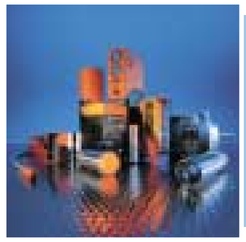
Catalogue
2005

fluid sensors and diagnostic systems

position sensors

networking and control

. . . for automation.



Position sensors

Fluid sensors and diagnostic systems

Networking and control

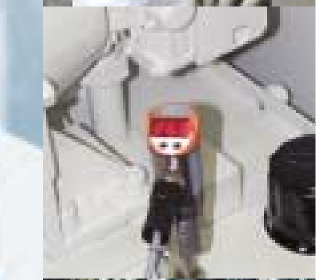
All products from one supplier

ifm stands for position and fluid sensors as well as networking and control systems for automation. More than 8,000 articles guarantee flexibility and compatibility.
They always provide a solution for your automation projects – from the individual sensor with practical accessories to the complete system.

Our quality philosophy

ifm products stand for highest quality on the world market. We have worked hard for this: From the production-accompanying quality assurance to 100% automated final testing. This gives you as the user safety for your machines and equipment. Our quality awareness is proven by the warranty of up to 5 years we grant on standard units.

Visit our website: www.ifm-electronic.com



Familiar with your industry

You are offered standard solutions and concepts specially tailored to the requirements of your industry. This is backed by the knowledge of our engineers who always keep themselves up-to-date for you. Our corporate intranet and our worldwide application know-how are continuously updated.
Our special project service provides support with the creation of tenders and partial project planning.

We are always in close contact with you

ifm is present on all important markets – worldwide in over 70 countries. Wherever you export - we are always close to you. In Germany alone over 100 engineers in seven branches give advice. ifm production sites are located in Germany, Sweden and the USA. We support you with workshops and seminars in our worldwide training centres and in your plant.

A success story

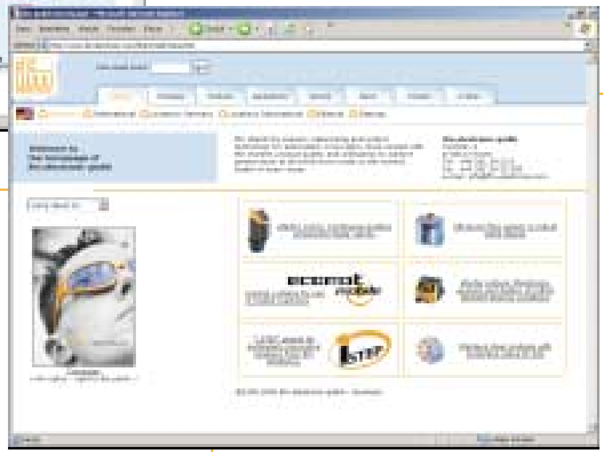
With our foundation in 1969 the introduction of newly developed proximity switches under the trade name efector laid the foundation stone for the success of the company. In 2004 ifm electronic achieved a turnover of 300 million euros. With more than 2,600 employees we service approx. 65,000 customers worldwide.

Visit our website: www.ifm-electronic.com

www.ifm-electronic.com

International homepage

Selection of 11 languages possible, links to country-specific contents, international locations of the corporate group



Homepage English version

News, selection list with direct jump goals, direct call of a data sheet via the order no., sitemap, editorial and address

e-shop

Company

- *Locations in Germany*
- *Milestones, company history*
- *ifm production, quality, logistics*
- *Sales and staff development*
- *Industrial partners of ifm*

Products

- *Position and fluid sensors*
- *Networking and control systems*
- *Virtual product operation*
- *Instructions, approvals, CAD drawings*

Applications

- *Examples for robotics, assembly and handling*
- *Examples for the automotive industry*
- *Examples for conveying*
- *Examples for the food industry*
- *Examples for mobile applications*
- *Examples for machine tools*

Service

- *Service overview*
- *Project service for engineering consultants with practical examples*
- *Training seminars, presentations*
- *Downloads (software, libraries, documentation, selection aids)*
- *Technical glossary*

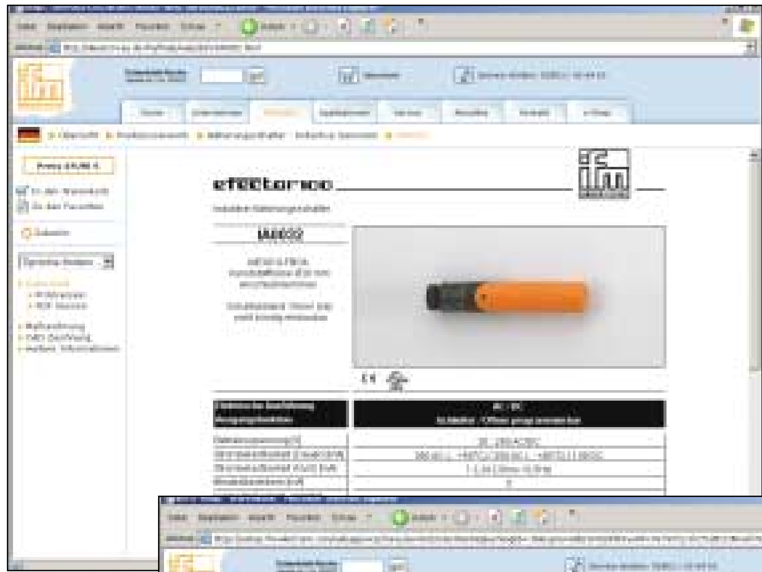
News

- *Product innovations*
- *Company news*
- *Exhibition info*
- *Press cuttings*

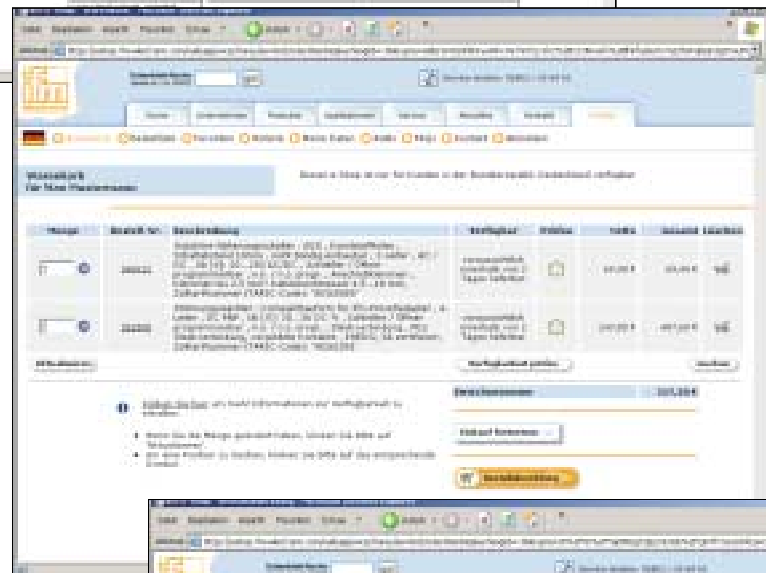
Contact

- *Telephone, fax, postal address*
- *Request for a phone call*
- *Technical enquiry*
- *Your comments*

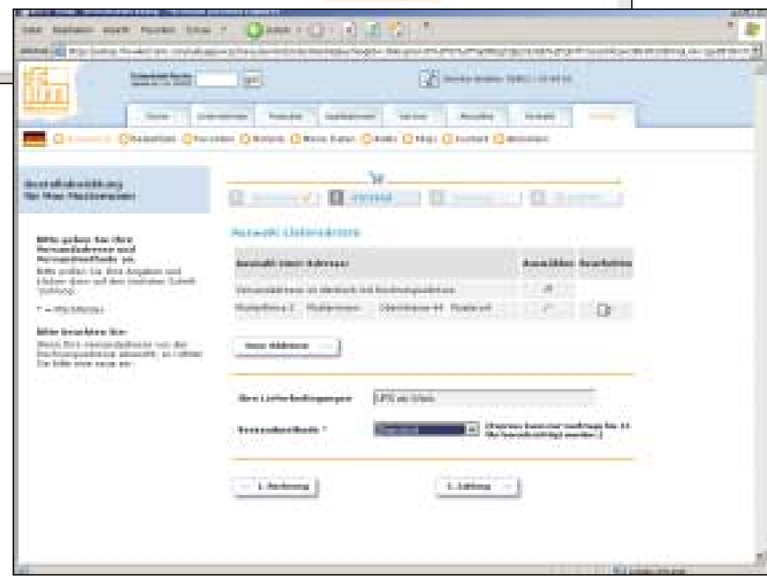
Online Ordering – now even simpler, faster and more convenient. The new e-shop.*



From the data sheet directly to the "virtual" basket.



- *Access to the e-shop with secured authentication*
- *Display of customer-related price*
- *Availability check in real time*



- *Easy order handling in four steps*
- *Management of several delivery addresses*
- *Personal product favourites*
- *Online parcel follow-up*
- *Individual order history*
- *Convenient quick input mask*
- *Acknowledgement via e-mail*

**Available in the USA and Germany since 2004: further countries to follow.*

- **Different connection options using cable, connector or terminals.**
- **Modular efector*m* units with increased sensing range.**
- **Special application sensors for almost all application areas.**
- **Cylindrical housings with a diameter of 4 to 34 mm and rectangular housings.**
- **Wide range of fixing accessories and sockets.**

Introduction

In all automated processes sensors are absolutely necessary to provide the PLC with information. They supply the necessary signals on positions, limits or serve as pulse pick-ups for counting tasks or for monitoring rotational speed. Inductive and capacitive proximity switches are nowadays indispensable for industrial usage. As compared to mechanical switches they offer ideal conditions: non-contact operation free from any wear and tear, high switching frequencies and accuracy. In addition, they are insensitive to vibration, dust and moisture. Inductive sensors detect all metals without contact, capacitive sensors almost all solid and liquid media such as metal, glass, wood, plastic, water, oil, etc.

Typical application: Positioning sensing in automation technology; proximity switches operate reliably and without wear.

Operating principle of inductive proximity switches

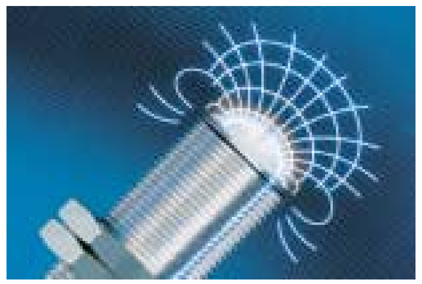
Inductive proximity switches take advantage of the physical effect of the change in the quality factor in a resonant circuit caused by eddy current losses in conductive materials. This is how it works: A LC tuned circuit generates a high frequency electromagnetic field. This field is radiated from the active face of the sensor. If a conductive material enters this field, eddy currents will be formed in accordance with the law of inductance which draw energy from the oscillator. This reduces the oscillation amplitude. The change is converted into a switching signal. The operating principle permits detection of all metals irrespective of whether they are moving or not.

The distance to the active face at which an electrically conductive material causes a change of signal in the sensor is called sensing range. The sensing range of an inductive proximity switch is defined by means of a target of mild steel (Fe 360). If the switch is damped by other metals, e.g. aluminium or copper, this is reduced. Using correction factors the user can calculate the attainable sensing ranges.

High frequency electromagnetic field: The inductive proximity switch detects all metals.

Modular sensors

A special series of inductive proximity switches are the application sensors "**efector***m*". The feature shared by these proximity switches is an increased sensing range. Due to a universal connection technology the switches can be used as 3-wire or 2-wire units. The integrated setting LED display reduces mounting time and ensure utilization of the increased sensing range. All units have a permanent laser-etched type label. This allows clear identification of the units even after many years.



Special sensor features.
For special applications or application areas ifm electronic offers proximity switches with special features.

Units for the machine tool industry, resistant to aggressive oils and lubricants

Especially in the machine tool industry applications are extremely harsh. Influence by aggressive oils and coolants, high moisture, hot chips, strong impacts and vibrations or temperature shocks are only some of the stresses the sensors are exposed to.
ifm modular units of the "coolant" range have been specially developed to cope with these high stresses. High quality materials, modular design of completely prefabricated and tested functional components as well as continuous testing during and after production guarantee a maximum degree of reliability and set new standards.

Article ID begins with: *IFC / IGC / IIC*
see remark in headline

Units for use in electromagnetic fields for welding

Electromagnetic fields place very high demands on the sensors. Electromagnetic field immune inductive proximity switches from ifm electronic are specially designed to meet these requirements. Modern circuit technology and a new coil structure ensure safe operation in electromagnetic fields. Due to these features electromagnetic field immune inductive proximity switches from ifm electronic are the optimum choice for use in welding systems. During welding these sensors guarantee a reliable function. The active face of these units is made of teflon© to protect them against weld slag. Sensors with a scratch-resistant, anti-adhesive and silicone-free coating of the metal sleeve provide a maximum of reliability.

Article ID begins with: *IFW / IGW / IIW / IM5*
see remark in headline

Increased temperature range 0...100 °C stainless steel sensors for the food industry

No matter whether it is icy cold or very hot: ifm offers sensors with an increased temperature range of 0 °C...100 °C or -40 °C...85 °C. The sensors are distinguished by their high ingress resistance in harsh applications are required for example in the food and pharmaceutical industries. This is evidenced by the protection ratings IP 68 and IP 69K. Ingress resistance is also ensured in contact with aggressive cleaning agents. The 316L housing ensures higher tightening torques for mounting. The PEEK sensing face meets the special requirements of the application. Due to the laser type label the unit can still be clearly identified after years.

Article ID begins with: *IFT / IGT / IIT*
see remark in headline

K = 1 / units without correction factor

No matter whether steel, aluminium, copper or other non-ferrous metals: The new "K = 1" sensors from ifm electronic have the same sensing range on all metals as opposed to conventional proximity switches.

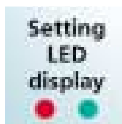
Article ID begins with: *IFW / IGW / IIW / IM5*
see remark in headline

K = 0 / units with selective metal detection "ferrous-only"

The ferrous-only switches detect only ferrous metals. Aluminium chips which build up on the active face during the process and lead to incorrect switching of conventional sensors are ignored due to this principle. Due to the special design, additional seals as well as a stainless steel cover as sensing face the sensor is resistant to oil and coolants and lubricants.

Article ID begins with: *IFC / IGC*
see remark in headline

Setting display for increased sensing range



The two-colour LED setting display helps to optimise the setting of the increased sensing range during mounting. The uncertain zone of the sensing range is indicated by a red LED. The assured sensing range, i.e. 81 % of the nominal sensing range of a proximity switch, can be used in an optimised manner.

Article ID begins with: *IFS / IGS / IIS / IFC / IGC / IIC / IFT / IGT / IIT*
see remark in headline

Photoelectric proximity switch

The M12 sensor with focussed, invisible light beam, plus a fixed range of 20 mm on almost all materials closes the gap between inductive sensors and photoelectric diffuse reflection sensors. The M12 sensor is just as robust and reasonably priced as a standard sensor.
A sensing range of 20 mm is obtained when referred to the shade RAL 9005 (dark black, semi-gloss). Referred to the shade "Kodak white" it is 50 mm.

Article ID begins with: *JAC / JAT*
see remark in headline

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
Threaded tubular metal housing, 3-wire, DC PNP, normally open or normally closed, connector version								
M5 / L = 45	0.8 f	V2A	3-wire	no	10...36 DC	2000	M8 connector	**IY5036**
M5 / L = 41	1.5 nf	V2A	3-wire	no	10...30 DC	1800	M8 connector	**IY5048**
M8 / L = 40	3 f	brass	3-wire	no	10...30 DC	1000	M8 connector	**IE5338**
M8 / L = 40	5 nf	brass	3-wire	no	10...30 DC	700	M8 connector	**IE5340**
M8 / L = 62	2 f	brass	3-wire	no	10...36 DC	1000	M12 connector	**IE5257**
M8 / L = 62	4 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IE5288**
M12 / L = 46	4 f	brass	3-wire	no	10...36 DC	700	M8 connector	**IFS210**
M12 / L = 51	7 nf	brass	3-wire	no	10...36 DC	700	M8 connector	**IFS211**
M12 / L = 45	4 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFS204**
M12 / L = 50	7 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFS205**
M12 / L = 70	4 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFS212**
M12 / L = 70	7 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFS213**
M18 / L = 46	8 f	brass	3-wire	no	10...36 DC	400	M8 connector	**IGS210**
M18 / L = 52	12 nf	brass	3-wire	no	10...36 DC	400	M8 connector	**IGS211**
M18 / L = 46	8 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGS204**
M18 / L = 51	12 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGS205**
M18 / L = 70	8 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGS212**
M18 / L = 70	12 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGS213**
M30 / L = 50	15 f	brass	3-wire	no	10...36 DC	100	M12 connector	**IIS204**
M30 / L = 50	22 nf	brass	3-wire	no	10...36 DC	100	M12 connector	**IIS205**
M30 / L = 70	15 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIS210**
M30 / L = 70	22 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIS211**
M12 / L = 45	4 f	brass	3-wire	nc	10...36 DC	700	M12 connector	**IFS206**
M12 / L = 50	7 nf	brass	3-wire	nc	10...36 DC	700	M12 connector	**IFS207**
M18 / L = 46	8 f	brass	3-wire	nc	10...36 DC	400	M12 connector	**IGS206**
M18 / L = 51	12 nf	brass	3-wire	nc	10...36 DC	300	M12 connector	**IGS207**
Threaded tubular metal housing, 3-wire, DC PNP, normally open, cable version								
M8 / L = 35	1 f	brass	3-wire	no	10...36 DC	750	cable, 2 m	**IE5072**
M8 / L = 35	3 f	brass	3-wire	no	10...30 DC	1000	cable, 2 m	**IE5343**
M8 / L = 35	5 nf	brass	3-wire	no	10...30 DC	700	cable, 2 m	**IE5345**
M12 / L = 35	2 f	brass	3-wire	no	10...36 DC	1500	cable, 2 m	**IF5188**
M12 / L = 35	4 nf	brass	3-wire	no	10...36 DC	1500	cable, 2 m	**IF5249**
M12 / L = 71	2 f	brass	3-wire	no	10...36 DC	800	cable, 2 m	**IF5297**
M12 / L = 71	4 nf	brass	3-wire	no	10...36 DC	1500	cable, 2 m	**IF5329**
M18 / L = 38	5 f	brass	3-wire	no	18...36 DC	500	cable, 2 m	**IG5221**
M18 / L = 38	8 nf	brass	3-wire	no	18...36 DC	200	cable, 2 m	**IG5285**
M18 / L = 80	5 f	brass	3-wire	no	10...36 DC	500	cable, 2 m	**IG5397**
M18 / L = 80	8 nf	brass	3-wire	no	10...36 DC	300	cable, 2 m	**IG5398**
M30 / L = 45	10 f	brass	3-wire	no	18...36 DC	300	cable, 2 m	**II5166**
M30 / L = 45	15 nf	brass	3-wire	no	18...36 DC	250	cable, 2 m	**II5346**
M30 / L = 81	10 f	brass	3-wire	no	10...36 DC	250	cable, 2 m	**II5256**
M30 / L = 81	15 nf	brass	3-wire	no	10...36 DC	250	cable, 2 m	**II5284**
Threaded tubular plastic housing, 3-wire, DC PNP, normally open, cable version								
M8 / L = 35	2 nf	plastic	3-wire	no	10...36 DC	800	cable, 2 m	**IE5099**
M12 / L = 71	2 f	plastic	3-wire	no	10...55 DC	800	cable, 2 m	**IF5313**
M12 / L = 71	4 nf	plastic	3-wire	no	10...36 DC	400	cable, 2 m	**IF5345**
M18 / L = 80	5 f	plastic	3-wire	no	10...36 DC	500	cable, 2 m	**IG5399**
M18 / L = 80	8 nf	plastic	3-wire	no	10...36 DC	300	cable, 2 m	**IG5401**
M30 / L = 81	10 f	plastic	3-wire	no	10...36 DC	250	cable, 2 m	**II5369**
M30 / L = 81	15 nf	plastic	3-wire	no	10...36 DC	250	cable, 2 m	**II5300**

