03 | 2009

LinearLine | Wire-Actuated Encoders

SIKO

Success is the result of a commitment to precision, innovation and customer benefit

"Precision is SIKO's top priority and standard!" True to this philosophy, SIKO has been developing and producing innovative solutions in distance and angle measurement technology for more than 45 years now. Based in Buchenbach in the foothills of the Black Forest, the company produces its own measurement technologies, which are a global success in all areas of mechanical engineering. Even today, SIKO's core concept is still manifest in its innovative power, product development and company spirit. Since taking over the business in 1990, industrial engineer Horst Wandres, son of its founder, has continued to develop this philosophy with impressive results.

Intelligent solutions

Attentive ears will always find the right solution. Automation and process optimization are the cornerstones of SIKO's ambitious new technologies and goal-oriented measurement solutions. The company pursues a clear, consistent line of development, ranging from digital position indicators and handwheels through incremental encoders, absolute encoders and measurement displays to future-oriented technologies with electronically programmable or magnetic measurement systems (MagLine).

SIKO again follows the road to success with its compact, ultra-resilient actuators (DriveLine), which enable automated adjustment of machine axles.

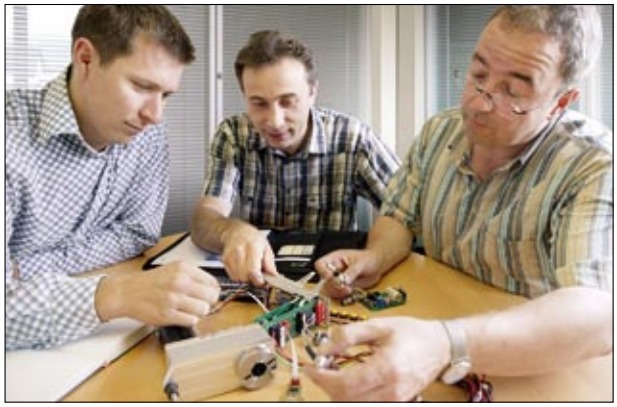
6 distinctive product lines	
PositionLine	Mechanical and electronic position indicators, handwheels with analog indicators, control knobs
RotoLine	Magnetic and optical encoders, geared potentiometers
LinearLine	Wire-actuated encoders
DriveLine	Actuators
MagLine	Magnetic length and angle measurement systems
DisplayLine	Measurement displays

Consistent teamwork

The secret of SIKO's development prowess lies in the motivation and team spirit of its workers. SIKO has a conscious policy of integrating the experiences of its 170 employees, which has a dynamic effect on all areas of company life. Outstanding individual performances blend together to enhance the efficiency of the whole organization.

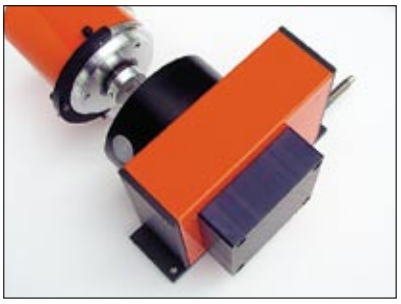
Not one for all but all together – this motto typifies SIKO's synergetic development process, delivering solutions which dominate the market in all aspects of "measurement technology in mechanical engineering".

This is SIKO today. Precision in motion, dynamic and open for the future ...



We speak the same language: At SIKO, a willingness to participate in open dialog enhances engineering performance. Our production site advantages are not interchangeable.

3.1 | Wire-Actuated Encoders



Rotary encoders made by SIKO are optimally suited to wire-actuated technology. Custom-specific encoders can also be mounted thanks to standardized mechanical “interfaces”.

3.1

The most flexible solution when the direct route goes round the corner

SIKO wire-actuated encoders are a perfect measurement solution thanks to their state-of-the-art, fail-safe technology and effortless integration. They are suitable for a wide range of measurement tasks under very varied conditions. Their sturdy design and wire types guarantee an exceptionally long, maintenance-free service life.

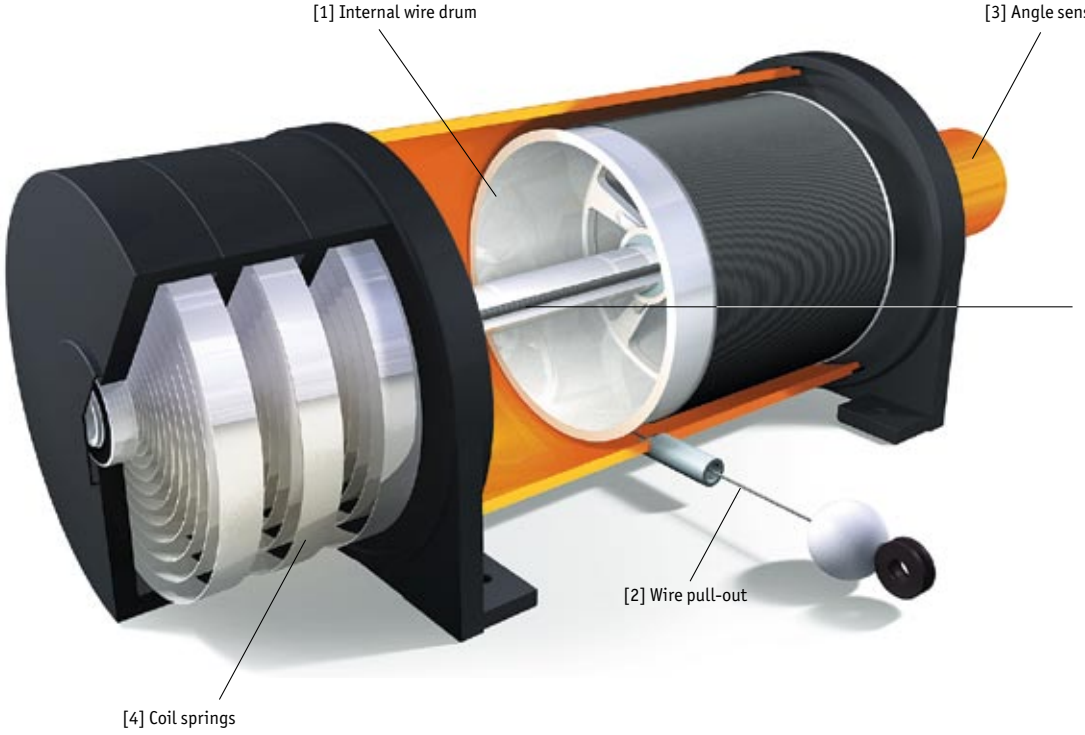
This is how the technology works

A single layer of measurement wire is wound onto an internal drum [1]. When the wire is pulled out [2], it causes the drum to rotate. The angle sensor [3] connected directly to the drum axle records this rotation and generates an arbitrarily usable measurement signal proportional to the wire movement. An integral coil spring [4] on the drum’s rotation axis guarantees a safe wire return movement (see illustration). Mounting effort is low, as the wire is simply attached to the object to be measured. This means there is no need of additional guiding systems or installation of energy supply chains. Moreover, the flexibility of the wire enables linear adjustments even at sites which are hard to reach. Indirect paths can also be measured by means of guide rollers.

A choice of incremental and absolute measuring principles is generally available. SIKO wire-actuated encoders cover almost the entire range of industrial applications - from compact versions in miniature format with a measurement length of 600 mm to solutions with wire pull-out lengths of 40 m.

Benefits

- Long service life thanks to consistent technological development and application-oriented choice of materials
- Excellent price-performance ratio
- Variable measurement lengths
- Easy adaptation of measuring transducers
- Standardized interfaces
- Problem-free, fast mounting



Special SGL feature:
As the wire is extended, the internal drum moves axially, ensuring maximum safety for guiding and rewinding the extended wire.

1

Areas of application

Measurement systems based on the "draw-wire" principle are easy to handle, since attaching the wire to the adjustment unit is quick and inexpensive.

Wire-actuated systems perform reliably on elevating platforms or forklifts without any additional mechanical protection. They are used to measure workpiece dimensions for the stop adjustment of miter saws in metal-working processes and for various measurement tasks in applications in the wood-processing industry, as illustrated here (horizontal panel saw).

SIKO's miniature encoders are the logical answer to ongoing integration in industrial products and processes. The tiny encoders have a wide range of application: They are reliable monitors of positioning tasks for patient tables (medical technology), adjustment of seats (vehicle technology) or controlled deflection of chassis (aircraft technology).

The SGL series is a modular system of wire-actuated encoders for measurement lengths of up to 40 m which finds use in stage, storage and crane technologies.

2

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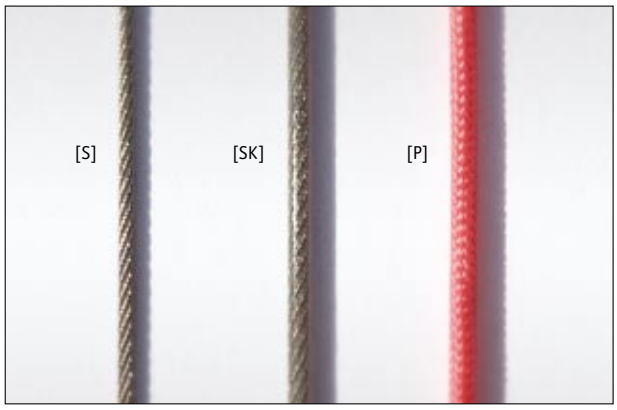
Retrofitting with a wire-actuated encoder enables direct selection of specified values for height and elevation. [2, 3] Finding the right place to deposit items is the key to a smooth workflow: Wire-actuated encoders are a reliable means of assigning predefined storage space. [4] Correct determination of workpiece dimensions by means of a wire-actuated encoder provides the basic value for cut and feed speeds on this metal saw. [5] SGP absolute wire-actuated encoder used for panel-cutting on a horizontal circular saw.

Measurement range and wire versions

Various measurement lengths and wire types are available depending on the measurement range requirements and the ambient conditions. The following table is a guide to selecting the right components (wire) when planning a linear wire measurement system.

