	housing	titanium-anodised aluminium		
	wire	stainless steel ø 0.5 mm		
Protection (sensor)	IP65 (IP67 on request for encoders)			

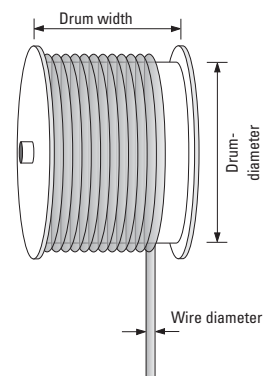
Operating principle

Construction

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



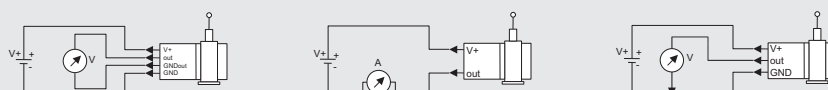
Electrical characteristics (digital output)

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders

Electrical characteristics (analogue output)

Analogue output	0 ... 10 V	4 ... 20 mA	Potentiometer
Output	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage:	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current	–	–	< 1 µA
Max. current consumption	22.5 mA (no load)	50 mA	–
Reverse polarity protection	yes	yes	–
Operating temperature	-20°C ... +60°C	-20°C ... +60°C	-20°C ... +85°C

Connection diagrams



CE compliant acc. to EN 61000-6-2, EN 61000-6-3

RoHS compliant acc. to EU guideline 2002/95/EG

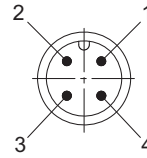
Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor | Draw wire encoder B80 | Measuring length max. 3 m

Terminal assignment (analogue output)

Pin	1	2	3	4
Cable colour	brown	white	blue	black
0 ... 10 V	V+	Signal	GND	GND Sig.
4 ... 20 mA	V+	n. c.	Signal	n. c.
1 kOhm	V+	Slider	GND	n. c.

Connector (analogue output)

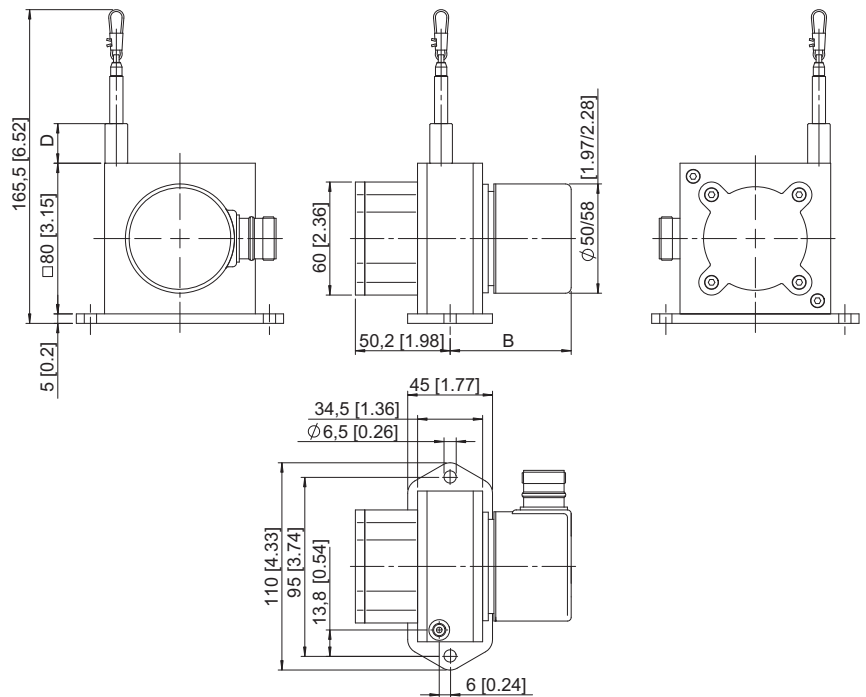


Dimensions

Draw wire mechanics with encoder

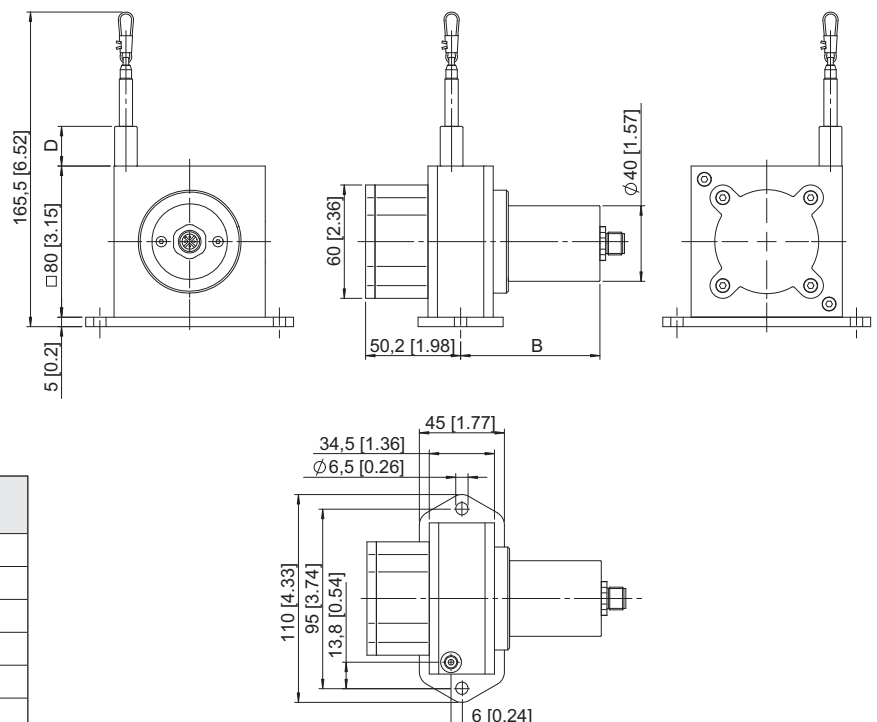
Measuring range [mm]	D [mm]
1000	21
2000	35
3000	35

Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4B1.XXXX.00XX.XXXX	54.25
Sendix absolute (5863) D8.4B1.XXXX.63XX.XXXX	66.75
Sendix absolute (5868) D8.4B1.XXXX.68XX.XXXX	93.25



Draw wire mechanics with analogue sensor

Sensor type	Measuring length [mm]	B	D
Potentiometer	1000	74	21
	2000	74	21
	3000	102.5	35
4 ... 20 mA 0 ... 10 V	1000	87.5	21
	2000	87.5	21
	3000	102.3	35



Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor

Draw wire encoder C120

Measuring length max. 6 m

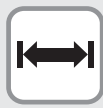


These draw-wire mechanics C120 can be used up to a measuring length of 6 metres.

This draw-wire mechanics may be combined with the proven Kübler Sendix encoders with incremental or absolute interface, as well as with analogue sensors.



Max. acceleration



Long service life



Wide temperature range



High IP value



Reverse polarity protection

Robust

- The titanium-anodised aluminium housing and the stainless steel wires allow for using the mechanics even in harsh conditions
- Wear-free wire exit thanks to diamond- polished ceramic guide

Versatile

- High traverse speed, up to 10 m/s
- High acceleration, up to 140 m/s²
- Quick fastening by means of 2 screws
- Various connection possibilities available

Order code with encoder

D8.4C1 . 0600 . XX XX . XXXX
Type a b c d e

a *Measuring range*
 0600 = 6000 mm
 other measuring ranges on request

b *Encoder used*
 00 = Sendix incremental 5000
 63 = Sendix absolute 5863
 68 = Sendix absolute 5868

c *Output circuit*
 depends on the encoder used

e *Resolution / Protocol / Options*
 depends on the encoder used

d *Type of connection*
 depends on the encoder used

Standard resolutions for draw wire with incremental encoder Sendix 5000, drum circumference 317.68 mm

	500	2000	
Pulses / revolution			
Pulses / mm	1.6	6.3	
Resolution (mm)	~ 0.63	~ 0.16	

Standard resolutions for draw wire with absolute encoder Sendix 5863 or 5868, drum circumference 317.68 mm

Absolute encoder	5863	5868
Pulses / revolution	2048 / 11 bit	4096, programmable via the bus / 12 bit
Pulses / mm	6.4	12.9
Resolution (mm)	~ 0.16	~ 0.08

Recommended standard device:

D8.4C1.XXXX.0054.2000

Draw wire with mounted encoder Sendix 5000 incremental (8.5000.8354.2000)

- Push-pull with inverted signals
- Supply voltage 10...30 V DC
- M12 connector, 8-pin, radial
- 2000 pulses per revolution.

D8.4C1.XXXX.6324.G123

Draw wire with mounted encoder Sendix 5863 (8.5863.1224.G123)

- SSI Interface
- Supply voltage 10...30 V DC
- SSI Gray Code
- M23 connector, 12-pin, radial
- Resolution 2048 PPR
- SET button and status LED

D8.4C1.XXXX.6822.2113

Draw wire with mounted encoder Sendix 5868 (8.5868.1222.2113)

- CANopen Interface
- Supply voltage 10...30 V DC
- M12 connector
- CANOpen Encoder profile V3.2
- SET button

D8.4C1.XXXX.6832.3113

Draw wire with mounted encoder Sendix 5868 (8.5868.1232.3113)

- Profibus Interface
- Supply voltage 10...30 V DC
- M12 connector
- Profibus Encoder profile Class2
- SET button

Linear Measuring Technology

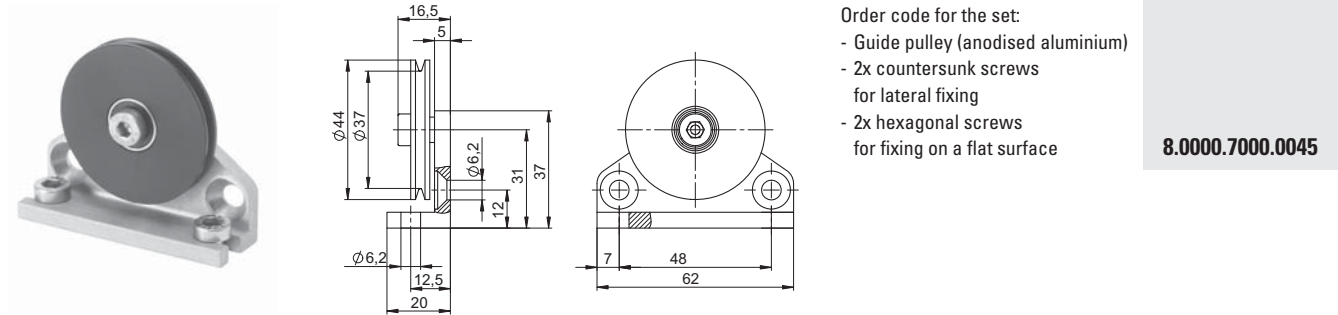
Draw wire mechanics with encoder or analogue sensor Draw wire encoder C120 Measuring length max. 6 m

Order code with analogue sensor D8.3C1 . 0600 . XXX X . 0000

Type a b c

- a** *Measuring range*
0600 = 6000 mm
other measuring ranges on request
- b** *Analogue sensor output / Supply voltage*
A11 = 4 ... 20 mA / 12 ... 30 V DC
A22 = 0 ... 10 V / 12 ... 30 V DC
A33 = Potentiometer 1 kOhm / max. 30 V DC
- c** *Type of connection*
1 = cable axial (2 m PVC cable)
3 = M12 connector, 4-pin

Guide pulley for draw-wire encoder



- Order code for the set:
- Guide pulley (anodised aluminium)
 - 2x countersunk screws for lateral fixing
 - 2x hexagonal screws for fixing on a flat surface

8.0000.7000.0045

Mechanical characteristics (draw wire mechanics):	
Measuring range	6000 mm
Extension force	F_{min} 8.8 N F_{max} 12.3 N
Max. speed.	10 m/s
Max. acceleration	140 m/s ²
Linearity	analogue output 0.1 % (of the measuring range) encoder 0.05 % (of the measuring range)
Weight	approx. 1600 g (depending on the sensor/encoder used)
Materials	housing titanium-anodised aluminium wire stainless steel \varnothing 0.5 mm
Protection (sensor)	IP65 (IP67 on request for encoders)

Operating principle

Construction
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note
Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

Electrical characteristics (digital output)

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders

Electrical characteristics (analogue output)			
Analogue output	0 ... 10 V	4 ... 20 mA	Potentiometer
Output	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current	–	–	< 1 μ A
Max. current consumption	22.5 mA(no load)	50 mA	–
Reverse polarity protection	yes	yes	–
Operating temperature	-20°C ... +60°C	-20°C ... +60°C	-20°C ... +85°C
Connection diagrams			
CE compliant acc. to	EN 61000-6-2, EN 61000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

Linear Measuring Technology

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor

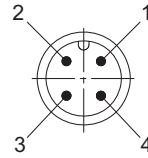
Draw wire encoder C120

Measuring length max. 6 m

Terminal assignment (analogue output)

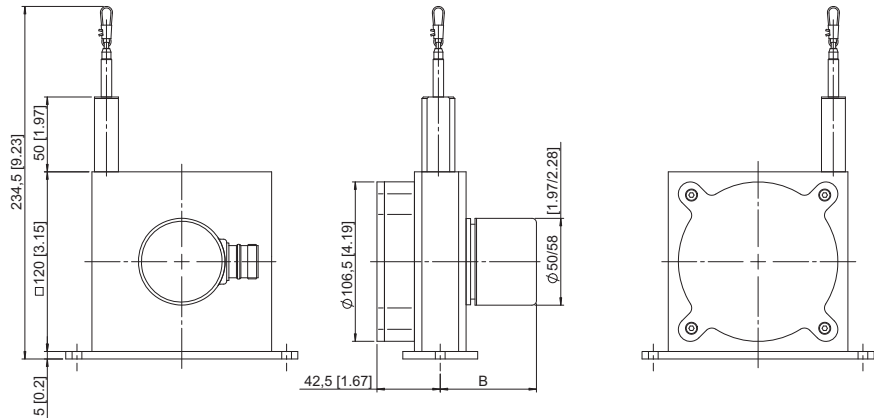
Pin	1	2	3	4
Cable colour	brown	white	blue	black
0 ... 10 V	V+	Signal	GND	GND Sig.
4 ... 20 mA	V+	n. c.	Signal	n. c.
1 kOhm	V+	Slider	GND	n. c.

Connector (analogue output)

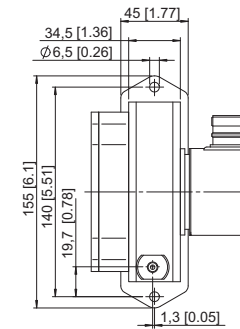


Dimensions

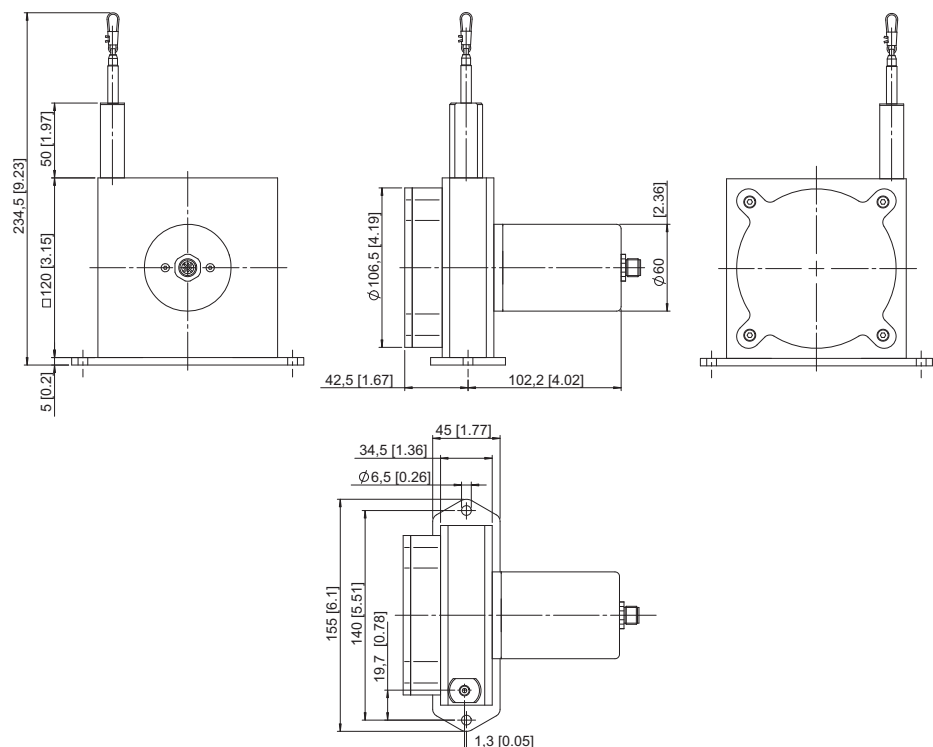
Draw wire mechanics with encoder



Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4C1.XXXX.00XX.XXXX	54.25
Sendix absolute (5863) D8.4C1.XXXX.63XX.XXXX	66.75
Sendix absolute (5868) D8.4C1.XXXX.68XX.XXXX	93.25



Draw wire mechanics with analogue sensor



Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor **Draw wire encoder D135** **Measuring length max. 40 m**



140 m/s²

-20° +90°



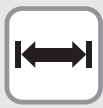
These draw-wire mechanics D135 can be used up to a measuring length of 40 metres.

This draw-wire mechanics may be combined with the proven Kübler Sendix encoders with incremental or absolute interface, as well as with analogue sensors.

With its compact construction, the D135 suits perfectly all measuring tasks from 8 up to 40 metres.



Max. acceleration



Long service life



Temperature



High IP value



Reverse polarity protection

Robust

- The titanium-anodised aluminium housing and the stainless steel wires allow for using the mechanics even in harsh conditions
- Wear-free wire exit thanks to diamond- polished ceramic guide

Versatile

- High traverse speed and high acceleration
- Flexible mounting thanks to fastening tabs or fastening grooves
- Various connection possibilities available

Order code with encoder

D8.4D1 . XXXX . XX XX . XXXX
Type a b c d e

a Measuring range

0800 = 8 000 mm	3000 = 30 000 mm
1000 = 10 000 mm	3500 = 35 000 mm
1200 = 12 000 mm	4250 = 42 500 mm
1500 = 15 000 mm	4000 = 40 000 mm
2000 = 20 000 mm	other measuring ranges
2500 = 25 000 mm	on request

b Encoder used

00 = Sendix incremental 5000
63 = Sendix absolute 5863
68 = Sendix absolute 5868

c Output circuit

depends on the encoder used

e Resolution / Protocol / Options

depends on the encoder used

d Type of connection

depends on the encoder used

Standard resolutions for draw wire with incremental encoder Sendix 5000, drum circumference 333.33 mm (357.14 mm for the 8 000 mm measuring range)

Pulses / revolution	500	2000
Pulses / mm	1.5 (1.4)	6 (5.6)
Resolution (mm)	~ 0.66 (0.71)	~ 0.17 (0.18)

Standard resolutions for draw wire with absolute encoder Sendix 5863 or 5868, drum circumference 333.33 mm (357.14 mm for the 8 000 mm measuring range)

Absolute encoder	5863	5868
Pulses / revolution	2048 / 11 bit	4096, programmable via the bus / 12 bit
Pulses / mm	6.14 (5.73)	12.28 (11.47)
Resolution (mm)	~ 0.16 (0.17)	~ 0.08 (0.09)

Recommended standard device:

D8.4D1.XXXX.0054.2000

Draw wire with mounted encoder Sendix 5000 incremental (8.5000.8354.2000)

- Push-pull with inverted signals
- Supply voltage 10...30 V DC
- M12 connector, 8-pin, radial
- 2000 pulses per revolution

D8.4D1.XXXX.6324.G123

Draw wire with mounted encoder Sendix 5863 (8.5863.1224.G123)

- SSI Interface
- Supply voltage 10...30 V DC
- SSI Gray Code
- M23 connector, 12-pin, radial
- Resolution 2048 PPR
- SET button and status LED

D8.4D1.XXXX.6822.2113

Draw wire with mounted encoder Sendix 5868 (8.5868.1222.2113)

- CANopen Interface
- Supply voltage 10...30 V DC
- M12 connector
- CANopen Encoder profile V3.2
- SET button

D8.4D1.XXXX.6832.3113

Draw wire with mounted encoder Sendix 5868 (8.5868.1232.3113)

- Profibus Interface
- Supply voltage 10...30 V DC
- M12 connector
- Profibus Encoder profile Class2
- SET button

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor

Draw wire encoder D135

Measuring length max. 40 m

Order code

D8.3D1 . XXXX . XXX X . 0000

with analogue sensor

Type **a** **b** **c**

a Measuring range

0800 = 8 000 mm 3000 = 30 000 mm
 1000 = 10 000 mm 3500 = 35 000 mm
 1500 = 15 000 mm 4000 = 40 000 mm
 2000 = 20 000 mm other measuring
 2500 = 25 000 mm ranges on request

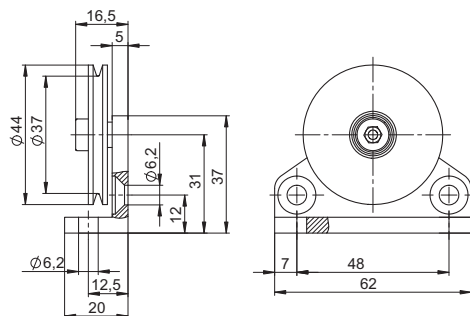
b Analogue sensor output / Supply voltage

A11 = 4 ... 20 mA / 12 ... 30 V DC
 A22 = 0 ... 10 V / 12 ... 30 V DC
 A33 = Potentiometer 1 kOhm / max. 30 V DC

c Type of connection

1 = cable axial (2 m PVC cable)
 3 = M12 connector, 4-pin

Guide pulley for draw-wire encoder



- Order code for the set:
- Guide pulley (anodised aluminium)
 - 2x countersunk screws for lateral fixing
 - 2x hexagonal screws for fixing on a flat surface

8.0000.7000.0045

Mechanical characteristics (draw wire mechanics)

Measuring range	8000 mm	10000/15000 mm	20000 mm	25000/30000 mm	35000/40000 mm	
Extension force	F_{min}	7.2 N	8.7 N	7.0 N	7.3 N	7.0 N
	F_{max}	16.0 N	16.9 N	12.4 N	15.7 N	14.1 N
Max. speed	10 m/s	6m/s	5m/s	5 m/s	5 m/s	
Max. acceleration	140 m/s ²	80 m/s ²	60 m/s ²	60 m/s ²	60 m/s ²	
Linearity	analogue output	0.1 % (of the measuring range)				
	encoder	0.05 % (of the measuring range)				
Weight	(depending on the measuring and the sensor/encoder used)					
Materials	housing	titanium-anodised aluminium				
	wire	stainless steel \varnothing 0.5 mm				
Protection (sensor)	IP65 (IP67 on request for encoders)					

Electrical characteristics (digital output)

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders

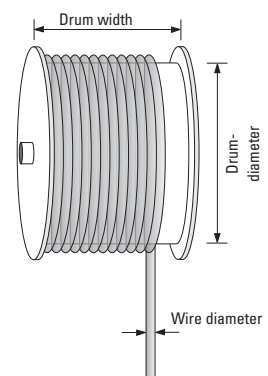
Operating principle

Construction

The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note

Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.



Linear Measuring Technology

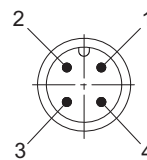
Draw wire mechanics with encoder or analogue sensor | Draw wire encoder D135 | Measuring length max. 40 m

Electrical characteristics (analogue output)			
Analogue output	0 ... 10 V	4 ... 20 mA	Potentiometer
Output	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current	–	–	< 1 µA
Max. current consumption	22.5 mA (no load)	50 mA	–
Reverse polarity protection	yes	yes	–
Operating temperature	-20°C ... +60°C	-20°C ... +60°C	-20°C ... +85°C
Connection diagrams			
CE compliant acc. to	EN 61000-6-2, EN 61000-6-3		
RoHS compliant acc. to	EU guideline 2002/95/EG		

Terminal assignment (analogue output)

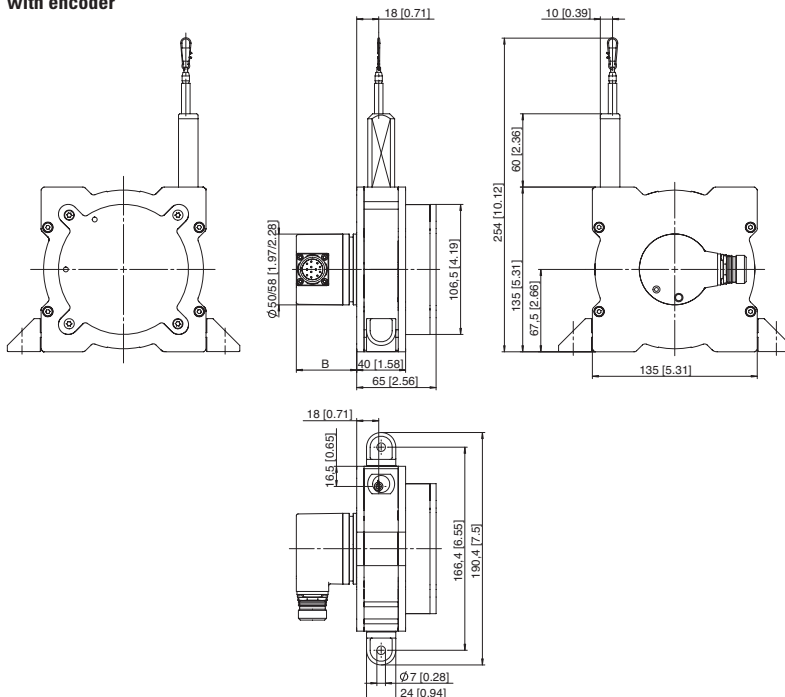
Pin	1	2	3	4
Cable colour	brown	white	blue	black
0 ... 10 V	V+	Signal	GND	GND Sig.
4 ... 20 mA	V+	n. c.	Signal	n. c.
1 kOhm	V+	Slider	GND	n. c.