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
Threaded tubular metal housing, 2-wire, DC PNP/NPN, normally open, connector version								
M12 / L = 45	4 f	brass	2-wire	no	10...30 DC	700	M12 connector	**IFS200**
M12 / L = 50	7 nf	brass	2-wire	no	10...30 DC	700	M12 connector	**IFS201**
M18 / L = 46	8 f	brass	2-wire	no	10...30 DC	300	M12 connector	**IGS200**
M18 / L = 51	12 nf	brass	2-wire	no	10...30 DC	250	M12 connector	**IGS201**
Threaded tubular metal housing, 2-wire, DC PNP/NPN, normally open / normally closed programmable, connector version								
M8 / L = 69	1 f	brass	2-wire	no / nc	5...36 DC	2700	M12 connector	**IE5203**
M8 / L = 69	2 nf	brass	2-wire	no / nc	5...36 DC	2000	M12 connector	**IE5298**
M12 / L = 83	2 f	brass	2-wire	no / nc	10...55 DC	1100	M12 connector	**IF5598**
M12 / L = 83	4 nf	brass	2-wire	no / nc	10...55 DC	1500	M12 connector	**IF5647**
M18 / L = 70	5 f	brass	2-wire	no / nc	10...55 DC	700	M12 connector	**IG5595**
M18 / L = 76	8 nf	brass	2-wire	no / nc	10...55 DC	300	M12 connector	**IG5597**
M30 / L = 78	10 f	brass	2-wire	no / nc	10...55 DC	450	M12 connector	**II5490**
M30 / L = 78	15 nf	brass	2-wire	no / nc	10...55 DC	200	M12 connector	**II5492**
Threaded tubular metal housing, 2-wire, DC PNP/NPN, normally open / normally closed programmable, cable version								
M8 / L = 50	1 f	brass	2-wire	no / nc	5...36 DC	2000	cable, 2 m	**IE5222**
M8 / L = 50	2 nf	brass	2-wire	no / nc	5...36 DC	2700	cable, 2 m	**IE5238**
M12 / L = 71	2 f	brass	2-wire	no / nc	10...55 DC	1100	cable, 2 m	**IF5645**
M12 / L = 71	4 nf	brass	2-wire	no / nc	10...55 DC	1500	cable, 2 m	**IF5646**
M18 / L = 80	5 f	brass	2-wire	no / nc	10...55 DC	700	cable, 2 m	**IG5594**
M18 / L = 80	8 nf	brass	2-wire	no / nc	10...55 DC	300	cable, 2 m	**IG5596**
M30 / L = 81	10 f	brass	2-wire	no / nc	10...55 DC	450	cable, 2 m	**II5489**
M30 / L = 81	15 nf	brass	2-wire	no / nc	10...55 DC	200	cable, 2 m	**II5491**
Threaded tubular housing, 2-wire, AC/DC, normally open								
M8 / L = 80	5 f	brass	2-wire	no	20...250	25 / 50	cable, 2 m	**IG0011**
M8 / L = 80	8 nf	brass	2-wire	no	20...250	25 / 50	cable, 2 m	**IG0012**
M30 / L = 81	10 f	brass	2-wire	no	20...250	25 / 50	cable, 2 m	**II0011**
M30 / L = 81	15 nf	brass	2-wire	no	20...250	25 / 50	cable, 2 m	**II0012**
M18 / L = 80	5 f	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**IG0005**
M18 / L = 80	8 nf	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**IG0006**
M30 / L = 81	10 f	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**II0005**
M30 / L = 81	15 nf	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**II0006**
Smooth tubular plastic housing, 3-wire, DC PNP								
Ø 20 / L = 77	10 nf	plastic	3-wire	no	10...36 DC	300	cable, 2 m	**IA5082**
Ø 20 / L = 92	10 nf	plastic	3-wire	no	10...36 DC	300	terminal	**IA5062**
Ø 20 / L = 92	10 nf	plastic	3-wire	nc	10...36 DC	300	terminal	**IA5063**
Ø 20 / L = 92	10 nf	plastic	3-wire	no	10...36 DC	300	M12 connector	**IA5127**
Ø 34 / L = 82	20 nf	plastic	3-wire	no	10...36 DC	60	cable, 2 m	**IB5096**
Ø 34 / L = 98	30 nf	plastic	3-wire	no / nc	10...36 DC	350	terminal	**IB5133**
Ø 34 / L = 98	20 nf	plastic	3-wire	no / nc	10...36 DC	350	terminal	**IB5063**
Tubular plastic housing, 2-wire, DC PNP/NPN, normally open / normally closed programmable								
M8 / L = 50	2 nf	plastic	2-wire	no / nc	5...36 DC	2000	cable, 2 m	**IE5202**
M12 / L = 71	4 nf	plastic	2-wire	no / nc	10...55 DC	1500	cable, 2 m	**IF5597**
M18 / L = 80	8 nf	plastic	2-wire	no / nc	10...55 DC	300	cable, 2 m	**IG5533**
M30 / L = 81	15 nf	plastic	2-wire	no / nc	10...55 DC	200	cable, 2 m	**II5436**
Ø 20 / L = 92	10 nf	plastic	2-wire	no / nc	10...55 DC	300	terminal	**IA5122**
Ø 20 / L = 77	10 nf	plastic	2-wire	no / nc	10...55 DC	300	cable, 2 m	**IA5108**
Ø 34 / L = 98	20 nf	plastic	2-wire	no / nc	10...55 DC	300	terminal	**IB5124**

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
Smooth tubular plastic housing, 2-wire, AC/DC, normally open								
Ø 20 / L = 77	10 nf	plastic	2-wire	no	20...250	25 / 70	cable, 2 m	**IA0004**
Ø 34 / L = 82	20 nf	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**IB0004**
Ø 34 / L = 82	30 nf	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**IB0026**
Smooth tubular plastic housing, 2-wire, AC/DC, normally open / normally closed programmable								
Ø 20 / L = 92	10 nf	plastic	2-wire	no / nc	20...250	25 / 70	terminal	**IA0032**
Ø 34 / L = 98	20 nf	plastic	2-wire	no / nc	20...250	25 / 50	terminal	**IB0016**
Rectangular housing, 3-wire DC								
40 x 12 x 26	2 f	plastic	3-wire	no	10...36 DC	1400	cable, 2 m	**IN5121**
40 x 12 x 26	4 nf	plastic	3-wire	no	10...36 DC	1300	cable, 2 m	**IN5129**
40 x 12 x 26	2 f	plastic	3-wire	no	10...36 DC	1400	M8 connector	**IN5230**
40 x 12 x 26	4 nf	plastic	3-wire	no	10...36 DC	1300	M8 connector	**IN5212**
28 x 10 x 16	2 f	plastic	3-wire	no	10...36 DC	800	M8 connector	**IS5035**
28 x 10 x 16	4 nf	plastic	3-wire	no	10...36 DC	2000	M8 connector	**IS5071**
28 x 10 x 16	2 f	plastic	3-wire	no	10...36 DC	800	cable, 2 m	**IS5001**
28 x 10 x 16	4 nf	plastic	3-wire	no	10...36 DC	2000	cable, 2 m	**IS5070**
60 x 36 x 10	8 nf	plastic	3-wire	no	10...36 DC	300	M8 connector	**IW5064**
60 x 36 x 10	5 f	plastic	3-wire	no	10...36 DC	400	cable, 2 m	**IW5051**
60 x 36 x 10	8 nf	plastic	3-wire	no	10...36 DC	300	cable, 2 m	**IW5058**
40 x 40 x 66	15 f	plastic	3-wire	no	10...36 DC	300	M12 connector	**IM5057**
40 x 40 x 66	35 nf	plastic	3-wire	no	10...36 DC	100	M12 connector	**IM5053**
40 x 40 x 66	20 f, K = 1	plastic	4-wire	no + nc	10...36 DC	200	M12 connector	**IM5067**
40 x 40 x 66	20 f	plastic	4-wire	no + nc	10...36 DC	100	M12 connector	**IM5068**
40 x 40 x 66	35 nf	plastic	4-wire	no + nc	10...36 DC	100	M12 connector	**IM5066**
40 x 40 x 120	15 f	plastic	3-wire	no / nc	10...36 DC	350	terminal block	**IM5020**
40 x 40 x 120	20 nf	plastic	3-wire	no / nc	10...36 DC	350	terminal block	**IM5019**
40 x 40 x 120	30 nf	plastic	3-wire	no / nc	10...36 DC	100	terminal block	**IM5046**
90 x 60 x 40	40 nf	plastic	3-wire	no / nc	10...36 DC	15	terminal block	**IC5005**
105 x 80 x 40	60 nf	plastic	3-wire	no / nc	10...36 DC	4	terminal block	**ID5005**
92 x 80 x 40	50 f	plastic	3-wire	no	10...36 DC	70	M12 connector	**ID5055**
105 x 80 x 40	60 nf	plastic	3-wire	no	10...36 DC	4	M12 connector	**ID5046**
92 x 80 40	50 f	plastic	4-wire	no + nc	10...36 DC	70	M12 connector	**ID5058**
Rectangular plastic housing, 2-wire, DC PNP/NPN, normally open / normally closed programmable								
28 x 10 x 16	2 f	plastic	2-wire	no / nc	5...36	2000	cable, 2 m	**IS5026**
40 x 12 x 26	2 f	plastic	2-wire	no / nc	10...55 DC	1300	cable, 2 m	**IN5207**
40 x 12 x 26	4 nf	plastic	2-wire	no / nc	10...55 DC	1200	cable, 2 m	**IN5208**
40 x 40 x 121	15 f	plastic	2-wire	no / nc	10...55 DC	350	terminal	**IM5037**
40 x 40 x 121	20 nf	plastic	2-wire	no / nc	10...55 DC	300	terminal	**IM5038**
Rectangular housing, 2-wire AC/DC								
40 x 12 x 26	2 f	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**IN0073**
40 x 12 x 26	4 nf	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**IN0081**
40 x 40 x 120	15 f	plastic	2-wire	no / nc	20...250	20 / 55	terminal block	**IM0011**
40 x 40 x 120	20 nf	plastic	2-wire	no / nc	20...250	20 / 55	terminal block	**IM0010**
90 x 60 x 40	40 nf	plastic	2-wire	no / nc	20...250	10	terminal block	**IC0003**
105 x 80 x 40	60 nf	plastic	2-wire	no / nc	20...250	4	terminal block	**ID0013**
120 x 80 x 30	50 nf	plastic	2-wire	no	20...250	25 / 35	cable, 2 m	**ID0014**

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
efector m "C"-series resistant against agressive oils and coolants Threaded tubular metal housing, 3-wire DC PNP, IP 68, connector version								
M12 / L = 45	2 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC239**
M12 / L = 60	2 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC243**
M12 / L = 70	2 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC241**
M12 / L = 45	4 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC204**
M12 / L = 60	4 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC229**
M12 / L = 70	4 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC237**
M12 / L = 50	4 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC240**
M12 / L = 60	4 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC244**
M12 / L = 70	4 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC242**
M12 / L = 50	7 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC205**
M12 / L = 60	7 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC230**
M12 / L = 70	7 nf	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC238**
M18 / L = 46	5 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC226**
M18 / L = 60	5 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC230**
M18 / L = 70	5 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC228**
M18 / L = 46	8 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC204**
M18 / L = 60	8 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC221**
M18 / L = 70	8 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC224**
M18 / L = 51	8 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGC227**
M18 / L = 60	8 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGC231**
M18 / L = 70	8 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGC229**
M18 / L = 51	12 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGC205**
M18 / L = 60	12 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGC220**
M18 / L = 70	12 nf	brass	3-wire	no	10...36 DC	300	M12 connector	**IGC225**
M30 / L = 50	10 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC212**
M30 / L = 60	10 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC216**
M30 / L = 70	10 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC214**
M30 / L = 50	15 f	brass	3-wire	no	10...36 DC	100	M12 connector	**IIC200**
M30 / L = 60	15 f	brass	3-wire	no	10...36 DC	100	M12 connector	**IIC206**
M30 / L = 70	14 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC210**
M30 / L = 50	15 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC213**
M30 / L = 60	15 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC217**
M30 / L = 70	15 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC215**
M30 / L = 50	22 nf	brass	3-wire	no	10...36 DC	100	M12 connector	**IIC201**
M30 / L = 60	22 nf	brass	3-wire	no	10...36 DC	100	M12 connector	**IIC207**
M30 / L = 70	22 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIC211**
M12 / L = 45	4 f	brass	3-wire	nc	10...36 DC	700	M12 connector	**IFC207**
M12 / L = 50	7 nf	brass	3-wire	nc	10...36 DC	700	M12 connector	**IFC208**
M18 / L = 46	8 f	brass	3-wire	nc	10...36 DC	400	M12 connector	**IGC207**
M18 / L = 51	12 nf	brass	3-wire	nc	10...36 DC	300	M12 connector	**IGC208**
efector m "C"-series resistant against agressive oils and coolants with ceramic sensing face Threaded tubular metal housing, 3-wire DC PNP normally open, IP 68, connector version								
M12 / L = 45	4 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IFC206**
M18 / L = 46	8 f	brass	3-wire	no	10...36 DC	400	M12 connector	**IGC206**
efector m "C"-series resistant against agressive oils and coolants with ceramic sensing face Threaded tubular metal housing, 3-wire DC PNP and 2-wire DC PNP/NPN normally open, IP 68, connector version								
M12 / L = 70	4 f	brass	3/2-wire	no	10...36 DC	500	M12 connector	**IFC210**
M18 / L = 70	8 f	brass	3/2-wire	no	10...36 DC	400	M12 connector	**IGC210**

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
efector m "C"-series resistant against agressive oils and coolants Threaded tubular metal housing, 2-wire DC PNP/NPN normally open, IP 68, connector version								
M12 / L = 45	4 f	brass	2-wire	no	10...30 DC	700	M12 connector	**IFC200**
M12 / L = 50	7 nf	brass	2-wire	no	10...30 DC	700	M12 connector	**IFC201**
M18 / L = 46	8 f	brass	2-wire	no	10...30 DC	400	M12 connector	**IGC200**
M18 / L = 51	12 nf	brass	2-wire	no	10...30 DC	250	M12 connector	**IGC201**
efector m "C"-series quadronorm, resistant against agressive oils and coolants with optical setting aid (2 LED) Threaded tubular metal housing, 2-wire DC PNP/NPN normally open / normally closed, IP 68, connector version								
M12 / L = 60	4 f	brass	2-wire	no / nc	10...36 DC	700	M12 connector	**IFC234**
M12 / L = 60	7 nf	brass	2-wire	no / nc	10...36 DC	700	M12 connector	**IFC235**
M18 / L = 70	8 f	brass	2-wire	no / nc	10...30 DC	400	M12 connector	**IGC222**
M18 / L = 70	12 nf	brass	2-wire	no / nc	10...36 DC	300	M12 connector	**IGC223**
M30 / L = 70	15 f	brass	2-wire	no / nc	10...30 DC	100	M12 connector	**IIC208**
M30 / L = 70	22 nf	brass	2-wire	no / nc	10...30 DC	100	M12 connector	**IIC209**
efector m "C"-series ferrous only, resistant against agressive oils and coolants Threaded tubular metal housing, 3-wire DC PNP, IP 68, connector version, detects only ferrous materials (K = 0)								
M12 / L = 70	3 f	brass	3-wire	no	10...30 DC	25	M12 connector	**IFC211**
M18 / L = 70	5 f	brass	3-wire	no	10...30 DC	25	M12 connector	**IGC211**
M12 / L = 70	3 f	brass	3-wire	nc	10...30 DC	25	M12 connector	**IFC213**
M18 / L = 70	5 f	brass	3-wire	nc	10...30 DC	25	M12 connector	**IGC215**
Threaded tubular metal housing, 3-wire DC PNP, IP 67, connector version, weld field immune								
M12 / L = 60	2 f	brass	3-wire	no	10...36 DC	1000	M12 connector	**IF5670**
M12 / L = 60	4 nf	brass	3-wire	no	10...36 DC	1000	M12 connector	**IF5675**
M18 / L = 60	5 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IG5667**
M30 / L = 60	10 f	brass	3-wire	no	10...36 DC	250	M12 connector	**II5503**
Threaded tubular teflon coated metal housing, 3-wire DC PNP, IP 67, connector version, weld field immune								
M12 / L = 60	2 f	brass	3-wire	no	10...36 DC	1000	M12 connector	**IF5750**
M12 / L = 60	4 nf	brass	3-wire	no	10...36 DC	1000	M12 connector	**IF5751**
M18 / L = 60	5 f	brass	3-wire	no	10...36 DC	700	M12 connector	**IG5647**
M30 / L = 60	10 f	brass	3-wire	no	10...36 DC	250	M12 connector	**II5711**
Rectangular plastic housing, 4-wire DC PNP, IP 67, connector version, weld field immune								
40 x 40 x 66	20 f	plastic	4-wire	no + nc	10...36 DC	200	M12 connector	**IM5067**
40 x 40 x 66	35 nf	plastic	4-wire	no + nc	10...36 DC	250	M12 connector	**IM5097**
92 x 80 x 40	50 f	brass	4-wire	no + nc	10...36 DC	70	M12 connector	**ID5059**
Rectangular teflon coated plastic housing, 4-wire DC PNP, IP 67, weld field immune, correction factor = 1								
40 x 40 x 66	20 f	plastic	4-wire	no + nc	10...36 DC	200	M12 connector	**IM5073**
40 x 40 x 66	35 nf	plastic	4-wire	no + nc	10...36 DC	250	M12 connector	**IM5098**
efector m "W"-series weld field immune, correction factor = 1, same sensing range for all metals Threaded tubular teflon coated metal housing, 3-wire DC PNP, IP 67, normally open, connector version								
M12 / L = 65	3 f	brass	3-wire	no	10...30 DC	4000	M12 connector	**IFW200**
M12 / L = 65	8 nf	brass	3-wire	no	10...30 DC	4000	M12 connector	**IFW201**
M18 / L = 65	5 f	brass	3-wire	no	10...30 DC	2000	M12 connector	**IGW200**
M18 / L = 65	12 nf	brass	3-wire	no	10...30 DC	2000	M12 connector	**IGW201**
M30 / L = 65	10 f	brass	3-wire	no	10...30 DC	1000	M12 connector	**IIW200**
M30 / L = 65	22 nf	brass	3-wire	no	10...30 DC	1000	M12 connector	**IIW201**