Wire versions		Poperties compared		
Type	Material	Tensile strength	Sliding properties	Measuring accuracy
S	stainless steel	•	•	•••
SK	plastic-coated steel	••	••	••
P	electric paraline non-conducting, signal color	•••	•••	•



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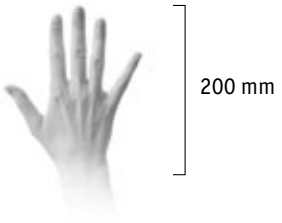
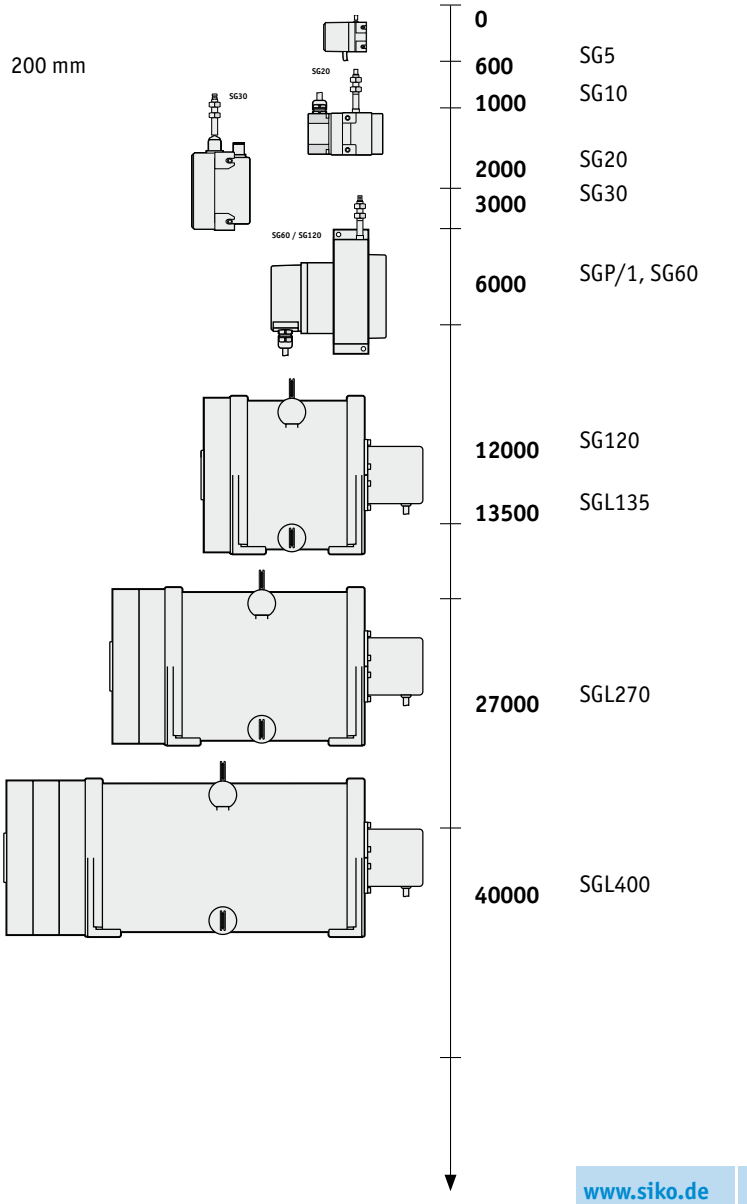
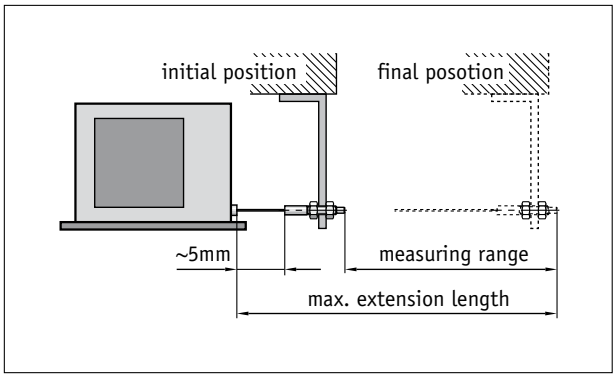




Mounting note

When attaching the wire it should be pulled out straight in line with the wire outlet.

Recommendation: A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



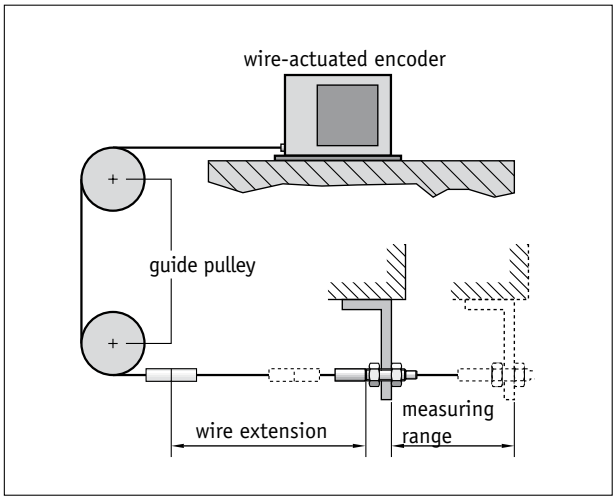
Mounting example

Guide rollers are used wherever the wire-actuated encoder cannot be installed in line with the extension direction of the wire. Several rollers can be used to redirect the wire without influencing the measurement result.

An opening slightly larger than the diameter of the wire is sufficient as a point of access at measurement sites which are hard to reach. A protective cover is recommended for use in soiled environments. Note: Mechanical stress shortens the lifespan of the wire.

A wire extension piece can be used for applications where the distance between the wire-actuated encoder and the measurement range is greater than the wire's maximum extension length. This does not extend the actual measurement range, however (see above: mounting note). This simple method is useful for measurements in areas where a sufficiently large distance is required between the wire-actuated encoder and the measured object due to high temperatures, harsh environments, measurement in liquid media, areas which are difficult to access, etc.

Detailed information on guide rollers or wire extension pieces can be found on the product page in the accessories section.

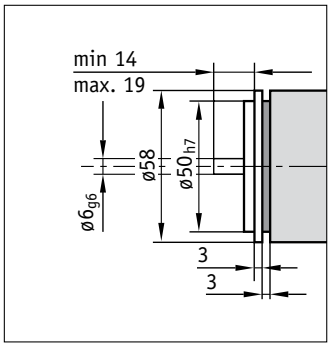


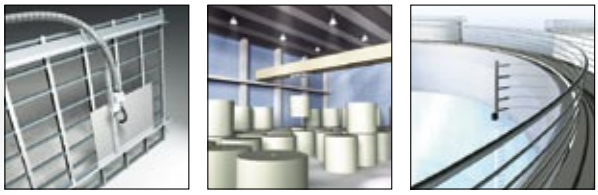
Customer-specific encoders

All rotary encoders with the following specifications can be installed on the SG60, SG120 and SGL wire-actuators (see diagram):

- 58 mm servo/synchro flange
- 6, 8 and 10 mm solid shaft*
- Maximum starting and operating torques 3 Ncm*

*depends on device: see product pages!



Application	Examples of use	Benefits
Rail-guided systems	Direct measurement of the guided element.  e.g., length stops, gantry cranes, level measurement ...	■ Little space required ■ Little assembly effort
Hydraulic cylinders	In combination with piston-guided systems or hydraulic cylinders, wire-actuated encoders use the deflection of these systems to gather length information.  e.g., presses, lifter tables, bending machines ...	■ Little space required ■ Mechanical tolerances do not influence measuring accuracy
Telescope-like systems	In combination with telescope-like systems, wire-actuated encoders can be ideally integrated and are also protected from environmental impact.  e.g., mobile cranes, vehicle hoists ...	■ Do not require guiding ■ Mechanical tolerances do not influence measuring accuracy
Chain, crane and cable winch adjustment	Direct position feedback after winch adjustment. The wire-actuated encoder can be positioned outside danger or humidity areas by means of wire extension.  e.g., forklifts, stage control systems, elevators ...  Or crane technology ...	■ Chain/wire tears are detectable ■ Mechanical tolerances do not influence measuring accuracy

Wire-Actuated Encoders

	 SG5	 SG10	 SG20	 SG30	 SGP/1	 SG60	 SG120	 SGL ...
Page	10	13	17	21	25	28	31	34
Measuring length								
0 to ... (mm)	600	2000	2000	3000	6000	6000	12000	40000
Transmitter: potentiometer								
Power output 4 ... 20 mA	•	•	•	•	•			•
Voltage output 0 ... 10 V	•	•	•	•	•			•
Potentiometer output	•	•	•	•	•			•
Transmitter: incremental rotary encoder								
Incremental output		•				•	•	•
Transmitter: absolute rotary encoder								
SSI						•	•	•
CAN bus						•	•	•
Profibus						•	•	•
Housing material								
Plastic	•	•						
Zinc die-cast/plastic			•					
Zinc die-cast				•				
Aluminum/plastic					•	•	•	
Aluminum								•

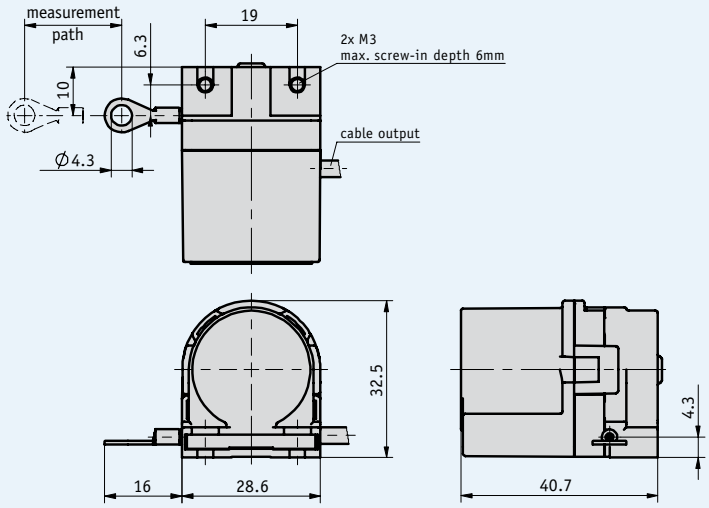
3.1

Wire-Actuated Encoder SG5

Miniature wire-actuated encoder with 600 mm measurement length

Profile

- Very small design
- Universally usable thanks to standardized interfaces
- Easy mounting
- Measurement lengths up to max. 600 mm
- Potentiometer, voltage or power output
- Housing made of reinforced plastic



Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 800 mm/s	
Pull-out force required	min. 3 N	
Drum circumference	60 mm	
Repeat accuracy	±0.15 mm	
Absolute accuracy	±0.35 %	
Operating temperature	-10 ... +80 °C	
Condensation	inadmissible	
Encoder portion protection categ.	IP50	with factory-connected cable
Wire design	stainless steel wire,Ø 0.4 mm	plastic-coated
Encoder portion protection categ	IP50 (potentiometer)	according to DIN VDE 0470
Weight	approx. 60 g	
Housing	reinforced plastic	

Electrical data

P10 encoder type, potentiometer

Feature	Technical data	Additional information
Value of resistance	10 kΩ	
Linearity of potentiometer	0.25 %	
Resistance tolerance	±5 %	
Power rating	1 W	
Pull-out length	0 mm : 0 Ω	
Cable length (connection)	max. 15 m	

Additional potentiometer values on request

MWI encoder type, current source (transducer*)

Feature	Technical data	Additional information
Output current	4 ... 20 mA	
Potentiometer	10 kΩ	
Operating voltage	15 ... 28 V DC	
Load resistance	<500 Ω	
Cable length (connection)	max. 30 m	

MWU encoder type, voltage source (transducer*)

Feature	Technical data	Additional information
Output current	0 ... 10 V DC	
Recomm. load resistance	2 ... 10 kΩ to GND	
Max. load	10 mA	
Operating voltage	15 ... 28 V DC with 3 mA without load	
Cable length (connection)	max. 20 m	

***Transducers** allow optimum adaptation of output current or output voltage to the measurement range. The transducer is preset at delivery to provide an output signal of 4 ... 20 mA (MWI) or 0 ... 10 V DC (MWU) between the starting point and the end point of the measurement range.

Pin assignment

Potentiometric outputs P10

Signal	E1 (terminal)
Po	brown
Pe	white
S	green

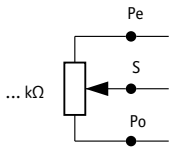
MWI transducer

Signal	Cable color
I+	brown
I-	white

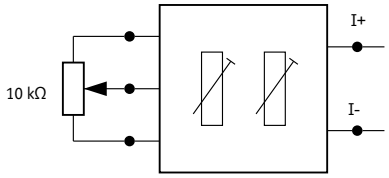
MWU transducer

Signal	Cable color
+24 V DC	brown
GND	white
U_{out}	green

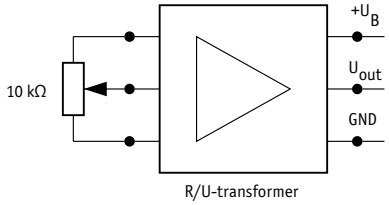
Potentiometric outputs P01, P05, P10



Transducer MWI

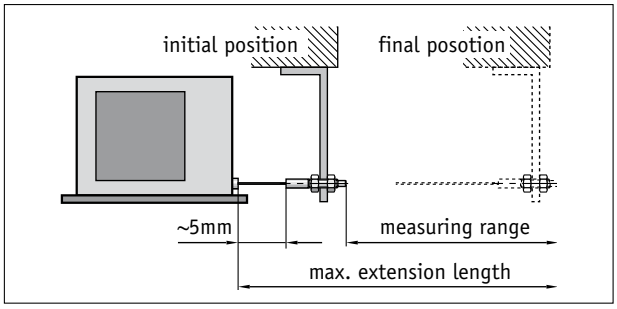


Transducer MWU



Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	300	A	300 mm	transducer setting, only with MWI or MWU encoder types
	600		600 mm	
Encoder type	P10	B	potentiometer with 10 kΩ	
	MWI		transducer 4 ... 20 mA	
	MWU		transducer 0 ... 10 V	
			others on request	
Cable length (m)	0K	C	without cable	
	0.5		0.5 m	
	...		1 ... 15 m in steps of 1 m	

Order code

SG5 – [ ] – [ ] – [ ]
A B C

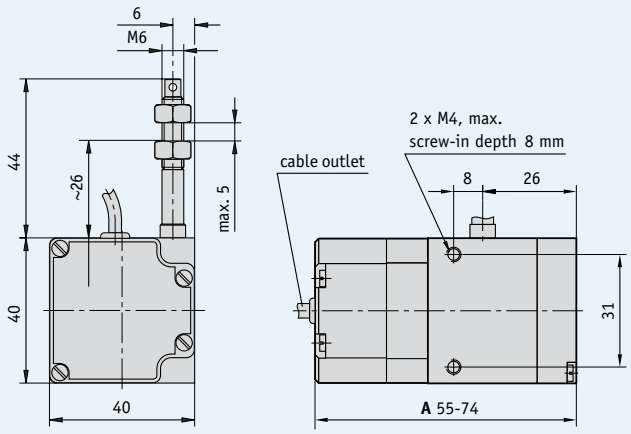
Scope of delivery: *SG5, User information*

Accessories:
Guide roller *Page 38*
Electronic displays MA50 or MA10/4 *Catalog 6 DisplayLine*

Additional information:
General information and areas of application *Page 4 cont.*

Profile

- Compact design
- Universally usable thanks to standardized interfaces
- Easy mounting
- Measurement lengths up to max. 2000 mm
- Potentiometer, voltage, power output or incremental encoder
- Housing made of reinforced plastic



Encoder type	Measure A
IV28M/1-0007	74
P10, MWI, MWU: measuring range ≤ 1000 mm	55

Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 800 mm/s	
Pull-out force required	min. 2 N	
Drum circumference	100 mm	
Repeat accuracy	±0.15 mm	
Operating temperature	-10 ... +80 °C	without transducer
	0 ... 50 °C	with transducer
Wire design	stainless steel wire,Ø 0.45 mm	plastic-coated
Encoder portion protection categ.	IP50 (potentiometer)	according to DIN VDE 0470
	IP54 (incremental encoder)	according to DIN VDE 0470
Weight	approx. 200 g	
Housing	reinforced plastic	

Electrical data

P10 encoder type, potentiometer

Feature	Technical data	Additional information
Value of resistance	10 kΩ	
Linearity of potentiometer	0.25 %	
Resistance tolerance	±5 %	
Power rating	1 W	
Pull-out length	0 mm : 0 Ω	
Cable length (connection)	max. 30 m	

Additional potentiometer values on request

MWI encoder type, current source (transducer*)

Feature	Technical data	Additional information
Output current	4 ... 20 mA	
Potentiometer	10 kΩ	
Operating voltage	15 ... 28 V DC	
Load resistance	<500 Ω	
Cable length (connection)	max. 30 m	

MWU encoder type, voltage source 0 ... 10 V DC (transducer*)

Feature	Technical data	Additional information
Output current	0 ... 10 V DC	
Recomm. load resistance	2 ... 10 kΩ to GND	
Max. load	15 mA	
Operating voltage	15 ... 28 V DC with 3 mA without load	
Cable length (connection)	max. 20 m	

***Transducer**s allow optimum adaptation of output current or output voltage to the measurement range. The transducer is preset at delivery to provide an output signal of 4 ... 20 mA (MWI) or 0 ... 10 V DC (MWU) between the starting point and the end point of the measurement range..

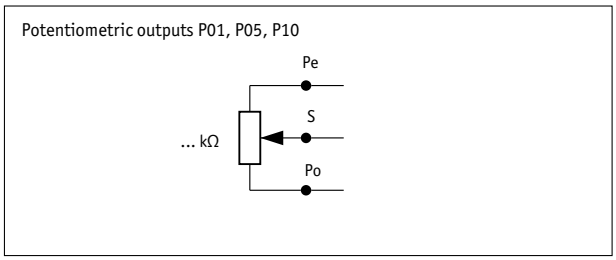
IV28M/1-0007 encoder type, incremental

Feature	Technical data	Additional information
Operating voltage	0 ... 30 V DC at 25 mA without load	
Output circuit	PP	
Output signals	AB0	
Steps per revolution	1000	
Resolution	0.1 mm (10 pulses per mm)	
Cable length (connection)	1 m	