Connector (analogue output)

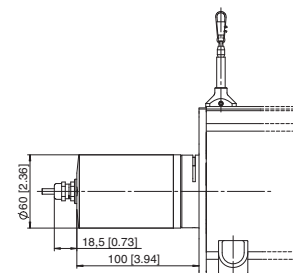


Dimensions

Draw wire mechanics, Measuring range 8000 mm
with encoder



with analogue output



Dimension B depends on the encoder used		
Encoder		B
Sendix incremental (5000)	D8.4D1.XXXX.00XX.XXXX	37.00
Sendix absolute (5863)	D8.4D1.XXXX.63XX.XXXX	49.50
Sendix absolute (5868)	D8.4D1.XXXX.68XX.XXXX	76.00

Linear Measuring Technology

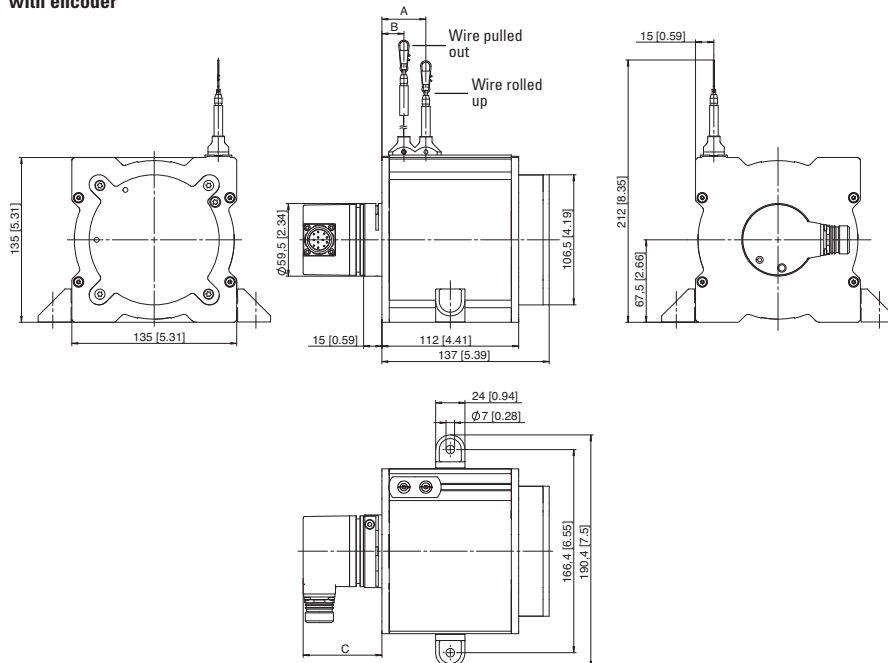
Draw wire mechanics with encoder or analogue sensor

Draw wire encoder D135

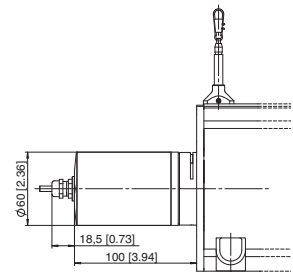
Measuring length max. 40 m

Dimensions

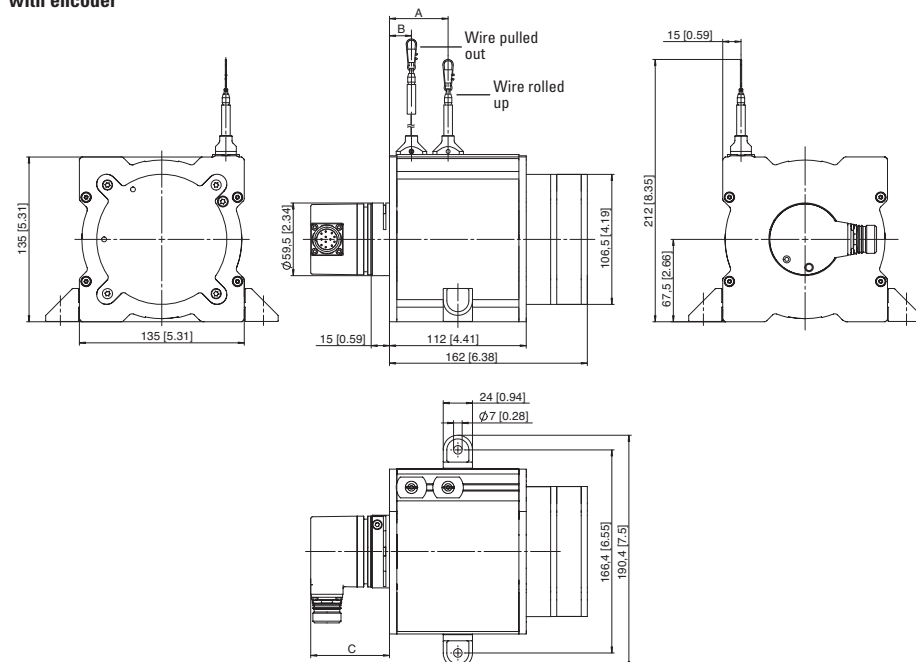
Draw wire mechanics, Measuring range 10000 - 12000 mm
with encoder



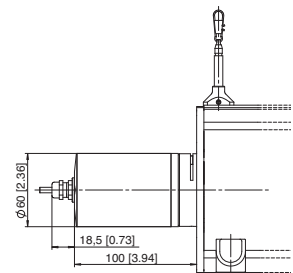
with analogue output



Draw wire mechanics, Measuring range 15000 - 20000 mm
with encoder



with analogue output



Dimension C depends on the encoder used	
Encoder	C
Sendix incremental (5000) D8.4D1.XXXX.00XX.XXXX	37.00
Sendix absolute (5863) D8.4D1.XXXX.63XX.XXXX	49.50
Sendix absolute (5868) D8.4D1.XXXX.68XX.XXXX	76.00

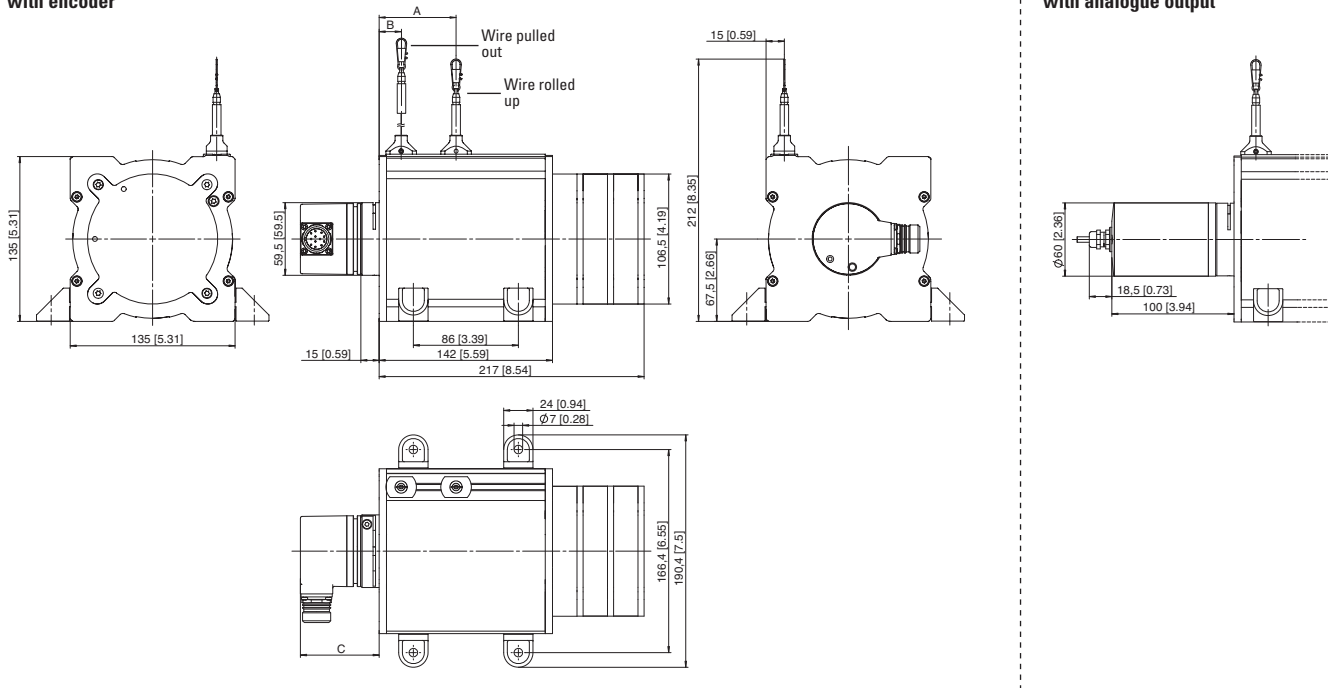
Measuring range	A - Wire rolled up	B - Wire pulled out
10 m	33 mm	18 mm
12 m	36 mm	18 mm
15 m	41 mm	18 mm
20 m	48 mm	18 mm

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor **Draw wire encoder D135** Measuring length max. 40 m

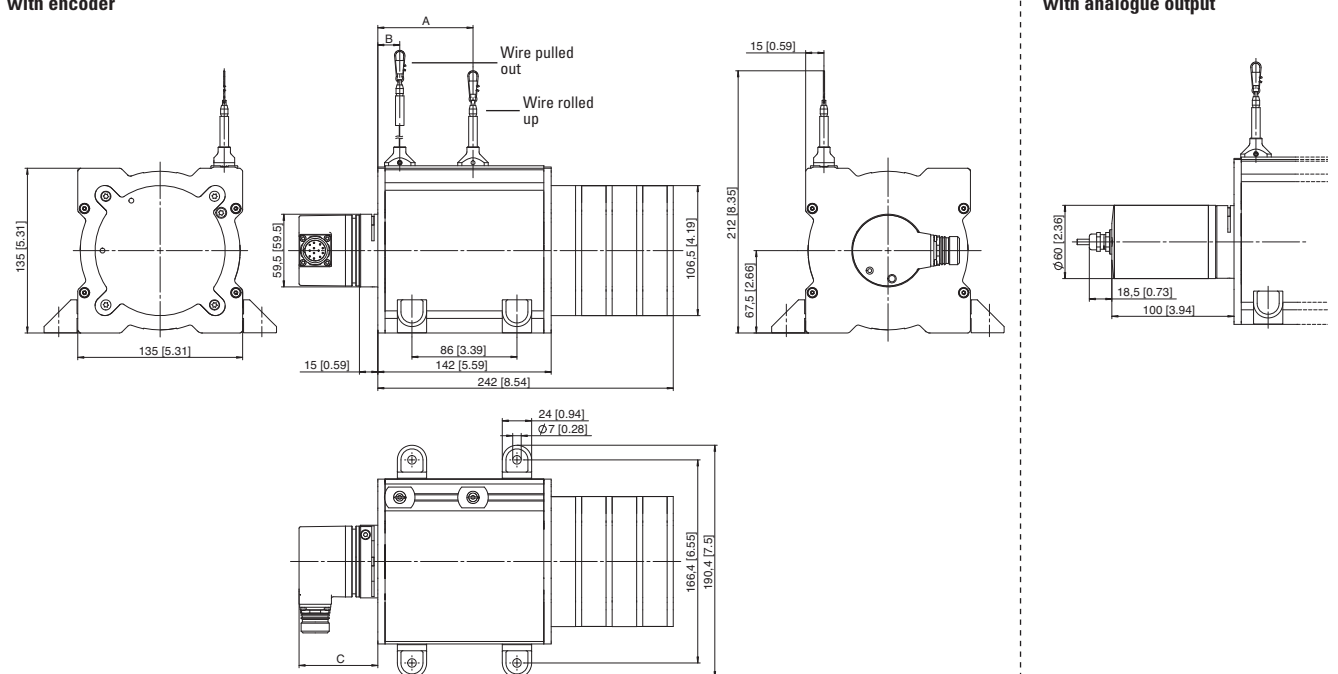
Dimensions

Draw wire mechanics, Measuring range 25000 - 30000 mm
with encoder



with analogue output

Draw wire mechanics, Measuring range 35000 - 42500 mm
with encoder



with analogue output

Dimension C depends on the encoder used	
Encoder	C
Sendix incremental (5000) D8.4D1.XXXX.00XX.XXXX	37.00
Sendix absolute (5863) D8.4D1.XXXX.63XX.XXXX	49.50
Sendix absolute (5868) D8.4D1.XXXX.68XX.XXXX	76.00

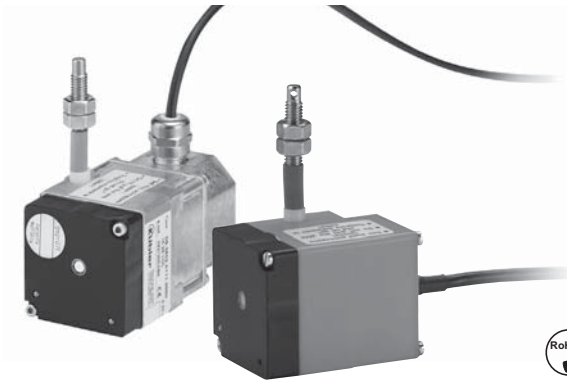
Measuring range	A - Wire rolled up	B - Wire pulled out
25 m	56 mm	18 mm
30 m	63 mm	18 mm
35 m	71 mm	18 mm
40 m	78 mm	18 mm
42.5 m	82 mm	18 mm

Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor

Miniature, analogue

Measuring length max. 2 m



The miniature draw wire encoder with analogue output is characterised by its compact design. It is available with a potentiometer, voltage or current output.



Compact and simple

- Measuring length up to 2000 mm
- For applications with a low traversing speed
- Easy to install

Order code miniature draw wire encoder

D5.350X . AXX . 0000
Type a b c

a Measuring range

- 1 = 1000 mm
- 2 = 2000 mm

b Output circuit

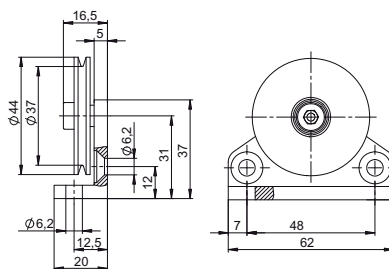
- 11 = analogue output 4 ... 20 mA
- 22 = analogue output 0 ... 10 V DC
supply voltage 15 ... 28 V DC
- 33 = Potentiometer output 10 kΩ

c Type of connection

- 1 = cable 2 m (for measuring range 1000 mm: axial)
(for measuring range 2000 mm: radial)
- 2 = M12 connector, 4-pin, radial
(only available for measuring range 2000 mm)

Accessories for draw-wire encoder

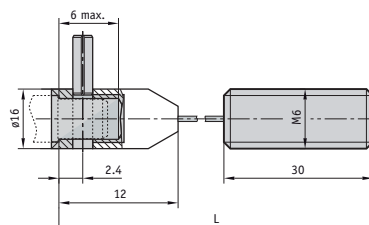
Guide pulley



Ordering information for the set
 - Guide pulley (anodised aluminium)
 - 2 x countersunk screws
 for lateral fixing,
 - 2 x socket screws
 for fixing on a flat surface

8.0000.7000.0045

Extension cable



Steel wire 2 m
 Steel wire 5 m
 Steel wire 10 m
 Paraleine 2 m

8.0000.7000.0033

8.0000.7000.0034

8.0000.7000.0035

8.0000.7000.0032

Linear Measuring Technology

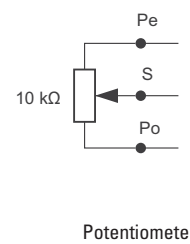
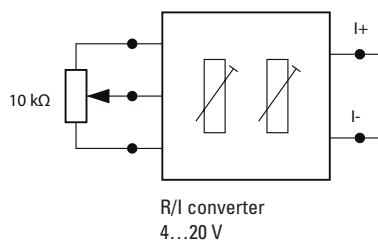
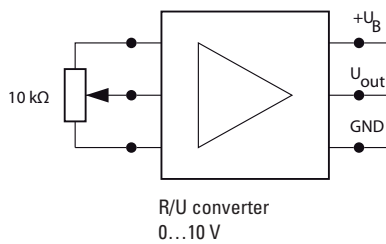
Draw wire mechanics with encoder or analogue sensor **Miniature, analogue** **Measuring length max. 2 m**

Mechanical characteristics (draw wire mechanics)	
Measuring range	1000 mm / 2000 mm
Extension force F_{min}	2 N
Repeat accuracy	± 0.15 mm
Linearity	± 0.35 %
Working temperature	0°C ... 50°C
Weight	approx. 200 g / 320 g
Material	housing: plastic / zinc die cast wire: stainless-steel \varnothing 0.45 mm plastic-coated

Electrical characteristics			
Analogue output	0 ... 10 V	4 ... 20 mA	Potentiometer 10 k Ω
Supply voltage	15 ... 28 V DC	–	–
Temperature range	0 ... 50°C	0 ... 50°C	0 ... 50°C
Load	max 500 Ω	max 500 Ω	–
CE compliant acc. to	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3		

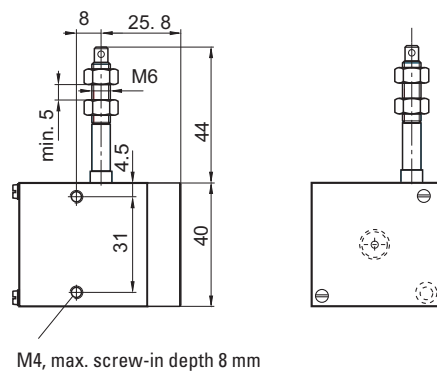
Terminal assignment

Colour	BN	WH	GN
Pin M12	1	2	3
0 ... 10 V	+ 24 V DC	GND	U_{out}
0 ... 20 mA	I+	I-	n.c.
Potentiometer	Po	Pe	S

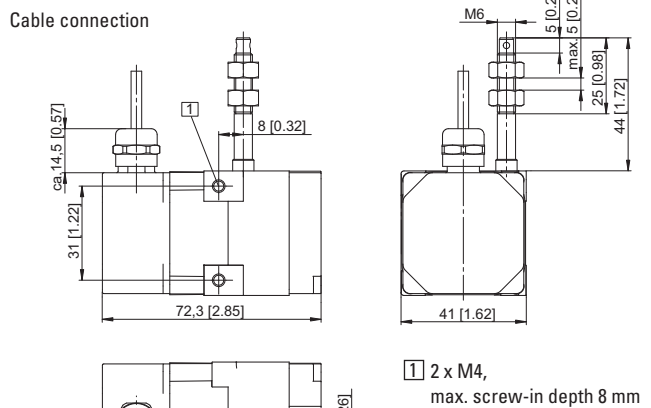


Dimensions

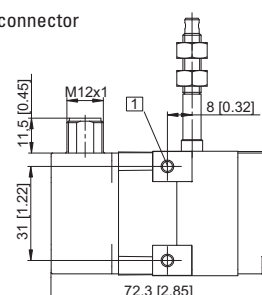
for measuring range 1000 mm



for measuring range 2000 mm



M12 connector



Linear Measuring Technology

Draw wire mechanics with encoder or analogue sensor **Miniature, incremental** **Measuring length max. 2 m**

Mechanical characteristics (draw wire mechanics)	
Measuring range	up to 2000 mm
Absolute accuracy	± 0.1 % for the whole measuring range
Repetition accuracy	± 0.15 mm per direction of travel
Resolution (incremental)	0.1 mm (standard encoder) with 1000 ppr.
Traversing speed	max. 800 mm/s
Required force	approx. 10 N (on wire)
Material:	housing reinforced plastic wire stainless steel \varnothing 0.45 mm plastic coated
Weight	ca. 0.210 kg

- Description of the incremental encoder (connected on load side)**
- Compensation for temperature and ageing
 - Short-circuit protected outputs
 - Reverse polarity protected power-supply input
 - Push-pull output

Mechanical characteristics (encoder)	
Protection acc. to EN 60529	IP64 from housing side
Working temperature	-20°C ... +85°C
Shock resistance acc. DIN-IEC 68-2-27	1000 m/s ² , 6 ms
Vibration resistance acc. DIN-IEC 68-2-6	100 m/s ² , 55 ... 2000 Hz

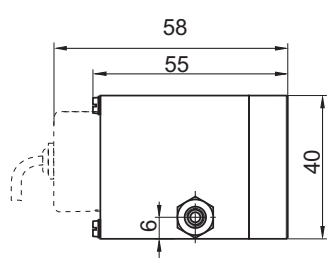
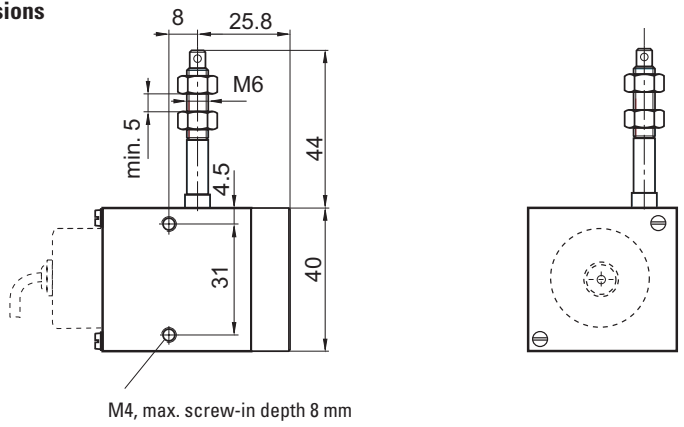
Electrical characteristics (encoder)		
Output circuits	Push-pull	Push-pull
Supply voltage	5 ... 24 V DC	8 ... 30 V DC
Current consumption (without load)	max. 50 mA	max. 50 mA
Permissible load / channel	max. 50 mA	max. 50 mA
Pulse rate	max. 160 kHz	max. 160 kHz
Switching level	high min. $U_B - 2.5$ V low max. 0.5 V	min. $U_B - 3$ V max. 2.5 V
Rising edge time t_r	max. 1 μ s	max. 1 μ s
Falling edge time t_f	max. 1 μ s	max. 1 μ s
Short-circuit protected outputs	yes	yes
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3	

Terminal assignment of the encoder

Signal	0V	+UB	A	\bar{A}	B	\bar{B}	0	$\bar{0}$
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD

Isolate unused outputs before initial start-up.

Dimensions



Linear Measuring Technology

Linear Measuring Technology

Draw wire mechanics with encoder

Draw wire encoder, Standard

Measuring length max. 6 m



These draw wire mechanics can be combined with all encoders having a size 58 synchro flange and 6 mm shaft.



Flexible and Simple

- Possibility for user to exchange encoder
- Measuring lengths 2800 mm or 6000 mm
- Simple installation

Order Code with encoder

D8.1 **XXX** . **XX** **XX** . **XXXX**
 Type **a** **b** **c** **d** **e**

a Measuring range

- 106 = 6000 mm
- 2A1 = 2800 m

b Mounted encoder

- 05 = 5805 62 = 5862
- 2Z = 5000 60 = 5860
- 04 = 5804 63 = 5863
- 68 = 5868

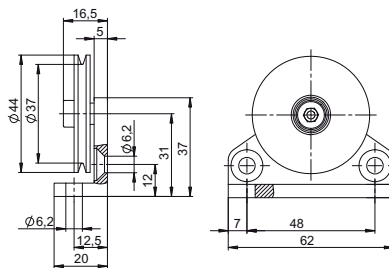
c Output circuit ¹⁾

d Type of connection ¹⁾

e Resolution / pulses / protocol ¹⁾

Accessories for draw-wire encoder

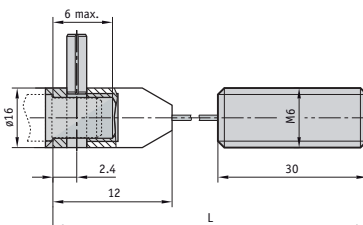
Guide pulley



- Ordering information for the set
- Guide pulley (anodised aluminium)
 - 2 x countersunk screws for lateral fixing,
 - 2 x socket screws for fixing on a flat surface

8.0000.7000.0045

Extension cable



- Steel wire 2 m
- Steel wire 5 m
- Steel wire 10 m
- Paraleine 2 m

8.0000.7000.0033

8.0000.7000.0034

8.0000.7000.0035

8.0000.7000.0032

1) These data depend on the chosen encoder

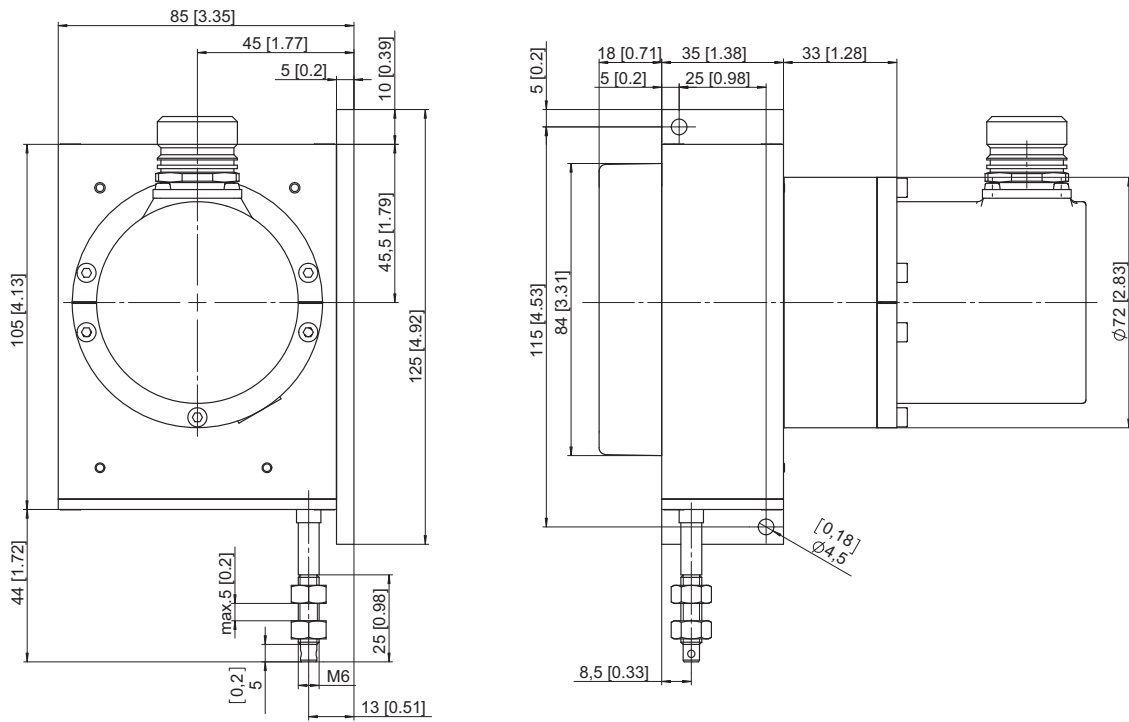
Linear Measuring Technology

Draw wire mechanics with encoder **Draw wire encoder, Standard** **Measuring length max. 6 m**

Mechanical characteristics	
Measuring range	2800 mm / 6000 mm
Traversing speed	max. 3000 mm/s
Extension force F_{min}	8 N
Repeat accuracy	± 0.15 mm
Working temperature	-20°C ... +80 °C
Weight	approx. 700 kg
Drum circumference	200 mm
Wire	2800 mm paraline (with \varnothing 1.05 mm) 6000 mm steel wire (with \varnothing 0.54 mm)

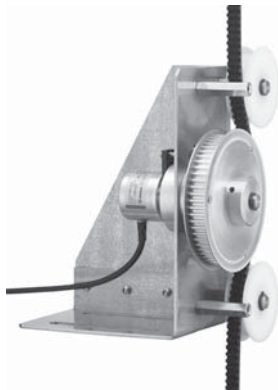
For the electrical characteristics as well as for the terminal assignment, please refer to the data sheet of the encoder used.