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
efector m "S"-series for industrial applications with optical setting aid (2 LED) Threaded tubular metal housing, 3-wire DC PNP or 2-wire DC PNP/NPN, normally open, connector version								
M12 / L = 70	4 f	brass	3/2-wire	no	10...30 DC	500	M12 connector	**IFS208**
M12 / L = 70	7 nf	brass	3/2-wire	no	10...30 DC	500	M12 connector	**IFS209**
M18 / L = 70	8 f	brass	3/2-wire	no	10...30 DC	400	M12 connector	**IGS208**
M18 / L = 70	12 nf	brass	3/2-wire	no	10...30 DC	300	M12 connector	**IGS209**
efector m photoelectric M12 proximity switch with 50 mm sensing range Threaded tubular metal housing, 3-wire DC PNP, normally open, connector version								
M8 / L = 66	25 f	brass	3-wire	no	12...30 DC	2500	M8 connector	**JAC200**
M12 / L = 63	50 f	brass	3-wire	no	10...30 DC	1600	M12 connector	**JAC201**
efector m "T"-series for food and hygienic applications, IP 68 & IP 69K, temperature range 0...100 °C Threaded tubular stainless steel housing, 3-wire DC PNP								
M12 / L = 45	4 f	V4A	3-wire	no	10...36 DC	700	M12 connector	**IFT203**
M12 / L = 50	7 nf	V4A	3-wire	no	10...36 DC	700	M12 connector	**IFT200**
M12 / L = 70	4 f	V4A	3-wire	no	10...36 DC	700	M12 connector	**IFT216**
M12 / L = 70	7 nf	V4A	3-wire	no	10...36 DC	700	M12 connector	**IFT217**
M18 / L = 46	8 f	V4A	3-wire	no	10...36 DC	500	M12 connector	**IGT203**
M18 / L = 51	12 nf	V4A	3-wire	no	10...36 DC	300	M12 connector	**IGT200**
M18 / L = 70	8 f	V4A	3-wire	no	10...36 DC	400	M12 connector	**IGT219**
M18 / L = 70	12 nf	V4A	3-wire	no	10...36 DC	300	M12 connector	**IGT220**
M30 / L = 50	14 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIT205**
M30 / L = 50	22 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIT200**
M30 / L = 70	14 f	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIT212**
M30 / L = 70	22 nf	V4A	3-wire	no	10...36 DC	100	M12 connector	**IIT213**
M12 / L = 56	3.5 f	V4A	3-wire	no	10...36 DC	700	cable, 6 m	**IFT206**
M12 / L = 61	7 nf	V4A	3-wire	no	10...36 DC	700	cable, 6 m	**IFT208**
M18 / L = 57	8 f	V4A	3-wire	no	10...36 DC	400	cable, 6 m	**IGT206**
M18 / L = 62	12 nf	V4A	3-wire	no	10...36 DC	300	cable, 6 m	**IGT208**
M30 / L = 59	14 f	V4A	3-wire	no	10...36 DC	100	cable, 6 m	**IIT209**
M30 / L = 59	22 nf	V4A	3-wire	no	10...36 DC	100	cable, 6 m	**IIT207**
M12 / L = 45	3.5 f	V4A	3-wire	nc	10...36 DC	700	M12 connector	**IFT204**
M12 / L = 50	7 nf	V4A	3-wire	nc	10...36 DC	700	M12 connector	**IFT201**
M18 / L = 46	8 f	V4A	3-wire	nc	10...36 DC	500	M12 connector	**IGT204**
M18 / L = 51	12 nf	V4A	3-wire	nc	10...36 DC	300	M12 connector	**IGT201**
efector m "T"-series for food and hygienic applications, IP 68 & IP 69K, temperature range 0...100 °C Threaded tubular stainless steel housing, 3-wire DC PNP and 2-wire DC PNP/NPN normally open with optical setting aid (2 LED)								
M12 / L = 70	3.5 f	V4A	3/2-wire	no	10...30 DC	500	M12 connector	**IFT205**
M12 / L = 70	7 nf	V4A	3/2-wire	no	10...30 DC	700	M12 connector	**IFT202**
M18 / L = 70	5 f	V4A	3/2-wire	no	10...30 DC	500	M12 connector	**IGT205**
M18 / L = 70	12 nf	V4A	3/2-wire	no	10...30 DC	300	M12 connector	**IGT202**
M30 / L = 70	14 f	V4A	3/2-wire	no	10...36 DC	100	M12 connector	**IIT204**
M30 / L = 70	22 nf	V4A	3/2-wire	no	10...36 DC	100	M12 connector	**IIT202**
efector m "T"-series for food and hygienic applications, IP 68 & IP 69K, temperature range 0...100 °C Smooth tubular stainless steel housing, 3-wire DC PNP and 2-wire DC PNP/NPN, normally open with optical setting aid (2 LED)								
Ø12 / L = 70	7 nf	V4A	3/2-wire	no	10...30 DC	700	M12 connector	**IFT210**
Ø12 / L = 79	7 nf	V4A	3/2-wire	no	10...30 DC	700	cable, 6 m	**IFT211**
Ø18 / L = 70	12 nf	V4A	3/2-wire	no	10...30 DC	300	M12 connector	**IGT211**
Ø18 / L = 81	12 nf	V4A	3/2-wire	no	10...30 DC	300	cable, 6 m	**IGT212**
efector m photoelectric M12 proximity switch with 50 mm sensing range, temperature range 0...100 °C Threaded tubular metal housing, 3-wire DC PNP, normally open, connector version								
M12 / L = 63	50 f	V4A	3-wire	no	10...30 DC	1600	M12 connector	**JAT201**

- **High operational reliability due to increased noise immunity.**
- **Adjustable sensing range up to 15 mm by means of a potentiometer.**
- **Resistant plastic housing for various applications.**
- **Different connection options using cable, connector or terminals.**
- **Types with programmable output function available.**

Introduction

Capacitive proximity switches are used for the non-contact detection of any objects. In contrast to inductive switches, which only detect metallic objects, capacitive sensors can also detect non-metallic materials.

Typical applications are in the wood, paper, glass, plastic, food and chemical industries. Capacitive sensors for example monitor that the contents of a cardboard box are complete or check the presence of the non-metallic caps.

Operating principle

The capacitance between the active electrode of the sensor and the electrical earth potential is measured. An approaching object influences the electrical alternating field between these two "capacitor plates". This applies to metallic and non-metallic objects.

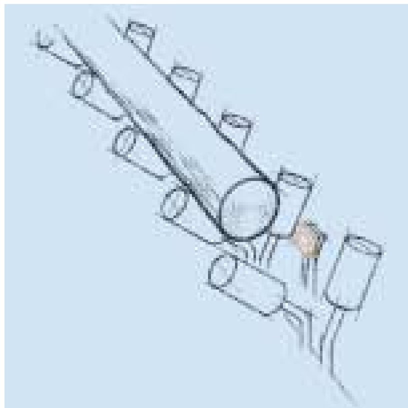
In principle, capacitive sensors work with an RC oscillator. A very small change in capacitance is enough to influence the oscillation amplitude. The evaluation electronics converts this into a switched signal. The sensitivity can be set with a potentiometer.

Increased noise immunity

When detecting objects very small changes in capacitance of 0.02 pF (with a basic capacitance of the electrode of 0.2 pF!) must be reliably converted into useful switched signals. This makes high requirements for the electronics as the circuit and design-related parasitic basic capacitances (e.g. conductive tracks, input capacitances of the components) can be much higher thus making a precise capacitance measurement much more difficult.

ifm electronic therefore developed a future-oriented solution to this problem. A new sensor circuit effectively avoids the indicated problems of the RC oscillator with an acceptable level of input. The new circuit concept achieves much better values with respect to all relevant noise parameters.

Special attention was given to very common noise sources in practice (frequency inverters, switched-mode power supplies, stepper-motor controllers, etc.).



Not only metal: Capacitive sensors detect almost all materials, here for example a log in a saw mill.

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
Threaded tubular plastic housing, 3-wire, DC PNP								
M18 / L = 84	8 nf	plastic	3-wire	no	10...36 DC	50	cable, 2 m	**KG5043**
M18 / L = 110	8 nf	plastic	3-wire	no	10...36 DC	50	terminal block	**KG5041**
M30 / L = 81	15 nf	plastic	3-wire	no	10...36 DC	40	cable, 2 m	**KI5002**
M30 / L = 81	15 nf	plastic	3-wire	nc	10...36 DC	40	cable, 2 m	**KI5001**
M30 / L = 92	15 nf	plastic	3-wire	no / nc	10...36 DC	40	DIN 43650 conn.	**KI5038**
M30 / L = 125	15 nf	plastic	3-wire	no / nc	10...55 DC	40	terminal block	**KI5023**
Threaded tubular plastic housing, 3-wire, DC NPN								
M18 / L = 84	8 nf	plastic	3-wire	no	10...36 DC	50	cable, 2 m	**KG5045**
M30 / L = 81	15 nf	plastic	3-wire	no	10...36 DC	40	cable, 2 m	**KI5015**
Threaded tubular plastic housing, 2-wire, DC								
M18 / L = 84	8 nf	plastic	2-wire	no / nc	10...55 DC	50	cable, 2 m	**KG5047**
M18 / L = 110	8 nf	plastic	2-wire	no / nc	10...55 DC	50	terminal block	**KG5040**
Threaded tubular plastic housing, 2-wire, AC/DC								
M18 / L = 84	8 nf	plastic	2-wire	no	20...250	25 / 50	cable, 2 m	**KG0009**
M18 / L = 110	8 nf	plastic	2-wire	no / nc	20...250	25 / 50	terminal block	**KG0008**
M30 / L = 81	15 nf	plastic	2-wire	no	20...250	25 / 40	cable, 2 m	**KI0016**
M30 / L = 81	15 nf	plastic	2-wire	nc	20...250	25 / 40	cable, 2 m	**KI0020**
M30 / L = 92	15 nf	plastic	2-wire	no / nc	20...250	25 / 40	DIN 43650 conn.	**KI0040**
M30 / L = 125	15 nf	plastic	2-wire	no / nc	20...250	25 / 40	terminal block	**KI0024**
Smooth tubular plastic housing, 3-wire, DC PNP								
Ø 34 / L = 81	20 nf	plastic	3-wire	no	10...36 DC	40	cable, 2 m	**KB5004**
Ø 34 / L = 81	20 nf	plastic	3-wire	nc	10...36 DC	40	cable, 2 m	**KB5002**
Smooth tubular plastic housing, 3-wire, DC NPN								
Ø 34 / L = 81	20 nf	plastic	3-wire	no	10...36 DC	40	cable, 2 m	**KB5001**
Ø 34 / L = 81	20 nf	plastic	3-wire	nc	10...36 DC	40	cable, 2 m	**KB5003**
Smooth tubular plastic housing, 2-wire, AC/DC								
Ø 34 / L = 81	20 nf	plastic	2-wire	no	20...250	25 / 40	cable, 2 m	**KB0025**
Ø 34 / L = 81	20 nf	plastic	2-wire	nc	20...250	25 / 40	cable, 2 m	**KB0029**
Rectangular plastic housing, 3-wire, DC PNP								
120 x 80 x 30	60 nf	plastic	3-wire	no	10...36 DC	10	cable, 2 m	**KD5022**
105 x 80 x 40	60 nf	plastic	3-wire	no / nc	10...36 DC	10	cable, 2 m	**KD5018**
Rectangular plastic housing, 2-wire, AC/DC								
120 x 80 x 30	60 nf	plastic	2-wire	no	20...250	10	cable, 2 m	**KD0012**
105 x 80 x 40	60 nf	plastic	2-wire	no / nc	20...250	10	terminals	**KD0009**
Rectangular plastic housing, 3-wire, DC PNP, function check output								
78 x 36 x 10	12 f	plastic	3-wire	no / nc	10...36 DC	40	cable, 2 m	**KW5001**
78 x 36 x 10	12 f	plastic	3-wire	no / nc	10...36 DC	40	pigtail with M12	**KW5005**

- **For all actuators according to VDI / VDE 3845.**
- **Valve position visible via target pucks / switching cams.**
- **AS-i dual sensor for quick and safe installation due to “plug & play”.**
- **Also available as complete set incl. all the accessories for a valve.**
- **High machine uptime: long-lasting and maintenance-free products.**

Introduction

In industrial processes where liquids, air or gases are used valves are needed for dosing and control. There is a wide variety of valve types; butterfly or ball valves being the most common quarter-turn types.

These valves are seldom operated manually. Pneumatic valve actuators are normally used for mechanical positioning. The valve position must be monitored electronically.

Mechanical switches are still often used for position feedback on the actuator shaft. For other solutions several proximity switches are used together with a switch target for position detection. Disadvantage: Mounting is mechanically complex. During switch mounting the signal wires can be reversed when they are connected in the top-mounted junction box. Where there are temperature fluctuations condensing humidity leads to corrosion and thus malfunction.

Feedback: Monitoring of pneumatic and manual valves must be possible.

Operating principle

An innovative design eliminates the disadvantages of these conventional solutions. In 1992 ifm electronic developed a standard which is now used by many leading actuator manufacturers. A round switch target, known as a “puck”, with two metal screws offset by 90° is mounted on the actuator shaft. The screws are located at a different height. A compact dual proximity switch (type IND) with two integral sensors detects the upper or lower metal screw depending on the valve position and thus the two switch positions.

Due to the simple construction the system operates safely with no wear at all. It is virtually resistant to external influence and meets the protection rating IP 67. Under certain conditions the unit can even be self-cleaning. The sensors are also resistant to mechanical stress such as vibration and shock.

Special design AS-i (T5)

An extended design is the series T5. In addition to the inductive dual sensor, the unit provides an integrated connection for the solenoid valve. The connection to the control unit is made via a two-wire AS-i cable. The asset: Up to 30 other units can be connected to this line and separately controlled via the AS-i master.

Dimensions [mm]	Sensing range [mm]	Material	Electrical design	Output function	U_b [V]	f [Hz]	Connection	Order no.
Double sensors for quarter-turn valves, 4-wire DC PNP								
40 x 26 x 26	4 nf	plastic	4-wire	2 x no	10...36 DC	1300	M12 connector	**IN5225**
40 x 26 x 26	4 nf	plastic	4-wire	2 x no	10...36 DC	1300	cable, 2 m	**IN5251**
40 x 26 x 26	4 nf	plastic	4-wire	2 x no	10...36 DC	1300	M18 connector	**IN5285**
40 x 26 x 47	4 nf	plastic	4-wire	2 x no	10...36 DC	1300	M12 V2A conn.	**IN5327**
Double sensors for quarter-turn valves, 4-wire DC PNP/NPN								
40 x 26 x 26	4 nf	plastic	4-wire	2 x no	10...36 DC	1300	M12 connector	**IN5224**
Double sensors for quarter-turn valves, 4-wire AC/DC								
40 x 26 x 40	4 nf	plastic	4-wire	2 x no	20...250 AC/DC	25 / 50	M18 connector	**IN0108**
40 x 26 x 40	4 nf	plastic	4-wire	2 x no	20...250 AC/DC	26 / 50	cable, 2 m	**IN0110**
Double sensors for quarter-turn valves, 4-wire DC PNP with integrated solenoid valve connection								
55 x 78 x 35	4 nf	plastic	4-wire	2 x no 1 x SV	10...36 DC	1300	Rd 24 x 1/8 M12 connector	**IN5334**
Accessories for double sensors								
Target puck Ø 53 mm								**E10320**
Target puck Ø 65 mm								**E10327**
Target puck Ø 102 mm								**E10328**
Target puck Ø 53 mm, adjustable between 0° and 360°								**E10661**

- **Visible red light facilitates adjustment.**
- **Variants with metal housing for robust use.**
- **LED display to check operation, switching status and function.**
- **Special functions like background suppression or polarisation filter available.**
- **Wide range of system components for easy and safe mountings.**

Introduction

Automation technology can no longer be imagined without photoelectric sensors as "artificial eyes". They are used where safe and non-contact detection of the exact position of objects is required. The material of the objects to be detected is of no importance. Compared to proximity switches photoelectric sensors have a much higher sensing zone.

Through-beam sensors

A through-beam sensor is distinguished by a long range. The system consists of two separate components: a transmitter and a receiver. The light only travels one way (from the transmitter to the receiver). Adverse effects in the applications, such as dust in the air, dirt on the lenses, steam or mist do not immediately interfere with the system. This is called a high insensitivity to dirt or a high excess gain.

Retro-reflective sensors

For a retro-reflective sensor the transmitter and receiver are incorporated into one housing. By means of a reflector the transmitted light is returned to the receiver. An object in the beam path interrupts the beam and triggers a switching operation. Retro-reflective sensors without polarisation filter operate in the infrared area, systems with polarisation filter with visible red light. Compared to through-beam sensors, retro-reflective sensors have an average excess gain.

Diffuse reflection sensors

A diffuse reflection sensor is used for the direct detection of objects. Transmitter and receiver are incorporated into one housing. The transmitter emits light which is reflected by the object to be detected and seen by the receiver. This system evaluates the reflected light of an object. Reflectors are not necessary for operation.

Fixing options

ifm electronic offers a complete component system of easy-to-use mounting sets. The solutions consist of a clamp which is fastened with only one screw, keeps the sensors safely in place and at the same time guarantees free movement in all axes.

The reflector reflects the light beam: For a retro-reflective sensor transmitter and receiver are integrated into one housing.

Artificial eyes: Photoelectric sensors are used to detect positions in automation technology.

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Sensor type	Sensing range [mm]	Spot Ø at max. range [mm]	Output function	Connection	Order no.
OF series with M12 threaded metal housing, 3-wire DC					
through-beam transmitter	4000	700	–	cable, 2 m	**OF5018**
through-beam receiver	4000	–	light on / dark on PNP	cable, 2 m	**OF5019**
through-beam transmitter	4000	700	–	M12 connector	**OF5021**
through-beam receiver	4000	–	light on / dark on PNP	M12 connector	**OF5022**
retro-reflective	50...2000	140	light on / dark on PNP	cable, 2 m	**OF5014**
retro-reflective, pol.-filter	200...800	70	light on / dark on PNP	cable, 2 m	**OF5024**
retro-reflective	50...2000	140	light on / dark on PNP	M12 connector	**OF5016**
retro-reflective, pol.-filter	200...800	70	light on / dark on PNP	M12 connector	**OF5025**
diffuse-reflective	1...200	92	light on / dark on PNP	cable, 2 m	**OF5010**
diffuse-reflective, foc. beam	1...400	185	light on / dark on PNP	cable, 2 m	**OF5026**
diffuse-reflective	1...200	92	light on / dark on PNP	M12 connector	**OF5012**
diffuse-reflective, foc. beam	1...400	185	light on / dark on PNP	M12 connector	**OF5027**
OG series with M18 threaded plastic housing, 3-wire DC					
through-beam transmitter	15000	2000	–	cable, 2 m	**OG5040**
through-beam receiver	15000	–	light on / dark on PNP	cable, 2 m	**OG5041**
through-beam transmitter	15000	2000	–	M12 connector	**OG5042**
through-beam receiver	15000	–	light on / dark on PNP	M12 connector	**OG5043**
retro-reflective, pol.-filter	3000	262	light on / dark on PNP	cable, 2 m	**OG5045**
retro-reflective, pol.-filter	3000	262	light on / dark on PNP	M12 connector	**OG5046**
diffuse-reflective	1...600	169	light on / dark on PNP	cable, 2 m	**OG5049**
diffuse-reflective	1...600	169	light on / dark on PNP	M12 connector	**OG5050**
diffuse-reflective, backgr.-s.	30...130	12	light on / dark on PNP	cable, 2 m	**OG5052**
diffuse-reflective, backgr.-s.	30...130	12	light on / dark on PNP	M12 connector	**OG5053**
OG series with M18 threaded stainless steel housing, 3-wire DC, IP 68 / IP 69K					
through-beam transmitter	15000	2000	–	cable, 6 m	**OG5107**
through-beam receiver	15000	–	light on / dark on PNP	cable, 6 m	**OG5108**
through-beam transmitter	15000	2000	–	M12 connector	**OG5116**
through-beam receiver	15000	–	light on / dark on PNP	M12 connector	**OG5117**
retro-reflective, pol.-filter	3000	262	light on / dark on PNP	cable, 6 m	**OG5106**
retro-reflective, pol.-filter	3000	262	light on / dark on PNP	M12 connector	**OG5115**
diffuse-reflective	1...600	169	light on / dark on PNP	cable, 6 m	**OG5113**
diffuse-reflective	1...600	169	light on / dark on PNP	M12 connector	**OG5114**
diffuse-reflective, backgr.-s.	30...130	12	light on / dark on PNP	cable, 6 m	**OG5109**
diffuse-reflective, backgr.-s.	30...130	12	light on / dark on PNP	M12 connector	**OG5119**
OG series with M18 threaded plastic housing, 2-wire AC/DC					
through-beam transmitter	15000	2000	–	cable, 2 m	**OG0028**
through-beam receiver	15000	–	light on	cable, 2 m	**OG0029**
retro-reflective, pol.-filter	3000	262	light on	cable, 2 m	**OG0043**
diffuse-reflective	1...600	169	light on	cable, 2 m	**OG0034**
OI series with M30 threaded plastic housing, 3-wire DC					
retro-reflective	100...4000	280	light on / dark on PNP	terminals	**OI5001**
retro-reflective, pol.-filter	150...2000	200	light on / dark on PNP	terminals	**OI5007**
diffuse-reflective	3...700	122	light on / dark on PNP	terminals	**OI5003**
OJ series with rectangular plastic housing, 35 x 24 x 11 mm, front sensing, 4-wire DC					
through-beam transmitter	10000	1000	–	M8 connector	**OJ5008**
through-beam receiver	10000	–	light on / dark on PNP	M8 connector	**OJ5009**
through-beam receiver	10000	–	light on / dark on NPN	M8 connector	**OJ5010**
retro-reflective, pol. filter	2000	64	light on / dark on PNP	M8 connector	**OJ5004**
retro-reflective, pol. filter	2000	64	light on / dark on NPN	M8 connector	**OJ5005**
retro-reflective, pol. filter	2000	64	light on / dark on PNP	PUR pigtail M12	**OJ5062**
retro-reflective, pol. filter	2000	64	light on / dark on PNP	PVC pigtail M12	**OJ5063**