Pin assignment

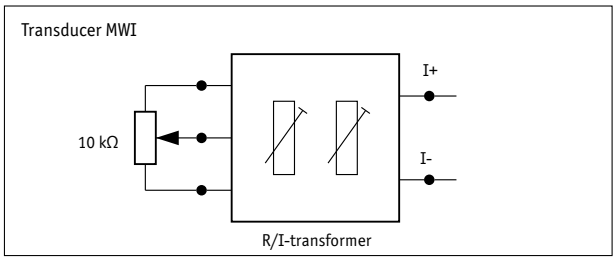
Potentiometric outputs P10

Signal	E1 (terminal)
Po	brown
Pe	white
S	green



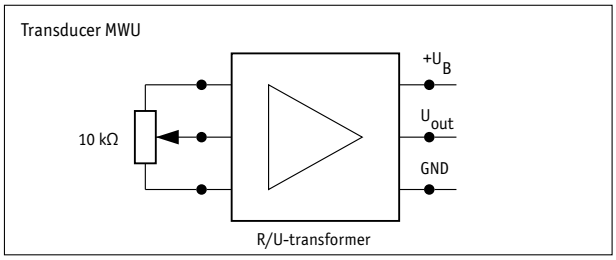
MWI transducer

Signal	Cable color
I+	brown
I-	white



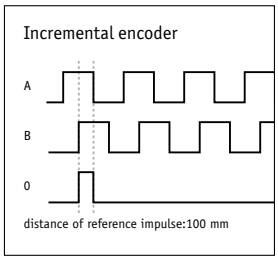
MWU transducer

Signal	Cable color
+24 V DC	brown
GND	white
U_{out}	green



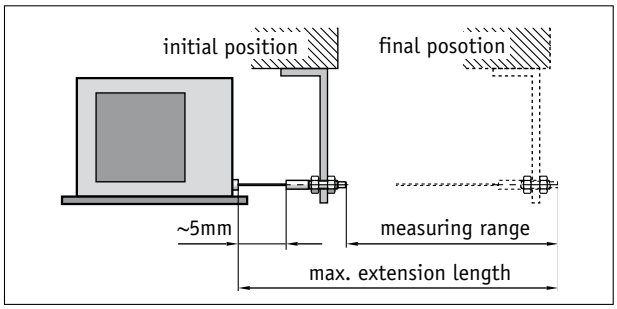
IV28M/1-0007 encoder type, incremental

Signal	E1 (terminal)
B	white
+24 V DC	brown
0/I	green
A	yellow
GND	gray



Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	...	A	300, 500, 1000	with encoder type Ω, I, U (potentiometer and transducer)
	2000		incremental output (IV28M/1)	
Encoder type	P10	B	potentiometer with 10 kΩ	
	MWI		transducer 4 ... 20 mA	
	MWU		transducer 0 ... 10 V	
	IV28M/1		incremental encoder	only with measuring range 2000
			others on request	
Cable length (m)	0.5	C	0.5 m	for P10 encoder type or MWI/MWU
	...		1 ... 30 m in steps of 1 m	for P10 encoder type or MWI/MWU
	IG		specified with "IV28M-0004" encoder type	

Order code

SG10 - [ ] - [ ] - [ ]
A B C

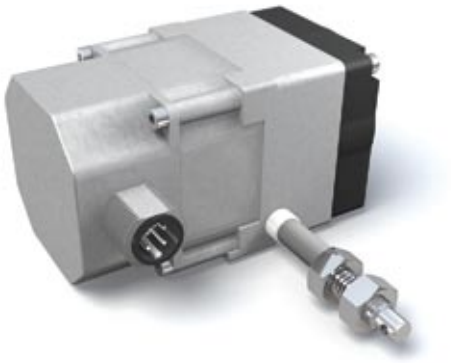
Scope of delivery: *SG10, User information*

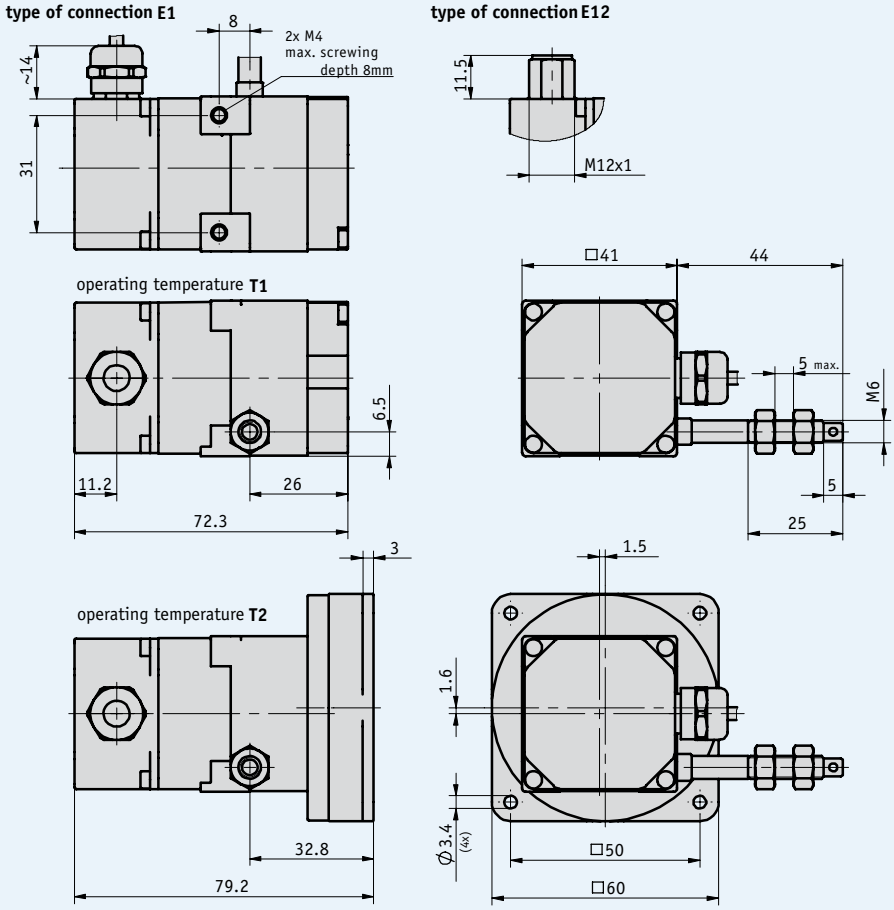
Accessories:
Guide roller *Page 38*
Electronic displays MA50 or MA10/4 *Catalog 6 DisplayLine*

Additional information:
General information and areas of application *Page 4 cont.*

Profile

- Compact design
- Universally applicable thanks to standardized interfaces
- Easy mounting
- Measurement lengths up to max. 2000 mm
- Potentiometer, voltage or power output
- Robust zinc die-cast housing





Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 1 m/s	
Pull-out force required	min. 2 N	with temperature range T1
	min. 11 N	with temperature range T2
Drum circumference	100 mm	
Repeat accuracy	±0.15 mm	
Absolute accuracy	±0.35 %	
Operating temperature	-10 ... +80 °C	with T1
	-40 ... +80 °C	with T2
Wire design	stainless steel wire,Ø 0.45 mm	plastic-coated
Encoder portion protection categ.	IP50	with temperature range T1
	IP64	with temperature range T2
Weight	approx. 320 g	
Housing	zinc die-cast	

3.1

Electrical data

- **P10 encoder type, potentiometer**

Feature	Technical data	Additional information
Value of resistance	10 kΩ	
Linearity of potentiometer	0.25 %	
Resistance tolerance	±5 %	
Power rating	1 W	
Pull-out length	0 mm : 0 Ω	
Cable length (connection)	max. 30 m	

Additional potentiometer values on request

- **MWI encoder type, current source** (transducer*)

Feature	Technical data	Additional information
Output current	4 ... 20 mA	
Potentiometer	10 kΩ	
Operating voltage	15 ... 28 V DC	
Load resistance	<500 Ω	
Cable length (connection)	max. 30 m	

- **MWU encoder type, voltage source 0 ... 10 V DC** (transducer*)

Feature	Technical data	Additional information
Output current	0 ... 10 V DC	
Recomm. load resistance	2 ... 10 kΩ to GND	
Max. load	15 mA	
Operating voltage	15 ... 28 V DC with 3 mA without load	
Cable length (connection)	max. 20 m	

* **Transducer**s allow optimum adaptation of output current or output voltage to the measurement range. The transducer is preset at delivery to provide an output signal of 4 ... 20 mA (MWI) or 0 ... 10 V DC (MWU) between the starting point and the end point of the measurement range.

Pin assignment

Potentiometric outputs P10

Signal	E1	E12
Po	brown	1
Pe	white	2
S	green	3
N.C.		4

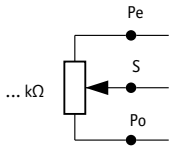
MWI transducer

Signal	E1	E12
I+	brown	1
I-	white	2
N.C.		3
N.C.		4

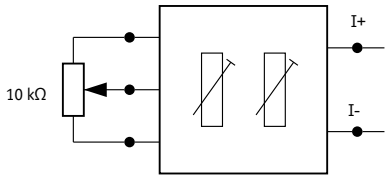
MWU transducer

Signal	E1	E12
+24 V DC	brown	1
GND	white	2
U_{out}	green	3
N.C.		4

Potentiometric outputs P01, P05, P10

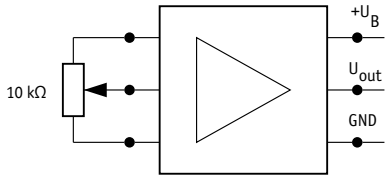


Transducer MWI



R/I-transformer

Transducer MWU

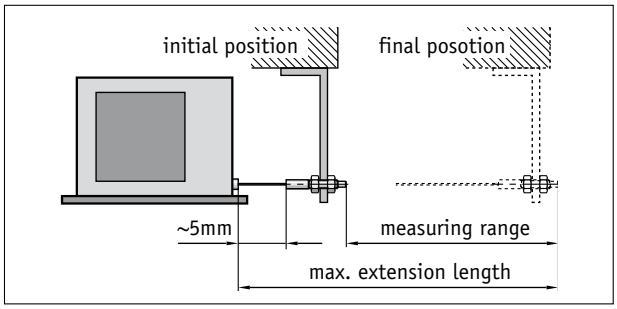


R/U-transformer

3.1

Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	...	A	1250, 1500, 1750, 2000	
Encoder type	P10	B	potentiometer with 10 kΩ	
	MWI		transducer 4 ... 20 mA	
	MWU		transducer 0 ... 10 V	
			others on request	
Type of connection	E1	C	flying leads	
	E12		connector	
Cable length (m)	...	D	1 ... 20 m in steps of 1 m	with P10 encoder type or MWU
	...		1 ... 30 m in steps of 1 m	with MWI encoder type
Operating temperature	T1	E	-10 ... +80 °C	
	T2		-40 ... +80 °C	

Order code

SG20 – [A] – [B] – [C] – [D] – [E]