Dimensions



Linear Measuring Technology

Elevator Measuring System for Shaft-copying **Encoder mounting fixture, guided-belt, LM2** **max. height 120 m**



System for shaft-copying, with complete mechanical kit in proven toothed belt technology.

A smooth-running toothed belt and a vibration-resistant encoder mounting fixture ensure quiet operation. The belt pulley benefits from separate bearing supports in the mounting fixture, so protecting the installed encoder from mechanical overloading. With the guided-belt system, the encoder mounting fixture and the measuring wheels are located on the elevator car.



Ideal for use in passenger elevators, freight elevators, automatic storage systems.

Reliable

- Rugged construction
- Reduced load on encoder bearings due to separate belt pulley-bearings
- Non-slip
- Tensioning rollers with belt guide
- Separation of bearing load and sensor technology ensure high level of protection for the installed encoder.
- Bracket with lateral reinforcement

Minimal noise generation

- Smooth-running toothed-belt ensures extremely quiet operation
- Vibration-free operation

Order-No. **8.LM2.01**

Encoder mounting fixture with measuring wheels for fixing on the elevator car

consists of:

- Encoder mounting fixture with mounted measuring wheel
- Belt guide
- Belt fixing and tensioning set
- Screws and other small components

suitable encoders:

- Incremental encoder: 8.3620.24XX.XXXX

Calculation of pulse rate PPR =

$$\frac{300 \text{ mm}}{\text{Resolution, e.g. } 0.5 \text{ mm}} = 600$$

- Absolute encoders:

SSI: 8.F3683.33XX.XXXX

CANopen: 8.F3688.37XX.XXXX



Linear Measuring Technology

Elevator Measuring System for Shaft-copying **Encoder mounting fixture, guided-belt, LM2** max. height 120 m

Accessories for encoder mounting fixture LM2

Fixing kit

Fixing at the top

Fixing at the bottom

Complete kit consists of:

- C-rails, 700 mm
- Bracket
- Screws
- Other small components

8.BLM2.01

Toothed belt

- Width 10 mm
- Polyurethane, with single parallel steel cords.
- Low belt-stretch
- High resistance to abrasive wear
- Resistant to the effects of UV radiation
- Maintenance-free
- Resistant to ageing
- Temperature range -10°C...+80°C

Calculation of the required length of toothed belt = Elevator height + approx. 5 m (depending on the distance between top and bottom fixing)

05.ZAR1.XXX

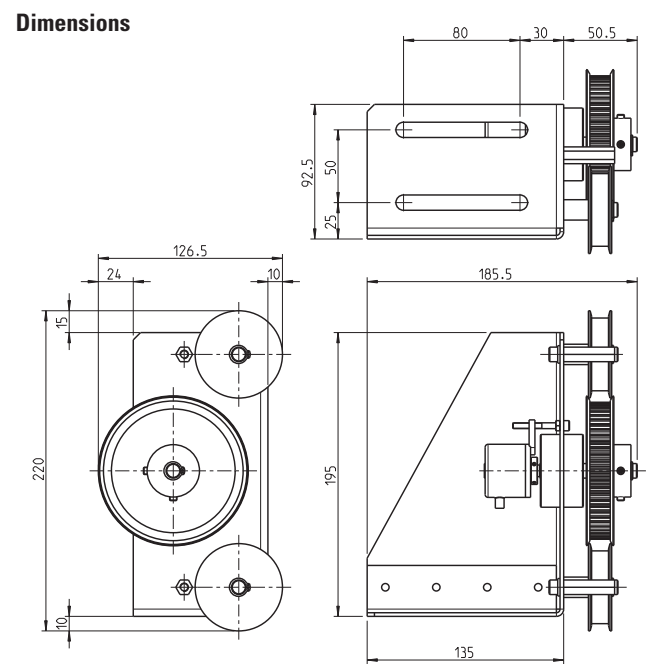
XXX = Length in metres
Standard delivery lengths: 20 m, 25 m, 30 m, 35 m, 40 m, 45 m, 50 m, 55 m, 60 m, 70 m, 80 m, 90 m, 100 m, 120 m, 250 m, 300 m
Other lengths on request

Guard plate

Protects the mechanics from external influences as well as safeguarding against accidental contact.

8.0000.7000.0050

General technical data	
Resolution in the shaft	depends on the resolution of the encoder (e.g. incremental encoder with 3000 PPR = 0.1 mm; absolute encoder 12 x 12 bit < 0.1 mm)
Elevator car speed	max. 6 m/s
Max. height of elevator	120 m
Effective circumference of belt pulley	300 mm



Linear Measuring Technology

Linear Measuring Technology

Elevator Measuring System for Shaft-copying

Encoder mounting fixture, guided-belt, LM3

max. height 28 m



System for shaft-copying, with complete mechanical kit in proven toothed belt technology.

A smooth-running toothed belt and a vibration-resistant encoder mounting fixture ensure quiet operation. The belt pulley can be mounted directly on the encoder shaft. With the guided-belt system, the encoder mounting fixture and the measuring wheels are located on the elevator car.

Ideal for use in passenger elevators, freight elevators, automatic storage systems.



Complete System

- Quick, easy mounting with accessories from a single source
- Reduced load on encoder bearings due to separate belt pulley-bearings
- Non-slip
- Tensioning rollers with belt guide

Minimal noise generation

- Smooth-running toothed-belt ensures extremely quiet operation
- Vibration-free operation

Order-No.

8.LM3.01

Encoder mounting fixture with measuring wheels for fixing on the elevator car

consists of:

- Encoder mounting fixture
- Measuring wheel
- Belt guide
- Belt fixing and tensioning set
- Screws and other small components

suitable encoders:

- Incremental encoder: 8.5000.83XX.XXXX

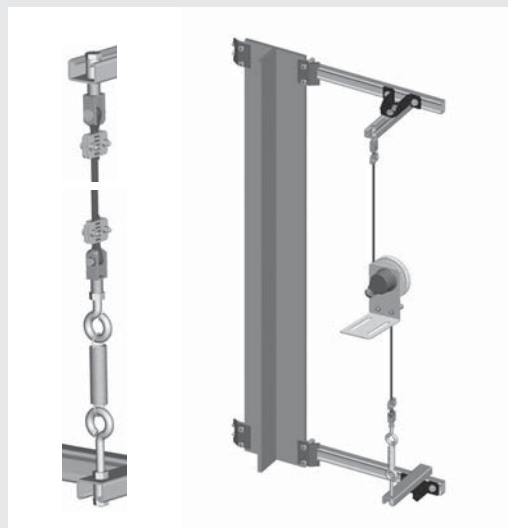
Calculation of pulse rate PPR =

$$\frac{300 \text{ mm}}{\text{Resolution, e.g. } 0.5 \text{ mm}} = 600$$

- Absolute encoders:

SSI: 8.5863.12XX.XXXX

CANopen: 8.5868.12XX.XXXX

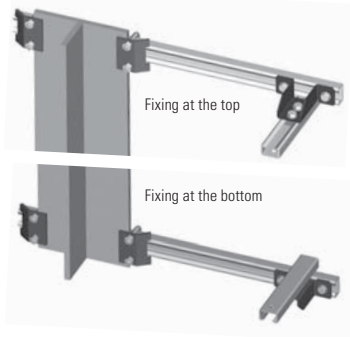


Linear Measuring Technology

Elevator Measuring System for Shaft-copying **Encoder mounting fixture, guided-belt, LM3** max. height 28 m

Accessories for encoder mounting fixture LM3

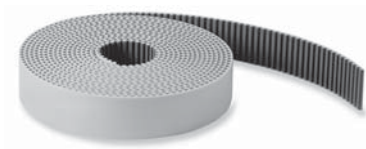
Fixing kit



- Complete kit consists of:
- C-rails, 700 mm
 - Bracket
 - Screws
 - Other small components

8.BLM2.01

Toothed belt



- Width 10 mm
- Polyurethane, with single parallel steel cords.
- Low belt-stretch
- High resistance to abrasive wear
- Resistant to the effects of UV radiation
- Maintenance-free
- Resistant to ageing
- Temperature range -10°C...+80°C

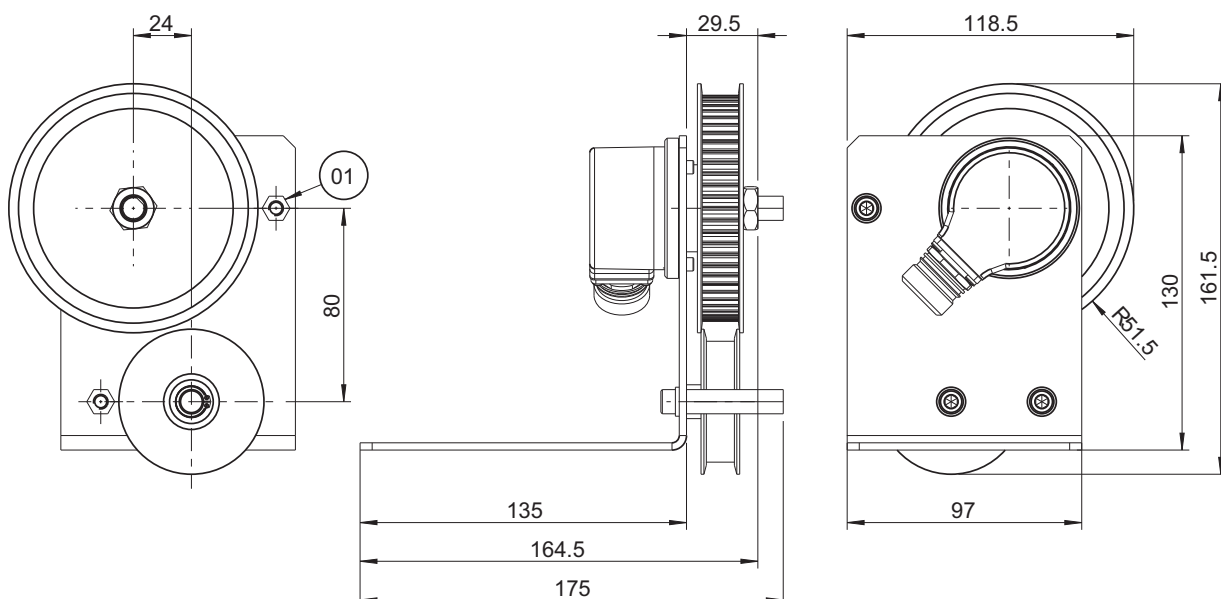
05.ZAR1.XXX

Calculation of the required length of toothed belt =
Elevator height + approx. 5 m
(depending on the distance between top and bottom fixing)

XXX = Length in metres
Standard delivery lengths:
20 m, 25 m, 30 m, 35 m, 40 m,
45 m, 50 m, 55 m, 60 m, 70 m,
80 m, 90 m, 100 m, 120 m,
250 m, 300 m
Other lengths on request

General technical data	
Resolution in the shaft	depends on the resolution of the encoder (e.g. incremental encoder with 3000 PPR = 0.1 mm; absolute encoder 12 x 12 bit < 0.1 mm)
Elevator car speed	max. 1.6 m/s
Max. height of elevator	28 m
Effective circumference of belt pulley	300 mm

Dimensions

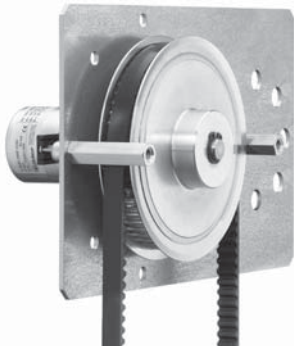


Linear Measuring Technology

Elevator Measuring System for Shaft-copying

Encoder mounting fixture, circumferential, LM5

max. height 120 m



System for shaft-copying, with complete mechanical kit in proven toothed belt technology.

A smooth-running toothed belt and a vibration-resistant encoder mounting fixture ensure quiet operation. The belt pulley benefits from separate bearing supports in the mounting fixture, so protecting the installed encoder from mechanical overloading. An encoder mounting fixture with measuring wheel is located at both the top and the bottom of the elevator shaft. The encoder can be mounted on top or bottom.



Ideal for use in passenger elevators, freight elevators, automatic storage systems.

Reliable

- Rugged construction
- Reduced load on encoder bearings due to separate belt pulley-bearings
- Non-slip
- Tensioning rollers with belt guide
- Separation of bearing load and sensor technology ensure high level of protection for the installed encoder.
- Mounted hollow shaft encoder

Minimal noise generation

- Smooth-running toothed-belt ensures extremely quiet operation
- Vibration-free operation

Order-No.

8.LM5.01

Encoder mounting fixture with measuring wheels for fixing on the elevator car

consists of:

- 2 x Encoder mounting fixture with mounted measuring wheel
- Belt guide
- Follower bracket set for toothed belt
- Belt fixing and tensioning set
- Screws and other small components

suitable encoders:

- Incremental encoder: 8.3620.24XX.XXXX

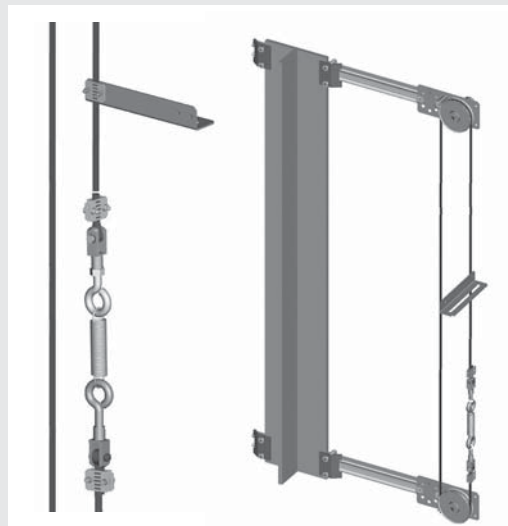
Calculation of pulse rate PPR =

$$\frac{300 \text{ mm}}{\text{Resolution, e.g. } 0.5 \text{ mm}} = 600$$

- Absolute encoders:

SSI: 8.F3683.33XX.XXXX

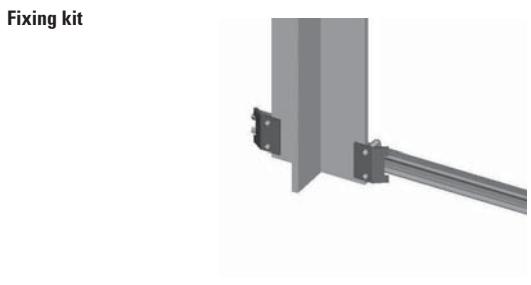
CANopen: 8.F3688.37XX.XXXX



Linear Measuring Technology

Elevator Measuring System for Shaft-copying Encoder mounting fixture, circumferential, LM5 max. height 120 m

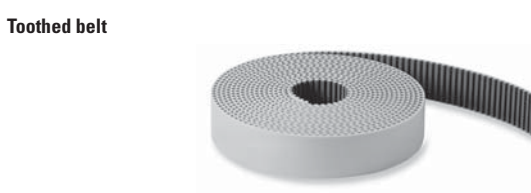
Accessories for encoder mounting fixture LM5



Fixing kit

Complete kit consists of:
 - C-rails, 700 mm
 - 4 x carrier clamps

8.BLM6.01



Toothed belt

- Width 10 mm
- Polyurethane, with single parallel steel cords.
- Low belt-stretch
- High resistance to abrasive wear
- Resistant to the effects of UV radiation
- Maintenance-free
- Resistant to ageing
- Temperature range -10°C...+80°C

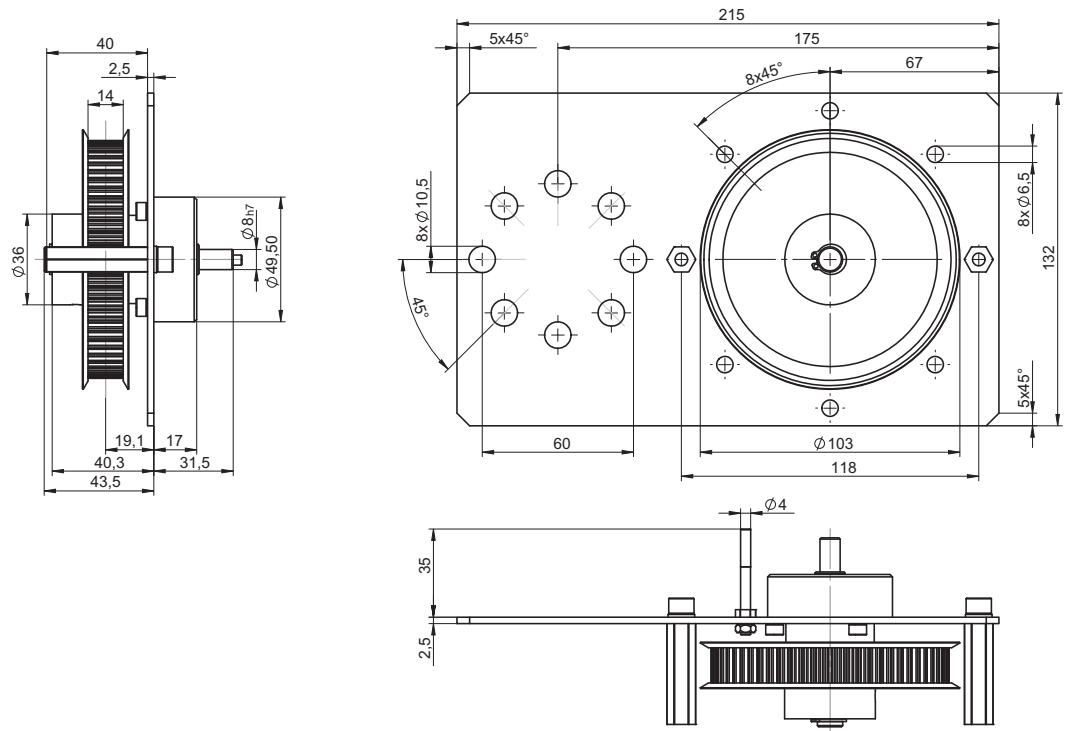
05.ZAR1.XXX

XXX = Length in metres
 Standard delivery lengths:
 20 m, 25 m, 30 m, 35 m, 40 m,
 45 m, 50 m, 55 m, 60 m, 70 m,
 80 m, 90 m, 100 m, 120 m,
 250 m, 300 m
 Other lengths on request

Calculation of the required length of toothed belt =
 Elevator height + approx. 5 m
 (depending on the distance between top and bottom
 fixing)

General technical data	
Resolution in the shaft	depends on the resolution of the encoder (e.g. incremental encoder with 3000 PPR = 0.1 mm; absolute encoder 12 x 12 bit < 0.1 mm)
Elevator car speed	max. 5 m/s
Max. height of elevator	120 m
Effective circumference of belt pulley	300 mm

Dimensions



Linear Measuring Technology

Mini Measurement System

Measuring wheel system, incl. encoder

Incremental



Very compact Mini Measurement System with incremental interface

Easy to install

- The measuring wheel, the sensor and the fastening are pre-assembled and thus easy to install:
fix – connect – ready-to-go

Compact construction

- Dimensions of the whole unit 74 mm x 50 mm x 52 mm
- Measuring wheel circumference 100 mm

Order code

05.2400.0040.1000.50 XX

Resolution
0.1 mm

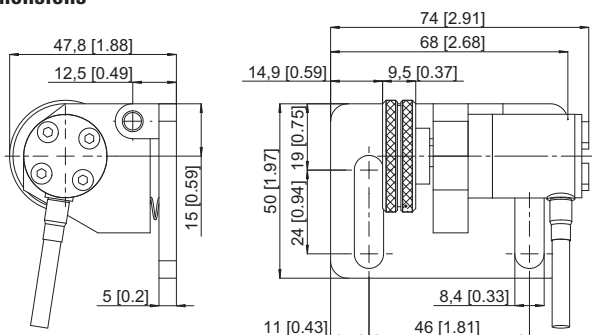
Cable outlet
radial, 2 m PVC cable

a *Measuring wheel*
45 = Knurled aluminium
49 = Rubber, Shore hardness 60

Technical Data

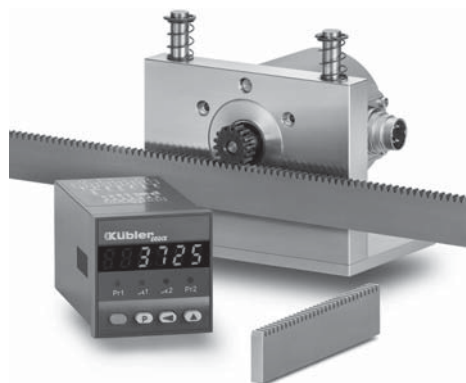
Speed max.	2000/min.
Protection	IP64
Output circuit	Push-pull with inversion
Power supply	8 ... 30 V DC
Current	≤ 20 mA
Load channel max.	20 mA
Output frequency max	≥ 100 kHz

Dimensions



Linear Measuring Technology

Length measuring kit Displacement measuring device with rack



Measuring system with mobile encoder holder, mounted on springs, (with rack and pinion) for an optimum contact pressure and protection of the encoder shaft.

Components suited optimally to each other. One rotation of the pinion corresponds to a movement of 50 mm.

The holding device for the encoder (8.0010.7000.0004) is a movable support for encoders, to the shaft of which, for instance, a measuring wheel or pinion can be attached. Due to the fact that it is movable, optimum contact pressure is ensured and overload on the bearings of the encoder prevented.

When used in conjunction with a pulse generating unit, the rack and pinion combination (8.0010.7000.0001 and ...0002) serves as a simple length and displacement measuring system. One rotation of the pinion on the rack corresponds to a displacement of 50 mm. Moreover the racks are designed in such a way that they can be butt-mounted without pitch error.

The absolute accuracy is 0.5 mm per meter. The resolution / repetition accuracy is 0.1 mm. Holding device, rack and pinion are available as a set for the purpose of displacement measurement (8.0010.7000.0005).

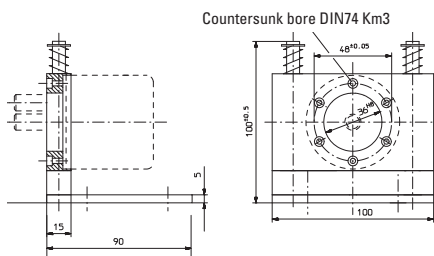
The installation aid (8.0010.7000.0003) is required to maintain exact pitch when butt-mounting racks.

Typical areas of application are:

- Wood working industry
- Textile industry
- Handling and automation technology
- Mechanical engineering / Special machines

Single components

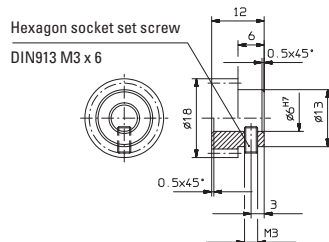
Flexible holding device for encoders



Guide rods stainless steel
Flange Al

8.0010.7000.0004

Pinion for displacement measuring device

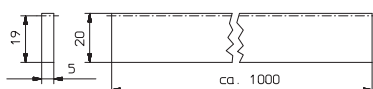


Material free-cutting steel
Surface burnished
Module pitch approx. 1
No of teeth 16

with bore diameter \varnothing 6 mm
with bore diameter \varnothing 10 mm

8.0010.7000.0002
8.0010.7000.0006

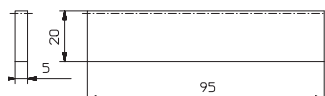
Rack



Material S235JR
Surface uncoated
Module pitch approx. 1

8.0010.7000.0001

Installation aid



Material S235JR
Surface uncoated
Module pitch approx. 1

8.0010.7000.0003

Encoder

type 5000, for rack and pinion, 0.1 mm resolution

8.5000.8354.0500

Standard cordset

with 2 m PVC cable, M12

05.WAKS8-2/P00

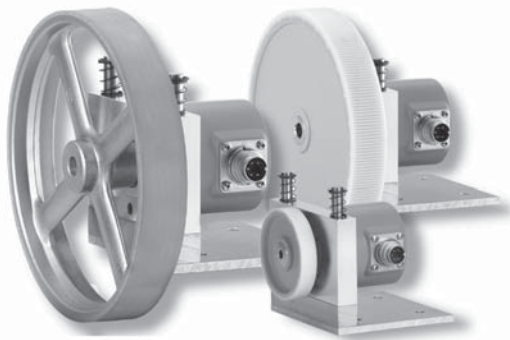
Preset counter

716 LED preset counter, 90 ... 260 V AC, 1 preset
923 LCD preset counter 90 ... 260 V AC, 1 preset

6.716.010.000
6.923.0100.000

Linear Measuring Technology

Length measuring kits	Length measuring kit with encoder	incl. measuring wheel
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The (metric) measuring kit is a complete solution for the quick and simple implementation of length measurements on products in movement.

Flexible

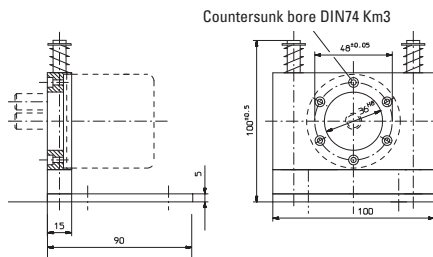
- Various measuring wheels for various applications:
 - Hytrel for the textile industry
 - Vulkollan for the wood, paper, metal and plastics industry
- Resolution 1 mm

Easy operation

- The encoder support ensures an optimal load on the encoder shaft.
- No additional power supply is required for the encoder, since it can be powered directly by the preset counter.