Sensor type	Sensing range [mm]	Spot Ø at max. range [mm]	Output function	Connection	Order no.
retro-reflective, pol. filter	2000	64	light on / dark on PNP	PVC cable, 2 m	**OJ5006**
retro-reflective, PET-detect.	200...1500	64	light on / dark on PNP	M8 connector	**OJ5085**
diffuse-reflective	1...600	60	light on / dark on PNP	M8 connector	**OJ5000**
diffuse-reflective	1...600	60	light on / dark on NPN	M8 connector	**OJ5001**
diffuse-reflective	1...600	60	light on / dark on PNP	PUR pigtail M12	**OJ5060**
diffuse-reflective	1...600	60	light on / dark on PNP	PVC pigtail M12	**OJ5061**
diffuse-reflective	1...600	60	light on / dark on PNP	PVC cable, 2 m	**OJ5002**
diffuse-reflective	1...1000	150	light on / dark on PNP	M8 connector	**OJ5070**
diffuse-reflective, backgr.-s.	15...400	18	light on / dark on PNP	PVC cable, 2 m	**OJ5044**
diffuse-reflective, backgr.-s.	15...400	18	light on / dark on PNP	PVC pigtail M12	**OJ5069**
OJ series with rectangular plastic housing, 35 x 24 x 11 mm, side sensing, 4-wire DC					
through-beam transmitter	10000	1000	–	M8 connector	**OJ5030**
through-beam receiver	10000	–	light on / dark on PNP	M8 connector	**OJ5031**
through-beam receiver	10000	–	light on / dark on NPN	M8 connector	**OJ5032**
retro-reflective, pol. filter	2000	64	light on / dark on PNP	M8 connector	**OJ5026**
retro-reflective, pol. filter	2000	64	light on / dark on NPN	M8 connector	**OJ5027**
retro-reflective, pol. filter	2000	64	light on / dark on PNP	PVC cable, 2 m	**OJ5028**
retro-reflective, PET-detect.	200...1500	64	light on / dark on PNP	M8 connector	**OJ5086**
diffuse-reflective	1...600	60	light on / dark on PNP	M8 connector	**OJ5022**
diffuse-reflective	1...600	60	light on / dark on NPN	M8 connector	**OJ5023**
diffuse-reflective	1...600	60	light on / dark on PNP	PVC cable, 2 m	**OJ5024**
diffuse-reflective	1...1000	150	light on / dark on PNP	M8 connector	**OJ5071**
diffuse-reflective, backgr.-s.	15...400	18	light on / dark on PNP	M8 connector	**OJ5048**
diffuse-reflective, backgr.-s.	15...400	18	light on / dark on PNP	PVC pigtail M12	**OJ5078**
OL series with rectangular plastic housing, 75 x 27 x 62 mm, 4-wire AC/DC with relais output					
through-beam transmitter	25000	2500	–	terminals	**OL0006**
through-beam receiver	25000	–	light on / dark on relais	terminals	**OL0007**
retro-reflective, pol.-filter	300...5000	250	light on / dark on relais	terminals	**OL0004**
diffuse-reflective	1...1000	300	light on / dark on relais	terminals	**OL0005**
diffuse-reflective	1...800	80	light on / dark on relais	terminals	**OL0009**
OA series with rectangular plastic housing, 85 x 36 x 100 mm, 5-wire AC/DC with relais output					
through-beam transmitter	50000	1500	–	terminals	**OA0101**
through-beam receiver	50000	–	light on / dark on relais	terminals	**OA0102**
retro-reflective	250...10000	250	light on / dark on relais	terminals	**OA0104**
retro-reflective, pol.-filter	200...8000	420	light on / dark on relais	terminals	**OA0106**
diffuse-reflective	5...1500	370	light on / dark on relais	terminals	**OA0108**
OH series with rectangular plastic housing, 25.1 x 7.6 x 12.5 mm, 3-wire DC					
through-beam transmitter	1200	10	–	PVC cable, 2 m	**OH5001**
through-beam receiver	1200	–	dark on PNP	PVC cable, 2 m	**OH5002**
through-beam transmitter	1200	10	–	PVC pigtail M8	**OH5012**
through-beam receiver	1200	–	dark on PNP	PVC pigtail M8	**OH5003**
retro-reflective	800	10	dark on PNP	PVC cable, 2 m	**OH5010**
retro-reflective	800	10	dark on PNP	PVC pigtail M8	**OH5011**
diffuse-reflective	2...50	3.5	light on PNP	PVC cable, 2 m	**OH5004**
diffuse-reflective	2...50	3.5	light on PNP	PVC pigtail M8	**OH5005**
diffuse-reflective, backgr.-s.	1...30	4.5	light on PNP	PVC cable, 2 m	**OH5006**
diffuse-reflective, backgr.-s.	1...30	4.5	light on PNP	PVC pigtail M8	**OH5007**
diffuse-reflective, backgr.-s.	1...15	2.5	light on PNP	PVC cable, 2 m	**OH5008**
diffuse-reflective, backgr.-s.	1...15	2.5	light on PNP	PVC pigtail M8	**OH5009**

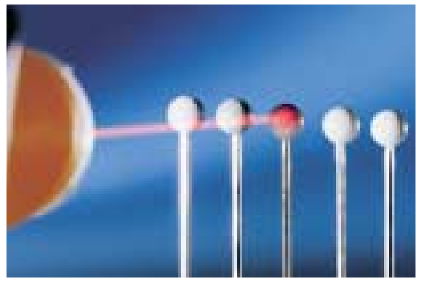
Sensor type	Sensing range [mm]	Spot Ø at max. range [mm]	Output function	Connection	Order no.
Accessories					
Mounting set for OF types, free standing, clamp: diecast zinc, fixture: stainless steel					**E20860**
Mounting set for OF types, profile mounting, clamp: diecast zinc, fixture: stainless steel					**E20865**
Mounting set for OG types, free standing, clamp: diecast zinc, fixture: steel					**E20718**
Mounting set for OG types, free standing, clamp: diecast zinc, fixture: steel					**E20719**
Mounting set for OG types, free standing, clamp: stainless steel, fixture: stainless steel					**E20870**
Mounting set for OG types, free standing, clamp: stainless steel, fixture: stainless steel					**E20869**
Mounting set for OG types, profile mounting, clamp: diecast zinc, fixture: stainless steel					**E20867**
Mounting set for OG types, profile mounting, clamp: diecast zinc, fixture: stainless steel					**E20866**
Mounting set for OI types, free standing, clamp: diecast zinc, fixture: stainless steel					**E20873**
Mounting set for OI types, profile mounting, clamp: diecast zinc, fixture: stainless steel					**E20875**
OJ front lense mounting set, free-standing					**E20966**
OJ side lense mounting set, free-standing					**E20968**
OJ swivel mount clip					**E20974**
OJ angel bracket, stainless steel					**E20984**
Mounting set for OL types, free standing, clamp: diecast zinc, fixture: V4A					**E20792**
Mounting set for OL types, free standing with protective cover, clamp: diecast zinc, fixture: V4A					**E20793**
Mounting set for OL types, profile mounting, fixture: stainless steel					**E20882**
Mounting set for OA types, free standing, clamp: diecast zinc, fixture: stainless steel					**E20893**
Mounting set for OA types, profile mounting, clamp: diecast zinc, fixture: stainless steel					**E20978**
OH swivel mount clip					**E21056**
OH mounting bracket for horizontal mounting					**E21057**
OH mounting bracket for vertical mounting					**E21058**
Prismatic reflector Ø 22 mm					**E20003**
Prismatic reflector Ø 42 mm					**E20004**
Prismatic reflector Ø 80 mm					**E20005**
Mounting set for round prismatic reflector, free standing					**E20914**
Prismatic reflector 45 x 28 mm					**E20452**
Prismatic reflector 93 x 45 mm					**E20453**
Prismatic reflector 50 x 50 mm					**E20744**
Prismatic reflector 95 x 95 mm					**E20454**

- **Detection of minute objects by means of a focussed laser beam.**
- **Clearly visible red light for easy setting to the object.**
- **Automatic switch point setting by pressing a pushbutton.**
- **Application sensors available for special application areas.**
- **System components available for fine adjustment.**

Introduction

Laser systems are used where detection of small objects or precise positioning is required. They are available as through-beam sensors, retro-reflective sensors or diffuse reflection sensors.

Laser light consists of light waves of identical length which have a defined phase relation (coherence). This results in an important feature of laser systems, that is the almost parallel light beam. Result: Due to the small angle of divergence long ranges of up to 60 metres can be achieved. The laser spot which is also clearly visible at daylight simplifies the alignment of the system. Apart from the advantages some points have to be taken into account for the selection of the suitable optical system: compared to standard sensors the laser sensors have a reduced temperature range (-10...50 °C). In view of the small light spot and the often high ranges the system is more sensitive to vibrations than standard sensors.



Mounting aids

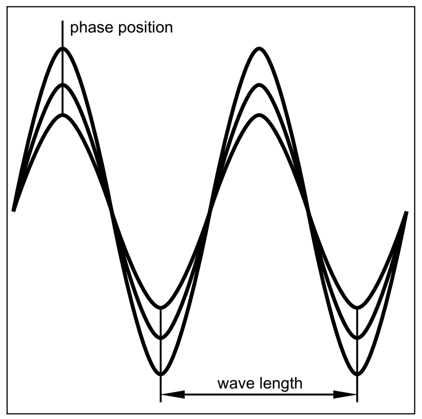
The ifm laser sensors offer a useful function for easier alignment: The laser power is increased during adjustment: This leads to a particularly bright laser spot which enables safe alignment from a distance even at daylight.

How dangerous are laser sensors?

Due to the small angle of divergence laser beams are focussed on a small area. The energy and power density on this area is extremely high. ifm laser sensors comply with the European standard EN60825 or the international standard IEC60825. These standards describe the operation of laser systems.

ifm laser sensors are classified in the laser protection class II. Thus the laser power, also in the setting mode with increased power, is max. 1 mW. When the laser beam hits the human eye, the eyelid is instinctively closed. When hitting the unprotected eye within a time of 0.25 s the laser beam must not cause any damage.

Coherent: Laser sensors emit light of a defined wave length and the same phase position.



Sensor type	Sensing range [mm]	Spot Ø at max. range [mm]	Output function	Connection	Order no.
OG series with M18 threaded stainless steel housing, 4-wire DC					
through-beam transmitter	2000...6000	5	–	M12 connector	**OG5060**
through-beam receiver	2000	–	light on / dark on PNP	M12 connector	**OG5067**
through-beam receiver	6000	–	light on / dark on PNP	M12 connector	**OG5068**
through-beam transmitter	60000	150	–	M12 connector	**OG5059**
through-beam receiver	60000	–	light on / dark on PNP	M12 connector	**OG5058**
retro-reflective, pol. filter	200...4000	7	light on / dark on PNP	M12 connector	**OG5071**
retro-reflective	200...13000	25	light on / dark on PNP	M12 connector	**OG5061**
diffuse-reflective	1...150	0.1	light on / dark on PNP	M12 connector	**OG5056**
OJ series with rectangular plastic housing, 35 x 24 x 11 mm, front sensing, 4-wire DC					
through-beam transmitter	1000	4	–	M8 connector	**OJ5019**
through-beam receiver	1000	–	light on / dark on PNP	M8 connector	**OJ5020**
through-beam transmitter	15000	24	–	M8 connector	**OJ5016**
through-beam receiver	15000	–	light on / dark on PNP	M8 connector	**OJ5017**
retro-reflective, pol. filter	8000	12	light on / dark on PNP	M8 connector	**OJ5014**
diffuse-reflective, backgr.-s.	15...200	2 x 1 vertical	light on / dark on PNP	M8 connector	**OJ5052**
diffuse-reflective, backgr.-s.	15...200	2 x 1 vertical	light on / dark on NPN	M8 connector	**OJ5053**
diffuse-reflective, backgr.-s.	7...150	0.8	light on / dark on PNP	M8 connector	**OJ5056**
OJ series with rectangular plastic housing, 35 x 24 x 11 mm, side sensing, 4-wire DC					
through-beam transmitter	1000	4	–	M8 connector	**OJ5041**
through-beam receiver	1000	–	light on / dark on PNP	M8 connector	**OJ5042**
through-beam transmitter	15000	24	–	M8 connector	**OJ5038**
through-beam receiver	15000	–	light on / dark on PNP	M8 connector	**OJ5039**
retro-reflective, pol. filter	8000	12	light on / dark on PNP	M8 connector	**OJ5036**
diffuse-reflective, backgr.-s.	15...200	2 x 1 vertical	light on / dark on PNP	M8 connector	**OJ5054**
diffuse-reflective, backgr.-s.	15...200	2 x 1 vertical	light on / dark on NPN	M8 connector	**OJ5055**
diffuse-reflective, backgr.-s.	7...150	0.8	light on / dark on PNP	M8 connector	**OJ5058**
OL series with rectangular plastic housing, 75 x 27 x 62 mm, 4-wire DC					
through-beam transmitter	60000	150	–	M12 connector	**OL5019**
through-beam receiver	60000	–	light on / dark on PNP	M12 connector	**OL5020**
retro-reflective, pol. filter	200...13000	25	light on / dark on PNP	M12 connector	**OL5022**
diffuse-reflective	1...150	0.1	light on / dark on PNP	M12 connector	**OL5024**
Accessories					
Mounting set for OG types, free standing, clamp: stainless steel, fixture: stainless steel					**E20870**
Mounting set for OG types, profile mounting, clamp: diecast zinc, fixture: stainless steel					**E20867**
OJ front lens mounting set, free standing, clamp: diecast zinc, fixture: stainless steel					**E20966**
OJ side lens mounting set, free standing, clamp: diecast zinc, fixture: stainless steel					**E20968**
OJ swivel mount clip, housing: diecast zinc					**E20974**
OJ front lens fine adjustment and mounting unit, housing: aluminium					**E20975**
OJ side lens fine adjustment and mounting unit, housing: aluminium					**E20976**
Prismatic reflector for laser units 50 x 50 mm					**E20722**
Prismatic reflector for laser units 30 x 20 mm					**E20994**
Prismatic reflector for laser units Ø 19 mm					**E20993**
Prismatic reflector for laser units Ø 10 mm					**E20990**

- **Precise connection of different fibre optics.**
- **Manual or automatic setting by means of “teach in”.**
- **LED display to check operation, switching stauts and function.**
- **Various glass fibre materials for different applications.**
- **Easy mounting on DIN rail possible.**

Introduction

Fully automatic manufacturing machines become more and more compact. Fibre optics are used where mounting space for photoelectric standard sensors is confined. Advantages of these systems: The evaluation electronics and the optoelectronic components are located separately from the sensing surface of the system. Fibre optic sensing heads can therefore be mounted in places where access is difficult. Fibre optics are the best choice, in particular for short ranges.

Versions of fibre optic systems

Through-beam principle

Transmitting and receiving fibre optics are laid separately. The two ends (fibre optic heads) are mounted opposite each other. The light beam interruption is evaluated according to the through-beam principle. The maximum range is 120 cm.

Diffuse reflection principle

Transmitting and receiving fibres are in one sheath. The sensing head incorporates receiving and transmitting fibre bundles. The ranges of the ifm sensors are max. 70 mm.

Minute objects up to 0.5 mm are detected safely.

Applications of fibre optic systems:

Confined space

The fibre optic head is directly located where sensing takes place, the mating amplifier where sufficient mounting space is available.

Detection of minute objects

Depending on the type of sensing head and range objects up to 0.5 mm can be detected safely. When the movement of objects is precise, it is possible to detect fine structures, e.g. thread pitches.

High temperatures

Fibre optics with metal sheath can be used up to 290 °C, fibre optics with metal silicone sheath up to 150 °C.

Chemical resistance

Metal silicone sheathed fibre optics are resistant to many aggressive chemicals.

Fibre optic systems can also be mounted in places where access is difficult.

Amplifier type	Sensing range [mm] through beam	Sensing range [mm] diffuse	Output function	Connection	Order no.
Fibre-optic amplifiers for plastic fibre optics, 4-wire DC, 10...36 V DC, red light					
1 channel	0...200	0...70	light on / dark on PNP	PVC cable, 2 m	**OB5011**
1 channel	0...200	0...70	light on / dark on NPN	PVC cable, 2 m	**OB5012**
1 channel	0...200	0...70	light on / dark on PNP	M12 connector	**OB5013**
1 channel	0...200	0...70	light on / dark on NPN	M12 connector	**OB5014**
Fibre-optic amplifiers for glass fibre optics, 3-wire DC, 10...55 V DC, infrared light					
1 channel	0...120	0...40	light on PNP	PVC cable, 2 m	**OU5001**
1 channel	0...120	0...40	light on NPN	PVC cable, 2 m	**OU5003**
1 channel	0...120	0...40	light on PNP	M12 connector	**OU5043**
1 channel	0...120	0...40	light on NPN	M12 connector	**OU5087**
Fibre-optic amplifiers for glass fibre optics, 4-wire DC, 10...50 V DC, red light					
1 channel	0...120	0...40	light on / dark on PNP	PVC cable, 2 m	**OK5001**
1 channel	0...120	0...40	light on / dark on NPN	PVC cable, 2 m	**OK5002**
1 channel	0...120	0...40	light on / dark on PNP	M12 connector	**OK5008**
Multi-channel fibre-optic amplifiers for glass fibre optics, 4-wire DC, 12...36 V DC, red light					
2 channel	0...400	0...200	light on / dark on PNP	M12 8-pin connector	**OO5004**
4 channel	0...400	0...200	light on / dark on PNP	M12 8-pin connector	**OO5005**
6 channel	0...400	0...200	light on / dark on PNP	M16 14-pin connector	**OO5006**
8 channel	0...400	0...200	light on / dark on PNP	M16 14-pin connector	**OO5007**
Multi-channel fibre-optic amplifiers for plastic fibre optics, 4-wire DC, 12...36 V DC, red light					
2 channel	0...400	0...200	light on / dark on PNP	M12 8-pin connector	**OO5000**
4 channel	0...400	0...200	light on / dark on PNP	M12 8-pin connector	**OO5001**
6 channel	0...400	0...200	light on / dark on PNP	M16 14-pin connector	**OO5002**
8 channel	0...400	0...200	light on / dark on PNP	M16 14-pin connector	**OO5003**

Dimensions Fibre optics	Sensing range [mm]	Material sensing head	Material sheating	Operating temperature	Fibres type		Order no.
Ø 3 angled	120 / 400	aluminium	PVC	-20...80	glass	thru-beam	**E20062**
Ø 3 angled	120 / 400	aluminium	aluminium	-40...290	glass	thru-beam	**E20129**
M4 straight	120 / 400	aluminium	PVC	-20...80	glass	thru-beam	**E20059**
M4 straight	120 / 400	aluminium	aluminium	-40...290	glass	thru-beam	**E20128**
M3 straight	60 / 160	aluminium	PE	-40...70	plastic	thru-beam	**E20609**
M4 straight	200 / 800	aluminium	PE	-40...70	plastic	thru-beam	**E20606**
Ø 1 straight	8 / 24	stainless steel	PVC	-20...80	glass	diffuse	**E20053**
Ø 1 straight	8 / 24	stainless steel	aluminium	-40...290	glass	diffuse	**E20057**
Ø 1 straight	8 / 24	stainless steel	metal sil.	-20...150	glass	diffuse	**E20507**
Ø 3 straight	40 / 200	aluminium	PVC	-20...80	glass	diffuse	**E20052**
Ø 3 straight	40 / 200	aluminium	aluminium	-40...290	glass	diffuse	**E20056**
Ø 3 straight	40 / 200	stainless steel	metal sil.	-20...150	glass	diffuse	**E20494**
Ø 4 angled	40 / 200	aluminium	PVC	-20...80	glass	diffuse	**E20054**
Ø 4 angled	40 / 200	aluminium	aluminium	-40...290	glass	diffuse	**E20058**
Ø 4 angled	40 / 200	stainless steel	metal sil.	-20...150	glass	diffuse	**E20495**
M6 straight	40 / 200	aluminium	PVC	-20...80	glass	diffuse	**E20051**
M6 straight	40 / 200	aluminium	aluminium	-40...290	glass	diffuse	**E20055**
M6 straight	40 / 200	stainless steel	metal sil.	-20...150	glass	diffuse	**E20489**
M3 straight	20 / 60	aluminium	PE	-40...70	plastic	diffuse	**E20712**
M4 straight	60	aluminium	PE	-40...70	plastic	diffuse	**E20651**
M4 straight	60 / 300	aluminium	PE	-40...70	plastic	diffuse	**E20645**
M4 straight	20 / 60	aluminium	PE	-40...70	plastic	diffuse	**E20639**
M6 straight	70 / 300	aluminium	PE	-40...70	plastic	diffuse	**E20633**

- **High switching frequencies.**
- **Robust designs.**
- **Programmable encoders.**
- **Special version with integrated Profibus interface.**
- **Hollow shaft encoders for drives with high acceleration.**

Introduction

In many manufacturing and production processes they are indispensable as reliable transducers to ensure precise positioning. They convert rotary movement into digital signals. Linear measurement is also possible in conjunction with rack and pinion or measuring wheels. Encoders use the wear-free photoelectric detection. A pulse disc firmly attached to the shaft ensures this detection. Encoders are basically divided into two types: incremental and absolute encoders.