Scope of delivery: *SG20, User information*

Accessories:

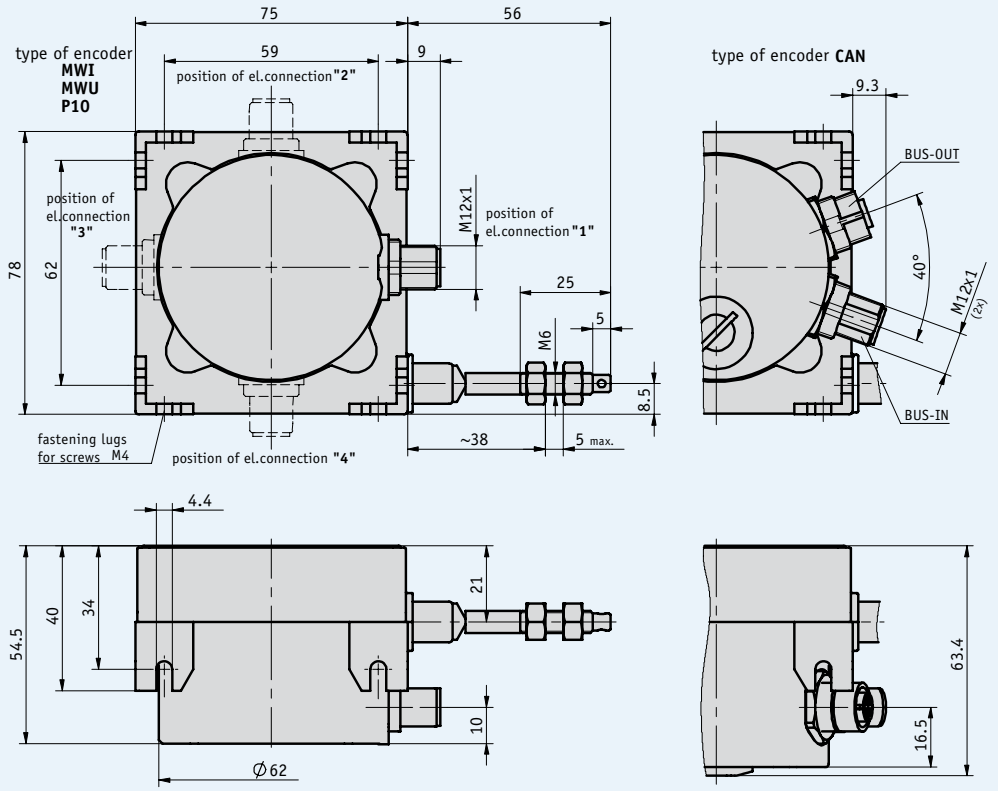
Guide roller	*Page 38*
Electronic displays MA50 or MA10/4	*Catalog 6 DisplayLine*

Additional information:

General information and areas of application	*Page 4 cont.*

Profile

- Compact, robust design
- Variable mounting options
- Measurement lengths up to 3000 mm
- Potentiometer, voltage or power output; CAN bus interface as an option
- Housing made of zinc die-cast and plastic
- Closable ventilation openings to prevent condensation
- High tightness on the wire outlet
- M12 plug connection



Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 800 mm/s	
Pull-out force required	min. 3 N on the wire	
Measurement range	up to 3000 mm	
Pull-out length	measuring range +10 mm	
Repeat accuracy	depends on the direction of approach, ±0.15 mm	
Drum circumference	200 mm	
Wire design	stainless steel wire, Ø 0.9 mm	plastic-coated
Protection category	IP63	with standard encoder
Condensation	inadmissible	
Connection	connector	
Operating temperature	-40 ... +80 °C	
Weight	approx. 500 g	
Housing	zinc die-cast/plastic	

Electrical data

P10 encoder type, Potentiometer

Feature	Technical data	Additional information
Value of resistance	10 kΩ	
Linearity of potentiometer	0.25 %	
Resistance tolerance	±5 %	
Power rating	1 W	
Pull-out length	0 mm : 0 Ω	
Cable length (connection)	max. 30 m	

Additional potentiometer values on request

MWI encoder type, current source (transducer*)

Feature	Technical data	Additional information
Output current	4 ... 20 mA	
Potentiometer	10 kΩ	
Operating voltage	15 ... 28 V DC	
Load resistance	<500 Ω	
Cable length (connection)	max. 30 m	

MWU encoder type, voltage source 0 ... 10 V DC (transducer*)

Feature	Technical data	Additional information
Output current	0 ... 10 V DC	
Recommended load resistance	2 ... 10 kΩ to GND	
Max. load	15 mA	
Operating voltage	15 ... 28 V DC with 3 mA without load	
Cable length (connection)	max. 20 m	

***Transducer**s allow optimum adaptation of output current or output voltage to the measurement range. The transducer is preset at delivery to provide an output signal of 4 ... 20 mA (MWI) or 0 ... 10 V DC (MWU) between the starting point and the end point of the measurement range.

Encoder type CAN, CAN bus

Feature	Technical data	Additional information
Operating voltage	24 V DC ± 20 % at 40 mA	
Interface	CANopen	
Baud rate	250 kBit/s	
Steps per revolution	1024 (10 Bit)	
Resolution	0.195 mm (5.12 pulses per mm)	

Pin assignment

Potentiometric outputs P10

Signal	PIN
Po	1
Pe	2
S	3
	4

MWI transducer

Signal	PIN
I+	1
I-	2
N.C.	3
N.C.	4

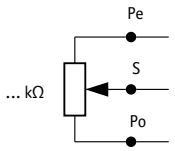
MWU transducer

Signal	PIN
+24 V DC	1
GND	2
U_{out}	3
N.C.	4

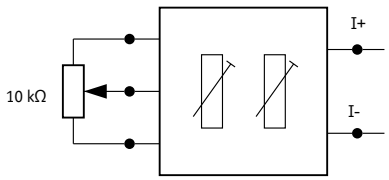
Encoder type CAN, CAN bus

Signal	PIN
GND	1
+24 V DC	2
CAN-GND	3
CAN-high	4
CAN-low	5

Potentiometric outputs P01, P05, P10

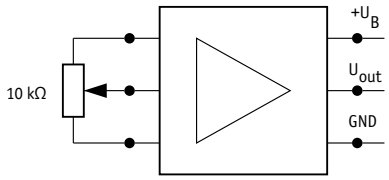


Transducer MWI



R/I-transformer

Transducer MWU

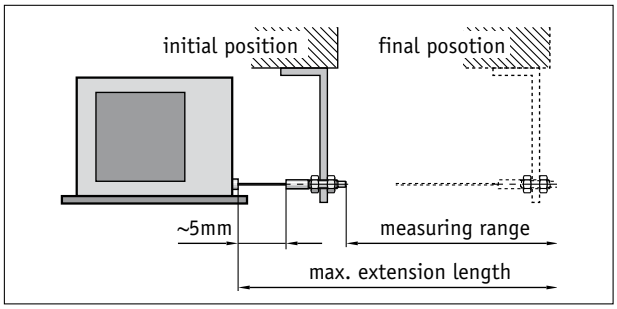


R/U-transformer

3.1

Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	...	A	2000, 2500, 3000	
Encoder type	CAN	B	CAN bus protocol	
	MWI		transducer current	
	MWU		transducer voltage	
	P10		potentiometer	
Position of electrical connection	1	C	0°	
	2		90°	
	3		180°	
	4		270°	

Order code

SG30 - [ ] - [ ] - [ ]
A B C

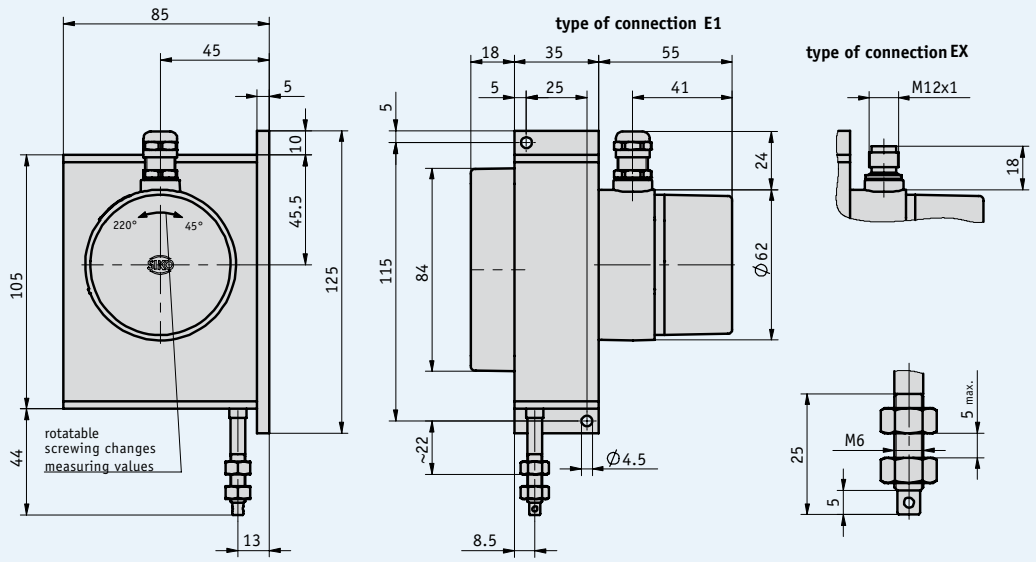
Scope of delivery: *SG30, User information*

Accessories:
Guide roller *Page 38*
Electronic displays MA50 or MA10/4 *Catalog 6 DisplayLine*

Additional information:
General information and areas of application *Page 4 cont.*

Profile

- Robust design
- Measurement lengths up to max. 6000 mm
- Potentiometer, voltage or power output
- Housing made of aluminum and plastic
- Potentiometer/resistance range adapted to actual measurement length via an integrated gear
- Various wire types