Single components

Flexible holding device for encoders



**Guide rods
Flange**

stainless steel
Al

8.0010.7000.0004

Spring encoder arm (s. page 286)

8.0000.7000.010

Measuring wheels (s. page 285)

- 0.2 m measuring wheel, plastic (Hytrel) corrugated
- 0.5 m measuring wheel, plastic (Vulkollan) smooth
- 0.5 m measuring wheel, plastic (Hytrel) corrugated

8.0000.3291.0010
8.0000.3552.0010
8.0000.3592.0010

Encoder

- type 5000 for 0.2 m measuring wheel, 1 mm resolution
- type 5000 for 0.5 m measuring wheel, 1 mm resolution

8.5000.8354.0200
8.5000.8354.0500

Standard cordset

with 2 m PVC cable, M12

05.WAKS8-2/P00

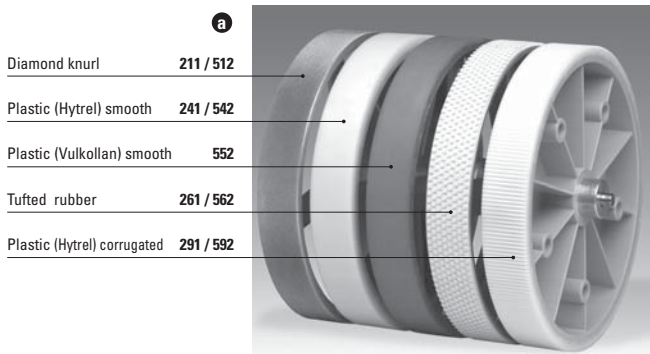
Preset counter

716 LED preset counter, 90 - 260 V AC, 1 preset

6.716.010.000

Linear Measuring Technology

Accessories Measuring wheels



- a**
Diamond knurl 211 / 512
- Plastic (Hytel) smooth 241 / 542
- Plastic (Vulkollan) smooth 552
- Tufted rubber 261 / 562
- Plastic (Hytel) corrugated 291 / 592

Measuring wheels are utilized in combination with encoders to measure material in the wood, paper, metal, textile and plastic industry.

When selecting a measuring wheel, the first consideration is the type of material to be measured as this serves as the basis for determining the surface finish or coating of the measuring wheel.

Various diameters, designed for use with Kübler encoders, available for metric and imperial systems.

Selection of the measuring wheel profile according to the surface of the measured material

Surface of the measured material	Recommended profile no.
Cardboard	1, 2, 3, 6
Wood	1, 2, 3, 6
Textile	1, 4, 5
Plastic (e.g. PVC, PE, ...)	2, 3, 6
Paper	2, 3, 6
Wire	3, 6
Bare metals	4
Varnished surfaces	4

Please note:

If a measuring wheel is mounted directly on the shaft of a rotary encoder, the pressure force between the measuring wheel and measured material should not exceed the radial shaft load listed in the data sheet of the encoder.

In addition, the measuring wheels can only be used for in-house purposes which are not subject to the stipulations of the German calibration code.

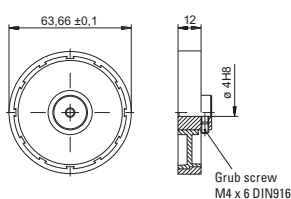
Order code Measuring wheels

8.0000 . 3 XXX . 00 XX
a b

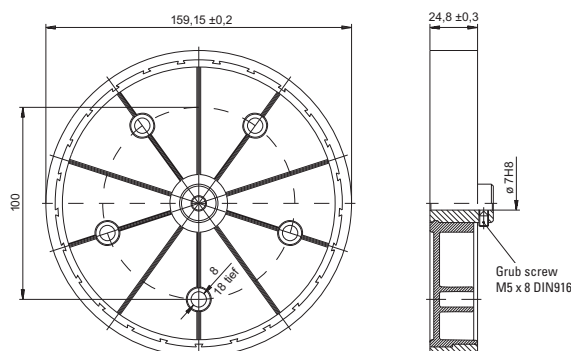
Measuring wheel Circumference / ϕ / width	Profile measuring wheels (s. o.)	Coating	Coating hardness A	Wheel No. a	Material of wheel body [mm]	Working temperature [°C]	Weight [g]	Standard-bore b [mm] ¹⁾
0,2 m / ϕ 63,7 mm / 12 mm	1	diamond knurl		211	aluminium	–	40	04, 06, 10
	2	plastic (Hytel) smooth	85 ... 90	241	plastic	-10 ... +50	35	04, 06, 10
	4	tufted rubber		261	aluminium	-10 ... +50	40	06, 10
	5	plastic (Hytel) corrugated	85 ... 90	291	plastic	-10 ... +70	35	04, 06, 10
0,5 m / ϕ 159,2 mm / 25 mm	1	diamond knurl		512	aluminium	–	350	10
	2	plastic (Hytel) smooth	85 ... 90	542	plastic	-10 ... +50	260	10
	3	plastic (Vulkollan) smooth	85 ... 90	552	aluminium	-30 ... +80	320	10
	4	tufted rubber		562	aluminium	-30 ... +80	320	10, 12
	5	plastic (Hytel) corrugated	85 ... 90	592	plastic	-30 ... +80	260	06, 10
12" / ϕ 3,82" / 0,38"	6	Natural rubber (NR) (smooth)	70 ... 75	751	aluminium	-30 ... +80	100	10

Dimensions

Measuring wheels No. 2XX



Measuring wheels No. 5XX



1) Other bore diameters on request

Accessories **Spring encoder arm**



Robust and reliable

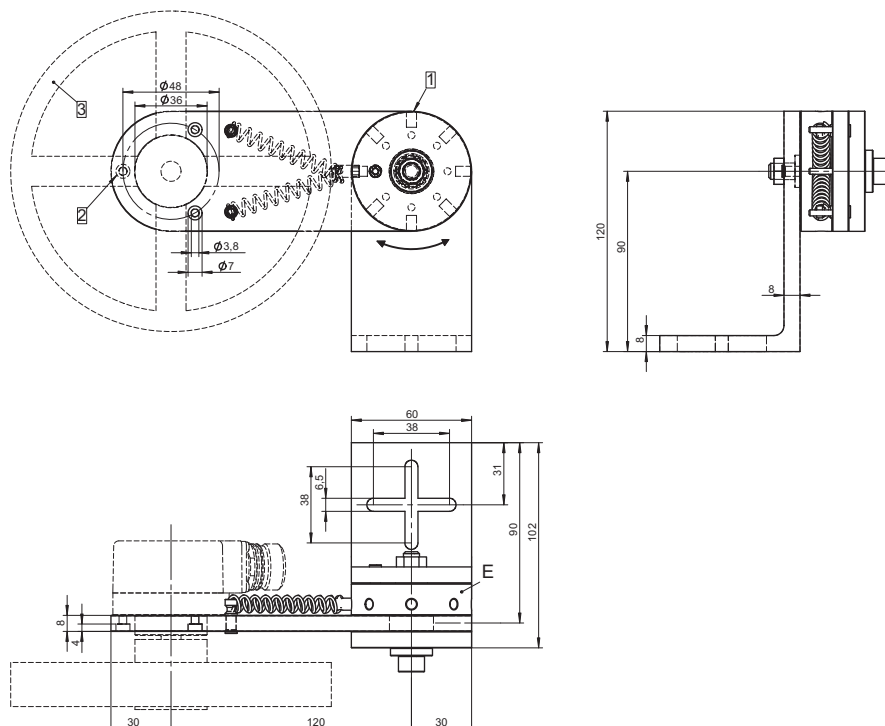
- Max. 40 N, adjustable spring pressure available in any position
Pressure for each notch appr. 20 N (first notch between 0 and appr. 20 N)
- Wide temperature range -40°C ... 120°C

Versatile

- Can be installed in any mounting position 9 setting positions in 40° steps
- Base plate – variable in 4 directions

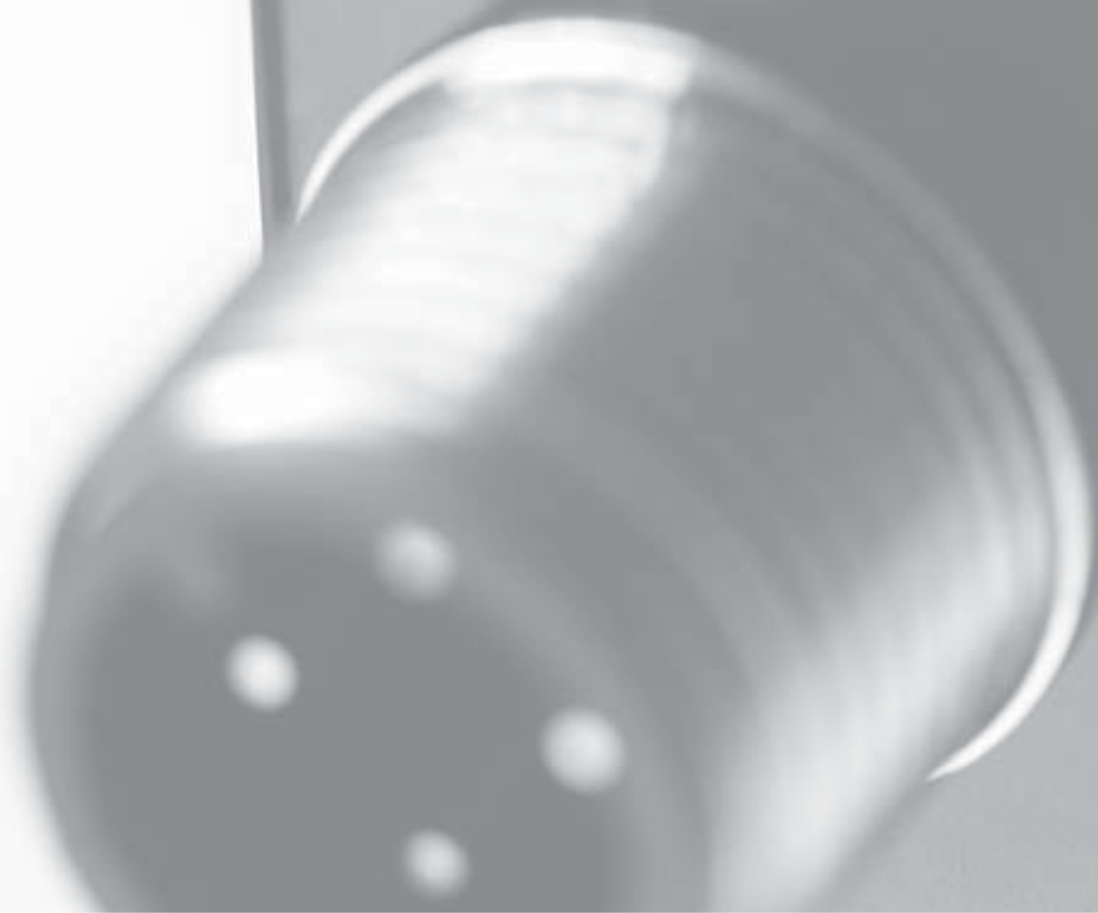
Order No. **8.0010.7000.0010**

Dimension



- 1 Setting with a size 0 or 1 screwdriver
- 2 3 pcs. screws M3 x 8 DIN 912 included
- 3 Measuring wheel

KUEBLER
www.kuebler.com
S40



Inclinometers

	Type	Interface	Page
Inclinometers	IS40	Analogue	290
	IS60	CANopen	292

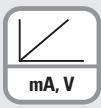
Inclinometers

Inclinometer	IS40	Analogue
---------------------	-------------	-----------------



The inclinometer IS40 permits 2-dimensional inclinations to be measured. Versions are available for the measuring ranges $\pm 10^\circ$, $\pm 45^\circ$ or $\pm 60^\circ$.

The compact robust construction makes this sensor the ideal device for measuring angles in harsh environments.



Output



High IP value



Shock / vibration resistant



Reverse polarity protection

Innovative

- Rugged construction
- High resolution and accuracy
- Current or voltage interface
- High shock resistance
- Zero point adjustment

Compact / Many applications

- Small design – Minimal space requirement
- For use in vehicle technology, solar installations, commercial vehicles, cranes and hoists

Order code Inclinometer IS40

8.IS40 . 2XXX1
Type a b c d e

a Measuring direction
2 = 2-dimensional X/Y

b Measuring range
1 = $\pm 10^\circ$
2 = $\pm 45^\circ$
3 = $\pm 60^\circ$

c Interface
1 = 4 ... 20 mA
3 = 0.1 ... 4.9 V DC
4 = ratiometric 2% ... 98% ¹⁾

d Supply voltage
1 = 5 V DC ²⁾
2 = 10 ... 30 V DC

e Type of connection
1 = M12 connector

Connection Technology

Connectors, self-assembly (straight)	M12	05.B-8151-0/9
Cordset, pre-assembled with 2 m PVC cable	Coupling M12	05.WAKS4.5-2/P00

Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) In relation to the supply voltage 5 V DC
2) Only in combination with interface 4

Inclinometers

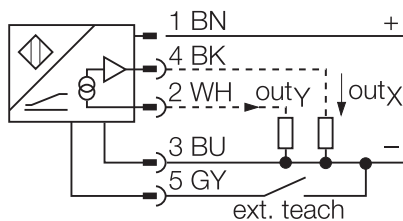
Inclinometer IS40 Analogue

Mechanical characteristics	
Connection	M12 connector
Weight	50 g
Protection EN 60529	IP68
Working temperature range	-30...+70°C
Materials	plastic PBT-GF20-V0
Shock resistance	30 g, 11 ms
Vibration resistance	55 Hz (1 mm)
Dimensions	60 x 30 x 20 mm

Interface characteristics	
Voltage output	
at U_B 10 ... 30 V DC	0.1 ... 4.9 V short-circuit protected to U_B
at U_B 5 V DC	2 ... 98% ratiometric (in relation to U_B)
Load resistance voltage output	≥ 40 k Ω
Output impedance voltage output	99...105 Ω
Current output	4...20 mA
Load resistance current output	≤ 200 Ω

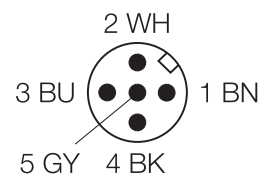
General electrical characteristics	
Supply voltage	5 V DC +/-0.25 V or 10 ... 30 V DC (depending on version)
Power consumption (no load)	≤ 20 mA
Reverse polarity protection (U_B)	yes
Measuring axes	2 (X/Y)
Measuring range	$\pm 10^\circ, \pm 45^\circ, \pm 60^\circ$
Resolution	for version $\pm 10^\circ$ $\leq 0.05^\circ$ for version $\pm 45^\circ$ $\leq 0.1^\circ$ for version $\pm 60^\circ$ $\leq 0.15^\circ$
Repeat accuracy	$\leq 0.2\%$ of measuring range $\leq 0.1\%$ after a warm-up period of 30 min
Absolute accuracy	for version $\pm 10^\circ$ 0.3° for version $\pm 45^\circ$ and $\pm 60^\circ$ 0.5°
Cross sensitivity	3%
Temperature drift	for version $\pm 10^\circ$ typ. 0.01°/K for version $\pm 45^\circ$ and $\pm 60^\circ$ 0.03°/K
Reaction time	0.1 s Time that the output signal requires to reach 90 % full scale, if the angle is changed from -60° to $+60^\circ$
Zero point adjustment	for version $\pm 10^\circ$ $\pm 5^\circ$ for version $\pm 45^\circ$ and $\pm 60^\circ$ $\pm 15^\circ$
CE compliant acc. to	EN 61362-2-3 EMC requirements for transducers

Connections

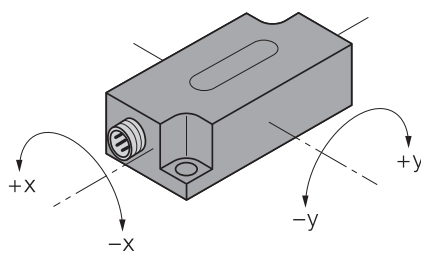


ext. teach: if this input is connected to 0 V, then the output of the inclinometer is reset to 0°.

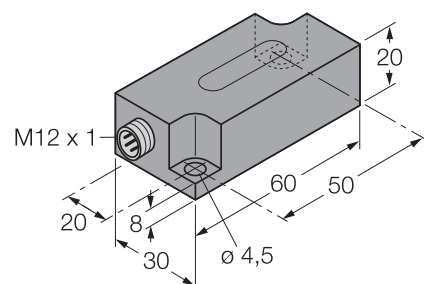
Terminal assignment



Direction of Inclination



Dimensions



Inclinometers

Inclinometer	IS60, 2-dimensional	CANopen
---------------------	----------------------------	----------------



The inclinometer IS60 permits 2-dimensional inclinations to be measured. Versions are available for the measuring ranges $\pm 10^\circ$, $\pm 45^\circ$ or $\pm 60^\circ$.

The sensor has a standardised CANopen interface, which enables easy configuration and start-up. All the parameters are stored in the internal permanent memory.



CANopen



High IP value



Shock / vibration resistant



Reverse polarity protection

Robust and reliable

- Protection rating IP68
- Robust plastic housing
- High shock resistance

User-friendly and accurate

- High resolution and accuracy
- Programmable vibration suppression
- High sampling rate and bandwidth

Order code Inclinometer IS60

8.IS60 . 2X523
Type a b c d e

a Measuring direction
2 = 2-dimensional X/Y

b Measuring range
1 = $\pm 10^\circ$
2 = $\pm 45^\circ$
3 = $\pm 60^\circ$

c Interface
5 = CANopen

d Supply voltage
2 = 10 ... 30 V DC

e Type of connection
3 = 2 x M12 connector

Connection Technology

Connectors, self-assembly (straight)

Coupling M12 for Bus in
Connector M12 for Bus out

05.B-8151/9
05.BS-8151-0/9

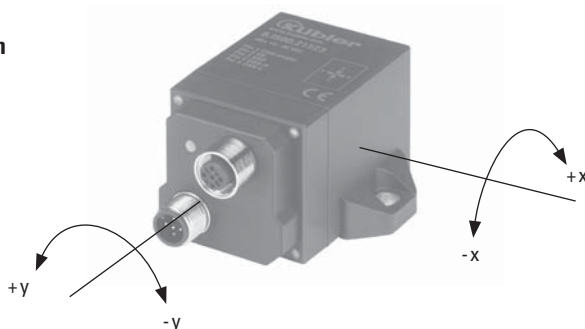
Cordset, pre-assembled with 6 m PVC cable

Coupling M12 for Bus in
Connector M12 for Bus out

05.00.6021.2211.006M
05.00.6021.2411.006M

Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

Direction of Inclination



Inclinometers

Inclinometer	IS60, 2-dimensional	CANopen
---------------------	----------------------------	----------------

Mechanical characteristics	
Connection CAN	M12 connector, 5-pin
Weight	approx. 0.2 kg
Protection EN 60 529	IP 68
Working temperature range	-40°C ... +80°C
Materials	plastic PBT-GF20-V0
Shock resistance	30 g 11ms
Vibration resistance	55Hz (1mm)
Dimensions	68 x 42.5 x 42.5 mm

Interface characteristics CANopen	
Interface	CANopen according to CiA DS-301, Profile to CiA DSP-410
Data rates	10k, 20k, 50k, 125k, 250k, 500k, 800k bit/s, 1 Mbit/s
Functions	TPDO (RTR, cyclic, event-driven, synchronized), parameterization per SDO and object register, digital filter (Butterworth Low pass, 8th order), SYNC Consumer, EMCY Producer, output and control of internal device temperature (± 2.0 K accuracy), failure control with the help of Heartbeat or Nodeguarding / Lifeguarding
Note ID	1...127

General electrical characteristics	
Supply voltage	10 ... 30 V DC
Power consumption (no load)	40 ... 105 mA
Reverse polarity protection (U_B)	yes
Measuring axes	2 (X/Y)
Measuring range	$\pm 10^\circ$, $\pm 45^\circ$, $\pm 60^\circ$
Resolution	for version $\pm 10^\circ$ 0.05° for version $\pm 45^\circ$ and $\pm 60^\circ$ 0.1°
Absolute accuracy	for version $\pm 10^\circ$ 0.2° for version $\pm 45^\circ$ 0.3° for version $\pm 60^\circ$ 0.4°
Calibration accuracy (at 25 °C)	$\pm 0.1^\circ$ (Zero point and final values)
Temperature drift (Zero point)	typ. $\pm 0.008^\circ/\text{K}$
Sampling rate	100 Hz
CE compliant acc. to	EN 61326-2-3 EMC requirements for transducers
RoHS compliant acc. to	EU guideline 2002/95/EG

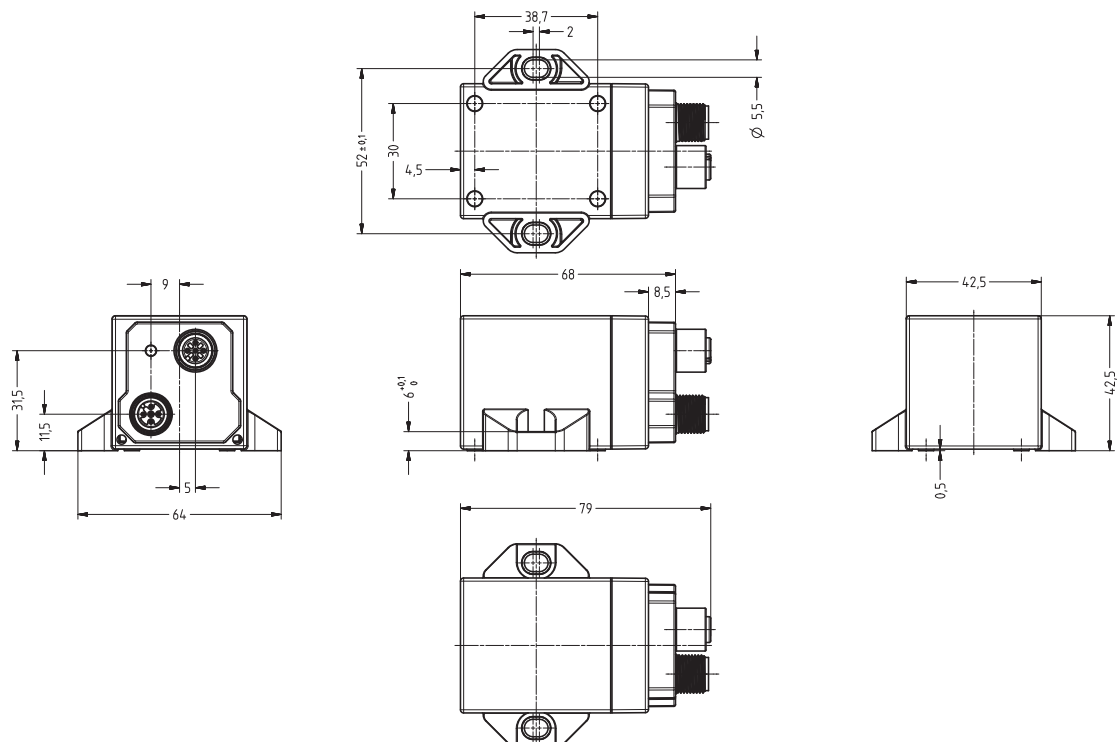
A full description of the technical data can be found in the relevant product manual at www.kuebler.com.

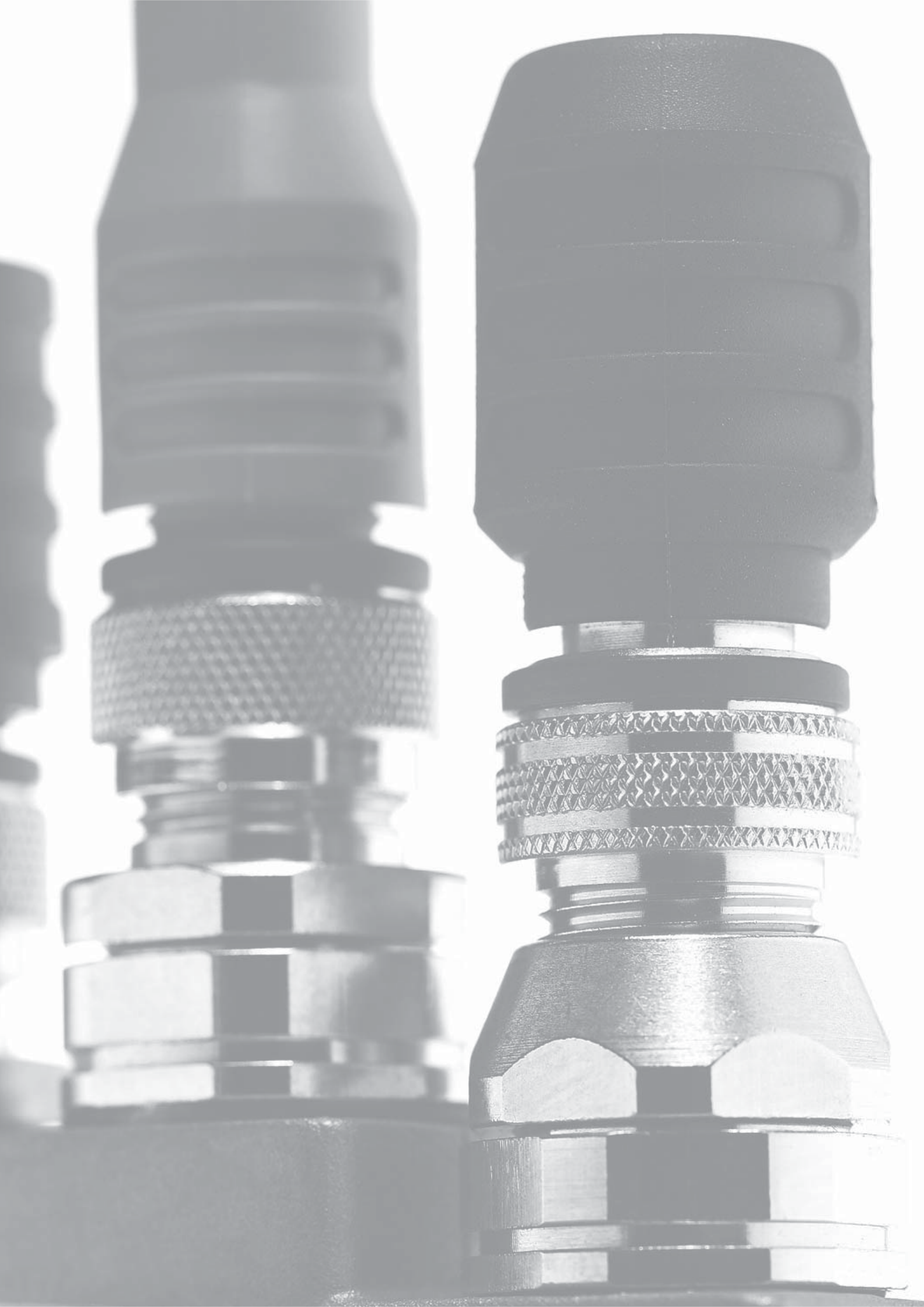
Terminal assignment

PIN	Signal	Assignment
1	CAN_SHLD	Shield
2	CAN V+	Supply voltage (+24 V DC)
3	CAN_GND	GND
4	CAN_H	CAN_H Bus cable
5	CAN_L	CAN_L-Bus cable



Dimensions





Connection Technology

Type of connection	Interface		Page
M12 connection technology	Incremental, SSI, Analogue	Connectors, self-assembly	296
		Cordsets, pre-assembled	297
	Profibus-DP	Connectors, self-assembly	298
		Bus cable, pre-assembled	300
	CANopen / DeviceNet	Connectors, self-assembly	303
		Bus cable, pre-assembled	304
M12 and RJ45 connection technology	EtherCat	Connectors, self-assembly	305
		Cordsets, pre-assembled	305
M23 connection technology	Standard	Connectors, self-assembly	306
		Cordsets, pre-assembled	307
MIL-approved connection technology	Standard	Connectors, self-assembly	309
Cable		Unprepared, cut to length	310
Optical fibre signal transmission	RS422/HTL	Optical fibre transmitter and receiver	312
	SSI	Optical fibre transmitter and receiver	314

The idea behind our Connection Technology System



Connection Technology from Kübler = System Safety!