Incremental encoders

Incremental encoders generate a precisely defined number of pulses per revolution. They are a measure of the angular or linear distance moved. The coded disc is divided into separate segments which are alternately transparent or opaque. An LED emits a parallel-orientated light beam which illuminates all segments of the coded disc. Photo elements receive the modulated light and convert it into two sinusoidal signals. Digitalisation electronics amplify the signals and shape them into square-wave pulse trains which are generated via the line driver in the output. The phase difference between signal A and B, which are phase-shifted by 90 degrees, allows evaluation of the direction of rotation.

Absolute encoders

Absolute encoders provide an absolute numerical value for each angular position. This code value is available immediately after power is applied. This “absolute” value makes a reference procedure like the one required for the incremental encoder unnecessary. Absolute encoders are used wherever angular positions have to be allocated to a certain value and where the detection of the present position is absolutely necessary in the case of a power failure.

Singleturn and multiturn

Singleturn encoders divide a mechanical revolution (0 to 360 degrees) into a certain number of measuring steps. The measuring values are repeated after one revolution. The maximum resolution is 8192.

Multiturn encoders, however, do not only detect angular positions but also distinguish between multiple revolutions.

Linear measurement by means of counter module: Rotary movement is converted into digital signals.

Hollow shaft encoders: For drives with high acceleration. They are also distinguished by reduced installation length.

Resolution	U_b [V]	f [kHz]	I_{last} [mA]	Shaft [mm]	Operating temperature [°C]	Connection	Order no.
Incremental encoder RB housing Ø 36.5 mm, solid shaft Ø 6 mm, cable entry axial and radial							
500	5	300	20	6	-40...100	PUR cable, 2 m	**RB1015**
10	10...30	160	50	6	-40...70	PUR cable, 2 m	**RB6001**
100	10...30	160	50	6	-40...70	PUR cable, 2 m	**RB6007**
360	10...30	160	50	6	-40...70	PUR cable, 2 m	**RB6013**
500	10...30	160	50	6	-40...70	PUR cable, 2 m	**RB6015**
1000	10...30	160	50	6	-40...70	PUR cable, 2 m	**RB6029**
Incremental encoder RC housing Ø 58 mm, solid shaft Ø 6 mm							
500	5	300	20	6	-30...100	PUR cable, 2 m axial	**RC1014**
100	10...30	300	50	6	-20...85	PUR cable, 2 m axial	**RC6003**
360	10...30	300	50	6	-20...85	PUR cable, 2 m axial	**RC6012**
500	10...30	160	50	6	-20...85	PUR cable, 2 m axial	**RC6014**
Incremental encoder RU housing Ø 58 mm, solid shaft Ø 6 mm, synchro flange							
500	5	300	20	6	-30...100	PUR cable, 2 m axial	**RU1016**
1000	5	300	20	6	-30...100	PUR cable, 2 m axial	**RU1024**
1024	5	300	20	6	-30...100	PUR cable, 2 m axial	**RU1025**
2000	5	300	20	6	-30...100	PUR cable, 2 m axial	**RU1033**
2500	5	300	20	6	-30...100	PUR cable, 2 m axial	**RU1036**
360	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6013**
500	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6016**
1000	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6024**
1024	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6025**
2000	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6033**
2500	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6036**
3600	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6040**
5000	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6045**
10000	10...30	300	50	6	-30...85	PUR cable, 2 m axial	**RU6052**
Incremental encoder RV housing Ø 58 mm, solid shaft Ø 10 mm, clamp flange							
360	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6013**
500	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6016**
1000	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6024**
1024	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6025**
2000	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6033**
2048	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6034**
2500	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6036**
3600	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6040**
5000	10...30	300	50	10	-30...85	PUR cable, 2 m axial	**RV6100**
Incremental encoder RO housing Ø 58 mm, hollow shaft Ø 12 mm, open to one side							
360	10...30	300	20	12	-30...85	PUR cable, 1 m radial	**RO6343**
500	10...30	300	20	12	-30...85	PUR cable, 1 m radial	**RO6344**
1024	10...30	300	20	12	-30...85	PUR cable, 1 m radial	**RO6345**
Absolute multiturn encoder with serial interface, RM housing Ø 58 mm, solid shaft Ø 6 / 10 mm							
8192	10...30	–	–	6	-20...85	PUR cable, 1 m radial	**RM6101**
8192	10...30	–	–	10	-20...85	PUR cable, 1 m radial	**RM6104**
Absolute multiturn encoder with Profibus data interface, RM housing Ø 58 mm, solid shaft Ø 6 / 10 mm							
8192	10...30	–	–	6	-20...60	terminal strip	**RM3001**
8192	10...30	–	–	10	-20...60	terminal strip	**RM3005**

- **Easy setting or programming.**
- **Different outputs (relay, transistor).**
- **Multifunction: Several functions in one unit.**
- **Adjustable output function.**
- **Easy rail mounting.**

Introduction

Although PLC applications in industrial automation are becoming more and more versatile there are still numerous processes in practice which require decentralised monitoring.

For this ifm electronic offers a number of pulse evaluation systems in the product group "ecomat 200". The application area ranges from simple standstill monitoring or blockage protection of a conveyor belt, maximum speed monitoring in wind power stations, slip monitoring of couplings through to direction monitoring, e.g. twin pumps with non-return valves.

Different units for rail mounting and compact designs in M30 metal housings are available. They include processor-controlled units for control panel mounting to indicate rotational speeds, speeds, processing times, quantities and electronic preset counters for the detection of quantities or linear measurement as well as electronic timer relays.

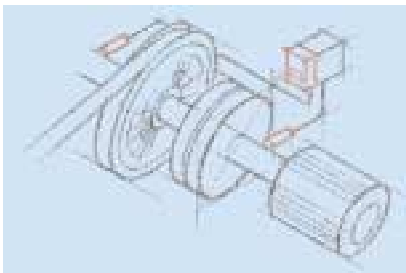
All units are distinguished by a high reliability and easy handling. Independent of the PLC they indicate operating states or signal faults. This helps to reduce downtimes and production loss.

ifm electronic offers the following evaluation systems:

- Speed monitor
- Standstill monitor
- Slip- / synchronisation monitor
- Direction monitor
- Frequency-to-current converter
- Displays
- Counters
- SSI controller
- Switching amplifiers
- Multifunction relay

Electronic timer relays. Depending on the scope of functions they can solve easy control tasks.

The monitor FS-1 for rotational speed monitoring.



U_b [V]	In-puts	Input function	Setting range [puls. / min.]	Setting range [Hz]	Out-puts analog	Out-puts relays	Out-puts transist.	Order no.
Pulse (Single/Double) evaluation systems for frequency / rotational speed								
110...240 AC/DC; 24 DC	1	PNP/NPN / Namur	1...60000	0.1...1000	1	2	2	**DD2003**
110...240 AC/DC; 24 DC	1	Namur 8.2 V	1...60000	0.1...1000	1	2	2	**DD2103**
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	1...60000	0.1...1000	–	2	2	**DD2005**
110...240 AC/DC; 24 DC	2	Namur 8.2 V	1...60000	0.1...1000	–	2	2	**DD2105**
Slip synchronous monitor								
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	slip / rotational speed		–	2	2	**DS2003**
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	differential pulses / reset time		–	2	2	**DS2005**
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	differential pulses		–	2	2	**DS2006**
Direction monitor and combined direction / speed monitor								
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	1...60000	1...1000	–	2	2	**DR2003**
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	1...60000	1...1000	–	2	2	**DR2005**
Frequency-to-current / voltage-converter								
110...240 AC/DC; 24 DC	2	PNP/NPN / Namur	0...60000	0...10000	1	1	1	**DW2003**
24 DC	2	PNP/NPN / Namur	0...60000	0...10000	1	1	1	**DW2004**
Speed monitor D100								
110...240 AC/DC; 24 DC	1	PNP	5...5000	–	–	1	1	**DD0116**
Standstill monitor A300								
110...240 AC/DC; 24 DC	1	PNP	5...25/20...100	–	–	1	1	**DA0116**
Digital display FX360, universal evaluation and display for all physical units which can be devived from pulse sequences								
115 / 230 AC; 24 DC	3	PNP/NPN / NAMUR	1...99999	0.1...25000	–	–	–	**DX2001**
115 / 230 AC; 24 DC	3	PNP/NPN / NAMUR	1...99999	0.1...25000	1	–	–	**DX2002**
115 / 230 AC; 24 DC	3	PNP/NPN / NAMUR	1...99999	0.1...25000	–	–	2	**DX2003**
Digital display AX360, multifunction process display for analogue standard signals								
115 / 230 AC; 24 DC	1	0...10 V; 0/4...20 mA	-999999...999999		–	–	2	**DX2011**
115 / 230 AC; 24 DC	1	0...10 V; 0/4...20 mA	-999999...999999		1	–	2	**DX2012**

Electrical design	U_b [V]	Setting range [puls. / min.]	Start-up Delay [s]	Sensing range	Output	Order no.
Speed monitor compact with cable connection						
2-wire	20...250 AC/DC	5...300	12	10 f	normally open	**DI0001**
2-wire	20...250 AC/DC	50...3000	12	10 f	normally open	**DI0002**
2-wire	20...250 AC/DC	5...300	0.5	10 f	normally open	**DI0004**
3-wire	20...250 AC	5...300	12	10 f	normally open	**DI0100**
3-wire PNP	10...36 DC	3...300	15	10 f	normally open	**DI5001**
3-wire PNP	10...36 DC	30...3000	15	10 f	normally open	**DI5003**
Speed monitor compact with SS connector						
3-wire PNP	10...36 DC	3...300	15	10 f	normally open	**DI5004**
3-wire PNP	10...36 DC	3...300	5	10 f	normally open	**DI5007**
Speed monitor compact with M12 connector						
3-wire PNP	10...36 DC	3...300	15	10 f	normally open	**DI5009**
Speed monitor compact ATEX; with cable connection						
2-wire	20...250 AC/DC	5...300	12	10 f	normally open	**DI001A**
3-wire PNP	10...36 DC	5...300	15	10 f	normally open	**DI501A**
Speed monitor compact ATEX; with M12 connector						
3-wire PNP	10...36 DC	5...300	15	10 f	normally open	**DI502A**
3-wire PNP	10...36 DC	5...300	5	10 f	normally open	**DI503A**

- **Compliance with EN 50081 (noise emission) and EN 50082 (noise immunity).**
- **Wide input voltage range.**
- **Output protected against short circuits and overload.**
- **Good power reserves.**
- **Robust metal housing for secure mounting.**

Introduction

They may be unglamorous and unobtrusive, but without them it would not be possible to operate an electronic system. Power supplies are essential. ifm offers low-cost transformer power supplies but also powerful switched-mode power supplies for different applications.

Transformer power supplies

Transformer power supplies provide a low voltage, normally 24 V DC. A transformer according to DIN 0551 ensures a safe electrical separation from mains voltage and low voltage. The output voltage can be regulated (± 5 %) or smoothed by means of capacitors. The different designs and output powers allow adaptation to diverse operating conditions.

Switched-mode power supplies

Primary switched-mode power supplies are a compact and economical solution to supply sensors and actuators. As opposed to conventional transformer power supplies with regulated output voltage they need no heavy transformers so that there are fewer iron and copper losses. They are therefore distinguished by a very high degree of efficiency of up to 92 %. Due to the operating principle by means of high frequency transformers switched-mode power supplies are much smaller and lighter than transformer power supplies with identical power. Nevertheless they guarantee an electrical separation. Furthermore, they offer a wide input voltage range as standard for worldwide use.

Power reserves

Mains fluctuations up to ± 15 % and mains interference are compensated for. Even mains voltage dips of a few milliseconds are compensated for, the output voltage is completely maintained. An active inrush current limitation reduces the inrush current by means of a fixed resistor which is bridged after start up. The outputs are protected against short circuits and overload. Special output characteristics allow a current which can be up to 1.7 higher than the nominal current without switch-off with the voltage being reduced at the same time. The dimensioning of the components allows a 20 to 25 % higher output current for a short time. This power reserve is provided by all power supplies as from 2.5 A for a period of one minute. At an operating temperature of up to 45 °C this power is available continuously.

Suitable for the application: ifm provides power supplies in different power classes.

Output current [A]	Output voltage [V]	Nominal voltage [V]	Efficiency typ. [%]	Order no.
Power supplies single-phase				
1	24 DC (+/- 3 %)	115 / 230 AC	84	**DN2010**
1.3	24...28 DC (+/- 2 %)	115 / 230 AC	87.5	**DN1020**
2.1	24...28 DC (+/- 2 %)	115 / 230 AC	88.5	**DN1021**
2.5	24 DC (+5 % / -1 %)	115 / 230 AC	87.5	**DN2011**
3	12...15 DC (+/- 2 %)	115 / 230 AC	87	**DN2021**
4	24 DC (+5 % / -1 %)	115 / 230 AC	90	**DN2112**
4.1	24...28 DC (+/- 2 %)	115 / 230 AC	90	**DN1022**
5	24 DC (+5 % / -1 %)	115 / 230 AC	90	**DN2012**
10	24...28 DC (+/- 2 %)	115 / 230 AC	90	**DN2013**
20	24...28 DC (+/- 2 %)	230 AC	91	**DN2014**
20	24...28 DC (+/- 2 %)	115 / 230 AC	90	**DN2114**
Power supplies 3-phase				
5	24...28 DC (+/- 2 %)	3 x 400...500 AC	89	**DN2032**
10	24...28 DC (+/- 2 %)	3 x 400...500 AC	90	**DN2033**
20	24...28 DC (+/- 2 %)	3 x 400 AC	92	**DN2034**
20	24...28 DC (+/- 2 %)	3 x 400...500 AC	92	**DN2134**
30	24...28 DC (+/- 2 %)	3 x 400...500 AC	93	**DN2036**
40	24...28 DC (+/- 2 %)	3 x 400...500 AC	92.5	**DN2035**

Current [A]	Output voltage [V]	Nominal voltage [V]	Output	Order no.
Switching amplifier 1-channel				
max. 100 mA	24 DC (+/- 5 %)	230 AC	relay	**DN0001**
max. 100 mA	24 DC (+/- 5 %)	110 AC	relay	**DN0012**
Switching amplifier 2-channel				
max. 300 mA	24 DC (+/- 2 %)	110...240 AC	2 relays	**DN0200**
Switching amplifier 1-channel with timer function				
max. 40 mA	24 DC (+/- 5 %)	230 AC; 24 DC	relay	**DT0001**

- **High reliability due to the elimination of mechanical components.**
- **Easy "teach in" via pushbutton.**
- **Analogue and switching outputs.**
- **The integrated LED display provides direct read-out of the current level.**
- **Suitable for measurements in aggressive media.**

Introduction

In industrial applications where industrial fluids or bulk material are used, storage tanks or silos are used for processing or storing of media. Tanks are filled and emptied almost automatically. Sensors are used to detect the level. Even critical process states such as an empty hydraulic tank and the resulting running dry of the pump or the unintentional overspill of a tank are permanently monitored by level sensors.

Advantages of electronic sensors

Level measurement distinguishes between direct measurement in the medium and the indirect detection from the outside (for example through the tank wall by means of capacitive sensors). Deposits and wear and tear often lead to failures in particular if mechanical switches are in contact with the medium. The electronic ifm sensors however can do without any mechanical component. This makes the sensors especially robust and reliable. The suitable electronic sensors work without any problem even in aggressive media, such as lubricants and coolants.

Another advantage of electronic sensors is the local indication of the level or the easy setting of the switching threshold simply by pressing a button as offered for some types.

There are two basic types of level detection in tanks: continuous measurement and the detection of defined limits.

Continuous level measurement

For continuous level measurement the level is detected continuously, converted into an electrical signal and indicated. The units have freely programmable switching outputs or an analogue output for further processing.

Continuous level sensors from ifm electronic use two physical measuring principles. For the capacitive measurement the tank and the material form an electrical capacitor. The capacity changes analogously to the level and is converted into a measure for the level by means of a microprocessor.

For hydrostatic level measurement a ceramic measuring cell detects the hydrostatic pressure of the material. Here the pressure change is a measure for the level.

Measurement in the medium: The LK probe is directly immersed in the medium to be monitored.

For special applications: Capacitive probe for monitoring oils and coolants.

Probe Length [mm]	Active range [mm]	Inactive range [mm]	U_b [V]	Output function	Connection	Order no.
Electronic level sensor with integrated display, DC PNP, outputs: 1 x analogue & 1 x nc (overflow)						
264	195	53	18...30 DC	1 x analogue, 1 x nc	M12 connector	**LK3122**
472	390	53	18...30 DC	1 x analogue, 1 x nc	M12 connector	**LK3123**
728	585	102	18...30 DC	1 x analogue, 1 x nc	M12 connector	**LK3124**
Electronic level sensor with integrated display, DC PNP, outputs: 1 x no / nc programmable, 1 x nc (overflow) output						
264	195	53	12...30 DC	1 x no / nc prog., 1 x nc	M12 connector	**LK1022**
472	390	53	12...30 DC	1 x no / nc prog., 1 x nc	M12 connector	**LK1023**
728	585	102	12...30 DC	1 x no / nc prog., 1 x nc	M12 connector	**LK1024**
Electronic level sensor with integrated display, DC PNP, outputs: 3 x no / nc programmable, 1 x nc (overflow) output						
264	195	53	18...30 DC	3 x no / nc prog., 1 x nc	M12 connector	**LK8122**
472	390	53	18...30 DC	3 x no / nc prog., 1 x nc	M12 connector	**LK8123**
728	585	102	18...30 DC	3 x no / nc prog., 1 x nc	M12 connector	**LK8124**

Probe Length [mm]	U_b [V]	Output function	Connection	Order no.
Binary electronic level sensors without display, DC PNP, output: 1 x normally open / normally closed programmable				
132	10...36 DC	1 x no / nc prog.	M12 connector	**LI5041**
273	10...36 DC	1 x no / nc prog.	M12 connector	**LI5042**
481	10...36 DC	1 x no / nc prog.	M12 connector	**LI5043**
737	10...36 DC	1 x no / nc prog.	M12 connector	**LI5044**

Dimensions [mm]	mounting	Electrical design	U_b [V]	Output function	Connection	Order no.
Capacitive level switches for dry bulk material and liquids detection through container wall						
M30 / L = 100	flush	PNP	10...36 DC	no / nc programmable	M12 connector	**KN5100**
M30 / L = 100	non flush	PNP	10...36 DC	no / nc programmable	M12 connector	**KN5101**
M30 / L = 100	flush	NPN	10...36 DC	no / nc programmable	M12 connector	**KN5102**
M30 / L = 100	non flush	NPN	10...36 DC	no / nc programmable	M12 connector	**KN5103**
M18 / L = 84	non flush	PNP	10...36 DC	no / nc programmable	M12 connector	**KN5113**
M18 / L = 76.5	non flush	PNP	10...36 DC	no / nc programmable	cable, 2 m	**KN5115**
78 x 36 x 10	non flush	PNP	10...36 DC	no / nc programmable	M8 connector	**KN5107**
72 x 36 x 10	non flush	PNP	10...36 DC	no / nc programmable	cable, 2 m	**KN5105**
78 x 36 x 10	non flush	NPN	10...36 DC	no / nc programmable	M8 connector	**KN5106**
72 x 36 x 10	non flush	NPN	10...36 DC	no / nc programmable	cable, 2 m	**KN5104**
Capacitive level switches for hot dry plastic granulates detection through container wall						
M30 / L = 92.5	non flush	PNP	10...36 DC	no / nc programmable	M12 connector	**KN5120**
M30 / L = 92.5	non flush	NPN	10...36 DC	no / nc programmable	M12 connector	**KN5122**
M30 / L = 92.5	non flush	2-wire AC	30...250 AC	no / nc programmable	1/2" connector	**KN0004**
M30 / L = 92.5	non flush	2-wire AC	30...250 AC	no	1/2" connector	**KN0005**
M30 / L = 92.5	non flush	2-wire AC	30...250 AC	nc	1/2" connector	**KN0006**
Capacitive level switches for hot dry plastic granulates detection with material contact						
M30 / L = 116	non flush	PNP	10...30 DC	no / nc programmable	M12 connector	**KN5121**
Sensor head and amplifier seperated, connection via 2 m cable						
Temperatures ranges: sensor -15...230 °C, electronics -25...70 °C						

- **Wear-free due to calorimetric measuring principle.**
- **For liquids and gases.**
- **Optional fittings for variable process connection.**
- **Special variants for hazardous areas.**
- **Local LED display.**

Introduction

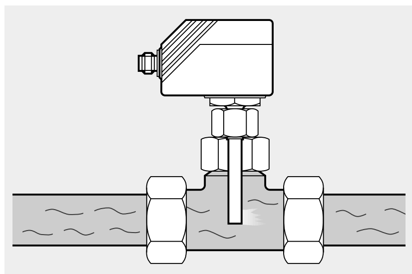
In almost all fields of process and plant engineering liquids or gases are used for coolant and lubricant supply of machines and units, ventilation of installations and buildings and the processing of products. In case of no flow of these media considerable damage and downtime may result. Thus it is very important to monitor that these media are at the right place at the right time and in sufficient quantities. In modern installations electronic flow monitors are used for this purpose. They work without wear and tear and without mechanical components. This guarantees reliable monitoring even in case of difficult media over a long period.