Mechanical data

Feature	Technical data	Additional information
Travel speed	see table	
Pull-out force required	min. 8 N on the wire	
Drum circumference	200 mm	
Wire design	steel wire Ø 0.54 mm	
	plastic-coated steel wire, Ø 0.87 mm	
	paraline Ø 1.05 mm	
Repeat accuracy	depends on the direction of approach ~0.5 mm	
Protection category	for potentiometer portion: IP53	
Operating temperature	-20 ... +80 °C	T1
	-40 ... +80 °C	T2 (max. pull-in speed 800 mm/s)
Color	nature anodized	others on request
Weight	approx. 730 g	
Housing	aluminum/plastic	

- **Max. travel speed**

Measurement range (mm)	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	... 6000
Max. travel speed (mm/s)	200	300	300	400	490	500	600	700	800	800	900	1000	... 1000

Electrical data

Potentiometric encoder type

Feature	Technical data	Additional information
Value of resistance	1, 2, 5, 10 kΩ	
Pull-out length	0 mm : 0 Ω	

Potentiometer option

Feature	(Type 02)	(Type 03)
Linearity	±0.25 %	±0.25 %
Resistance tolerance	±5 %	±5 %
Power rating	1 W	2 W

MWI encoder type, current source (transducer*)

Feature	Technical data	Additional information
Output current	4 ... 20 mA	
Potentiometer	10 kΩ	
Operating voltage	15 ... 28 V DC	
Load resistance	<500 Ω	

MWU encoder type, voltage source 0 ... 10 V DC (transducer*)

Feature	Technical data	Additional information
Output current	0 ... 10 V DC	
Recomm. load resistance	2 ... 10 kΩ to GND	
Max. load	15 mA	
Operating voltage	15 ... 28 V DC with 3 mA without load	

*Transducers allow optimum adaptation of output current or output voltage to the measurement range. The transducer is preset at delivery to provide an output signal of 4 ... 20 mA (MWI) or 0 ... 10 V DC (MWU) between the starting point and the end point of the measurement range..

Pin assignment

Potentiometric outputs P10

Signal	E1 (terminal)	E12 (plug-in pin)
Po	brown	1
Pe	white	2
S	green	3
N.C.		4

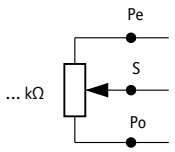
MWI transducer

Signal	E1 (terminal)	E12 (plug-in pin)
I+	1	1
I-	2	2
N.C.	3	3
N.C.		4

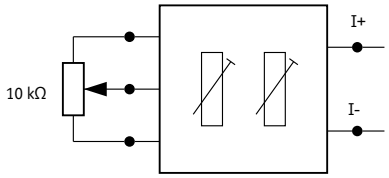
MWU transducer

Signal	E1 (terminal)	E12 (plug-in pin)
+24 V DC	1	1
GND	2	2
U_{out}	3	3
N.C.		4

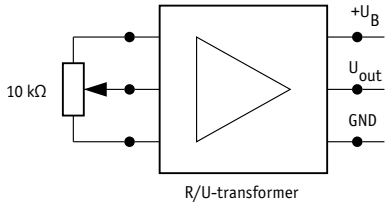
Potentiometric outputs P01, P05, P10



Transducer MWI

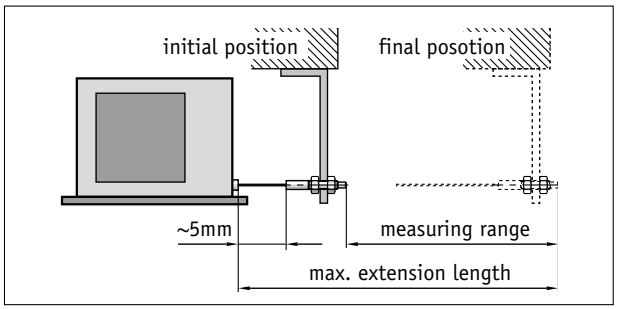


Transducer MWU



Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	...	A	750 ... 6000	in steps of 250 mm
Wire design	S	B	stainless steel wire	measurement range max. 6000 mm
	SK		steel wire, plastic-coated	measurement range max. 4000 mm
	P		paraline, non-conducting, signal color	measurement range max. 2800 mm
Type of connection	E1	C	screwed cable gland PG7	cable Ø 3-6.5 mm
	EX		for M12 connector	
Potentiometer type	02	D	10 turns/wire	(P01, P05, P10)
	03		10 turns/hybrid	(P01, P05, P10)
Analog output	MWI	E	transducer 4 ... 20 mA	
	MWU		transducer 0 ... 10 V	
	P01		potentiometer 1 kΩ	
	P05		potentiometer 5 kΩ	
	P10		potentiometer 10 kΩ	
Operating temperature	T1	F	-20 ... +80 °C	
	T2		-40 ... +80 °C	max. pull-in speed 800 mm/s

Order code

SGP/1 - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]
A B C D E F

Scope of delivery: *SGP/1, User information*

Accessories:
Guide roller *Page 38*
Electronic displays MA50 or MA10/4 *Catalog 6 DisplayLine*

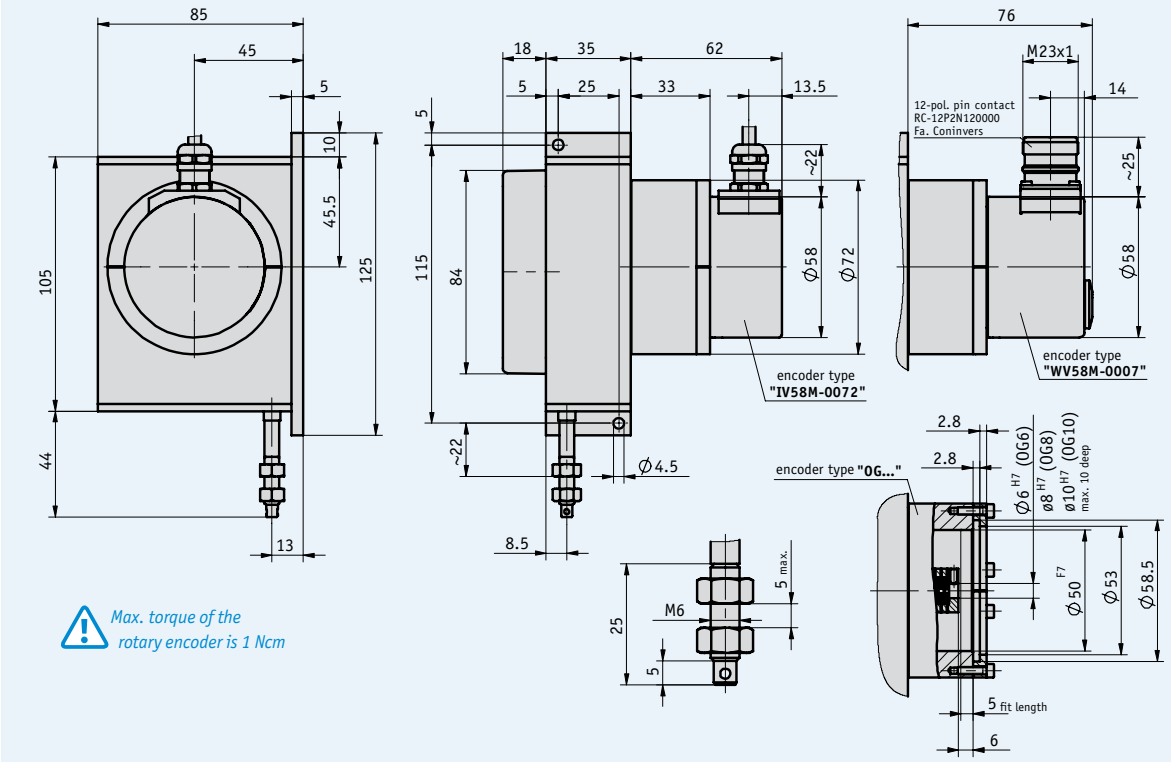
Additional information:
General information and areas of application *Page 4 cont.*

Wire-Actuated Encoder SG60
Robust design with 6000 mm measurement length

Profile

- Robust design
- Easy mounting
- Measurement lengths up to max. 6000 mm
- Incremental or absolute encoder
- Housing made of aluminum and plastic
- High flexibility thanks to freely selectable rotary encoders with 58 mm standard flange
- Various wire types

3.1



Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 3000 mm/s	
Pull-out force required	min. 8 N on the wire	
Measurement range	up to 6000 mm	
Pull-out length	measuring range +10 mm	
Repeat accuracy	depends on the direct. of approach, ±0.15 mm	
Drum circumference	200 mm	
Wire design	steel wire Ø 0.54 mm	
	steel wire, plastic-coated Ø 0.87 mm	
	paraline Ø 1.05 mm	
Protection category	IP65 (with standard encoder)	protection category may vary depending on the rotary encoder type
Operating temperature	-20 ... +80 °C	T1
	-40 ... +80°C	T2 (max. pull-in speed 800 mm/s)
Color	nature anodized	
Weight	approx. 700 g	
Housing	aluminum/plastic	

Electrical data

IV58M-0072 encoder type, incremental

Feature	Technical data	Additional information
Operating voltage	0 ... 30 V DC at 25 mA without load	
Output circuit	PP	
Output signals	AB0	
Steps per revolution	2000	
Resolution	0.1 mm (10 pulses per mm)	
Cable length (connection)	1 m	
Protection category	IP65	

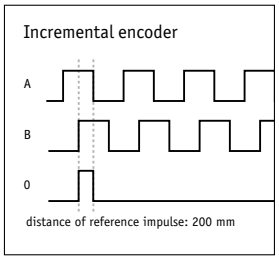
WV58M-0007 encoder type, absolute digital

Feature	Technical data	Additional information
Operating voltage	0 ... 30 V DC at 40 mA	
Interface	RS422/SSI	
Steps per revolution	4096 (12bit)	
Resolution	0.048 mm (20.48 pulses per mm)	
Connection	E2 (connector M12)	
Protection category	IP65	