All the products in the Connection Technology section have been tested and approved with the relevant compatible Kübler sensors.

They ensure the full functionality and high signal quality of our sensors.

Your benefit:

- Elimination of connection errors
– no laborious fault finding
- Optimal shielding
– avoids EMC problems
- Shorter installation times
– saves time, cuts costs
- No time-consuming search for the right connector or cable
– saves time, eliminates errors

Connection Technology

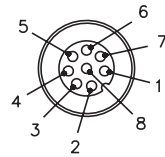
M12 Connection Technology Incremental, SSI, Analogue

Connectors, self-assembly, 8-pin

Coupling



straight, IP67, metal housing



screw connections,
for cable ø 6 ... 8 mm

suitable for our incremental and SSI series:

3610 / 3620	F3653 / F3673
5000 / 5020	5006
5814 / 5834	5821
5853 / 5873	5863 / 5883
5876	A020 / A02H

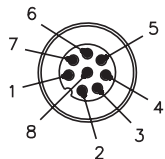
Order No.

05.CMB 8181-0

Connector



straight, IP67, metal housing



screw connections,
for cable ø 6 ... 8 mm

suitable for:

versions with cable outlet

Order No.

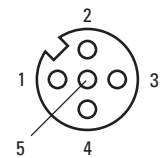
05.CMBS 8181-0

Connectors, self-assembly, 5-pin

Coupling



straight, IP67, metal housing



screw connections,
for cable ø 6 ... 8 mm

suitable for our analogue series:

A50, B80, C120, D135,
IS40, IS60
3651 / 3671

Order No.

8.0000.5116.0000

Accessories (Working temperature range -25°C ... +90°C)

Securing clip for M12 connectors EX zone 2/22



plastic housing

suitable for use in areas with combustible dust acc. to EN 50281-1-1

Order No.

8.0000.5000.0006

Connection Technology

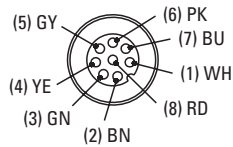
M12 Connection Technology Incremental, SSI, Analogue

Cordsets, pre-assembled, 8-pin (Working temperature range -30°C ... +80°C)

Coupling, PVC cable



straight, IP67, single-ended, plug housing metal / plastic



suitable for our incremental and SSI series:	
3610 / 3620	F3653 / F3673
5000 / 5020	5006
5814 / 5834	5821
5853 / 5873	5863 / 5883
5876	A020 / A02H

cable length
2 m
5 m
10 m
15 m

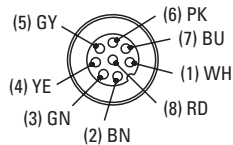
Order No.

- 05.WAKS8-2/P00**
- 05.WAKS8-5/P00**
- 05.WAKS8-10/P00**
- 05.WAKS8-15/P00**

Coupling, PVC cable



right-angle, IP67, single-ended, plug housing metal / plastic



suitable for our incremental and SSI series:	
3610 / 3620	F3653 / F3673
5000 / 5020	5006
5814 / 5834	5821
5853 / 5873	5863 / 5883
5876	A020 / A02H

cable length
2 m
5 m
10 m
15 m

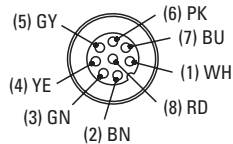
Order No.

- 05.WWAKS8-2/P00**
- 05.WWAKS8-5/P00**
- 05.WWAKS8-10/P00**
- 05.WWAKS8-15/P00**

Coupling, PUR cable



straight, IP67, single-ended, plug housing metal / plastic



suitable for our incremental and SSI series:	
3610 / 3620	F3653 / F3673
5000 / 5020	5006
5814 / 5834	5821
5853 / 5873	5863 / 5883
5876	A020 / A02H

cable length
2 m
5 m
10 m
15 m

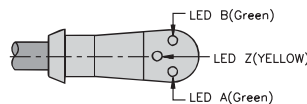
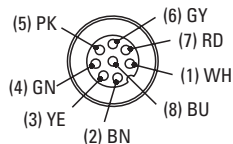
Order No.

- 05.WAKS8-2/S366**
- 05.WAKS8-5/S366**
- 05.WAKS8-10/S366**
- 05.WAKS8-15/S366**

Connector, with integrated control LEDs, PVC cable



right-angle, IP67, single-ended



suitable for our incremental series:	
3610 / 3620	5006
5000 / 5020	5821
A020	A02H

cable length
2 m
4 m
6 m
7 m
10 m

Order No.

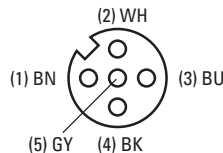
- 05.E-WKC 8T-PX3-930-0002**
- 05.E-WKC 8T-PX3-930-0004**
- 05.E-WKC 8T-PX3-930-0006**
- 05.E-WKC 8T-PX3-930-0008**
- 05.E-WKC 8T-PX3-930-0010**

Cordsets, pre-assembled, 5-pin (Working temperature range -30°C ... +80°C)

Coupling, PVC cable



straight, IP67, single-ended, plug housing metal / plastic



suitable for our analogue series:	
A50	B80
C120	D135
IS40	

cable length
2 m
5 m
10 m
15 m

Order No.

- 05.WAKS4.5-2/P00**
- 05.WAKS4.5-5/P00**
- 05.WAKS4.5-10/P00**
- 05.WAKS4.5-15/P00**

Connection Technology

M12 Connection Technology Profibus-DP

Connectors, self-assembly, 5-pin

Coupling, Bus in



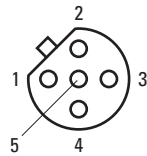
straight, IP67, metal housing

suitable for our series:

5858 / 5878
5868 / 5888
9080

Order No.

05.BMWS 8151-8.5



screw connections,
for cable \varnothing 4 ... 9 mm

Connector, Bus out



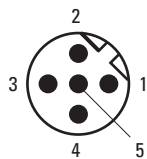
straight, IP67, metal housing

suitable for our series:

5858 / 5878
5868 / 5888
9080

Order No.

05.BMSWS 8151-8.5



screw connections,
for cable \varnothing 4 ... 9 mm

Coupling, Bus in



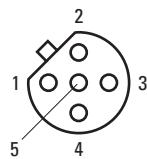
right-angle, IP67, metal housing

suitable for our series:

5858 / 5878
5868 / 5888
9080

Order No.

05.BMWS 8251-8.5



screw connections,
for cable \varnothing 4 ... 9 mm

Connector, Bus out



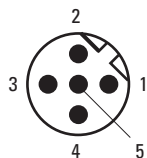
right-angle, IP67, metal housing

suitable for our series:

5858 / 5878
5868 / 5888
9080

Order No.

05.BMSWS 8251-8.5



screw connections,
for cable \varnothing 4 ... 9 mm

Accessories

Terminating resistor



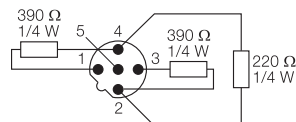
straight, IP67,
metal / plastic housing

suitable for our series:

5858 / 5878
5868 / 5888
9080

Order No.

05.RSS4.5-PDP-TR



M12 lead-through



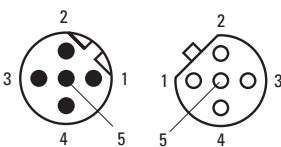
straight, IP67, metal housing

suitable for our series:

5858 / 5878
5868 / 5888
9080

Order No.


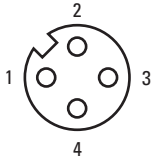
05.FKW-FSW45/M12


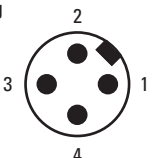



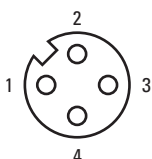
Connection Technology


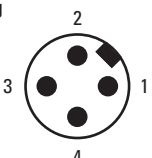
M12 Connection Technology Profibus-DP

Connectors, self-assembly, 4-pin, Profibus-DP power supply


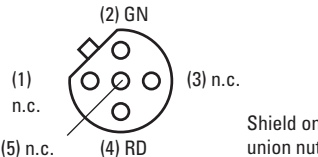

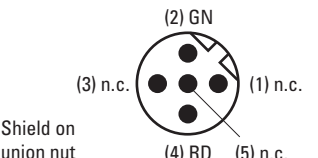

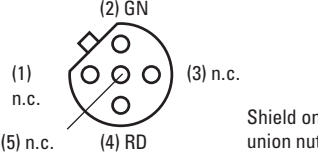

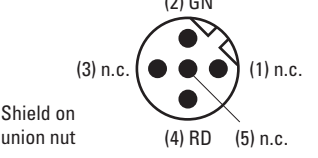

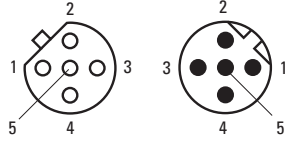

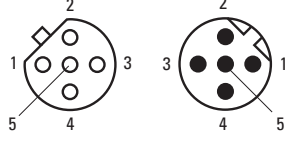
<p>Coupling</p> 	<p>straight, IP67, plastic housing</p>  <p>screw connections, for cable ø 4 ... 6 mm</p>	<p><i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080</p>	<p><i>Order No.</i> 05.B8141-0</p>
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<p>Connector</p> 	<p>straight, IP67, metal / plastic housing</p>  <p>screw connections, for cable ø 4 ... 6 mm</p>	<p><i>suitable for:</i> versions with cable outlet</p>	<p><i>Order No.</i> 05.BS8141-0</p>
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<p>Coupling</p> 	<p>right-angle, IP67, plastic housing</p>  <p>screw connections, for cable ø 4 ... 6 mm</p>	<p><i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080</p>	<p><i>Order No.</i> 05.B8241-0</p>
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<p>Connector</p> 	<p>right-angle, IP67, metal / plastic housing</p>  <p>screw connections, for cable ø 4 ... 6 mm</p>	<p><i>suitable for:</i> versions with cable outlet</p>	<p><i>Order No.</i> 05.BS8241-0</p>
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Connection Technology

M12 Connection Technology		Profibus-DP		
Bus cable, pre-assembled, 5-pin		(Working temperature range -30°C ... +80°C)		
Coupling, PUR cable, Bus in 	straight, single-ended, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 6 m 10 m 15 m	<i>Order No.</i> 05.00.6011.3211.006M 05.00.6011.3211.010M 05.00.6011.3211.015M
Connector, PUR cable, Bus out 	straight, single-ended, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 6 m 10 m 15 m	<i>Order No.</i> 05.00.6011.3411.006M 05.00.6011.3411.010M 05.00.6011.3411.015M
Coupling, PUR cable, Bus in 	right-angle, single-ended, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 6 m 10 m 15 m	<i>Order No.</i> 05.00.6011.3311.006M 05.00.6011.3311.010M 05.00.6011.3311.015M
Connector, PUR cable, Bus out 	right-angle, single-ended, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 6 m 10 m 15 m	<i>Order No.</i> 05.00.6011.3511.006M 05.00.6011.3511.010M 05.00.6011.3511.015M
Coupling + connector, PUR cable, Bus in + Bus out 	straight, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 2 m 6 m 10 m 15 m	<i>Order No.</i> 05.00.6011.3432.002M 05.00.6011.3432.006M 05.00.6011.3432.010M 05.00.6011.3432.015M
Coupling + connector, PUR cable, Bus in + Bus out 	right-angle, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 2 m 6 m 10 m 15 m	<i>Order No.</i> 05.00.6011.3533.002M 05.00.6011.3533.006M 05.00.6011.3533.010M 05.00.6011.3533.015M

Connection Technology

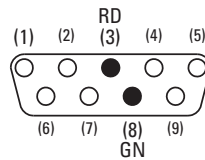
M12 Connection Technology Profibus-DP

Bus cable, pre-assembled, Sub-D-connector (Working temperature range -30°C ... +80°C)

**Sub-D-connector, PUR cable
Profibus Master**



single-ended, with terminating resistor



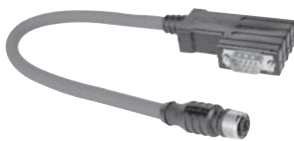
Shield on housing

suitable for our series:
5858 / 5878
5868 / 5888
9080

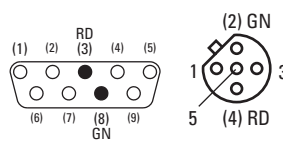
cable length
0,5 m
2 m

Order No.
05.00.6011.5511.00M5
05.00.6011.5511.002M

**Sub-D-connector + M12 coupling, PUR cable,
Profibus Master, Bus in**



with terminating resistor



Shield on housing

suitable for our series:
5858 / 5878
5868 / 5888
9080

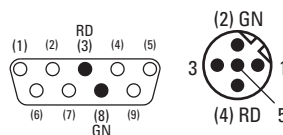
cable length
0,5 m
2 m

Order No.
05.00.6011.5532.00M5
05.00.6011.5532.002M

**Sub-D-connector + M12 connector, PUR cable,
Profibus Master, Bus out**



with terminating resistor



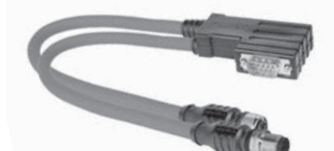
Shield on housing

suitable for our series:
5858 / 5878
5868 / 5888
9080

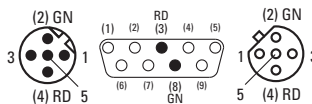
cable length
0,5 m
2 m

Order No.
05.00.6011.5534.00M5
05.00.6011.5534.002M

**M12-connector + Sub-D-connector + M12 coupling,
PUR cable, Profibus Master, Bus in / Bus out**



with terminating resistor



Shield on housing

suitable for our series:
5858 / 5878
5868 / 5888
9080


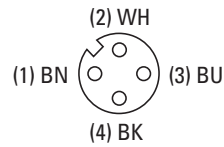
cable length
2 x 0,5 m
2 x 2 m


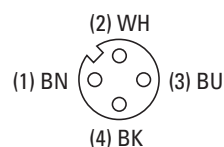
Order No.
05.00.6012.5536.00M5
05.00.6012.5536.002M


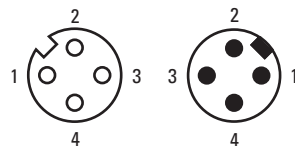
Connection Technology

M12 Connection Technology Profibus-DP

Bus cable, pre-assembled, 4-pin, Profibus-DP power supply (Working temperature range -30°C ... +90°C)

Coupling, PUR/PVC cable 	straight, single-ended, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 2 m 6 m 10 m	<i>Order No.</i> 05.WAK4-2/S90 05.WAK4-6/S90 05.WAK4-10/S90
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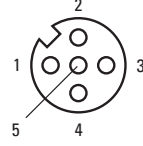
Coupling, PUR/PVC cable 	right-angle, single-ended, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 2 m 6 m 10 m	<i>Order No.</i> 05.WWAK4-2/S90 05.WWAK4-6/S90 05.WWAK4-10/S90
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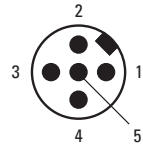
M12 connector + M12 coupling, PUR/PVC cable 	straight, IP67, metal / plastic housing 	<i>suitable for our series:</i> 5858 / 5878 5868 / 5888 9080	<i>cable length</i> 2 m 5 m 10 m	<i>Order No.</i> 05.WAK4-2-WAS4/S90 05.WAK4-5-WAS4/S90 05.WAK4-10-WAS4/S90
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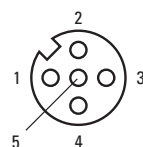
Connection Technology


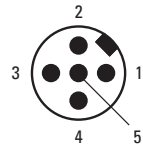
M12 Connection Technology CANopen / DeviceNet


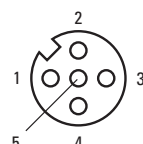
Connectors, self-assembly, 5-pin


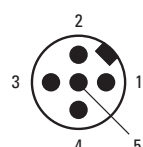
<p>Coupling, Bus in</p> 	<p>straight, IP67, plastic housing</p>  <p>screw connections, for cable ø 6 ... 8 mm</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>F3658 / F3678</td> <td>M3658 / M3678</td> </tr> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> <tr> <td>IS40 / IS60</td> <td></td> </tr> </table>	F3658 / F3678	M3658 / M3678	5858 / 5878	5860	5868 / 5888	9080	IS40 / IS60		<p><i>Order No.</i></p> <p>05.B-8151-0/9</p>
F3658 / F3678	M3658 / M3678										
5858 / 5878	5860										
5868 / 5888	9080										
IS40 / IS60											

<p>Connector, Bus out</p> 	<p>straight, IP67, metal / plastic housing</p>  <p>screw connections, for cable ø 6 ... 8 mm</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>F3658 / F3678</td> <td>M3658 / M3678</td> </tr> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> <tr> <td>IS60</td> <td></td> </tr> </table>	F3658 / F3678	M3658 / M3678	5858 / 5878	5860	5868 / 5888	9080	IS60		<p><i>Order No.</i></p> <p>05.BS-8151-0/9</p>
F3658 / F3678	M3658 / M3678										
5858 / 5878	5860										
5868 / 5888	9080										
IS60											


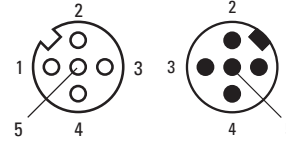
<p>Coupling, Bus in</p> 	<p>straight, IP67, metal housing</p>  <p>screw connections, for cable ø 6 ... 8 mm</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>F3658 / F3678</td> <td>M3658 / M3678</td> </tr> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> </table>	F3658 / F3678	M3658 / M3678	5858 / 5878	5860	5868 / 5888	9080	<p><i>Order No.</i></p> <p>8.0000.5116.0000</p>
F3658 / F3678	M3658 / M3678								
5858 / 5878	5860								
5868 / 5888	9080								


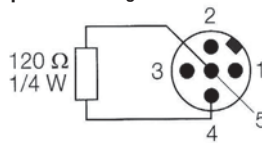
<p>Connector, Bus out</p> 	<p>straight, IP67, metal housing</p>  <p>screw connections, for cable ø 6 ... 8 mm</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>F3658 / F3678</td> <td>M3658 / M3678</td> </tr> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> </table>	F3658 / F3678	M3658 / M3678	5858 / 5878	5860	5868 / 5888	9080	<p><i>Order No.</i></p> <p>8.0000.5111.0000</p>
F3658 / F3678	M3658 / M3678								
5858 / 5878	5860								
5868 / 5888	9080								

<p>Coupling, Bus in</p> 	<p>right-angle, IP67, plastic housing</p>  <p>screw connections, for cable ø 4 ... 8 mm</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>F3658 / F3678</td> <td>M3658 / M3678</td> </tr> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> </table>	F3658 / F3678	M3658 / M3678	5858 / 5878	5860	5868 / 5888	9080	<p><i>Order No.</i></p> <p>05.B-8251-0/9</p>
F3658 / F3678	M3658 / M3678								
5858 / 5878	5860								
5868 / 5888	9080								

<p>Connector, Bus out</p> 	<p>right-angle, IP67, metal / plastic housing</p>  <p>screw connections, for cable ø 4 ... 8 mm</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>F3658 / F3678</td> <td>M3658 / M3678</td> </tr> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> </table>	F3658 / F3678	M3658 / M3678	5858 / 5878	5860	5868 / 5888	9080	<p><i>Order No.</i></p> <p>05.BS-8251-0/9</p>
F3658 / F3678	M3658 / M3678								
5858 / 5878	5860								
5868 / 5888	9080								

Accessories

<p>T-junction, coupling – coupling – connector</p> 	<p>IP67, metal / plastic housing</p> 	<p><i>suitable for:</i></p> <p>M12 connector and coupling</p>	<p><i>Order No.</i></p> <p>05.FKM5-FKM5-FSM5</p>
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<p>Terminating resistor</p> 	<p>IP67, plastic housing</p>  <p>120 Ω 1/4 W</p>	<p><i>suitable for our series:</i></p> <table border="0"> <tr> <td>5858 / 5878</td> <td>5860</td> </tr> <tr> <td>5868 / 5888</td> <td>9080</td> </tr> </table>	5858 / 5878	5860	5868 / 5888	9080	<p><i>Order No.</i></p> <p>05.RSE 57 TR2</p>
5858 / 5878	5860						
5868 / 5888	9080						

Connection Technology

M12 Connection Technology CANopen / DeviceNet

DeviceNet – Bus cable, pre-assembled, 5-pin (Working temperature range -30°C ... +80°C)


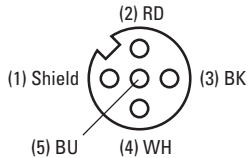
Coupling, PUR cable, Bus in

straight, single-ended, IP67, metal / plastic housing

suitable for our series: 5860, 9080, IS60

cable length: 6 m, 10 m, 15 m

Order No.: 05.00.6021.2211.006M, 05.00.6021.2211.010M, 05.00.6021.2211.015M


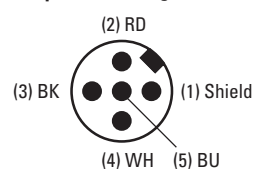
Connector, PUR cable, Bus out

straight, single-ended, IP67, metal / plastic housing

suitable for our series: 5860, 9080, IS60

cable length: 6 m, 10 m, 15 m

Order No.: 05.00.6021.2411.006M, 05.00.6021.2411.010M, 05.00.6021.2411.015M


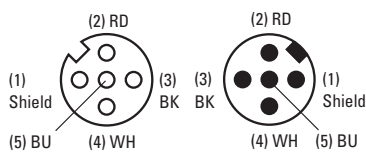
Connector + coupling, PUR cable, Bus in / out

straight, IP67, metal / plastic housing

suitable for our series: 5860, 9080

cable length: 2 m, 4 m, 10 m

Order No.: 05.00.6021.2422.002M, 05.00.6021.2422.004M, 05.00.6021.2422.010M


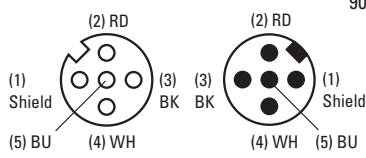
Connector + coupling, PUR cable, Bus in / out

right-angle, IP67, metal / plastic housing

suitable for our series: 5860, 9080

cable length: 2 m, 6 m

Order No.: 05.00.6021.2523.002M, 05.00.6021.2523.006M

CANopen – Bus cable, pre-assembled, 5-pin (Working temperature range -30°C ... +80°C)


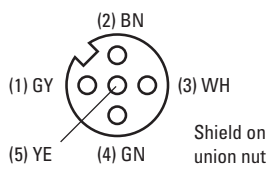
Coupling, PVC cable, Bus in

straight, single-ended, IP67, metal housing

suitable for our series: M3658 / M3678, 5858 / 5878, 5868 / 5888

cable length: 2 m, 5 m, 10 m, 15 m

Order No.: 8.0000.6V88.0002, 8.0000.6V88.0005, 8.0000.6V88.0010, 8.0000.6V88.0015


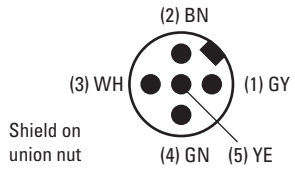
Connector, PVC cable, Bus out

straight, single-ended, IP67, metal housing

suitable for our series: M3658 / M3678, 5858 / 5878, 5868 / 5888

cable length: 2 m, 5 m, 10 m, 15 m


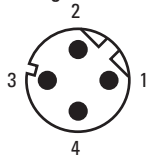
Order No.: 8.0000.6V81.0002, 8.0000.6V81.0005, 8.0000.6V81.0010, 8.0000.6V81.0015