Operating principle

Electronic flow monitors operate on the basis of the calorimetric principle. They use the physical effect that a flowing medium absorbs heat energy and conducts it away. The sensor tip contains two temperature-dependent resistors as well as a heat source. The heat source generates a local temperature rise in the medium which is detected by one of the PTCs. If the medium flows, energy is conducted away from the heat source, i.e. it is cooled. The resulting temperature change is an indication of flow.

To avoid a falsification of the result of the measurement by a change in the medium temperature, a second PTC is used for temperature compensation. As these systems work without any mechanically moved parts the user can mount them independent of mounting position and flow direction. For certain applications and environments preferred positions are recommended.

Monitoring very small flow rates: Flow monitor with flow adapter.



Electronic sensor: Wear-free monitoring of flow.

Operating range for liquids / gases [cm/s]	Greatest sensitivity for liquids / gases [cm/s]	Response time [sec]	Output [V]	Connection	Order no.
Electronic flow monitor with LED bar graph display for visual indication of flow					
3...300 / 200...3000	3...60 / 200...800	1...10	1x no / nc PNP	M12 connector	**SI1000**
3...300 / 200...3000	3...60 / 200...800	1...10	2 x no / nc PNP	M12 connector	**SI1002**
3...300 / 200...3000	3...60 / 200...800	1...10	1x no / nc, relay	1/2" UNF connector	**SI1006**
Medium temperature ran					
Electronic flow monitor with LED bar graph display for visual indication of flow					
3...300 / 200...3.000	3...60 / 200...800	1...10	1 x no / nc PNP	M12 connector	**SI1100**
SI1100: sensor material titanium, high resistance against agressive media					
Electronic flow monitor with LED bar graph display for visual indication of flow					
3...300 / –	3...60 / –	1...2	1 x no / nc PNP	M12 connector	**SI1010**
SI1010: short response time for monitoring flow of coolants / oils in machine tools					
Electronic flow sensor with LED bar graph display for visual indication of flow and analogue output					
3...300 / –	3...60 / –	1...10	4...20 Ma	M12 connector	**SI1004**
Electronic flow monitor with LED bar graph display for visual indication of flow and 2 outputs: 1 x flow / 1 x temperature					
3...300 / 200...3000	3...60 / 200...800	1...10	2 x no / nc	M12 connector	**SI1007**
Temperature setting range 0...80 °C					
Electronic flow monitor with LED bar graph display for visual indication of flow for hygienic applications					
3...300 / 200...3000	3...60 / 200...800	1...10	1 x no / nc PNP	M12 connector	**SI2000**
3...300 / 200...3000	3...60 / 200...800	1...10	1 x no / nc PNP	M12 connector	**SI2100**
3...300 / 200...3000	3...60 / 200...800	1...10	1 x no / nc PNP	M12 connector	**SI2200**
Medium temperature range: -25...95 °C, 120 °C max. 1 hr					
Different probe length: SI2000: 55 mm, SI2100: 20 mm, SI2200: 38 mm					
Electronic airflow monitor					
– / 100...1000	– / 100...400	80...250 AC/DC	1 x relay	cable, 2 m	**SL0101**
– / 100...1000	– / 100...400	24 AC	1 x relay	cable, 2 m	**SL0201**
– / 100...1000	– / 100...400	24 DC	1 x relay	cable, 2 m	**SL5101**

Operating range for liquids / gases [cm/s]	Greatest sensitivity	Response time [sec]	Medium temperature [°C]	Connection	Order no.
Electronic flow sensors for separate amplifiers					
3...300 / 200...3000	3...60 / 200...800	1...10	-25...80	M12 connector	**SF5200**
3...300 / 200...3000	3...60 / 200...800	1...10	-25...80	PUR cable, 6 m	**SF5350**
3...300 / 200...3000	3...60 / 200...800	1...10	0...120 / 0...100	cable, 6 m	**SF5300**
3...300 / 200...3000	3...60 / 200...800	1...10	-25...80	M12 connector	**SF5700**
3...300 / 200...3000	3...60 / 200...800	1...10	0...120 / 0...100	cable, 6 m	**SF5800**
Sensor material: SF5200, SF5350, SF5300 stainless steel, SF5700, SF5800 titanium for agressive media					

Suppy voltage [V] Tolerance [%]	Output	Response time [sec]	Output when flow is present	Output when wire is broken	Order no.
Control monitor for connecting SF flow sensors					
24 DC / +/- 10 %	DC PNP	1...10	switched on	switched off	**SR0127**
230 AC	relay	1...10	relay energized	–	**SN0100**
110 AC / +/- 10 %	relay	1...10	relay energized	–	**SY0100**
24 DC / +/- 10 %	relay	1...10	relay energized	–	**SR0100**
24 DC / +/- 10 %	2 x relay	1...10	relay energized	relay de-energized	**SR0120**

- **Checking compressed air consumption and leakage monitoring.**
- **Compressed air meter with display and totaliser function.**
- **Wide measuring range, detection of minute leaks.**
- **Integrated pipe length: easy mounting, high accuracy.**
- **Alphanumeric display, analogue, switching and pulse outputs.**

Thermal compressed air meter

Much success has recently been achieved as regards saving of energy, production costs and processes. It has been possible to use electricity, water, coolants and other process materials more efficiently and at reduced costs. Against this background, industry has focused in the past few years on the cost reduction as regards the use and consumption of compressed air. As it is one of the most expensive media for transferring energy used in industry, considerable cost savings and less strain on the environment are possible when it is used efficiently.

In order to find points where savings can be made the user has to know where too much energy is used and where expensively generated energy is lost due to leakages. **efector** *metris* provides a low-cost solution for the measurement of the compressed air used as well as the possibility of detecting progressive leakages.

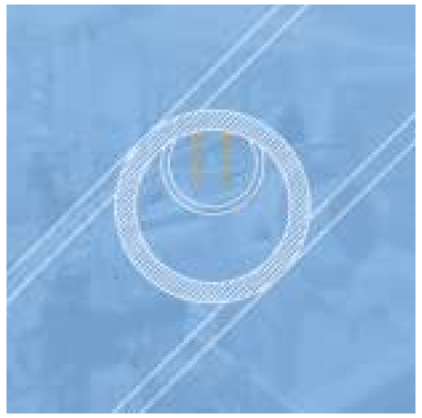
Optimised consumption of compressed air.

Operating principle

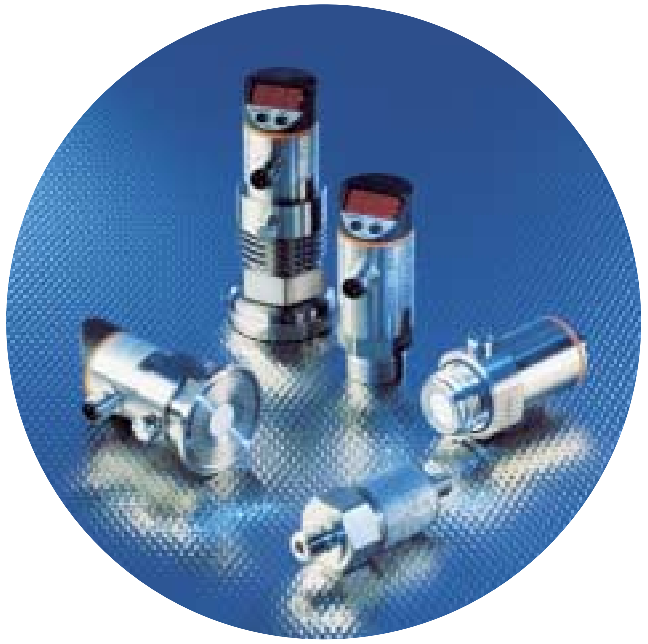
The compressed air meter **efector** *metris* works according to the calorimetric principle.

As a thermal measuring method it is especially suited for the measurement of volumetric flow of gaseous media. An additional correction of the measured data via pressure and temperature is not necessary in this case. The temperature of the medium is detected by means of two PT elements positioned in the air flow one of which serves as reference. The other probe which is heated additionally, is maintained at the same heat level depending on the heat loss caused by the medium flowing past it. The electrical energy needed to maintain the constant heat level is proportional to the volumetric flow of the gaseous media. The mechanical design of the measuring elements in a defined measuring pipe allows high measuring dynamics, fast response times and high sensitivity. The measured data is processed by means of state-of-the-art microprocessor technology with a variety of possibilities for signal processing. The measured data which is displayed and provided refers to standard cubic metres to DIN / ISO 2533 (1013 hPa, 15 °C, 0 % relative air humidity).

The calorimetric principle measures the standard volume flow irrespective of temperature and pressure.



Measuring range [Norm litre/min / Norm m³/h]	Setting range [Norm litre/min / Norm m³/h]	Pressure rating [bar]	Medium temperature [°C]	Process connection	U_b [V]	Order no.
Compressed air consumption meter with integrated pipe length and 4-digit alphanumerical LED display						
4...1250 / 0.25...75.0	6...1250 / 0.4...75.0	16	0...60	DN15	19...30 DC	**SD6000**
12.5...3750 / 0.75...225.0	19...3750 / 1.1...225.0	16	0...60	DN25	19...30 DC	**SD8000**
22.2...6830 / 1.3...410.0	30...6830 / 2.0...410.0	16	0...60	DN40	19...30 DC	**SD9000**
39...11670 / 2.3...700	60...11670 / 4...700	16	0...60	DN50	19...30 DC	**SD2000**



- **Transmitters or sensors with integrated control monitor.**
- **Overload protection and high long-term stability due to a ceramic measuring cell.**
- **Measuring range up to 600 bar.**
- **Optional fittings for variable process connection.**
- **EPS interface for external programming.**

Introduction

The ifm pressure sensors have been developed for monitoring system pressure in hydraulic and pneumatic applications. Today we cannot imagine the food industry or hygienic applications without pressure sensors. ifm offers a variety of different types for different industrial applications.

All units have one thing in common: They have a one-piece housing and need no moving parts such as pistons or springs. The result: The sensor are extremely robust against mechanical influence and work completely without wear and tear and fatigue.
The sensor has a ceramic measuring cell. The advantage of this material is that it is resistant to corrosion and gives long-term stability. In the long run this guarantees a continuous accuracy of the measured values.
ifm sensors are also resistant to dynamic pressure peaks and have a high overload resistance. It is of special importance that they are resistant to pressure peaks which usually arise on fast closing valves. Depending on the mounting position pressure peaks as well as vacuum peaks can alternate quickly. Even in these critical situations ifm sensors are resistant.
The flush sealing system of the ceramic measuring cell when mounted in the stainless steel housing allows optimum cleaning of the sensor – an absolute must for the use in the food industry or in hygienic applications.

A variety of sensor solutions

The pressure sensors from ifm are available in various designs, including pressure switches and pressure transmitters. A new unit series monitors the pressure in the food industry and other hygienic applications and meets the 3A, FDA and EHEDG requirements.

EPS interface

The pressure sensors often have to be mounted at positions in the installation / machine that are difficult to access. Programming and reading of the values on site are difficult. The solution: For these applications ifm offers sensors with EPS interface. Pressure sensor and control monitor are located on site in the sensor housing. Programming is performed using the programming unit (PP 2000) or the PC programming assistant.

Separate display/ programming unit PP2000.

The display: The 7-segment display shows the system pressure at a glance.

Measuring range [bar]	Permissible overload pressure	Burst pressure limit	Setpoint [bar]	Reset point [bar]	Resolution steps of [bar]	Output	Order no.
Electronic pressure sensors PP, M12 connector, U_b: 9.6...30 V DC, PNP / NPN, programmable via EPS interface							
0...400	600	1000	4...400	2...398	1	2 x no / nc	**PP7020**
0...250	400	850	3...250	2...249	1	2 x no / nc	**PP7021**
0...100	300	650	1...99.9	0.5...99.5	0.1	2 x no / nc	**PP7022**
0...25	100	350	0.3...25	0.2...24.9	0.1	2 x no / nc	**PP7023**
0...10	50	150	0.1...9.99	0.05...9.94	0.01	2 x no / nc	**PP7024**
0...2.5	20	50	0.03...2.5	0.02...2.49	0.01	2 x no / nc	**PP7026**
Programming and display unit for EPS sensors							**PP2000**
Teach button for EPS sensors							**E30051**
Service system for programming and reading PP sensors							**ZZ0050**
Electronic pressure sensors PN with 4-digit LED display, M12 connector, U_b: 18...36 V DC, PNP, process connection G 1/4 I							
0...400	600	1000	4...400	2...398	2	1 x no / nc	**PN5000**
0...250	400	850	2...250	1...249	1	1 x no / nc	**PN5001**
0...100	300	650	1...100	0.5...99.5	0.5	1 x no / nc	**PN5002**
0...25	150	350	0.2...25	0.1...24.9	0.1	1 x no / nc	**PN5003**
0...10	75	150	0.1...10	0.05...9.95	0.05	1 x no / nc	**PN5004**
0...2.5	20	50	0.02...2.5	0.01...2.49	0.01	1 x no / nc	**PN5006**
0...1	10	30	0.01...1	0.005...0.995	0.005	1 x no / nc	**PN5007**
Electronic pressure sensors PN with 4-digit LED display, M12 connector, U_b: 18...36 V DC, PNP / NPN, process connection G 1/4 I							
0...600	800	1200	6...600	3...597	3	2 x no / nc	**PN7060**
0...400	600	1000	4...400	2...398	2	2 x no / nc	**PN7000**
0...250	400	850	2...250	1...249	1	2 x no / nc	**PN7001**
0...100	300	650	1...100	0.5...99.5	0.5	2 x no / nc	**PN7002**
0...25	150	350	0.2...25	0.1...24.9	0.1	2 x no / nc	**PN7003**
0...10	75	150	0.1...10	0.05...9.95	0.05	2 x no / nc	**PN7004**
0...2.5	20	50	0.02...2.5	0.01...2.49	0.01	2 x no / nc	**PN7006**
0...1	10	30	0.01...1	0.005...0.995	0.005	2 x no / nc	**PN7007**
-1...1	10	30	-0.97...1	-0.98...0.99	0.01	2 x no / nc	**PN7009**
Electronic pressure sensors PN with 4-digit LED display, 1/2" UNF connector, U_b: 85...265 V AC, Triac-Outp., process con. 1/4 NPT							
0...400	600	1000	4...400	2...398	1	1 x no / nc	**PN4220**
0...250	400	850	2...250	1...249	1	1 x no / nc	**PN4221**
0...100	300	650	1...99.9	0.5...99.5	0.1	1 x no / nc	**PN4222**
0...25	100	350	0.2...25	0.1...24.9	0.1	1 x no / nc	**PN4223**
0...10	50	150	0.1...9.99	0.05...9.95	0.01	1 x no / nc	**PN4224**
0...2.5	20	50	0.02...2.5	0.01...2.49	0.01	1 x no / nc	**PN4226**
0...1	10	30	0.01...0.999	0.005...0.994	0.001	1 x no / nc	**PN4227**
Electronic pressure sensor PK with two complementary normally open / normally closed outputs, switchpoint setting via two setting rings, M12 connector, U_b: 9.6...32 V DC, process connection G 1/4 A							
11...400	600	1600	20...400	12...392	–	2 x no / nc compl.	**PK6520**
0...250	400	1000	12.5...250	7.5...245	–	2 x no / nc compl.	**PK6521**
0...100	200	1000	5...100	3...98	–	2 x no / nc compl.	**PK6522**
0...10	25	300	0.5...10	0.3...9.8	–	2 x no / nc compl.	**PK6524**
Electronic pressure sensor PK with two normally open outputs and fixed 1 % hysteresis switchpoint setting via two setting rings, M12 connector, U_b: 9.6...32 V DC, process connection G 1/4 A							
11...400	600	1600	20...400	–	–	2 x no	**PK7520**
0...250	400	1000	12.5...250	–	–	2 x no	**PK7521**
0...100	200	1000	5...100	–	–	2 x no	**PK7522**
0...10	25	300	0.5...10	–	–	2 x no	**PK7524**

Measuring range [bar]	Permissible overload pressure	Burst pressure limit	Setpoint [mA] [bar]	Reset point [bar]	Resolution steps of [bar]	Output	Order no.
Electronic pressure transmitter PA with 4...20 mA analogue output, M12 connector, U_b: 10.8...30 V DC, process connection G 1/4 I							
0...400	600	1000	–	–	–	4...20 mA	**PA3020**
0...250	400	850	–	–	–	4...20 mA	**PA3021**
0...100	300	650	–	–	–	4...20 mA	**PA3022**
0...25	100	350	–	–	–	4...20 mA	**PA3023**
0...10	50	150	–	–	–	4...20 mA	**PA3024**
0...2.5	20	50	–	–	–	4...20 mA	**PA3026**
0...1	10	30	–	–	–	4...20 mA	**PA3027**
-1...0	10	30	–	–	–	4...20 mA	**PA3029**
Electronic pressure transmitter PA with 0...10 V analogue output, M12 connector, U_b: 16...30 V DC, process connection G 1/4 I							
0...400	600	1000	–	–	–	0...10 V	**PA9020**
0...250	400	850	–	–	–	0...10 V	**PA9021**
0...100	300	650	–	–	–	0...10 V	**PA9022**
0...25	100	350	–	–	–	0...10 V	**PA9023**
0...10	50	150	–	–	–	0...10 V	**PA9024**
0...2.5	20	50	–	–	–	0...10 V	**PA9026**
0...1	10	30	–	–	–	0...10 V	**PA9027**
Electronic pressure sensor PN with analogue and switching output and LED display, M12 connector, U_b: 20...30 V DC, PNP, process connection G 1/4 I							
0...600	800	1200	6...600	3...597	3	0...10 V / 4...20 mA	**PN3060**
0...400	600	1000	4...400	2...398	2	0...10 V / 4...20 mA	**PN3000**
0...250	400	850	2...250	1...249	1	0...10 V / 4...20 mA	**PN3001**
0...100	300	650	1...100	0.5...99.5	0.5	0...10 V / 4...20 mA	**PN3002**
0...25	150	350	0.2...25	0.1...24.9	0.1	0...10 V / 4...20 mA	**PN3003**
-1...10	75	150	-0.9...10	0.95...9.95	0.05	0...10 V / 4...20 mA	**PN3004**
0...2.5	20	50	0.02...2.5	0.01...2.49	0.01	0...10 V / 4...20 mA	**PN3006**
0...1	10	30	0.01...1	0.005...0.995	0.005	0...10 V / 4...20 mA	**PN3007**
-1...1	20	50	-0.96...1	-0.98...0.98	0.02	0...10 V / 4...20 mA	**PN3009**
Electronic pressure sensor PN with analogue and switching output and LED display, M12 connector, U_b: 20...30 V DC, PNP/NPN, process connection G 1/4 I							
0...400	600	1000	4...400	2...398	1	0...10 V / 4...20 mA	**PN2020**
0...250	400	850	2...250	1...249	0.5	0...10 V / 4...20 mA	**PN2021**
0...100	300	650	0.8...100	0.4...99.6	0.2	0...10 V / 4...20 mA	**PN2022**
-1...25	100	350	-0.8...25	-0.9...24.9	0.05	0...10 V / 4...20 mA	**PN2023**
-1...10	50	150	-0.88...10	-0.94...9.94	0.02	0...10 V / 4...20 mA	**PN2024**
-0.13...2.5	20	50	-0.11...2.5	-0.1...2.49	0.01	0...10 V / 4...20 mA	**PN2026**
-0.05...1	10	30	-0.046...1	-0.05...0.996	0.002	0...10 V / 4...20 mA	**PN2027**
-0.0125...0.25	10	30	-0.0105...0.25	-0.0115...0.249	0.0005	0...10 V / 4...20 mA	**PN2028**