Pin assignment

IV58M-0072 encoder type, incremental

Signal	E1
0/I	green
A	yellow
B	white
GND	gray
+24 V DC	brown

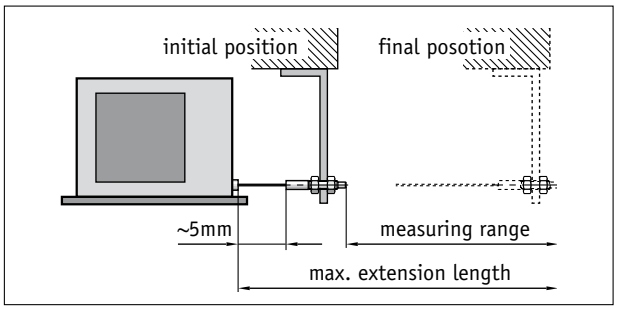


WV58M-0007encoder type, absolute digital

Signal	PIN
GND	1
+UB = +10 ... +30 V	2
Clock +	3
Clock -	4
Data +	5
Data -	6
RS485 DÜA	10
RS485 DÜB	12
N.C.	7-9, 11

Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	...	A	1000 ... 6000	in steps of 100 mm
Wire design	S	B	stainless steel wire	measurement range max. 6000 mm
	SK		steel wire, plastic-coated	measurement range max. 4000 mm
	P		paraline, non-conducting, signal color	measurement range max. 2800 mm
Encoder type*	IV58M-0072	C	incremental	
	WV58M-0007		absolute	
	OG6		without encoder, with clutch diameter= 6 mm	
	OG8		without encoder, with clutch diameter= 8 mm	
	OG10		without encoder, with clutch diameter= 10 mm	
Operating temperature	T1	D	-20 ... +80 °C	
	T2		-40 ... +80 °C	max. pull-in speed 800 mm/s
Color	N	E	nature anodized	
			others on request	

* For additional encoder variants, refer to product data sheets IV58M and WV58M, see Catalog 2 RotoLine

Order code

SG60 - [A] - [B] - [C] - [D] - [E]

Scope of delivery: *SG60, User information*

Accessories:

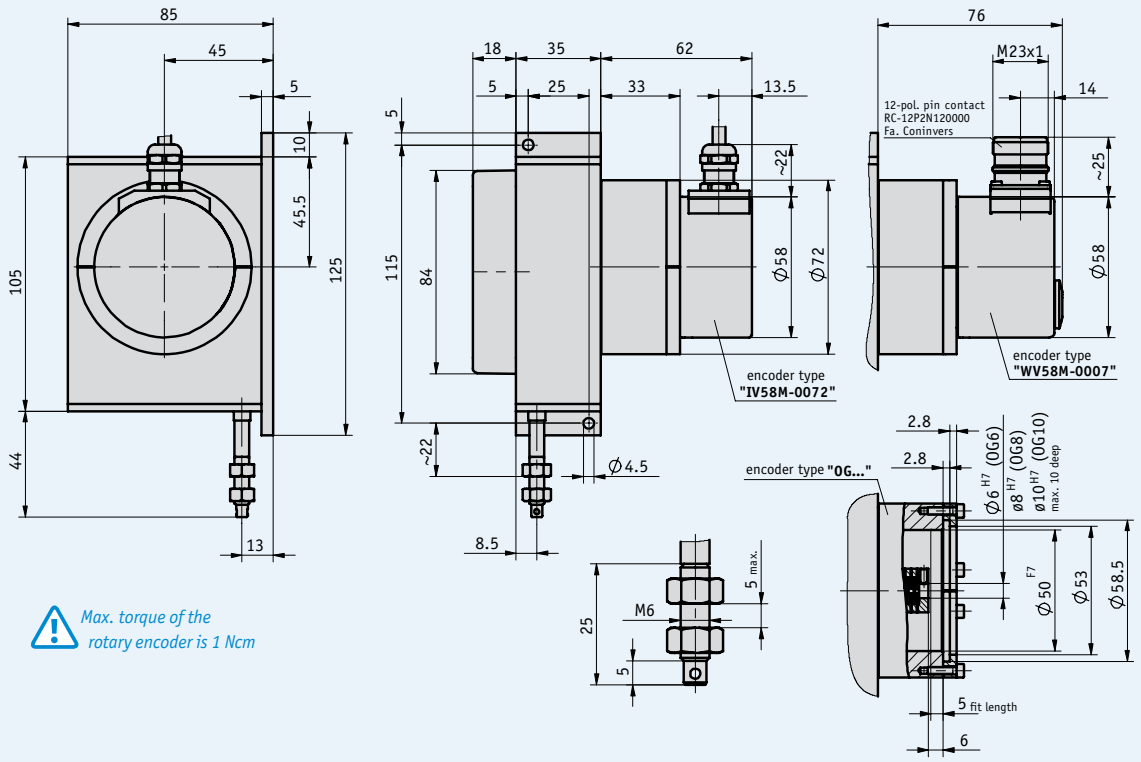
Guide roller *Page 38*
Wire extension piece *Page 39*
Electronic displays MA50 or MA10/4 *Catalog 6 DisplayLine*
Rotary encoders IV58M, WV58M *Catalog 2 RotoLine*

Additional information:

General information and areas of application *Page 4 cont.*

Profile

- Robust design
- Easy mounting
- Measurement lengths up to max. 12000 mm
- Incremental or absolute encoder
- Housing made of aluminum and plastic
- High flexibility thanks to free choice of rotary encoders with 58 mm standard flange
- Various wire types



Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 3000 mm/s	
Pull-out force required	min. 8 N on the wire	
Measurement range	up to 12000 mm	
Pull-out length	measurement range +10 mm	
Repeat accuracy	depends on the direct. of approach ±0.15 mm	
Drum circumference	200 mm	
Wire design	steel wire Ø 0.54 mm	
	steel wire, plastic-coated Ø 0.87 mm	
	paraline Ø 1.05 mm	
Protection category	IP65 (with standard encoder)	protection category may vary depending on the rotary encoder type
Operating temperature	-20 ... +80 °C	
Color	nature anodized	
Weight	approx. 700 g	
Housing	aluminum/plastic	

Electrical data

- **IV58M-0072 encoder type, incremental**

Feature	Technical data	Additional information
Operating voltage	0 ... 30 V DC at 25 mA without load	
Output circuit	PP	
Output signals	AB0	
Steps per revolution	2000	
Resolution	0.1 mm (10 pulses per mm)	
Cable length (connection)	1 m with flying leads	
Protection category	IP65	

- **Encoder type WV58M-0007, absolute digital**

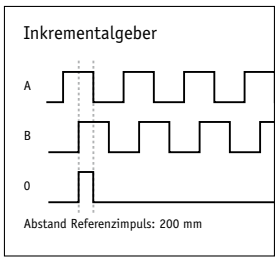
Feature	Technical data	Additional information
Operating voltage	0 ... 30 V DC at 40 mA	
Interface	RS422/SSI	
Steps per revolution	4096 (12bit)	
Resolution	0.048 mm (20.48 pulses per mm)	
Connection	E2 (connector M12)	
Protection category	IP65	

3.1

Pin assignment

- **IV58M-0004 encoder type, incremental**

Signal	E1
0/I	green
A	yellow
B	white
GND	gray
+24 V DC	brown



- **WV58M-0007encoder type, absolute digital**

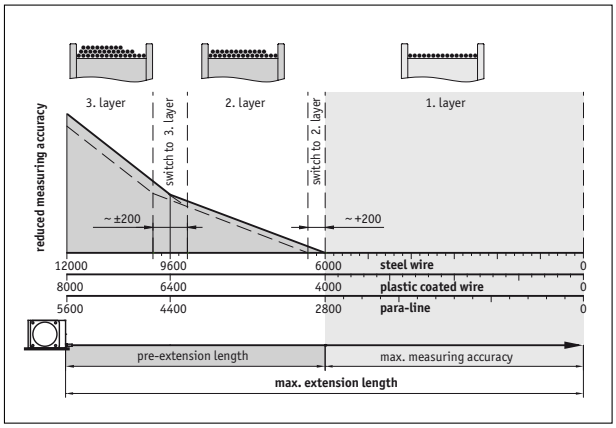
Signal	PIN
GND	1
+UB = +10 ... +30 V	2
Clock +	3
Clock -	4
Data +	5
Data -	6
RS485 DÜA	10
RS485 DÜB	12
N.C.	7-9, 11

Pull-out length/Measurement range

The high degree of accuracy provided by SIKO's wire-actuated encoders is due to the fact that the whole wire length (measurement range) is wound on the drum in only a single layer. The comparably small diameter of the steel wire in the SG120 encoder enables achievement of the encoder's 6000 mm maximum measurement range using only the first drum layer. More room is required for the larger diameters of plastic-coated steel wire and synthetic paraline, resulting in measurement ranges which are accordingly shorter.

If a reduction in measurement accuracy is accepted, winding in 2 or 3 layers is also available, which alters the possible measurement lengths accordingly.