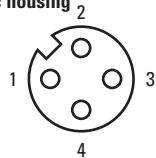




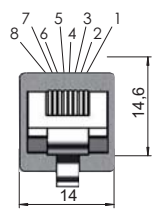
Connection Technology

M12 and RJ45 Connection Technology EtherCat


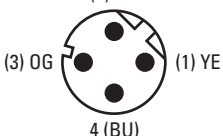
Connectors, self-assembly, 4-pin

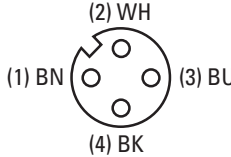
<p>M12 connector, Port A and B</p> 	<p>straight, D-coded, IP67, metal housing</p>  <p>screw connections, for cable ø 4 ... 9 mm</p>	<p><i>suitable for our series:</i> 5858 / 5878 5868 / 5888</p>	<p><i>Order No.</i> 05.WASCSY4S</p>
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<p>M12 coupling, power supply</p> 	<p>straight, IP67, plastic housing</p>  <p>screw connections, for cable ø 4 ... 6 mm</p>	<p><i>suitable for our series:</i> 5858 / 5878 5868 / 5888</p>	<p><i>Order No.</i> 05.B8141-0</p>
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<p>RJ45 connector</p> 	<p>straight, IP20, plastic housing</p>  <p>screw connections, for cable ø 4.5 ... 8 mm</p>	<p><i>suitable for:</i> EtherCat Bus cable</p>	<p><i>Order No.</i> 05.VS-08-RJ45-5-Q/IP20</p>
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Cordsets, pre-assembled, 4-pin (Working temperature range -30°C ... +80°C)

<p>M12 connector, PUR cable, Port A and B</p> 	<p>straight, D-coded, single-ended, IP67, metal / plastic housing (2) WH (3) OG (1) YE 4 (BU)</p> 	<p><i>suitable for our series:</i> 5858 / 5878 5868 / 5888</p>	<p><i>cable length</i> 2 m 5 m 10 m</p>	<p><i>Order No.</i> 05.00.6031.4411.002M 05.00.6031.4411.005M 05.00.6031.4411.010M</p>
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<p>M12 coupling PUR cable, power supply</p> 	<p>straight, single-ended, IP67, metal / plastic housing (2) WH (1) BN (3) BU 4 (BK)</p> 	<p><i>suitable for our series:</i> 5858 / 5878 5868 / 5888</p>	<p><i>cable length</i> 2 m 5 m 10 m</p>	<p><i>Order No.</i> 05.WAK4-2/S90 05.WAK4-5/S90 05.WAK4-10/S90</p>
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Connection Technology

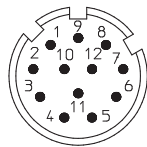
M23 Connection Technology Standard

Connectors, self-assembly, 12-pin

Coupling, male



**pin assignment ccw
IP67, metal housing**



Solder connections,
for cable ø 5.5 ... 10.5 mm

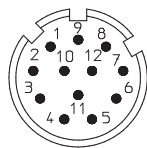
suitable for:
Versions with cable outlet

Order No.
8.0000.5011.0000

Plug connector with coupling thread



**pin assignment ccw
IP67, metal housing**



Solder connections,
for cable ø 5.5 ... 10.5 mm

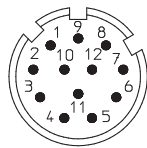
suitable for:
Versions with cable outlet

Order No.
8.0000.5015.0001

**Plug connector with coupling thread,
central fastening**



**pin assignment ccw
IP67, metal housing**



Solder connections,
for cable ø 5.5 ... 10.5 mm

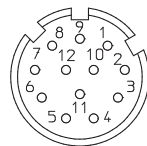
suitable for:
Versions with cable outlet

Order No.
8.0000.5015.0000

Coupling



**pin socket assignment cw
IP67, metal housing**



Solder connections,
for cable ø 5.5 ... 10.5 mm

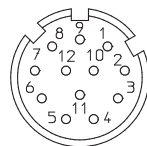
suitable for our series:
5000 / 5020 5814 / 5834
580X / 582X 585X / 587X
586X / 588X 9000
908X A02X

Order No.
8.0000.5012.0000

Coupling, Ex zone 2/22



**pin socket assignment cw
IP67, metal housing**



Solder connections,
for cable ø 5.5 ... 10.5 mm

suitable for our series:
5000 / 5020 5814 / 5834
580X / 582X 585X / 587X
586X / 588X 9000
908X A02X

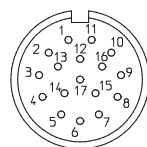
Order No.
8.0000.5012.0000.Ex

Connectors, self-assembly, 17-pin

Coupling



**pin socket assignment ccw
IP67, metal housing**



Solder connections,
for cable ø 5.5 ... 10.5 mm

suitable for our series:
5850 / 5870
with parallel interface

Order No.
8.0000.5042.0000

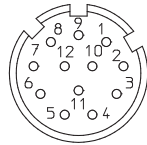
M23 Connection Technology Standard

Cordsets, pre-assembled, 12-pin, for incremental encoders (Working temperature range -30°C ... +80°C)



Coupling, PUR cable
(10 x 0.14 mm² + 2 x 0.5 mm²)

pin socket assignment cw
IP67, metal housing



<i>suitable for our series:</i>	<i>cable length</i>
5000 / 5020 5814 / 5834	2 m
580X / 582X 9000	5 m
(Push-Pull output)	10 m
	15 m

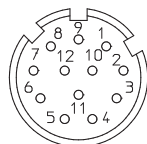
<i>Order No.</i>
8.0000.6101.0002
8.0000.6101.0005
8.0000.6101.0010
8.0000.6101.0015

PIN:	1	2	3	4	5	6	7	8	9	10	11	12
cable colour:	PK	BN	BU	RD	GN	YE	-	GY	-	WH 0.5 mm ²	WH	BN 0.5 mm ²



Coupling, PVC cable
(12 x 0.14 mm²)

pin socket assignment cw
IP67, metal housing



<i>suitable for our series:</i>	<i>cable length</i>
5000 / 5020 5814 / 5834	2 m
580X / 582X 9000	5 m
(Push-Pull output)	10 m
	15 m

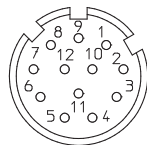
<i>Order No.</i>
8.0000.6201.0002
8.0000.6201.0005
8.0000.6201.0010
8.0000.6201.0015

PIN:	1	2	3	4	5	6	7	8	9	10	11	12
cable colour:	PK	RD-BU	BU	RD	GN	YE	-	GY	-	WH	GY-PK	BN



Coupling, PVC cable
(6 x 2 x 0.14 mm²)

pin socket assignment cw
IP67, metal housing



<i>suitable for our series:</i>	<i>cable length</i>
5000 / 5020 5814 / 5834	2 m
580X / 582X 9000	5 m
(RS422 or SinCos interface)	10 m
	15 m

<i>Order No.</i>
8.0000.6901.0002
8.0000.6901.0005
8.0000.6901.0010
8.0000.6901.0015

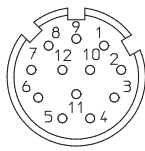
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
cable colour:	PK	RD-BU	BU	RD	GN	YE	-	GY	-	WH	GY-PK	BN

M23 Connection Technology Standard

Cordsets, pre-assembled, 12-pin, for absolute encoders



**pin socket assignment cw
IP67, metal housing**



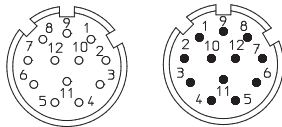
suitable for our series:		cable length
5850 / 5870	5853 / 5873	2 m
5863 / 5883	5862 / 5882	5 m
9081	(SSI- or analogue interface)	10 m
		15 m

Order No.
8.0000.6901.0002.0031
8.0000.6901.0005.0031
8.0000.6901.0010.0031
8.0000.6901.0015.0031

PIN:	1	2	3	4	5	6	7	8	9	10	11	12
cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU



**pin socket assignment cw / pin assign-
ment ccw, IP67, metal housing**



suitable for our series:		cable length
5850 / 5870	5853 / 5873	2 m
5863 / 5883	5862 / 5882	5 m
9081	(SSI- interface)	10 m
		15 m

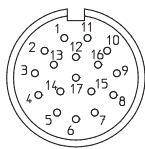
Order No.
8.0000.6905.0002.0032
8.0000.6905.0005.0032
8.0000.6905.0010.0032
8.0000.6905.0015.0032

PIN:	1	2	3	4	5	6	7	8	9	10	11	12
cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU

Cordsets, pre-assembled, 17-pin, for absolute encoders



**Pin socket assignment ccw
IP67, metal housing**



suitable for our series:		cable length
5850 / 5870	5852 / 5872	2 m
	(Parallel interface)	5 m
		10 m
		15 m

Order No.
8.0000.6741.0002
8.0000.6741.0005
8.0000.6741.0010
8.0000.6741.0015

PIN:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	WH-GN	BN-GN	WH-YE	YE-BN	WH-GY

Connection Technology

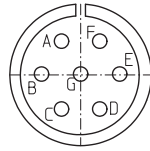
MIL-approved connection technology	Standard
-------------------------------------------	-----------------

Connectors, self-assembly, 7-pin			
-----------------------------------------	--	--	--

Coupling



straight, IP67, metal housing



Solder connections,
for cable ø 5 ... 8 mm

suitable for our series:
580X, 582X

Order No.

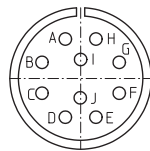
8.0000.5052.0000

Connectors, self-assembly, 10-pin			
------------------------------------------	--	--	--

Coupling



straight, IP67, metal housing










Solder connections,
for cable ø 5 ... 8 mm

suitable for our series:
580X, 582X, 5000, 5020





Order No.

8.0000.5062.0000

Connection Technology

Cable		Unprepared, cut to length		
12 core + shield				
PUR electronic trailing cable halogen-free 	Cross section 10 x 0.14 mm ² + 2 x 0.5 mm ² Permanent working temp. range flexible installation -30°C ... +80°C secure installation -50°C ... +90°C Bending radius flexible installation min. 50 mm secure installation min. 35 mm Cable diameter approx. 6.9 ±0.3 mm	<i>suitable for:</i> robust incremental encoders	<i>Order No.</i> 8.0000.6100.XXXX ¹⁾	
	PVC electronic cable LiVCY 	Cross section 12 x 0.14 mm ² Permanent working temp. range flexible installation -5°C ... +70°C secure installation -30°C ... +80°C Bending radius flexible installation min. 100 mm secure installation min. 70 mm Cable diameter approx. 6.7 ±0.2 mm	<i>suitable for:</i> incremental encoders Standard cable	<i>Order No.</i> 8.0000.6200.XXXX ¹⁾
TPE electronic cable (TP) halogen-free 	Cross section 5 x 2 x 0.14 mm ² + 2 x 0.5 mm ² Permanent working temp. range flexible installation -40°C ... +110°C secure installation -60°C ... +135°C Bending radius flexible installation min. 90 mm secure installation min. 70 mm Cable diameter approx. 8.5 ±0.4 mm	<i>suitable for:</i> high temperatures or voltages Sine wave encoders	<i>Order No.</i> 8.0000.6E00.XXXX ¹⁾	
	PVC electronic cable LiVCY (TP) 	Cross section 6 x 2 x 0.14 mm ² Permanent working temp. range flexible installation -5°C ... +70°C secure installation -30°C ... +80°C Bending radius flexible installation min. 110 mm secure installation min. 75 mm Cable diameter approx. 7.3 ±0.2 mm	<i>suitable for:</i> absolute encoders with SSI or 4 ... 20 mA interface, twisted pair conductors	<i>Order No.</i> 8.0000.6900.XXXX ¹⁾
5 core + shield				
PVC electronic cable LiVCY 	Cross section 5 x 0.14 mm ² Permanent working temp. range flexible installation -5°C ... +70°C secure installation -30°C ... +80°C Bending radius flexible installation min. 75 mm secure installation min. 75 mm Cable diameter approx. 4.7 ±0.2 mm	<i>suitable for:</i> incremental encoders without inversions	<i>Order No.</i> 8.0000.6300.XXXX ¹⁾	
	PUR trailing cable halogen-free, flame resistant 	Cross section 8 x 0.14 mm ² Permanent working temp. range flexible installation -20°C ... +80°C secure installation -40°C ... +80°C Bending radius flexible installation min. 65 mm secure installation min. 45 mm Cable diameter approx. 5.5 ±0.2 mm	<i>suitable for:</i> Limes, 365X, 368X SSI and analogue	<i>Order No.</i> 8.0000.6P00.XXXX ¹⁾
18 core + shield				
PVC electronic cable LiVCY 	Cross section 18 x 0.14 mm ² Permanent working temp. range flexible installation -5°C ... +70°C secure installation -30°C ... +80°C Bending radius flexible installation min. 120 mm secure installation min. 100 mm Cable diameter approx. 7.8 ±0.2 mm	<i>suitable for:</i> absolute encoders with parallel interface, twisted pair conductors	<i>Order No.</i> 8.0000.6700.XXXX ¹⁾	

1) XXXX = cable length in meters (e.g. 10 m = 0010)

Cable		Unprepared, cut to length		
Profibus-DP Cable				
PUR outer jacket, PE wire insulation  	Cross section	10 x 0.14 mm ² + 2 x 0.5 mm ²	<i>suitable for:</i> robust incremental encoders	<i>Order No.</i> 05.KABEL451.XXX¹⁾
	Permanent working temp. range	flexible installation -30°C ... +70°C secure installation -50°C ... +90°C		
	Bending radius	flexible installation min. 70 mm secure installation min. 50 mm		
	Cable diameter	approx. 6.9 ±0.2 mm		
DeviceNet Cable				
PUR outer jacket, PE wire insulation  	Cross section	10 x 0.14 mm ² + 2 x 0.5 mm ²	<i>suitable for:</i> robust incremental encoders	<i>Order No.</i> 05.KABEL5723.XXX¹⁾
	Permanent working temp. range	flexible installation -30°C ... +70°C secure installation -50°C ... +90°C		
	Bending radius	flexible installation min. 70 mm secure installation min. 50 mm		
	Cable diameter	approx. 6.9 ±0.2 mm		

1) XXX = cable length in meters (e.g. 10 m = 010)

Optical fibre signal transmission

RS422/HTL

Optical fibre transmitter and receiver

eco plus

Cost advantage compared to conventional wiring over 150 m length*



The solution for tough signal transmission.

The system is made up of an optical fibre transmitter and an optical fibre receiver. The optical fibre transmitter converts the electrical signals of a normal incremental encoder into a light signal for transmission by means of an optical fibre.

The receiving module converts the optical signal back into electrical signals. Up to 4 channels with inverted signals may be transmitted safely.

Innovative

- Signal transmission thanks to a simple glass fibre
- Safe signal transmission up to 1000 m
- Input frequency up to 400 kHz
- Input level 10 ... 30 V or RS422
- Inverted input signals
- Resists extremely strong electro-magnetical fields

Application areas

- Process control technology and automation technology
- Applications sensitive to interference
- High voltage plants

Compact

- Can be installed even where space is tight
- Minimal installation depth, diameter 70 mm
- Compact cable outlet

- Plants with long transmission distances
- Potential separation
- Explosive areas

Order code

Optical fibre transmitter / receiver

6.LWLX.X
a b

a
S = Optical fibre transmitter
E = Optical fibre receiver

b Output circuit / Power supply
 1 = RS422 / 10 ... 30 V DC
 2 = HTL, without inverted signals / 10 ... 30 V DC
 (only for optical fibre transmitter)
 4 = RS422 / 5 V DC
 5 = HTL / 10 ... 30 V DC, output

Scope of delivery:
 - Optical fibre module
 - Multilingual operating manual

Optical fibre transmitter versions can be combined with any version of the optical fibre receivers.

Accessories

Simplex Patch cable
ST-ST - Multimode



Connector:
 2 x ST/PC, Optical fibre:
 1 x 50/125

05.B09-B09-821-XXXX

XXXX = Length in m
 Standard lengths: 2 m, 5 m,
 8 m, 10 m, 15 m, 20 m, ...
 (in 5 m steps)

ST Multimode coupling



Barrel: ceramic, slotted

05.LWLK.001

* Comparison of costs:
 Costs per meter standard copper cable compared to costs per meter optical fibre signal cable + costs of transmitter + costs of receiver

Connection Technology

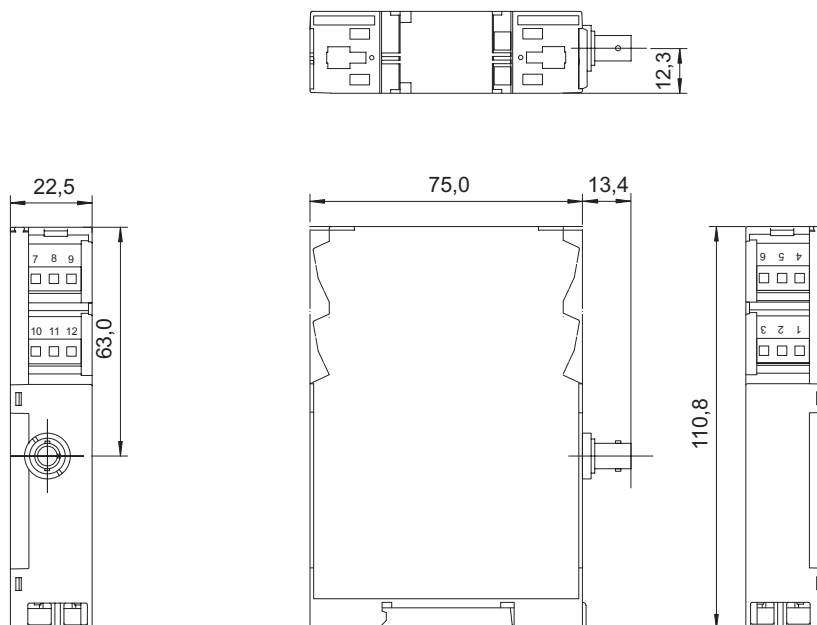
Optical fibre signal transmission RS422/HTL Optical fibre transmitter and receiver

Technical data			
Supply voltage	10 ... 30 V or 5 V ±5%	Glass fibre	multimode fibre, 50/125 µm, 62,5/125 µm
Power consumption per module	< 2 W	Input signals sampling rate	10 MSamples/s
Operating voltage reverse connection protection	available	Optical fibre transmission distance	max. 1000 m
Encoder inputs optical fibre transmitter channels	A, \bar{A} , B, \bar{B} , 0, $\bar{0}$	Dimensions (W x L x H)	22,5 x 110,8 x 88,4 mm
Max. input frequency optical fibre transmitter and output frequency optical fibre receiver	400 kHz	Protection	IP40, terminals IP20
Input level optical fibre transmitter	10 ... 30 V or RS 422	Terminals	protected against contact 2,5 mm ²
Optical wavelength	820 nm	Temperature range	-10°C ... +60°C
Optical transmission rate	120 Mbit/s	Weight	approx. 95 g
Optical fibre synchronisation display	LED on the receiver	Standards	EN 55 011 Class B1 EN 61 000-6-2: 2006
Optical fibre connection	ST connector, 13 mm, ø 9 mm, on the bottom side of the housing		

Terminal assignment

Channel	\bar{A}	\bar{B}	$\bar{0}$ (\bar{C})	A	B	0 (C)	\bar{D}	+U _B	D	0 V, GND <small>linked internally</small>
Pin	1	2	3	4	5	6	7	8	10	9, 11, 12

Dimensions



Optical fibre signal transmission

SSI

Optical fibre transmitter and receiver

eco plus

Cost advantage compared to conventional wiring over 150 m length*



Optical fibre transmission system for SSI absolute encoders

The system is made up of an optical fibre transmitter and an optical fibre receiver.

The optical fibre transmitter converts the electrical signals of a normal absolute encoder with Synchronous Serial Interface (SSI) into a light signal for transmission by means of an optical fibre. The receiving module converts the optical signal back into electrical signals. Absolute signals can be transmitted safely through one glass fibre over distances of up to 1500 m.

The resolution of 13 bit for a singleturn encoder or 25 bit for a multiturn encoder can be defined by means of a DIP-switch on the front side of the module.

Reliable transmission

- Safe signal transmission up to 1500 m
- Resists extremely strong electro-magnetic fields

Application areas

- Process control technology and automation technology
- Applications sensitive to interference
- High voltage plants

Easy installation

- Signal transmission via a single glass fibre.
- Resolution of 13 bit or 25 bit can be set via DIP-switch
- LED for monitoring of power supply, clock and date
- DIN-rail mounting – requires min. installation space – only 22 mm wide

- Plants with long transmission distances
- Potential separation
- Explosive areas

Order code

Optical fibre transmitter / receiver

LWL X . AX
a b

a
S = Optical fibre transmitter
E = Optical fibre receiver

b Supply voltage
 1 = 10 ... 30 V DC
 4 = 5 V DC

Scope of delivery:

- Optical fibre module
- Operating manual, dual language, German and English

Accessories

Simplex Patch cable ST-ST - Multimode



Connector:
 2 x ST/PC, Optical fibre:
 1 x 50/125

05.B09-B09-821-XXXX

XXXX = Length in m
 Standard lengths: 2 m, 5 m,
 8 m, 10 m, 15 m, 20 m, ...
 (in 5 m steps)

ST Multimode coupling



Barrel: ceramic, slotted

05.LWLK.001

* Comparison of costs:
 Costs per meter standard copper cable compared to costs per meter optical fibre signal cable + costs of transmitter + costs of receiver

Connection Technology

Optical fibre signal transmission SSI Optical fibre transmitter and receiver

Technical data		Glass fibre	
Supply voltage	10 ... 30 V DC or 5 V DC \pm 5%		multimode fibre, 50/125 μ m, 62.5/125 μ m
Power consumption per module	U_B 10 ... 30 V DC max 1.6 W U_B 5 V DC max 0.8 W	Max. optical fibre transmission distance	max. 1500 m
Operating voltage reverse connection protection	available	Dimensions	(W x L x H) 22.5 x 110.8 x 88.4 mm
Encoder inputs optical fibre transmitter	-T, +T and -D, +D	Protection	IP40, terminals IP20
SSI clock rate	500 kHz fixed setting	Terminals	protected against contact 2.5 mm ² max. conductor diameter
Optical wavelength	820 nm (infrared)	Temperature range	-10°C ... +60°C
Optical transmission rate	120 Mbit/s	Weight	approx. 100 g
Optical fibre connection	ST connector, 13 mm, \varnothing 9 mm, on the bottom side of the housing	Standards	EN 55 011 Class B1 EN 61 000-6-2: 2006

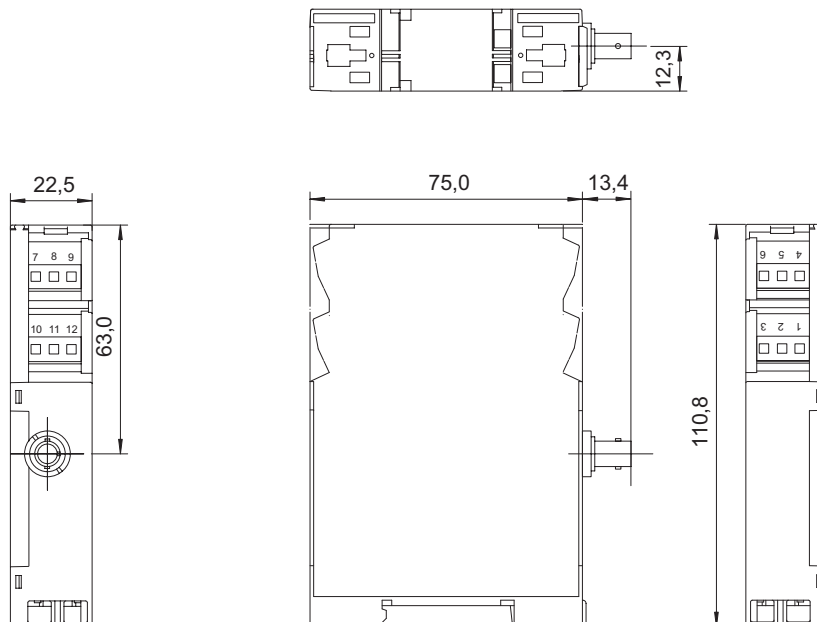
Connection diagram Optical fibre transmitter

Pin	Signal
1	0 V (GND)
2	+ U_B
3	+ T
4	- T
5	+ D
6	- D
7	0 V (GND)
8	+ U_B

Connection diagram Optical fibre receiver

Pin	Signal	
1	0 V (GND)	
2	+ U_B	from power supply
3	+ D	
4	- D	to controller
5	+ T	
6	- T	from controller
7	emitter (-)	
8	collector (+)	optocoupler output alarm output

Dimensions





Accessories

			Page
Encoder mounting attachments	Fixing components for hollow shaft encoders	Overview	318
		Details	320
	Fixing components for shaft encoders	Overview	325
		Details	326
<hr/>			
Robust bearing unit	Suitable for Sendix 50xx and 58xx		331
<hr/>			
Connection of motor and encoder	Couplings	Bellows- / Spring washer-type coupling	332
	Flexible shaft coupling	Paguflex	334
<hr/>			
Bearing box			335
<hr/>			

Encoder mounting attachments	Fixing components for hollow shaft encoders	Overview
------------------------------	---------------------------------------------	----------

Fig.	Description	Pitch circle diameter	Order No.:	Details s. page	Incremental Encoders				Absolute Singleturn Encoders				Abs. Multiturn Encoders		
					3620	3720	5020	5823, 5824, 5825	3670, 3671, M3678	F3673, F3678	5873, 5878	5870, 5872	F3683, F3688	5883, 5888	5882, 5860
	Spring element, short For applications with limited axial play and low dynamics, and reduced mounting space	36XX 42 mm M36XX 42 mm F36XX 42 mm 37XX 40 mm 50XX 42 mm 58XX 42 mm	8.0010.4H00.0000 <i>Connection to the application:</i> cylindrical pin	320	X	X	X	X	X	X	X	X	X	X	X
	Spring element, long For applications with axial play and low dynamics	36XX 60 mm M36XX 60 mm F36XX 60 mm 37XX 63 mm 50XX 44 mm 58XX 65 mm	8.0010.4I00.0000 <i>Connection to the application:</i> cylindrical pin	320	X	X	X	X	X	X	X	X	X	X	X
	Fastening arm, short (flexible) For applications with axial and radial play, low dynamics	64.5 mm	8.0010.40M0.0000 <i>Connection to the application:</i> 1 screw	320			X	X		X	X		X	X	
	Fastening arm, medium (flexible) For applications with axial and radial play, for constant rotary movements	65 mm ... 91.5 mm	8.0010.40E0.0000 <i>Connection to the application:</i> 1 screw	320			X	X		X	X		X	X	
	Fastening arm, long (flexible) For applications with axial and radial play, and low dynamics	80 mm ... 170 mm	8.0010.4R00.0000 <i>Connection to the application:</i> 1 screw	321			X	X		X	X		X	X	
	Stator coupling, double-winged For applications with axial and radial play, and high dynamics	46 mm	8.0010.4C00.0000 <i>Connection to the application:</i> 2 screws	321	X	X			X	X			X		
	Stator coupling, double-winged For applications with high demands for accuracy	63 mm	8.0010.4D00.0000 <i>Connection to the application:</i> 2 screws	321				Flange C+D	X			X	X	X	X
	Stator coupling, for fixing to side of encoder For standard applications with axial and radial play, and high dynamics	65 mm	8.0010.1602.0000 <i>Connection to the application:</i> 3 screws	322				Flange C+D	X			X	X	X	X
	Stator coupling, for fixing to front of encoder For applications with axial and radial play, and high dynamics	65 mm	8.0010.40L0.0000 <i>Connection to the application:</i> 3 screws	322			X	X				X	X	X	X
	Spring tether element For applications with low axial and radial play, and low dynamics	42 mm ... 84.5 mm	8.0010.40W0.0000 <i>Connection to the application:</i> 1 screw	322			X	X				X	X	X	X