Measuring range [bar]	Permissible overload pressure	Burst pressure limit	Process connection	Medium temperature	Switching output	Analogue output	Order no.
Electronic pressure transmitter PM with analogue output, M12 connector, U_b: 14...30 V DC Flush mounted process adaption, robust ultra-clean ceramic measuring cell, resistant to water hammer and vacuum							
-1...25	100	350	ifm thread	-25...125 °C	–	4...20 mA	**PM2053**
-0.5...10	50	150	ifm thread	-25...125 °C	–	4...20 mA	**PM2054**
-0.99...4	30	100	ifm thread	-25...125 °C	–	4...20 mA	**PM2055**
-0.13...2.5	20	50	ifm thread	-25...125 °C	–	4...20 mA	**PM2056**
-0.05...1	10	30	ifm thread	-25...125 °C	–	4...20 mA	**PM2057**
-0.0125...0.25	10	30	ifm thread	-25...125 °C	–	4...20 mA	**PM2058**
-1...25	100	350	G 1 A	-25...125 °C	–	4...20 mA	**PM2653**
-0.5...10	50	150	G 1 A	-25...125 °C	–	4...20 mA	**PM2654**
-0.13...2.5	20	50	G 1 A	-25...125 °C	–	4...20 mA	**PM2656**
-0.05...1	10	30	G 1 A	-25...125 °C	–	4...20 mA	**PM2657**
-0.0125...0.25	10	30	G 1 A	-25...125 °C	–	4...20 mA	**PM2658**
Electronic pressure transmitter PI with analogue & switching output and LED display, U_b: 20...30 V DC, PNP/NPN Flush mounted process adaption, robust ultra-clean ceramic measuring cell, resistant to water hammer and vacuum							
-1...25	100	350	ifm thread	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2053**
-0.5...10	50	150	ifm thread	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2054**
-0.13...2.5	20	50	ifm thread	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2056**
-0.05...1	10	30	ifm thread	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2057**
0.0125...0.25	10	30	ifm thread	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2058**
-1...25	100	350	G 1 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2653**
-0.5...10	50	150	G 1 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2654**
-0.13...2.5	20	50	G 1 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2656**
-0.05...1	10	30	G 1 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2657**
-0.0125...0.25	10	30	G 1 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2658**
-1...25	100	200	G 3/4 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2953**
-0.5...10	50	150	G 3/4 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2954**
-0.13...2.5	20	50	G 3/4 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2956**
-0.05...1	10	30	G 3/4 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2957**
-1...3	20	50	G 3/4 A	-25...125 °C	no / nc	0...10 V / 4...20 mA	**PI2959**
Electronic pressure sensor PE with switching output and LED display, M12 connector, U_b: 20...30 V DC, PNP/NPN G 1/4 I process adaption, robust ultra-clean ceramic measuring cell, resistant to water hammer and vacuum							
0...25	150	350	G 1/4 I	-25...80 °C	2 x no / nc	–	**PE7003**
0...10	75	150	G 1/4 I	-25...80 °C	2 x no / nc	–	**PE7004**
0...2.5	20	50	G 1/4 I	-25...80 °C	2 x no / nc	–	**PE7006**
-1...1	20	50	G 1/4 I	-25...80 °C	2 x no / nc	–	**PE7009**
Accessories							
Adapter for PP / PA / PN pressure sensors G 1/4 - G 1/2							**E30000**
Adapter for PP / PA / PN pressure sensors G 1/4 - G 1/4							**E30007**
Protective cover for PN5x / PN7x							**E30006**

- **Precise temperature measurement by Pt1000 sensor element.**
- **Integrated or separate control monitors selectable.**
- **Modular concept – tailor-made for every application.**
- **Optional fittings for variable process connection.**
- **Robust mechanics with high resistance to vibration and shock.**

Introduction

The controlling and monitoring of temperatures are amongst the most important measuring tasks in automation and process technology. In process technology for example the right temperature is decisive for the quality and efficiency of the process. In automation technology an exact temperature detection is very important for monitoring installations and as protection against dangerous states. In heating and air conditioning economic and easy operation is not possible without temperature measurement and control.

Local display of the current temperature.

Operating principle

The temperature sensors of ifm electronic are based on a Pt1000 resistor. The measured temperature value corresponds to a change in resistance and is converted into an electrical analogue signal.

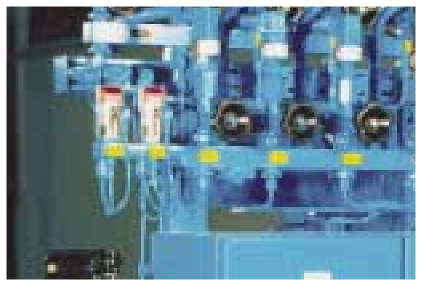
The microprocessor and the display make process adjustment much easier. The user can set the values for the switch points, hysteresis and measuring range by means of programming buttons even without the system temperature being applied. This enables installation and setup of the system within a few minutes.

Film technology is used for the electronic circuitry. A flexible, temperature-resistant and extremely resistant polyimide film is used as carrier of the SMD components. Together with a special potting method an extreme shock and vibration resistance is achieved.

From sensor to system

A complete temperature measurement system usually consists of several components. The temperature in a medium is detected by a sensor and is converted into an electrical measured signal. The mechanical design and the dimensions of the sensors must vary to enable use for different media and measuring points. ifm electronic offers a selection of robust probe sensors or types with connection cables. To indicate and process the measured value the sensor is connected to a separate control monitor.

For further processing, freely programmable switching or analogue outputs are available.



Imperative: Temperature detection in heating and air conditioning.

Measuring range [°C]	Setpoint [°C]	Reset point [°C]	Resolution in steps of [°C]	Switching output	Analogue output	U_b [V]	Order no.
Temperature transmitter TA with integrated G 1/2" thread, M12 connector							
0...140	–	–	–	–	4...20 mA	10...30 DC	**TA3430**
-10...150	–	–	–	–	4...20 mA	10...30 DC	**TA3431**
Temperature sensor TN with integrated control monitor and LED display, M12 connector							
-40...125	-39.5...125	-40...124.5	0.5	2 x no / nc	–	18...30 DC	**TN7530**
-40...125	-39.5...125	-40...124.5	0.5	1 x no / nc	0...10 V / 4...20 mA	20...30 DC	**TN2530**
Temperature monitor TR with LED display for temperature sensors TS / TT, M12 connector							
-40...300	-39.8...300	-40...299.8	0.1	1 x no / nc	0...10 V / 4...20 mA	20...30 DC	**TR2432**
-40...150	-39.5...150	-40...149.5	0.5	2 x no / nc	–	18...30 DC	**TR7430**
-40...150	-39.8...150	-40...149.8	0.2	4 x no / nc	–	18...28 DC	**TR8430**

Measuring range [°C]	Probe length [mm]	Total length [mm]	Probe diameter [mm]	Cable length [mm]	Dynamic response T05 / T09	Connector	Order no.
Temperature sensor for connection with temperature control monitors TR (probe version for industrial applications)							
-40...150	160	182	Ø 10	–	6 / 25 sec.	M12	**TT1050**
-40...150	260	282	Ø 10	–	6 / 25 sec.	M12	**TT2050**
-40...150	360	382	Ø 10	–	6 / 25 sec.	M12	**TT3050**
-40...150	560	582	Ø 10	–	6 / 25 sec.	M12	**TT5050**
-40...150	160	182	Ø 8	–	6 / 25 sec.	M12	**TT1150**
-40...150	260	282	Ø 8	–	6 / 25 sec.	M12	**TT2150**
-40...150	360	382	Ø 8	–	6 / 25 sec.	M12	**TT3150**
-40...150	160	182	Ø 6	–	6 / 25 sec.	M12	**TT1250**
-40...150	260	282	Ø 6	–	6 / 25 sec.	M12	**TT2250**
-40...150	360	382	Ø 6	–	6 / 25 sec.	M12	**TT3250**
Progressive ring fitting for temperature sensors Ø 10 mm - G 1/2							**E30016**
Mounting set for direct adaption of temperature sensors TT to control monitors TR							**E30017**
Temperature sensor for connection with temperature control monitors TR (probe version for hygienic applications)							
-40...150	110	132	Ø 10	–	5 / 14 sec.	M12	**TT0061**
-40...150	160	182	Ø 10	–	5 / 14 sec.	M12	**TT1061**
Mounting set for direct adaption of temperature sensors TT to control monitors TR							**E30017**
Cable gland Ø 6 / 8 / 10 mm - G 1/2 for temperature sensors TT / TS							**E30018**
Hygienic ifm process adapter clamp 1.5"							**E33001**
Hygienic ifm process adapter DIN11851 - 1.5" / DN40							**E33012**
Hygienic clamp adapter with ifm adapter thread for temperature sensors Ø 10 mm							**E34110**
Temperature sensor for connection with temperature control monitors TR (cable version)							
-40...150	47.5	–	Ø 10	2000	6 / 25 sec.	M12	**TS2051**
-40...150	47.5	–	Ø 10	5000	6 / 25 sec.	M12	**TS5051**
-40...150	47.5	–	Ø 8	2000	6 / 25 sec.	M12	**TS2151**
-40...150	47.5	–	Ø 6	2000	6 / 25 sec.	M12	**TS2251**
Cable gland Ø 6 / 8 / 10 mm - G 1/2 for temperature sensors TT / TS							**E30018**
Hygienic ifm process adapter clamp 1.5"							**E33001**
Hygienic ifm process adapter DIN11851 - 1.5" / DN40							**E33012**
Hygienic thermowell with ifm adapter thread for temperature sensors Ø 10 mm, length 45 mm							**E34005**
Hygienic thermowell with ifm adapter thread for temperature sensors Ø 10 mm, length 95 mm							**E34010**
Temperature sensor for connection with temperature control monitors TR (cable version for industrial applications)							
-50...250	45.5	–	Ø 10	2000	12 / 39 sec.	M12	**TS2056**
-50...250	50	–	Ø 6	2000	11 / 37 sec.	M12	**TS2256**
-25...90	–	–	32 x 12	2000	9 / 15 sec.	M12	**TS2229**
TS2229: bolt-on sensor 32 x 12 mm / M6, application: contact sensor for solid bodies							

- **Low-cost permanent vibration monitoring.**
- **Reliable measuring principle by acoustic emission detection.**
- **Predictive maintenance increases machine uptime.**
- **Easy parameter setting and setup.**
- **Direct local reading of the bearing condition, programmable switching outputs.**

Introduction

The rolling element bearing is a standard element for the construction of machinery and equipment. The correct function of this force-transmitting and moving component is critical for uptime of machinery and equipment. Due to the high dynamic and static loads during operation as well as design limitations the rolling element bearing is often the Achilles' heel with regard to lifetime. Thus unforeseen damage to the bearing often leads to production or quality loss. State-of-the-art for industrial monitoring of rolling element bearings is presently restricted to the intermittent measurement with handheld measuring instruments and to expensive central measuring systems which due to their enormous acquisition costs only make sense economically for monitoring expensive machines like turbines or large gears.

Parameter setting of efector octavis is simply done at the PC via the RS-232 interface.

Innovative technology

With the **efector** *octavis* ifm brings the first vibration sensor with integrated rolling element bearing diagnosis based on frequency analysis on the market. Due to the implementation of a proprietary diagnostic algorithm several different rolling element bearings can be monitored separately and their condition can be displayed via a "green-yellow-red" logic. Monitoring and diagnosis are performed in real time. Thus vibration measurement technology is integrated into automation technology so that expensive expert know-how for a reliable bearing diagnosis is not required. Therefore permanent monitoring of small machines and components is possible for the first time without losing the diagnostic quality of expensive systems.

After mounting press the Teach pushbutton – efector octavis is taught the reference conditions of the application.

Easy parameter setting

For the easy parameter setting of the rolling element bearing monitor, it is only necessary to take the relevant bearing data from the rolling element bearing database. For variable speed drives information on speed must be provided. The speed can either be provided by an analogue signal or a pulse generator connected to the sensor. The mechanical dimensions are 36 x 36 x 36 mm.

Measuring range	Frequency range [Hz]	Monitoring range [rpm]	U_b [V]	Current consumption [mA]	Order no.
Application: Rolling element bearing diagnosis · Diagnosis of up to 2 different rolling element bearings Design: Micromechanical acceleration sensor, capacitive measuring principle, one measurement axis					
± 25 g	3...6000	500...6000	10...32 V DC	100	**VB1001**
Application: Vibration diagnosis · Diagnosis of up to 20 frequencies in the spectrum, freely selectable Design: Micromechanical acceleration sensor, capacitive measuring principle, one measurement axis					
± 25 g	3...6000	100...12000	10...32 V DC	100	**VE1001**
± 25 g	0.125...500	10...2500	10...32 V DC	100	**VE1002**
Accessories					
Parameter setting software for rolling element bearing monitor					**VBS001**
Expert software for vibration diagnostic unit					**VES001**
SubD9 cable, 3 m PUR					**E11572**
Power supply, 24 V					**E30080**
Pulse generator					**E30082**
Sockets					
2 m PUR, M12 straight, without LED					**E10966**
5 m PUR, M12 straight, without LED					**E10967**
2 m PVC, M12 straight, without LED					**E10954**
10 m PVC, M12 straight, without LED					**E10955**
Y connection cable					**E11664**

- **Support of the AS-i standard 2.1 for extended functionality.**
- **Powerful controllers with easy-to-use graphic display.**
- **"Safety at Work" for safety-related applications.**
- **Wide range of modules for control cabinets and field applications.**
- **Intelligent system solutions for special tasks.**

Introduction

The actuator-sensor interface (AS-i) sets new technological standards in the design and automation of installations. This leads to economic advantages for the OEM and the user for project management, commissioning and maintenance of machines. In contrast to conventional fieldbuses AS-i has a finely granulated structure and can therefore be integrated even into proximity switches.

AS-i considerably reduces wiring complexity since conventional parallel wiring of each sensor or actuator to the controller is no longer necessary. This saves the user a great number of terminals, splitter boxes, input/output cards and cable lines.

Safety at Work is designed for safety-related applications. Here an E-stop implemented with AS-i.

Wide selection of connection options

Via its field connections AS-i allows low-cost connection of conventional devices. Up to 248 binary sensors and 186 actuators can be connected per AS-i line. It is also possible to integrate sensors with bus capability into the system at any time. These sensors with integrated AS-interface supply more information to the controller without the need of additional wiring. Therefore this latest sensor generation is also referred to as intelligent sensors.

Voltage supply and data via one cable

Voltage supply and data communication of all sensors are normally performed via a (yellow) AS-i cable. For some modules actuators can also be supplied via this cable. If a higher output current or emergency stop switch-off is required, actuators are supplied via a second black flat cable with a separate 24 V auxiliary voltage.

One AS-i flat cable instead of many parallel cables:
In a brewery the interface serves to transfer the sensor signals to the higher-level controller.

AS-i in the automation pyramid

AS-interface has established itself at the lowest automation level, it is located below the fieldbuses. The strengths of AS-i are its simple structure, speed, quick wiring and price/performance ratio. It can be used as a feeder bus for higher bus systems, they in turn then ensure a non time critical transmission of the data over longer distances to the host controller.

Description	Order no.
AS-i controller / Gateway with housing for DIN rail mounting	
AS-i Controller E stand alone, freely programmable, with graphic display, 1 AS-i master 2.1 + 3.0	**AC1303**
AS-i Controller E stand alone, freely programmable, with graphic display, 2 AS-i master 2.1 + 3.0	**AC1304**
AS-i Controller E with Ethernet gateway and graphic display, 1 AS-i master 2.1 + 3.0	**AC1309**
AS-i Controller E with Ethernet gateway and graphic display, 2 AS-i master 2.1 + 3.0	**AC1310**
AS-i Controller E with Profibus DP gateway and graphic display, 1 AS-i master 2.1 + 3.0	**AC1305**
AS-i Controller E with Profibus DP gateway and graphic display, 2 AS-i master 2.1 + 3.0	**AC1306**
AS-i Controller E with DeviceNet gateway and graphic display, 1 AS-i master 2.1 + 3.0	**AC1308**
AS-i Controller E with DeviceNet gateway and graphic display, 2 AS-i master 2.1 + 3.0	**AC1314**
SmartLink AS-i Controller with Profibus DP gateway, 1 AS-i master 2.1 + 3.0	**AC1335**
SmartLink AS-i Controller with Profibus DP gateway, 2 AS-i master 2.1 + 3.0	**AC1326**
AS-i repeater	
AS-i repeater for DIN rail mounting, operating voltage: 18.5...31.6 DC, consumption 2 x 100 mA	**AC2215**
AS-i repeater for field mounting, operating voltage: 18.5...31.6 DC, consumption 2 x 100 mA	**AC1015**
AS-i power supply	
AS-i power supply SilverLine 115/230 V AC, output current 2.8 A, output voltage 29.5...31.6 V DC	**AC1216**
AS-i power supply SilverLine 115/230 V AC, output current 8 A, output voltage 29.5...31.6 V DC	**AC1218**
AS-i power supply SilverLine 3 x 400...500 V AC, output current 8 A, output voltage 29.5...31.6 V DC	**AC1223**
AS-i power supply 115/230 V AC, output current 2.8 A, output voltage 29.5...31.6 V DC	**AC1226**
AS-i power supply 115/230 V AC, output current 2 x 4 A, output voltage 29.5...31.6 V DC	**AC1212**
AS-i power supply 24 V DC, output current 2.8 A, output voltage 29.5...31.6 V DC	**AC1207**
AS-i power supply 115/230 V AC, output current 2.8 & 6 A, output voltage 29.5...31.6 & 26 V DC	**AC1209**
AS-i power supply with integrated earth fault monitor	
AS-i power supply SilverLine 115/230 V AC, output current 4 A, output voltage 29.5...31.6 V DC	**AC1224**
AS-i power decoupler	
AS-i power decoupler 26.5...31.6 V DC, output current 0.3 A, output voltage 24 V DC +/- 20 %	**AC1211**
AS-i insulation monitor	
AS-i insulation monitor for detection of asymetric insulation faults	**AC2211**
AS-i insulation monitor for detection of symetric and asymetric insulation faults	**AC2212**

Number of inputs	Number of outputs	Input voltage from AS-i	Output voltage according to PELV	Max. input current [mA]	Output current /channel & total [A]	AS-i profile S-	Total current consumpt. from AS-i [mA]	Order no.
SmartLine control cabinet modules as single slave with extended address mode								
4 DI	-	yes	-	200	-	0.A.E	< 250	**AC2250**
4 DI	4 DOT	yes	yes	200	1 (4)	7.0.E	< 250	**AC2251**
-	4 DOT	-	yes	-	2 (4)	8.0.E	< 50	**AC2252**
4 DI	-	-	-	500	-	0.A.E	< 50	**AC2254**
4 DI	2 DOR	-	-	500	1.5 (6)	7.A.E	< 50	**AC2255**
4 DI	4 DOT	yes	yes	500	1 (4)	7.0.E	< 50	**AC2257**
4 DI	4 DOR	yes	-	200	6	7.0.E	< 250	**AC2258**
SmartLine control cabinet modules as single slave with extended address mode								
4 AI C	-	yes	-	< 500	-	7.3.E	< 180	**AC2216**
-	4 AO C	-	yes	-	< 0.5	7.3.G	< 180	**AC2218**
4 PT100	-	yes	-	< 80	-	7.3.E	< 80	**AC2220**
CompactLines field modules with digital inputs and outputs and M12 x 1 sockets								
4 DI	-	yes	-	200	-	0.0.E	< 250	**AC2410**
4 DI-Y	-	yes	-	200	-	0.A.E	< 250	**AC2457**
-	4 DOT	-	yes	-	2 (4)	8.0	< 75	**AC2417**
2 DI	2 DOT	yes	yes	100	2 (4)	3.0.E	< 150	**AC2411**
4 DI	4 DOT	yes	yes	200	2 (4)	7.0.E	< 250	**AC2412**
2 DI-Y	2 DOT	yes	yes	200	2 (4)	3.F.E	< 250	**AC2458**
4 DI-Y	4 DOT	yes	yes	200	2 (4)	7.F.E	< 250	**AC2459**
CompactLines field modules with digital inputs and outputs and M12 x 1 sockets in high-grade stainless steel								
4 DI	-	yes	-	200	-	0.0.E	< 250	**AC2451**
4 DI	4 DOT	yes	yes	200	2 (4)	7.0.E	< 250	**AC2452**
ClassicLine field modules with digital inputs and outputs and M12 x 1 sockets								
4 DI	-	yes	-	200	-	0.0.E	< 240	**AC2505**
-	4 DOT	-	yes	-	1 (2)	8.0.E	< 50	**AC2508**
4 DI	4 DOT	yes	yes	200	1 (2)	7.0.E	< 250	**AC2509**
2 DI	2 DOT	yes	yes	100	1 (2)	3.0.E	< 150	**AC2507**
ClassicLine field modules with digital inputs and outputs and M12 x 1 sockets, 2.1 A/B slaves								
2 DI-Y	2 DOT-Y	yes	yes	100	1 (2)	B.A.E	< 150	**AC2514**
4 DI-Y	3 DOT	yes	yes	100	1 (2)	7.A.E	< 180	**AC2504**
4 DI-Y	-	yes	-	100	-	0.A.E	< 150	**AC2515**
Illuminated push-button field module in ClassicLine housing, AC2018 red/green, AC2026 selectable								
2 BI	2 LO	yes	-	-	-	3.F	< 55	**AC2018**
2 BI	2 LO	yes	-	-	-	3.F	< 55	**AC2026**
Universal field modules with digital inputs and outputs and unit connection via lateral cable glands and cage clamps								
4 DI	-	yes	-	160	-	0.0	< 200	**AC2032**
4 DI	4 DOT	yes	yes	200	2 (4)	7.F	< 260	**AC2035**
ProcessLine field modules with digital I/O and M12 sockets, 2.1 A/B slaves, high-grade stainless steel, IP 69K								
4 DI	3 DOT	yes	yes	200	0.7 (2.1)	7.A.E	< 240	**AC2904**
ProcessLine accessories, made of high-grade stainless steel, IP 69K protection								
Passive AS-i splitter box for the connection of 8 intelligent sensors/actuators								**AC2900**
T-splitter for the connection of AC2900/AC2904 to AS-i flat cable								**E70354**