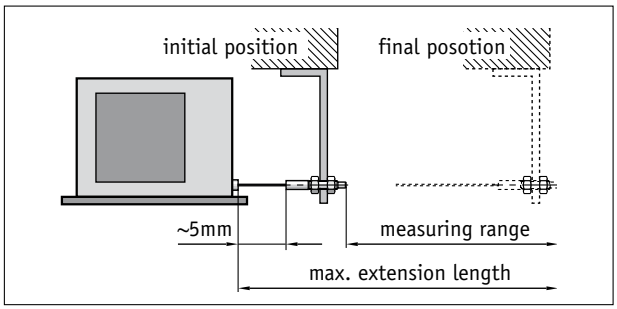
Pull-out lengths SG120	1st layer	2nd and 3rd layer
Steel wire	6000 mm	12000 mm
Steel wire, plastic-coated	4000 mm	8000 mm
Paraline	2800 mm	5600 mm



Dimensions indicated in millimeters

Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
Measurement range (mm)	...	A	2900 ... 12000	in steps of 100 mm
Wire design	S	B	stainless steel wire	measurement range max. 6100–12000 mm
	SK		steel wire, plastic-coated	measurement range max. 4100–8000 mm
	P		paraline, non-conducting, signal color	measurement range max. 2900–5600 mm
Encoder type*	IV58M-0072	C	incremental	
	WV58M-0007		absolute	
	OG6		without encoder, with clutch diameter= 6 mm	
	OG8		without encoder, with clutch diameter= 8 mm	
	OG10		without encoder, with clutch diameter= 10 mm	
Color	N	D	nature anodized	
			others on request	

* For additional encoder variants, refer to product data sheets IV58M and WV58M, see Catalog 2 RotoLine

Order code

SG120 – [A] – [B] – [C] – [D]

Scope of delivery: *SG120, User information*

Accessories:

Guide roller	*Page 38*
Wire extension piece	*Page 39*
Electronic displays MA50 or MA10/4	*Catalog 6 DisplayLine*
Rotary encoders IV58M, WV58M	*Catalog 2 RotoLine*

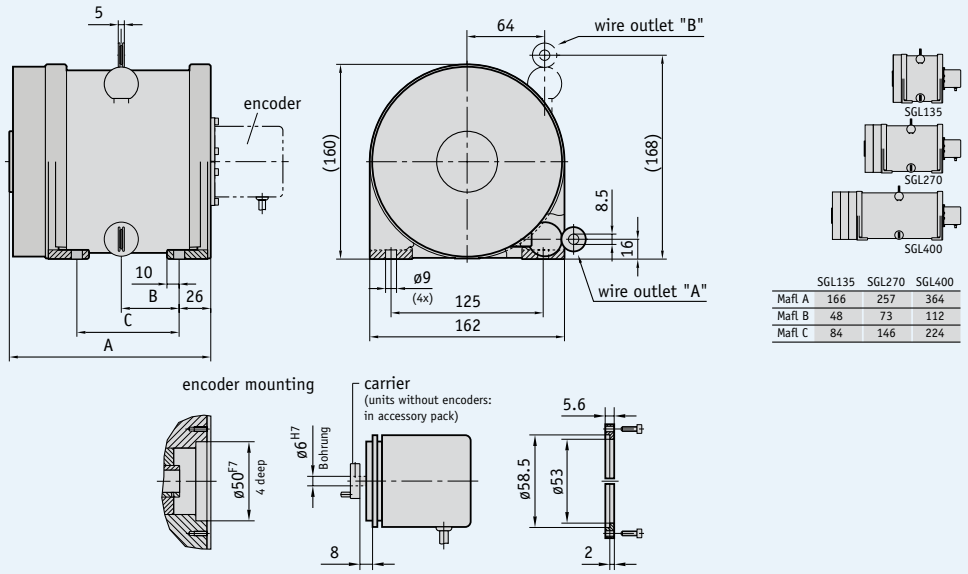
Additional information:

General information and areas of application	*Page 4 cont.*

Wire-Actuated Encoder SGL
Aluminum housing and 40 m measurement length

Profile

- 3 versions enable measurement lengths of 13500 mm, 27000 mm or 40000 mm
- Potentiometer, voltage or power output
- Incremental or absolute encoder
- Housing made of aluminum
- High flexibility thanks to free choice of rotary encoders with 58 mm standard flange
- High operational safety owing to forced-guided wire drum
- Various wire types



	SGL135	SGL270	SGL400
Mafl A	166	257	364
Mafl B	48	73	112
Mafl C	84	146	224

Mechanical data

Feature	Technical data	Additional information
Travel speed	max. 4 m/s	
Pull-out force required	min. 25 N, on the wire	
Drum circumference	400 mm	
Wire design	steel wire Ø 1 mm	
	paraline Ø 1.05 mm	
Protection category	specified by the mounted encoder	
Operating temperature	-20 ... +80 °C	encoder-specific values, see also encoder technical data
Color	orange, RAL 2004	others on request
Weight	SGL400 approx. 9 kg	
Wire outlet	plastic	
Housing/spring housing	aluminum	

Electrical data

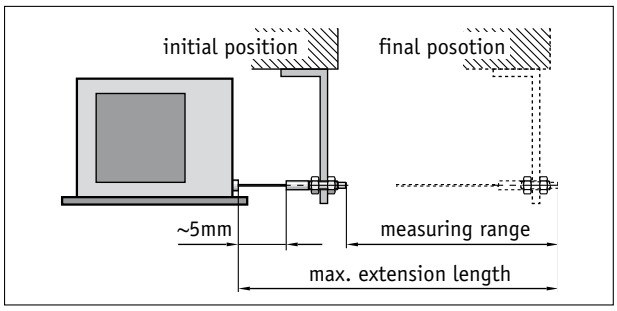
Rotary encoders suitable for use with SGL can be found in Catalog 2 RotoLine. Depending on the output signals, the following devices can be used:

- For analog outputs such as potentiometers, current or voltage: GP03/1 and GP43 (with switching outputs)
- For incremental outputs: IV58M
- For absolute outputs: WV58M

Please see data sheets for technical specifications on these devices.

Mounting note

When you attach the wire, it should be pulled out straight in line with the wire outlet. **Recommendation:** A 5 mm wire extension is recommended before the measurement starting point. This prevents the wire snapping back to the stop on rewinding.



Symbolic representation

Order

Order table

Feature	Order data		Specifications	Additional information
SGL-Type/measuring range	SGL 135	A	measurement range max. 13500 mm	measurement range max. 15000 mm as an option
	SGL 270		measurement range max. 27000 mm	
	SGL 400		measurement range max. 40000 mm	
Wire design	S	B	stainless steel wire	
	P		paraline, non-conducting, signal color	
Wire outlet	A	C	horizontal	
	B		vertical	
Encoder type	SFP	D	many encoder types possible, see accessories	
	OG		without encoder	

Order code

SGL – [A] – [B] – [C] – [D]

Scope of delivery: *SGL, User information*

Accessories:

Guide roller	*Page 38*
Electronic displays MA55, MA10/4	*Catalog 6 DisplayLine*
Rotary encoders GP03/1, GP43, IV58M, WV58M	*Catalog 2 RotoLine*

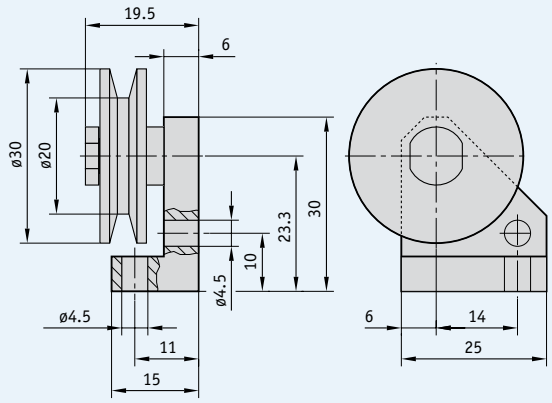
Additional information:

General information and areas of application	*Page 4 cont.*

3.2

Profile

- For changing the measurement direction. Guide rollers are used when the wire-actuated encoder cannot be installed in line with the extension direction of the wire
- Several guide rollers can be combined



Mechanical data

Feature	Technical data	Additional information
Roller material	plastic	
Accommodation material	aluminum	
Weight	25 g	

Order

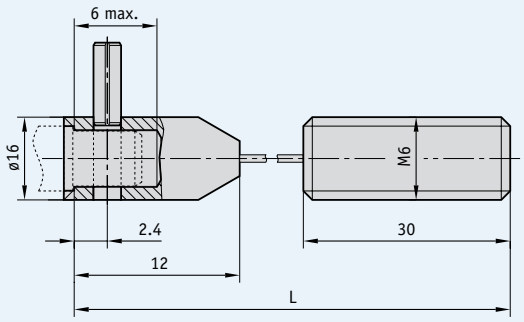
- **Mounting example** (see page 11)
- **Order code**

UR

Scope of delivery: *Guide roller*

Profile

- For extending the measurement wire or bridging the gap to the object to be measured. This does not extend the actual measurement range of the encoder, however
- Easy mounting



Order

Order table

Feature	Order text		Specification	Additional information
Wire length	...	A	0.1 ... 20 m, in steps of 0.1 m	
	SK	B	steel wire, plastic-coated	
	P		paraline	

Order code

SV - [ ] - [ ]
A B

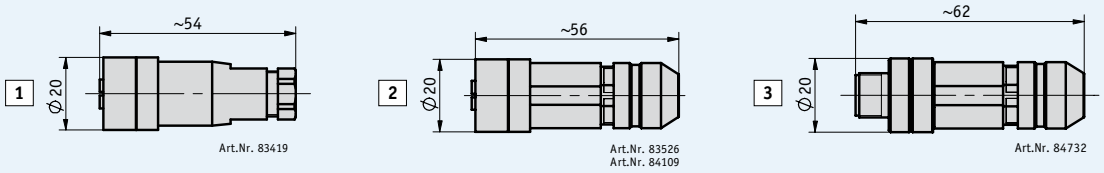
Scope of delivery: *Wire extension piece, User information*

Profile

- Mating connector, straight

When screwed on, the distance to the device will increase by approx. 3 mm.

Mating connectors, straight



				Wire-Actuated Encoders		
				SG20	SG30	SGP/1
	Bild	PIN	Ø cable	Order data		
Mating connectors, straight						
	1	4	4 ... 6	83419	E12	P10, MWI, MWU EX
	2	4	6 ... 8	83526		P10, MWI, MWU
	2	5	6 ... 8	84109		Bus-OUT
	3	5	6 ... 8	84732		Bus-IN

Order

- **Order code** (siehe Product matrix)

Scope of delivery: *Mating connector*

3.3

Wire-Actuated Encoders

Germany

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Subject to technical alterations 03/2009 – Nr. 84811