Accessories

Encoder mounting attachments		Fixing components for hollow shaft encoders			Overview		
Fig.	Description	Pitch circle diameter	Order No.:	Details s. page	A020	A02H	9080, 9081
	Spring element, short For applications with reduced mounting space	76 mm	8.0010.4J00.0000 <i>Connection to the application:</i> cylindrical pin	323	X	X	X
	Spring element, long For applications with high axial play	110 mm	8.0010.4K00.0000 <i>Connection to the application:</i> cylindrical pin	323	X	X	X
	Tether square For applications with axial and radial play with low dynamics for constant rotary movements	9080: 120 mm 9081: 120 mm	8.0010.4G00.0000 <i>Connection to the application:</i> 1 screw	323			X
	Fastening arm, short For applications with axial play	149 mm	8.0010.4T00.0000 <i>Connection to the application:</i> s. details	323	X	X	X
	Fastening arm, long For applications with fastening points located on variable pitch circle diameters	104 mm ... 206 mm	8.0010.4E00.0000 <i>Connection to the application:</i> 1 screw	324	X	X	X
	Tether arm, long For applications with low axial and radial play, flexible in use	Length = 70 mm : Length = 100 mm : Length = 150 mm : 262 mm ... 422 mm	8.0010.40S0.0000 8.0010.40T0.0000 8.0010.40U0.0000 <i>Connection to the application:</i> 1 screw	324	X	X	X
	Stator coupling For applications with axial and radial play, and high dynamics	119 mm	8.0010.40V0.0000 <i>Connection to the application:</i> 2 screws	324	X	X	

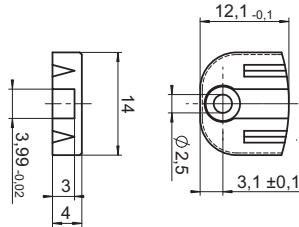
Accessories

Encoder mounting attachments Fixing components for hollow shaft encoders Details

Dimensions / Details

Spring element, short

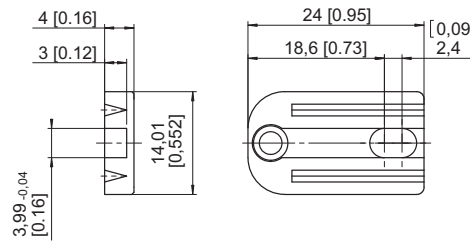
- Scope of delivery:*
- spring element (plastic)
 - 1 screw for fixing to the encoder
- Connection to application:*
- cylindrical pin (8.0010.4700.0000) (not supplied)



Order-No.
8.0010.4H00.0000

Spring element, long

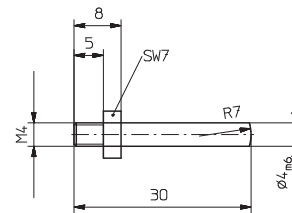
- Scope of delivery:*
- spring element (plastic)
 - 1 screw for fixing to the encoder
- Connection to application:*
- cylindrical pin (8.0010.4700.0000) (not supplied)



Order-No.
8.0010.4I00.0000

Cylindrical pin, long with fastening thread

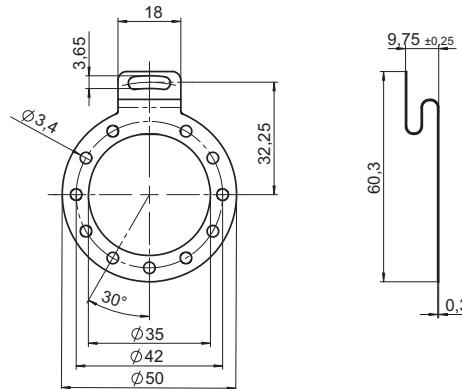
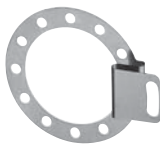
- suitable for spring element short (8.0010.4H00.0000) and long (8.0010.4I00.0000)



Order-No.
8.0010.4700.0000

Fastening arm, short

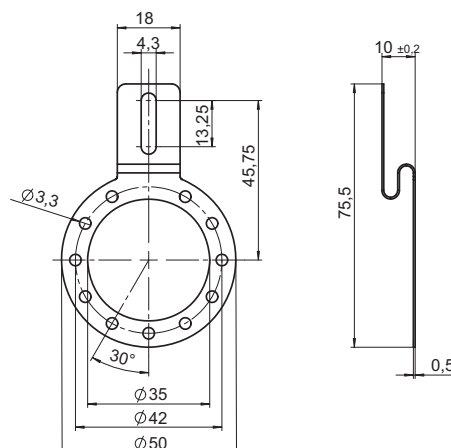
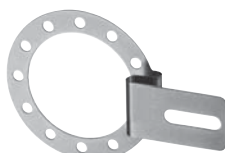
- Scope of delivery:*
- Fastening arm (stainless steel)
 - 3 screws for fixing to the encoder
- Connection to application:*
- 1 screw (not supplied)



Order-No.
8.0010.40M0.0000

Fastening arm, medium

- Scope of delivery:*
- Fastening arm (stainless steel)
 - 3 screws for fixing to the encoder
- Connection to application:*
- 1 screw (not supplied)



Order-No.
8.0010.40E0.0000

Accessories

Encoder mounting attachments Fixing components for hollow shaft encoders Details

Dimensions / Details

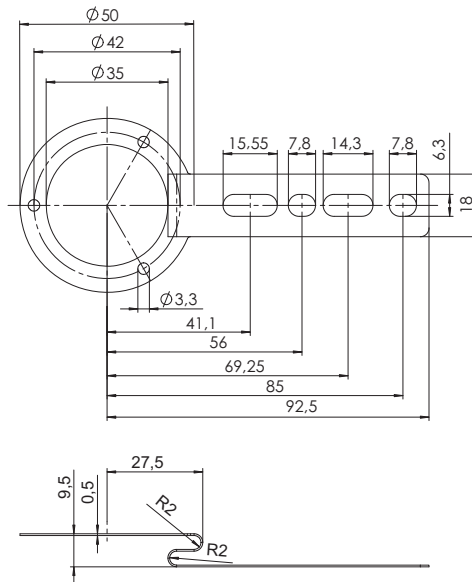
Fastening arm, long

Scope of delivery:

- Fastening arm (stainless steel)
- 3 screws for fixing to the encoder

Connection to application:

- 1 screw (not supplied)



Order-No.

8.0010.4R00.0000

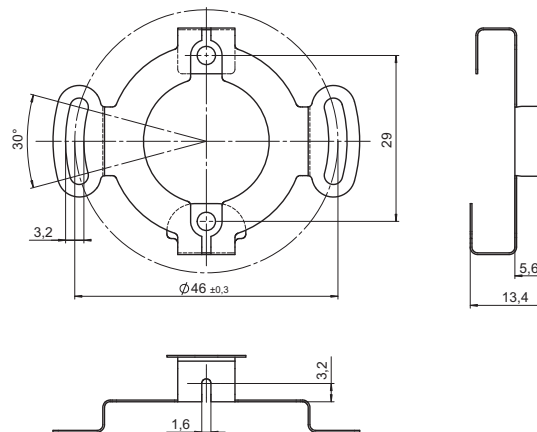
Stator coupling, double-winged for front fixing onto the encoder flange

Scope of delivery:

- Stator coupling (stainless steel)
- 2 screws for fixing to the encoder

Connection to application:

- 2 screws (not supplied)



Order-No.

8.0010.4C00.0000

Stator coupling, double-winged for side fixing onto the encoder flange

Scope of delivery:

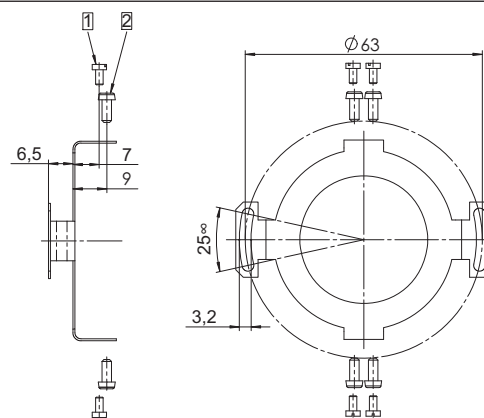
- Stator coupling (stainless steel)

- 1 4 screws M2 x 4 mm for fixing to the encoder 5882

- 2 4 screws M2.5 x 6 mm for fixing to the encoders 582X, 587X, 502X

Connection to application:

- 2 socket head screws M3 x 8 with washer (supplied)



Order-No.

8.0010.4D00.0000

Accessories

Encoder mounting attachments Fixing components for hollow shaft encoders Details

Dimensions / Details

Stator coupling, for side fixing onto the encoder flange

Scope of delivery:

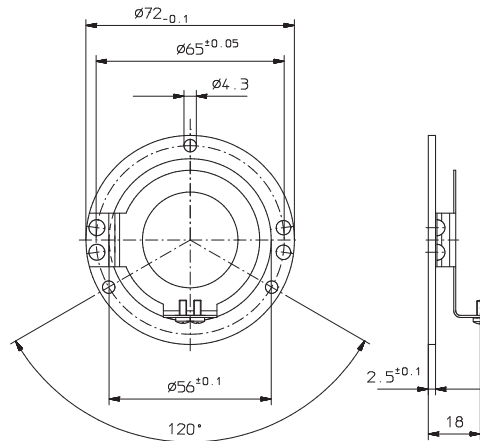
- Stator coupling (stainless steel)

1 2 screws M2 x 4 mm for fixing to the encoder 5882

2 2 screws M2.5 x 6 mm for fixing to the encoders 582X, 587X, 502X

Connection to application:

- 3 screws (not supplied)



Order-No.

8.0010.1602.0000

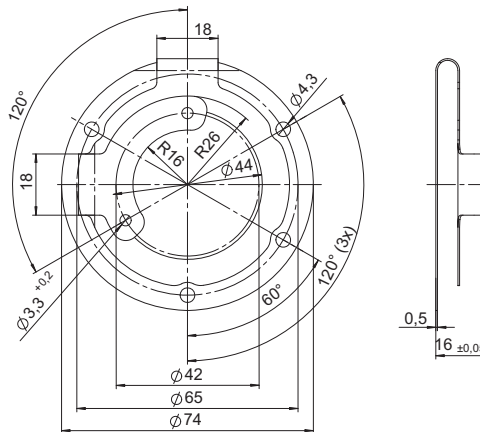
Stator coupling, for front fixing onto the encoder flange

Scope of delivery:

- Stator coupling (stainless steel)
- 2 screws for fixing to the encoder

Connection to application:

- 3 screws (not supplied)



Order-No.

8.0010.40L0.0000

Spring tether element

Scope of delivery:

- Spring tether element
- 1 screw for fixing to the encoder

Connection to application:

- 1 screw (not supplied)

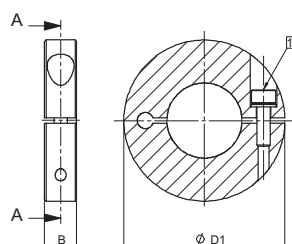


Order-No.

8.0000.40W0.0000

Clamping ring

Stainless steel, for high rotational speeds



	for encoder	B	D1	for hollow shaft ø
582X		6 mm	25 mm	6 mm
		6 mm	27 mm	8 mm
		6 mm	29 mm	10 mm
		6.2 mm	30 mm	12 mm
5020		6.2 mm	30 mm	12 mm

Order-No.

8.0000.4T00.0000

8.0000.4U00.0000

8.0000.4V00.0000

8.0000.4W00.0000

8.0000.4W01.0000

1 screw DIN 912 A2 M2.5, max. tightening torque 0.45 Nm

Accessories

Encoder mounting attachments Fixing components for hollow shaft encoders Details

Dimensions / Details

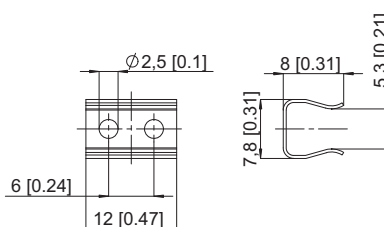
Spring element, short

Scope of delivery:

- spring element (stainless steel)
- 2 screws for fixing to the encoder

Connection to application:

- cylindrical pin (8.0010.4700.0003) (not supplied)



Order-No.

8.0010.4J00.0000

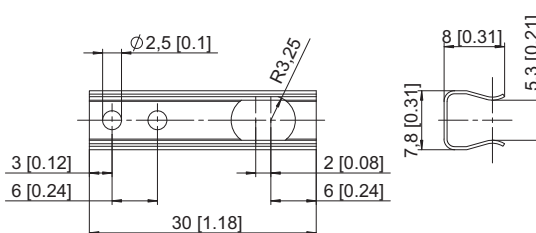
Spring element, long

Scope of delivery:

- Spring element (stainless steel)
- 2 screws for fixing to the encoder

Connection to application:

- cylindrical pin (8.0010.4700.0003) (not supplied)

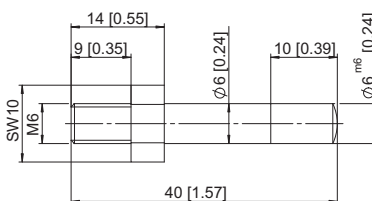


Order-No.

8.0010.4K00.0000

Cylindrical pin, long with fastening thread

suitable for spring element short (8.0010.4J00.0000) and long (8.0010.4K00.0000)



Order-No.

8.0010.4700.0003

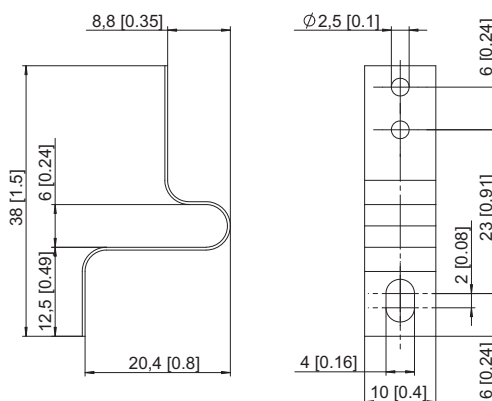
Tether square

Scope of delivery:

- tether square (stainless steel)
- 2 screws for fixing to the encoder

Connection to application:

- 1 screw (not supplied)



Order-No.

8.0010.4G00.0000

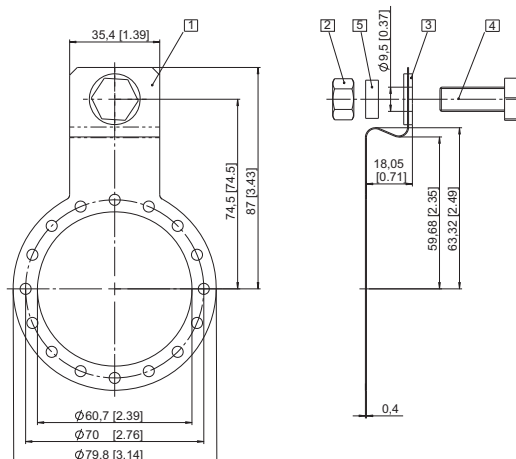
Fastening arm, short

Scope of delivery:

- 1 Fastening arm (stainless steel)
- 3 screws for fixing to the encoder

Connection to application:

- 2 Hexagonal nut 3/8 - 16 UNC
- 3 Washer (isolating)
- 4 Hexagonal screw 3/8 16 UNC x 1"
- 5 Washer D10.4 x 15 x 15 (supplied)



Order-No.

8.0010.4T00.0000

Accessories

Encoder mounting attachments Fixing components for hollow shaft encoders Details

Dimensions / Details

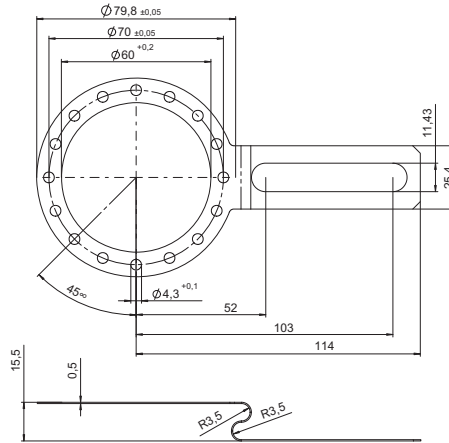
Fastening arm, short

Scope of delivery:

- Fastening arm (stainless-steel)
- 3 screws for fixing to the encoder

Connection to application:

- 1 screw (not supplied)



Order-No.

8.0010.4E00.0000

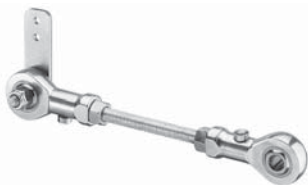
Tether arm, long

Scope of delivery:

- Tether arm
- 1 2 Socket cap screws M2.5 x 6
- 2 2 Lock washers for fixing to the encoder

Connection to application:

- 1 screw (not supplied)



L1	L2
70 [2.76]	88 [3.46]
100 [3.94]	118 [4.65]
150 [5.91]	168 [6.61]

Order-No.

8.0010.40S0.0000

8.0010.40T0.0000

8.0010.40U0.0000

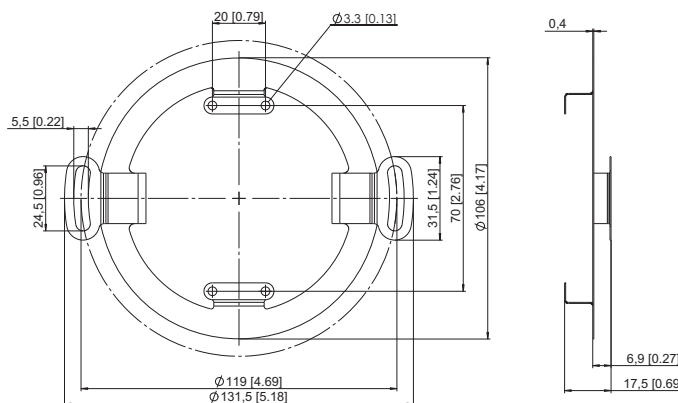
Stator coupling

Scope of delivery:

- Stator coupling (stainless steel)
- 4 screws for fixing to the encoder

Connection to application:










- 2 screws (not supplied)



Order-No.

8.0010.40V0.0000

Accessories

Encoder mounting attachments		Fixing components for shaft encoders				Overview					
Fig.	Description	Order-No.	Details s. page	Incremental Encoders			Abs. Singleturn Encoders		Abs. Multiturn Encoders		
				5000	5803, 5804, 5805	7030	5853, 5858	5850, 5852	7053, 7058, 7031	5863, 5868	5862, 5860
	Flange, square Suitable for shaft encoders with clamping flange <input type="checkbox"/> 58.0 mm, 4 mm thick <input type="checkbox"/> 63.5 mm, 3 mm thick <input type="checkbox"/> 70.0 mm, 10 mm thick <input type="checkbox"/> 80.0 mm, 4 mm thick	8.0010.2100.0000	326	X	X		X	X	X	X	
		8.0010.2120.0000	326	X	X		X	X	X	X	
		8.0010.2600.0000	326	X	X		X	X	X	X	
		8.0010.2800.0000	326	X	X		X	X	X	X	
	Flange, ø 70 mm Suitable for shaft encoders with clamping flange 5 mm thick 10 mm thick	8.0010.2200.0000	327	X	X		X	X	X	X	
		8.0010.2500.0000	327	X	X		X	X	X	X	
	Flange ø 65 mm With this adapter flange, Kübler encoders with size 58 mm can replace encoders with diameter 65 and pitch circle diameter 48 mm	8.0010.2230.0000	327	X	X		X	X	X	X	
	Flange, ø 115 mm Euroflange	8.0010.2160.0000	328	X	X		X	X	X	X	
		8.0010.2170.0000				X		X		X	
	Flange, ø 58 mm Converts encoders with a clamping flange into synchro flange.	8.0010.2180.0000	328	X	X		X	X	X	X	
	Flange, ø 90 mm Mechanically compatible with former encoder Type 9000	8.0010.2270.0000	328	X	X		X	X	X	X	
	Angular flange 80 mm x 80 mm x 40 mm	8.0010.2300.0000	329	X	X		X	X	X	X	
	Assembly bell Electrical and thermal isolation by means of glass fibre reinforced plastic and isolating spring washer coupling – supplied as complete set	8.0000.4500.XXY	329	X	X		X	X	X	X	
	Fastening eccentrics For shaft encoders with synchronous flange. Use at least three fastening eccentrics to mount the encoder.	8.0010.4200.0000	330	see table page 330							
		8.0010.4100.0000									

Accessories

Encoder mounting attachments Fixing components for shaft encoders Details

Dimensions / Details

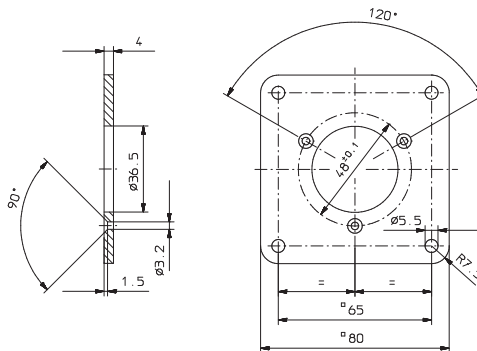
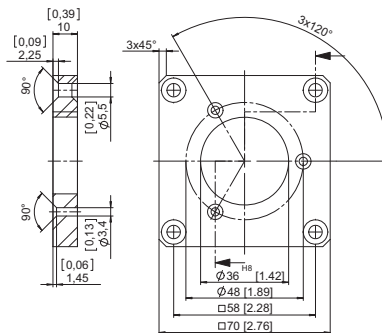
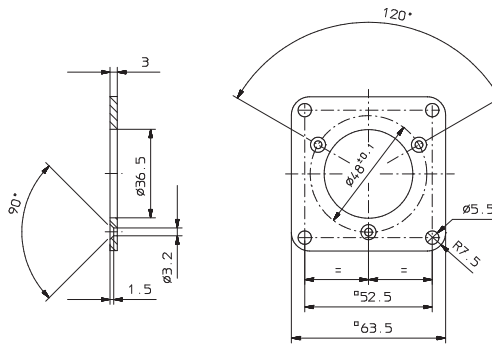
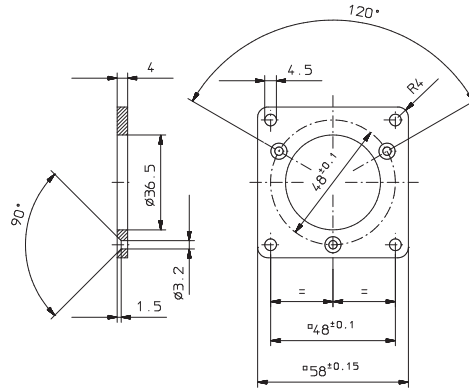
Flange, square

Scope of delivery:

- flange (aluminium)
- 3 screws for fixing to the encoder

Connection to application:

- 4 screws (not supplied)



Order-No.

8.0010.2100.0000

Order-No.

8.0010.2120.0000

Order-No.

8.0010.2600.0000

Order-No.

8.0010.2800.0000

Accessories

Encoder mounting attachments Fixing components for shaft encoders Details

Dimensions / Details

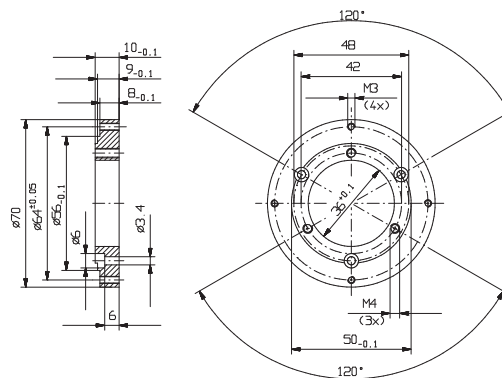
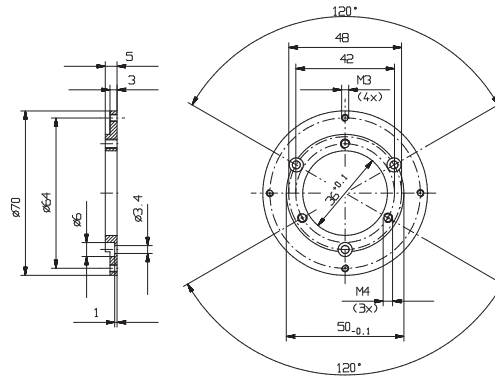
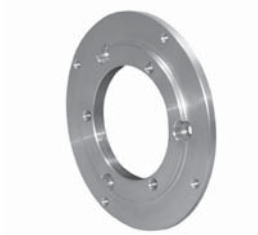
Flange, ø 70 mm

Scope of delivery:

- flange (aluminium)
- 3 screws for fixing to the encoder

Connection to application:

- 4 screws (not supplied)



Order-No.

8.0010.2200.0000

Order-No.

8.0010.2500.0000

Flange, ø 65 mm

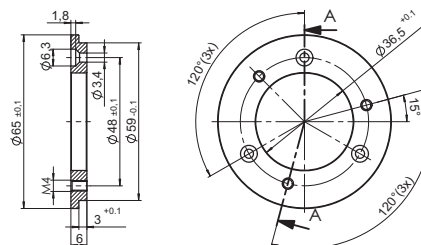
With this adapter flange, Kübler encoders with size 58 mm can replace encoders with diameter 65 and pitch circle diameter 48 mm.