Description	Order no.
AirBox for single acting pneumatic actuators, two 3/2-way seat valves, digital inputs and pneumatic outputs	
AirBox 1, 2 digital inputs, 2 pneumatic outputs, IP 65	**AC2024**
AirBox 1, 2 digital inputs, 2 pneumatic outputs, IP 67	**AC2027**
AirBox 32, 2 x 2 digital inputs, 2 pneumatic outputs, IP 65	**AC2042**
AirBox 32, 2 x 2 digital inputs, 2 pneumatic outputs, IP 65, external 24 V DC valve supply	**AC2041**
AirBox 32, 2 x 2 digital inputs, 2 pneumatic outputs, IP 67, stainless steel version	**AC2055**
AirBox for double acting pneumatic actuators, one 4/2-way monostable seat valve, digital inputs and pneumatic outputs	
AirBox 42, 2 digital inputs, 1 pneumatic output, IP 65	**AC2046**
AirBox 42, 2 digital inputs, 1 pneumatic output, IP 65, external 24 V DC valve supply	**AC2048**
AS-i dual inductive sensor for control of quarter-turn actuators or valves	
Dual sensor, 4 mm nf sensing range, single slave, 2 inputs	**AC2305**
Dual sensor, 4 mm nf sensing range, single slave, 2 inputs / 1 output	**AC2306**
Dual sensor, 4 mm nf sensing range, single slave, 2 inputs / 2 outputs	**AC2307**
Dual sensor, 4 mm nf sensing range, A/B slave, 2 inputs / 1 output	**AC2316**
AS-i inductive sensors, M12 connector, IP 67	
Inductive sensor M12 threaded stainless steel housing, L = 60 mm, sensing range 4 mm flush	**IFC247**
Inductive sensor M12 threaded stainless steel housing, L = 60 mm, sensing range 7 mm non flush	**IFC248**
Inductive sensor M18 threaded stainless steel housing, L = 60 mm, sensing range 8 mm flush	**IGC234**
Inductive sensor M18 threaded stainless steel housing, L = 60 mm, sensing range 12 mm non flush	**IGC235**
Inductive sensor M30 threaded stainless steel housing, L = 60 mm, sensing range 14 mm flush	**IIC220**
Inductive sensor M30 threaded stainless steel housing, L = 60 mm, sensing range 22 mm non flush	**IIC221**
Inductive sensor 40 x 40 x 66 rectangular plastic housing, sensing range 15 mm flush	**IM5055**
AS-i photoelectric sensors, M12 connector, IP 67	
Retro-reflective sensor with polarsation filter, sensing range 5 m	**OC5226**
Diffuse reflection sensor with background supression, sensing range 0.02...0.25 m	**OC5227**
AS-i pressure sensors, M12 connector, G 1/4 I process connection	
Analogue electronic pressure sensor with integrated AS-i slave, measuring range 0...400 bar	**PPA020**
Analogue electronic pressure sensor with integrated AS-i slave, measuring range 0...10 bar	**PPA024**
AS-i module lower parts for ClassicLine field modules; version yellow / yellow, 2 x AS-i	
FC coupling module lower part	**AC5000**
FC coupling module lower part with adressing plug	**AC5010**
FC coupling module lower part, metal parts stainless steel, seals viton	**AC5014**
FC coupling module lower part with adressing plug, metal parts stainless steel, seals viton	**AC5012**
AS-i module lower parts for ClassicLine field modules; version yellow / black, 1 x AS-i / 1 x power supply 24 V DC	
FC coupling module lower part	**AC5003**
FC coupling module lower part with adressing plug	**AC5011**
FC coupling module lower part, metal parts stainless steel, seals viton	**AC5015**
FC coupling module lower part with adressing plug, metal parts stainless steel, seals viton	**AC5013**
AS-i flat cable	
AS-i flat cable, yellow EPDM (rubber), for AS-i power supply, available in length of 25 m, 50 m, 100 m	**AC4000**
AS-i flat cable, black EPDM (rubber), for external 24 V power supply, available in length of 25 m, 50 m, 100 m	**AC4002**
AS-i flat cable, yellow TPE, for AS-i power supply, available in length of 25 m, 50 m, 100 m	**AC4003**
AS-i flat cable, black TPE, for external 24 V power supply, available in length of 25 m, 50 m, 100 m	**AC4004**
Other AS-i accessories	
AS-i adressing unit for AS-i version 2.1 with extended adress mode	**AC1144**
AS-i T-splitter AS-i yellow, plastic IP 67	**E70271**

Connectors and splitter boxes
Complete ifm product range

- Complete range: Plugs / sockets, jumpers and splitter boxes.
- Various cable materials for different applications.
- High quality materials, reliable under difficult conditions.
- Cable lengths up to 10 m.
- Integrated LEDs for easy diagnosis.

Introduction

With a wide variety of different sensor designs ifm electronic offers a wide range of high quality connectors. The choice of types covers common M8, M12, M18 types through to solenoid connectors.

In addition to the sockets the basic range covers connection cables (jumpers) and splitter boxes.The M12 design in particular has become firmly established on the sensor market for many years and is therefore the preferred choice for extremely harsh applications.
To be able to meet the different application requirements three product series have been developed.

M12 series with cable for factory automation

The ifm standard series for industrial use. Halogen-free PUR cable with high resistance to alternate bending stress, PUR housing material, gold-plated contacts and protection rating IP 68 guarantee long life in an oily and greasy environment. The international UL and CSA approval means these units are accepted anywhere in the world market.

M12 series with cable for the food industry

This series is specially designed for hygienic areas in food manufacture. High quality PVC cable and housing materials, coupling nuts of high-grade stainless steel (316S12) as well as gold-plated contacts are ideal features for use in wet areas. The high protection ratings IP 68 and IP 69K withstand high-pressure steam cleaning. They are chemically resistant to most common cleaning agents. The UL / CSA approval is a matter of course for these units.

M12 series with cable for welding

Specially for use in automated welding systems, several product reliability features must be met. This includes a long-term resistance to weld spatter. Irradiated, halogen-free PUR cables provide an especially efficient protection. This prevents weld slag from burning into the cable material thus damaging it. Teflon coated coupling nuts prevent the connector from being welded to the sensor. A special polyester fleece strip foil in the cable ensures a long life even in case of high torsional stress, for example in robot arms.

ifm plug and socket connections: The right connection for every application.

Design			Number of poles		Cable	Order no.		
			Plug	Socket	[m]	Straight	Angled	Angled LED
Products for industrial applications								
plug	M12 connector	IP 68	4	–	–	**E11504**	**E11505**	–
plug	M12 connector	IP 68	5	–	–	**E11506**	**E11507**	–
socket	M8 connector	IP 68	–	3	2 m PUR	**E11486**	**E11489**	**E11492**
socket	M8 connector	IP 68	–	3	5 m PUR	**E11487**	**E11490**	**E11493**
socket	M8 connector	IP 68	–	3	10 m PUR	**E11488**	**E11491**	**E11494**
socket	M8 connector	IP 68	–	4	2 m PUR	**E11196**	**E11199**	–
socket	M8 connector	IP 68	–	4	5 m PUR	**E11197**	**E11200**	–
socket	M8 connector	IP 68	–	4	10 m PUR	**E11198**	**E11201**	–
				4				
socket	M12 connector	IP 68	–	4	–	**E11508**	**E11509**	**E11510**
socket	M12 connector	IP 68	–	5	–	**E11511**	**E11512**	–
socket	M12 connector	IP 68 / IP 69K	–	4	2 m PUR	**E10906**	**E10900**	**E10903**
socket	M12 connector	IP 68 / IP 69K	–	4	5 m PUR	**E10907**	**E10901**	**E10904**
socket	M12 connector	IP 68 / IP 69K	–	4	10 m PUR	**E10908**	**E10902**	**E10905**
socket	M12 connector	IP 68	–	5	2 m PUR	**E10966**	**E10963**	–
socket	M12 connector	IP 68	–	5	5 m PUR	**E10967**	**E10964**	–
socket	M12 connector	IP 68	–	5	10 m PUR	**E10968**	**E10965**	–
jumper	M8 straight / M8	IP 68	3	3	0.3 m PUR	**E11319**	**E11324**	**E11329**
jumper	M8 straight / M8	IP 68	3	3	0.6 m PUR	**E11320**	**E11325**	**E11330**
jumper	M8 straight / M8	IP 68	3	3	1 m PUR	**E11321**	**E11326**	**E11331**
jumper	M8 straight / M8	IP 68	3	3	2 m PUR	**E11322**	**E11327**	**E11332**
jumper	M8 straight / M8	IP 68	3	3	5 m PUR	**E11323**	**E11328**	**E11333**
jumper	M8 straight / M8	IP 68	3	4	0.3 m PUR	**E11334**	**E11337**	–
jumper	M8 straight / M8	IP 68	3	4	0.6 m PUR	**E11335**	**E11338**	–
jumper	M8 straight / M8	IP 68	3	4	1 m PUR	**E11202**	**E11204**	–
jumper	M8 straight / M8	IP 68	3	4	2 m PUR	**E11203**	**E11205**	–
jumper	M8 straight / M8	IP 68	3	4	5 m PUR	**E11336**	**E11339**	–
jumper	M8 straight / M8	IP 68	4	3	0.3 m PUR	**E11351**	**E11354**	–
jumper	M8 straight / M8	IP 68	4	3	0.6 m PUR	**E11352**	**E11355**	–
jumper	M8 straight / M8	IP 68	4	3	1 m PUR	**E11267**	**E11356**	–
jumper	M8 straight / M8	IP 68	4	3	2 m PUR	**E11268**	**E11357**	–
jumper	M8 straight / M8	IP 68	4	3	5 m PUR	**E11353**	**E11358**	–
jumper	M8 straight / M8	IP 68	4	4	0.3 m PUR	**E11359**	**E11362**	–
jumper	M8 straight / M8	IP 68	4	4	0.6 m PUR	**E11360**	**E11363**	–
jumper	M8 straight / M8	IP 68	4	4	1 m PUR	**E11206**	**E11208**	–
jumper	M8 straight / M8	IP 68	4	4	2 m PUR	**E11207**	**E11209**	–
jumper	M8 straight / M8	IP 68	4	4	5 m PUR	**E11361**	**E11364**	–
jumper	M8 straight / M12	IP 68	3	3	0.3 m PUR	**E11340**	**E11343**	**E11346**
jumper	M8 straight / M12	IP 68	3	3	0.6 m PUR	**E11341**	**E11344**	**E11347**
jumper	M8 straight / M12	IP 68	3	3	1 m PUR	**E11263**	**E11265**	**E11348**
jumper	M8 straight / M12	IP 68	3	3	2 m PUR	**E11264**	**E11266**	**E11349**
jumper	M8 straight / M12	IP 68	3	3	5 m PUR	**E11342**	**E11345**	**E11350**
jumper	M8 straight / M12	IP 68	4	4	0.3 m PUR	**E11365**	**E11368**	**E11371**
jumper	M8 straight / M12	IP 68	4	4	0.6 m PUR	**E11366**	**E11369**	**E11372**
jumper	M8 straight / M12	IP 68	4	4	1 m PUR	**E11259**	**E11261**	**E11373**
jumper	M8 straight / M12	IP 68	4	4	2 m PUR	**E11260**	**E11262**	**E11374**
jumper	M8 straight / M12	IP 68	4	4	5 m PUR	**E11367**	**E11370**	**E11375**

Design			Number of poles		Cable	Order no.		
			Plug	Socket	[m]	Straight	Angled	Angled LED
Products for industrial applications								
jumper	M12 straight / M8	IP 68	3	3	0.3 m PUR	**E11376**	**E11381**	**E11386**
jumper	M12 straight / M8	IP 68	3	3	0.6 m PUR	**E11377**	**E11382**	**E11387**
jumper	M12 straight / M8	IP 68	3	3	1 m PUR	**E11378**	**E11383**	**E11388**
jumper	M12 straight / M8	IP 68	3	3	2 m PUR	**E11379**	**E11384**	**E11389**
jumper	M12 straight / M8	IP 68	3	3	5 m PUR	**E11380**	**E11385**	**E11390**
jumper	M12 straight / M8	IP 68	3	4	0.3 m PUR	**E11391**	**E11396**	–
jumper	M12 straight / M8	IP 68	3	4	0.6 m PUR	**E11392**	**E11397**	–
jumper	M12 straight / M8	IP 68	3	4	1 m PUR	**E11393**	**E11398**	–
jumper	M12 straight / M8	IP 68	3	4	2 m PUR	**E11394**	**E11399**	–
jumper	M12 straight / M8	IP 68	3	4	5 m PUR	**E11395**	**E11400**	–
jumper	M12 straight / M8	IP 68	4	4	0.3 m PUR	**E11441**	**E11446**	–
jumper	M12 straight / M8	IP 68	4	4	0.6 m PUR	**E11442**	**E11447**	–
jumper	M12 straight / M8	IP 68	4	4	1 m PUR	**E11210**	**E11212**	–
jumper	M12 straight / M8	IP 68	4	4	2 m PUR	**E11211**	**E11213**	–
jumper	M12 straight / M8	IP 68	4	4	5 m PUR	**E11445**	**E11450**	–
jumper	M12 straight / M12	IP 68	3	3	0.3 m PUR	**E11401**	**E11406**	**E11411**
jumper	M12 straight / M12	IP 68	3	3	0.6 m PUR	**E11402**	**E11407**	**E11412**
jumper	M12 straight / M12	IP 68	3	3	1 m PUR	**E11403**	**E11408**	**E11413**
jumper	M12 straight / M12	IP 68	3	3	2 m PUR	**E11404**	**E11409**	**E11414**
jumper	M12 straight / M12	IP 68	3	3	5 m PUR	**E11405**	**E11410**	**E11415**
jumper	M12 straight / M12	IP 68	4	4	0.3 m PUR	**E11451**	**E11456**	**E11461**
jumper	M12 straight / M12	IP 68	4	4	0.6 m PUR	**E11452**	**E11457**	**E11462**
jumper	M12 straight / M12	IP 68	4	4	1 m PUR	**E11453**	**E11458**	**E11463**
jumper	M12 straight / M12	IP 68	4	4	2 m PUR	**E11454**	**E11459**	**E11464**
jumper	M12 straight / M12	IP 68	4	4	5 m PUR	**E11455**	**E11460**	**E11465**
jumper	M12 straight / M12	IP 68	5	5	0.3 m PUR	–	**E11481**	–
jumper	M12 straight / M12	IP 68	5	5	0.6 m PUR	–	**E11482**	–
jumper	M12 straight / M12	IP 68	5	5	1 m PUR	–	**E11483**	–
jumper	M12 straight / M12	IP 68	5	5	2 m PUR	–	**E11484**	–
jumper	M12 straight / M12	IP 68	5	5	5 m PUR	–	**E11485**	–

Design			Number of poles		Cable	Order no.	
			Plug	Socket	[m]	DIN-A	Industrial standard type A
Products for industrial applications							
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	0.3 m PUR	**E11416**	–
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	0.6 m PUR	**E11417**	–
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	1 m PUR	**E11418**	–
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	2 m PUR	**E11419**	–
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	5 m PUR	**E11420**	–

Design			Number of poles		Cable	Order no.	
			Plug	Socket	[m]	DIN-B	Industrial standard type B
Products for industrial applications							
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	0.3 m PUR	**E11421**	**E11431**
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	0.6 m PUR	**E11422**	**E11432**
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	1 m PUR	**E11423**	**E11433**
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	2 m PUR	**E11424**	**E11434**
jumper	M12 / valve plug	IP 67	2 + PE	2 + PE	5 m PUR	**E11425**	**E11435**

Design			Number of poles		Cable	Order no.	
			Plug	Socket	[m]	DIN-C	Industrial standard type C
Products for industrial applications							
jumper	M12 / valve plug	IP 65 / IP 67	2 + PE	2 + PE	0.3 m PUR	**E11426**	**E11436**
jumper	M12 / valve plug	IP 65 / IP 67	2 + PE	2 + PE	0.6 m PUR	**E11427**	**E11437**
jumper	M12 / valve plug	IP 65 / IP 67	2 + PE	2 + PE	1 m PUR	**E11428**	**E11438**
jumper	M12 / valve plug	IP 65 / IP 67	2 + PE	2 + PE	2 m PUR	**E11429**	**E11439**
jumper	M12 / valve plug	IP 65 / IP 67	2 + PE	2 + PE	5 m PUR	**E11430**	**E11440**

Design			Number of poles		Cable	Order no.		
			Plug	Socket	[m]	Straight	Angled	Angled LED
Products for hygienic applications								
socket	M8 connector	IP 68	–	3	5 m PVC	**E11495**	**E11498**	**E11501**
socket	M8 connector	IP 68	–	3	10 m PVC	**E11496**	**E11499**	**E11502**
socket	M8 connector	IP 68	–	3	25 m PVC	**E11497**	**E11500**	**E11503**
socket	M8 connector	IP 68	–	4	5 m PVC	**E11223**	**E11220**	–
socket	M8 connector	IP 68	–	4	10 m PVC	**E11224**	**E11221**	–
socket	M8 connector	IP 68	–	4	25 m PVC	**E11225**	**E11222**	–
socket	M12 connector	IP 68 / IP 69K	–	4	5 m PVC	**E10662**	**E10700**	**E10702**
socket	M12 connector	IP 68 / IP 69K	–	4	10 m PVC	**E10663**	**E10701**	**E10703**
socket	M12 connector	IP 68 / IP 69K	–	4	25 m PVC	**E10899**	**E10800**	**E10773**
socket	M12 connector	IP 68	–	5	5 m PVC	**E10954**	**E10704**	–
socket	M12 connector	IP 68	–	5	10 m PVC	**E10955**	**E10705**	–
socket	M12 connector	IP 68	–	5	25 m PVC	**E10956**	**E10953**	–
Products for oils and coolants								
socket	M12 connector	IP 68 / IP 69K	–	4	2 m PUR	**E10906**	**E10900**	**E10903**
socket	M12 connector	IP 68 / IP 69K	–	4	5 m PUR	**E10907**	**E10901**	**E10904**
socket	M12 connector	IP 68 / IP 69K	–	4	10 m PUR	**E10908**	**E10902**	**E10905**
socket	M12 connector	IP 68	–	5	2 m PUR	**E10966**	**E10963**	–
socket	M12 connector	IP 68	–	5	5 m PUR	**E10967**	**E10964**	–
socket	M12 connector	IP 68	–	5	10 m PUR	**E10968**	**E10965**	–
Products for welding applications								
socket	M12 connector	IP 68	–	4	2 m PUR	**E10915**	**E10909**	**E10912**
socket	M12 connector	IP 68	–	4	5 m PUR	**E10916**	**E10910**	**E10913**
socket	M12 connector	IP 68	–	4	10 m PUR	**E10917**	**E10911**	**E10914**
socket	M12 connector	IP 68	–	5	2 m PUR	**E10960**	**E10957**	–
socket	M12 connector	IP 68	–	5	5 m PUR	**E10961**	**E10958**	–
socket	M12 connector	IP 68	–	5	10 m PUR	**E10962**	**E10959**	–
Products for hazardous NAMUR areas								
socket	M12 connector	IP 67	–	4	2 m PUR	**E10357**	**E10355**	–
socket	M12 connector	IP 67	–	4	5 m PUR	**E10358**	**E10356**	–

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