Scope of delivery:

- flange (aluminium)
- 3 screws for fixing to the encoder

Connection to application:

- 3 screws (not supplied)



Order-No.

8.0010.2230.0000

Accessories

Encoder mounting attachments Fixing components for shaft encoders Details

Dimensions / Details

Flange, ø 115 mm, Euroflange (Euro REO 444)

- Scope of delivery:*
- flange (aluminium)
 - 3 screws for encoder mounting

Connection to application:

- 6 screws (not supplied)

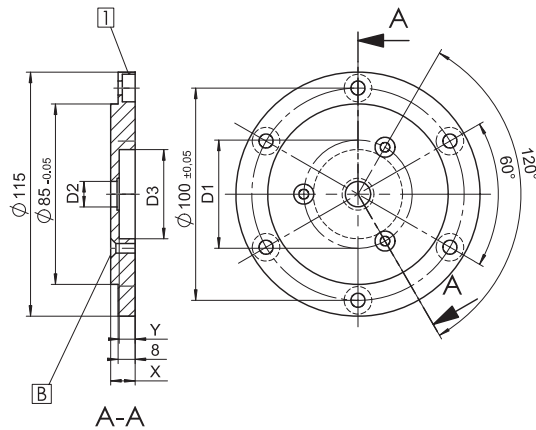
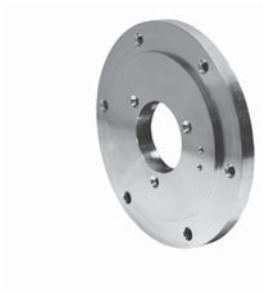
encoder type	D1	D2	D3	X	Y	B
580X/5000	48	36	58	11	1	DIN 74-BM3
70XX	51	12	42	11.5	7.5	DIN 74-BM4

Order-No.

8.0010.2160.0000

8.0010.2170.0000

- 1** countersunk DIN 74-Hm6
- B** see table



Flange, ø 58 mm

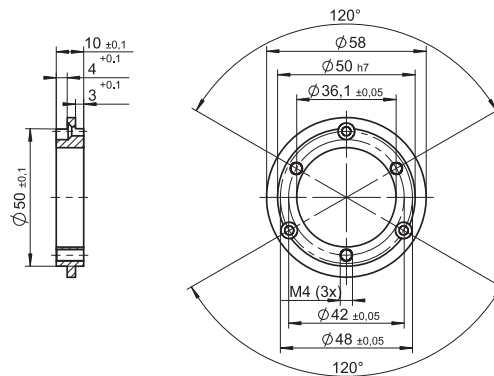
Converts encoders with a clamping flange into synchro flange.

Scope of delivery:

- flange (aluminium)
- 3 screws for encoder mounting

Connection to application:

- 3 screws (not supplied)



Order-No.

8.0010.2180.0000

Flange, ø 90 mm

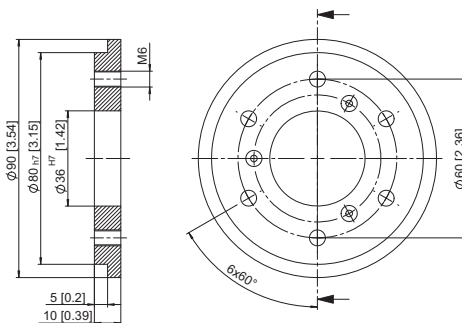
Mechanically compatible with former encoder Type 9000

Scope of delivery:

- flange
- 3 screws for encoder mounting

Connection to application:

- 6 screws (not supplied)



Order-No.

8.0010.2270.0000

Accessories

Encoder mounting attachments Fixing components for shaft encoders Details

Dimensions / Details

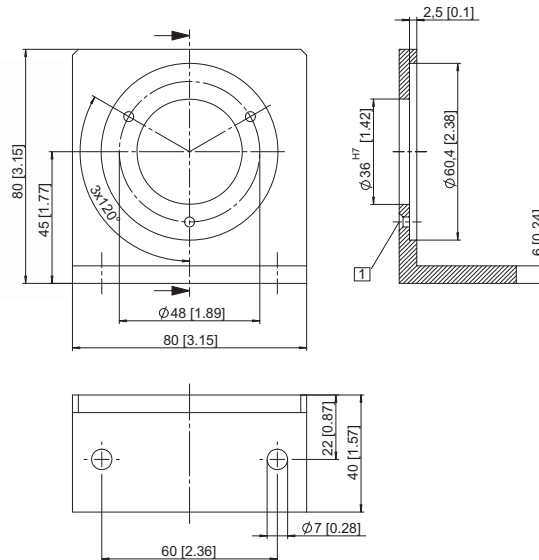
Angular flange

Scope of delivery:

- angular flange (aluminium)
- 3 screws for encoder mounting

Connection to application:

- 2 screws (not supplied)



1 countersunk DIN 74-Hm6

Order-No.

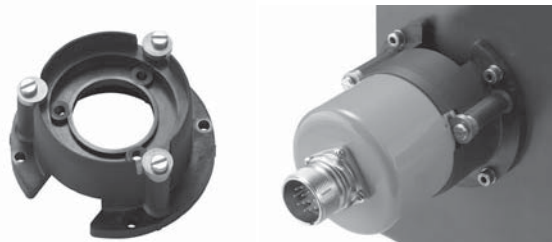
8.0010.2300.0000

Assembly bell

- Easy and quick encoder mounting
- Electrical and thermal isolation by means of glass fibre reinforced plastic and isolating spring washer coupling
- Supplied as complete set

Scope of delivery:

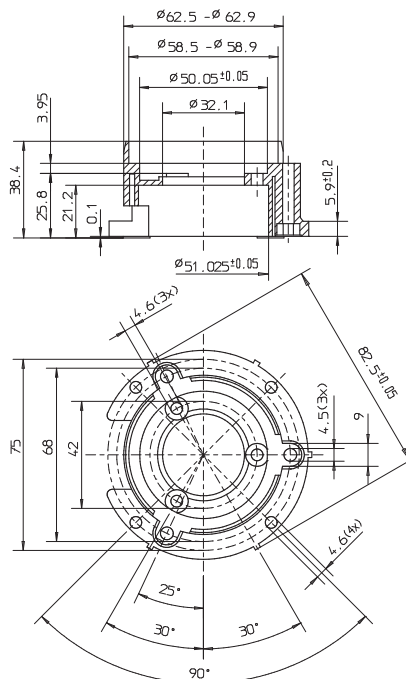
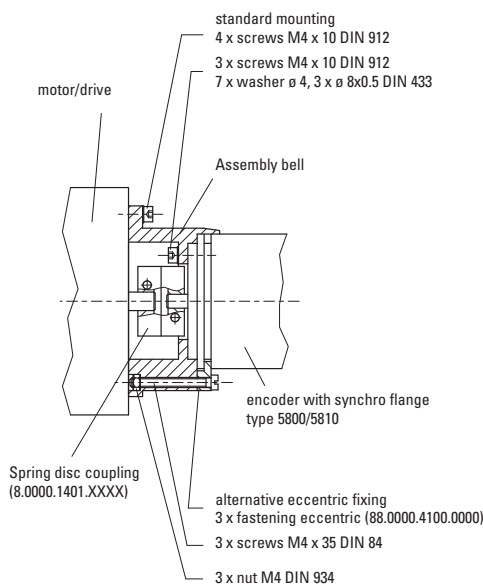
- Assembly bell
- Spring washer type coupling (8.0000.1401.XXXX)
- 4 hexagon socket head cap screws DIN 912 M4 x 12
- 3 hexagon socket head cap screws DIN 912 M4 x 10
- 7 washers DIN 433 ϕ 4
- 3 fastening eccentrics (8.0000.4B00.0000)
- 3 hexagon head screws DIN 84 M 4 x 35
- 3 hexagon nuts DIN 934 - M4



Order-No.

8.0000.4500.XXYY

XX = Coupling diameter
d1 in mm
YY = Coupling diameter
d2 in mm



Encoder mounting attachments	Fixing components for shaft encoders	Details
------------------------------	--------------------------------------	---------

Dimensions / Details

Fastening eccentrics

for encoders with synchro flange

- Suitable for Kübler encoders with synchro flange
- Material ACu Zn 39 Pb 3
- Surface finish: galvanized Ni

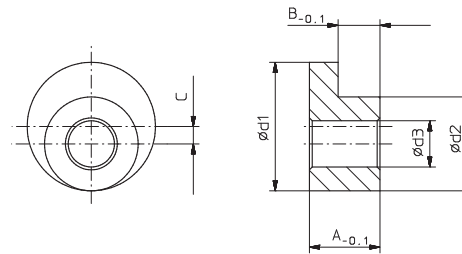
Scope of delivery:

- 3 eccentrics
- 3 screws

(Use at least three fastening eccentrics to mount the encoder)

<i>encoder type</i>	<i>D1</i>	<i>D2</i>	<i>D3</i>	<i>A</i>	<i>B</i>	<i>C</i>
3610 3651 M3658 F3653 / F3658 F3663 / F3668	6.8	5	2.8	3.5	2.25	0.9
5000 5803 / 5804 / 5805 5853 / 5858 5863 / 5868 5850 / 5852 7053 / 7058 7063 / 7068	8.9	6.5	3.2	5.6	2.9	1.2

Order-No.
8.0010.4200.0000
8.0010.4100.0000



Accessories

Robust bearing unit Suitable for Sendix 50xx and 58xx



Quick and simple – More protection

Separating the bearing load and the sensor technology affords the encoder greater protection in harsh environments.

Retrofitting to all encoders with a 58 mm clamping flange is very easy and quick.



Shock / vibration resistant



Temperature



High IP value



High shaft load capacity

Order-No. 8.0010.8200.000C

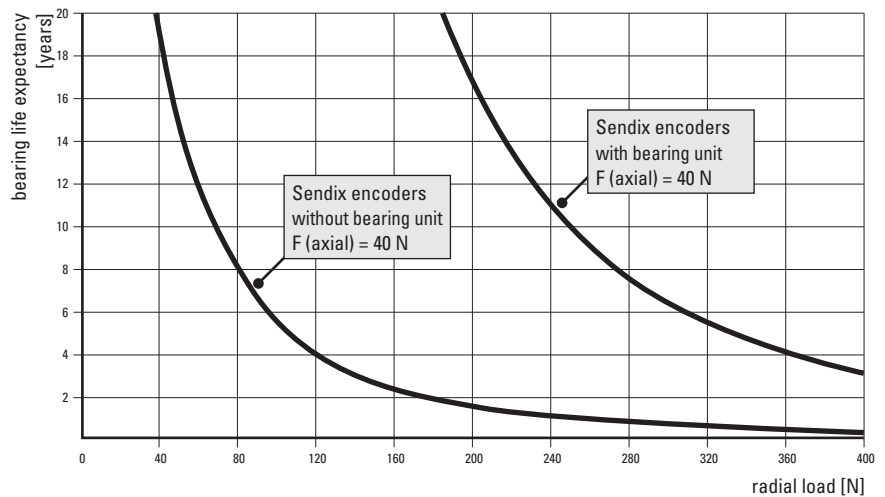
Robust bearing unit

(matching shaft encoders with clamping flange and shaft 10 mm)

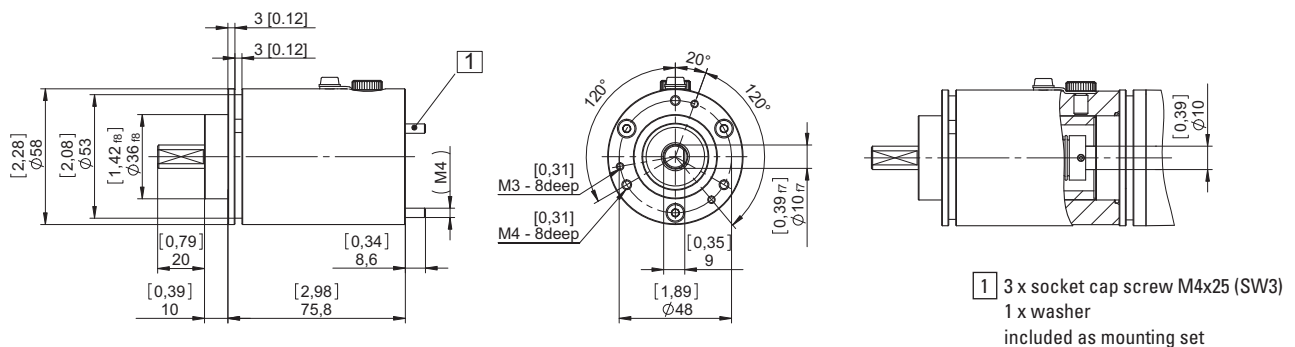
Technical Data	
Speed	max. 6.000 min ⁻¹
Weight	ca. 560 g
Protection	IP67
Material	housing aluminium (seawater resistant)
	shaft stainless steel

Bearing life expectancy L10

at 3,000 revolutions/min with continuous operation



Dimensions



Accessories

Connection of motor and encoder	Couplings	Bellows and spring washer couplings
----------------------------------------	------------------	--------------------------------------------



Bellows couplings provide cost-effective connection of the motor and encoder. They are also able to correct any angular errors between the drive and encoder.

Spring washer couplings are used with high speeds.

Order code	8.0000 . 1 X 01 . XX XX					
Couplings	Type	a	b	c		
a Type of coupling						
1 = Bellows-type \varnothing 19 mm						
2 = Bellows-type \varnothing 15 mm						
3 = Spring washer type, \varnothing 30 mm, one-part						
4 = Spring washer type, \varnothing 30 mm, three part, plug-in						
5 = Bellows-type \varnothing 25 mm						
b Bore diameter d1 (see technical data)						
Note: for the bore diameter						
d1 = 3/8" please enter Code A1						
d1 = 1/4" please enter Code A2						
c Bore diameter d2 (see technical data)						
Example a): d1 = 10 mm and d2 = 12 mm						
Order-No. = 8.0000.1X01.1012						
Example b): d1 = 3/8" and d2 = 10 mm						
Order-No. = 8.0000.1X01.A110						

Technical data						
Type		8.0000.1101.XXXX	8.0000.1201.XXXX	8.0000.1301.XXXX	8.0000.1401.XXXX	8.0000.1501.XXXX
Max. speed	min ⁻¹	12000	12000	12000	12000	12000
Max. torque	Ncm	150	50	80	60	200
Max. radial displacement	mm	± 0.2	± 0.2	± 0.4	± 0.3	± 0.2
Max. angular displacement	°	± 1.5	± 1.5	± 3	± 2.5	± 1.5
Max. axial displacement	mm	± 0.7	± 0.5	± 0.4	± 0.4	± 0.6
Torsion spring parameter	Ncm/°	700	210	265	55	1300
Moment of inertia	gcm ²	5.5	1.2	19	35	18
working temperature	°C	-30 ... +120	-30 ... +120	-30 ... +120	-10 ... +80	-30 ... +120
Weight approx.	g	14	6	16	30	24
Material flange		Al	Al	Al Cu Mg Pb	zinc diecast	Al
Bellow or spring washer/casing		stainless steel	stainless steel	Cu Sn 6 nickel-plated	PA 6.6 20% gf	stainless steel
Diameter d/d1 from ... to	mm	3...12	3...9	3...8	4...16	3...16
Max. tightening torque	Ncm	150	70	80	80	180
Standard bore diameter	(d1 / d2) mm	12 / 12 12 / 10 10 / 10 6 / 6	8 / 6 6 / 6 6 / 4 4 / 4 10 / 8	6 / 6 6 / 4	12 / 12 12 / 10 10 / 10 10 / 6 6 / 6 3/8" / 10 3/8" / 6 1/4" / 10 1/4" / 6	15 / 12 14 / 12 14 / 10 6 / 14

Description and applications

Manufacturing and installation tolerances as well as the effects of temperature cause alignment errors between shafts in drive engineering which can sometimes lead to extreme overload on the bearings.

This may result in increased wear of the bearings and may lead to premature failure of the encoder. By using couplings, these alignment errors can be compensated, thereby reducing the load on the bearings to a minimum. A distinction should be made between three different kinds of alignment error: radial, angular and axial displacement.

Whilst with torsion-free but flexible shaft couplings, axial shaft displacements produce only static forces in the coupling, radial and angular displacements produce alternating stresses, restoring forces and moments which may have an impact on adjoining components (shaft bearings).

Depending on the type of coupling, particular attention should be paid to radial shaft displacement which should be kept to a minimum.

Accessories

Connection of motor and encoder

Couplings

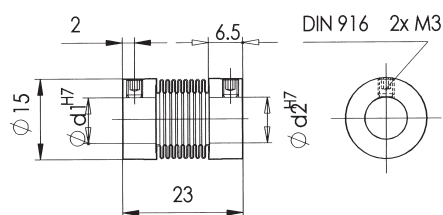
Bellows and spring washer couplings

Metal bellows-type couplings (.1101, .1201 und .1501)

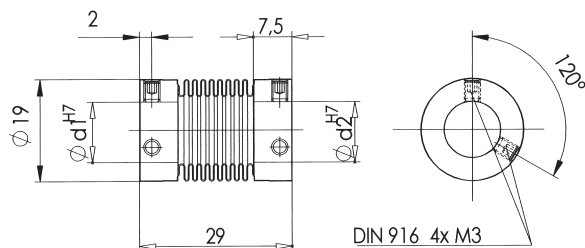
Metal bellows-type couplings are recommended as an inexpensive type of coupling. They are also suitable for compensating larger angle displacements.

Dimensions

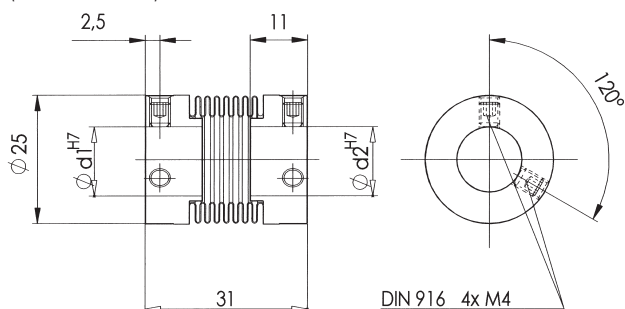
Bellows-type coupling \varnothing 15 mm
(8.0000.1201.XXXX)



Bellows-type coupling \varnothing 19 mm
(8.0000.1101.XXXX)



Bellows-type coupling \varnothing 25 mm
(8.0000.1501.XXXX)



Installation instructions:

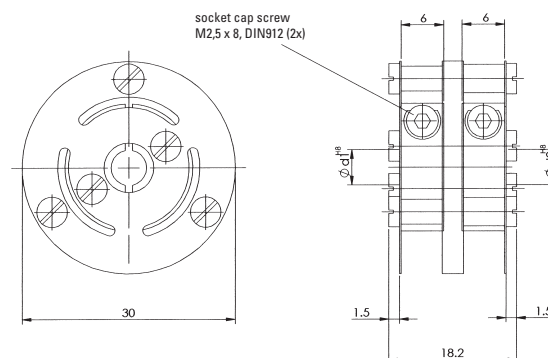
1. Check shaft for displacement; See technical data for details
2. Align and adjust coupling on shafts.
3. Tighten locking screws carefully. Avoid overtightening.
4. During installation protect the coupling from damage and from overbending.

Spring washer-type couplings (.1300 und .1401)

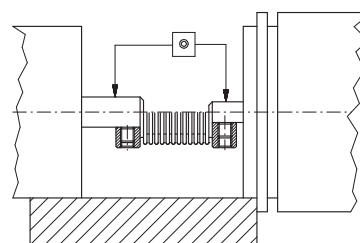
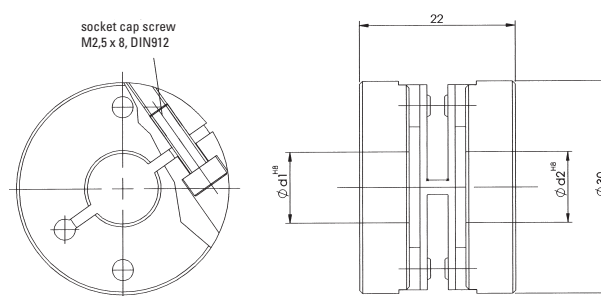
Spring washer-type couplings (.1300 and .1401) are used mainly in those cases where high speeds and smaller angular displacements are involved. For applications where electrical insulation between rotary encoder and drive is required, the electrically insulating spring washer-type coupling should be used.

Dimensions

Spring washer-type coupling, one-part
(8.0000.1301.XXXX)



Spring washer-type coupling, three part, plug-in
(8.0000.1401.XXXX)



Accessories

Connection of motor and encoder	Flexible shaft coupling	Paguflex
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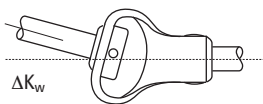
The safe, uncomplicated and economical solution, if drive shafts with angular, radial and/or axial displacement are to be friction-locked together.

Order-No.	8.0000.1G01.0606
Size 1	
Bore diameter both sides 6 mm	

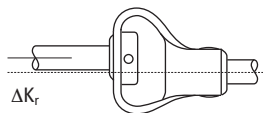
Order-No.	8.0000.1H01.1010
Size 2	
Bore diameter both sides 10 mm	

Functional principle

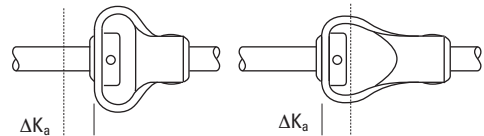
Compensation of an angular misalignment



Compensation of a radial misalignment



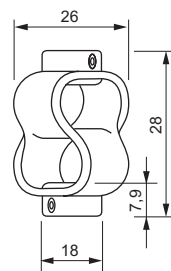
Compensation of a axial misalignment



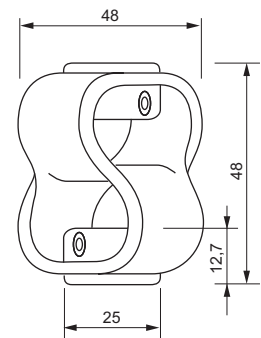
Technical data			
Type		8.0000.1G01.0606	8.0000.1H01.1010
max. torque			
with displacement $K_w \leq 1^\circ$, $K_a \leq 2 \text{ mm}$, $K_r \leq 0.5 \text{ mm}$			
	T_{Kmax1} [Nm]	0.8	3.0
max. torque			
with max. angular and radial displacement			
	T_{Kmax2} [Nm]	0.5	1.8
Compliance			
Axial misalignment	$2 \cdot \Delta K_a$ [mm]	9.0	15
Radial misalignment	ΔK_r [mm]	2.6	3.2
Angular misalignment	ΔK_w [°]	10	15
Working temperature		[°C]	-40 ... +100

Dimensions

Size 1



Size 2



Accessories

Bearing box



In applications where the encoder is driven by use of gears, chains, belts etc. and the permitted axial and radial shaft loads are exceeded, we recommend the use of the special designed bearing box which has stronger bearings.

This can be combined with all encoders with a 58 mm clamping flange and shaft dia. 10 x 20 mm.

Order-No.

8.0010.8200.0004

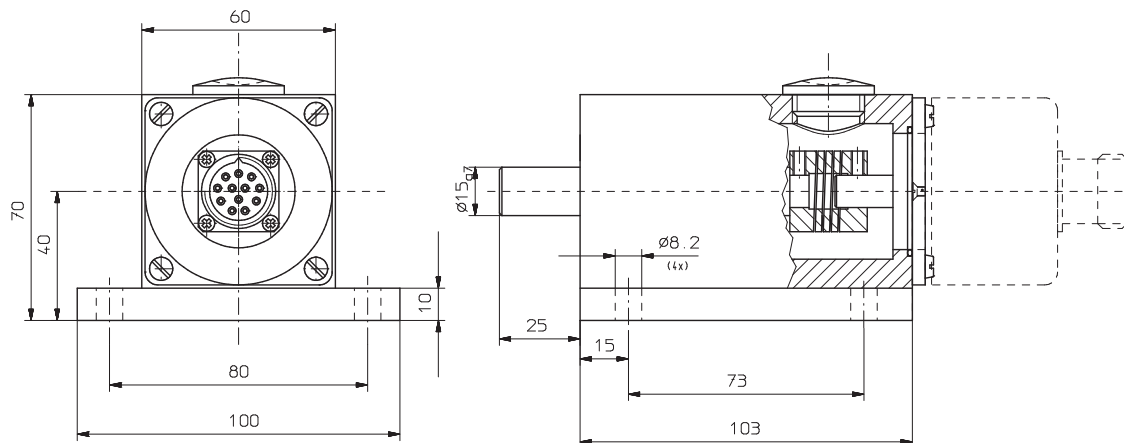
Scope of delivery

- Bearing box with lock cover and sealing
- Coupling for shaft \varnothing 10 mm
- Flange adapter 8.0010.2100.0000
- 3 x countersunk head screws DIN 63 M 3 x 8
- 4 x slotted cheese head screws DIN 84 M 4 x 8

Technical data

Shaft load	axial	150 N
	radial	250 N
Lifetime of bearings		50.000 h
Protection EN 60 529		IP65
max. speed		4000 min ⁻¹

Dimensions



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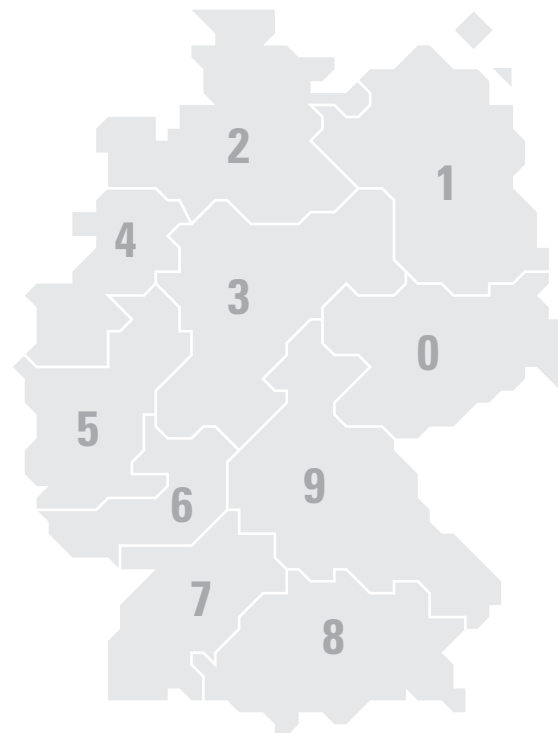
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