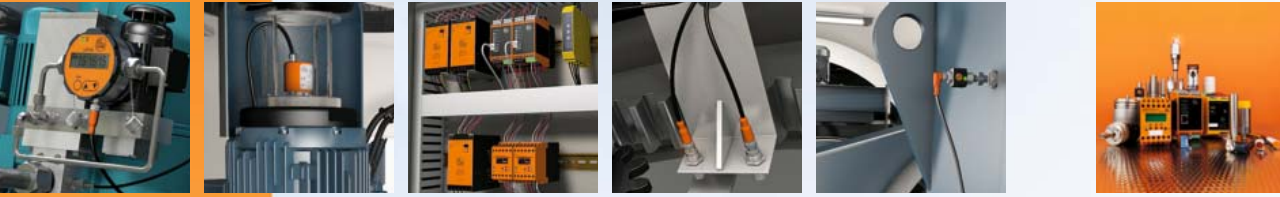


ifm electronic



Processes in the Wind Industry

www.ifm.com/gb/wind

ifm – close to you!

ifm – your partner for wind energy



The ifm group of companies stands for a large range of different sensors and systems for automation technology.

For more than 40 years the family-run company has been researching, developing and producing with the aim of optimising technical processes and conserving resources.

With industry and application know-how, ifm – one of the leading manufacturers of automation technology – provides successful system solutions that are both innovative and economical.

A product range which meanwhile amounts to more than 7800 articles provides sufficient flexibility to meet customer requirements in the most varied industries: from an individual sensor, matching accessories to a complete system solution. Of course, all relevant approvals are available.

As one of the global players, ifm guarantees worldwide availability of the units. More than 70 branch offices worldwide ensure competent advice on-site.

ifm – close to you!



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<i>General information</i>	6 - 7	
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<i>ifm – worldwide addresses</i>	22 - 24	

The company in your vicinity.



State-of-the-art communication.

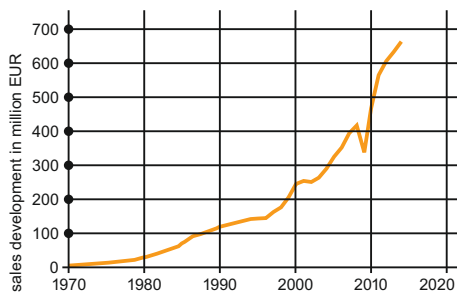
With the right address – www.ifm.com – only a mouse click separates you from the world of automation technology. See the power of our products in interactive representations. Gain an impression with 3-dimensional views of our units. Download CAD drawings for direct integration in your applications. Or order online in ifm's e-shop – fast, convenient and reliable.

We are there for you.

Close contact with our customers is part of our success. Therefore we have consistently developed our sales network right from the start. Today the ifm group of companies is represented in more than 70 countries – close to you! With application advice and service at the heart of our operation. For the introduction of new products and technologies we support you with workshops and seminars in our training centres or in your plant.

Security by success.

Since its foundation in 1969 ifm has constantly grown, now having more than 5500 employees worldwide, and achieved a turnover of more than EUR 720 million in 2015. This success gives you the security of having a reliable partner for the implementation of your automation projects. Comprehensive service and a warranty of 5 years on standard units are just two examples of this reliability.



Turnover development since 1970.



Not only components.

ifm stands for a large range of different sensors and systems for automation. Our range of more than 7,800 articles guarantees flexibility and compatibility. So there is always a reliable solution for your automation projects – from the individual sensor with practical accessories to the complete system.

Availability guaranteed.

Your deadlines matter to us. That is why we are constantly optimising our production processes in order to be able to quickly and flexibly produce large quantities at a constantly high quality – and to continue to shorten delivery times. Your order is dispatched via our centralised logistics centre reliably and on time.

Quality as part of our philosophy.

The quality standard of our products is an integral part of our company philosophy. And we guarantee it! So we provide you, the users, with a maximum degree of security: By means of our own production technology, ifm film technology, as well as by means of extensive quality assurance measures such as 100 % final testing. By quality we understand, for example, ecologically conscious production – Made in Germany!



The development of innovative products is one of our core competences. From high-quality standard solutions to products specially tailored to the requirements of the individual industries – from mobile machines to the food industry.

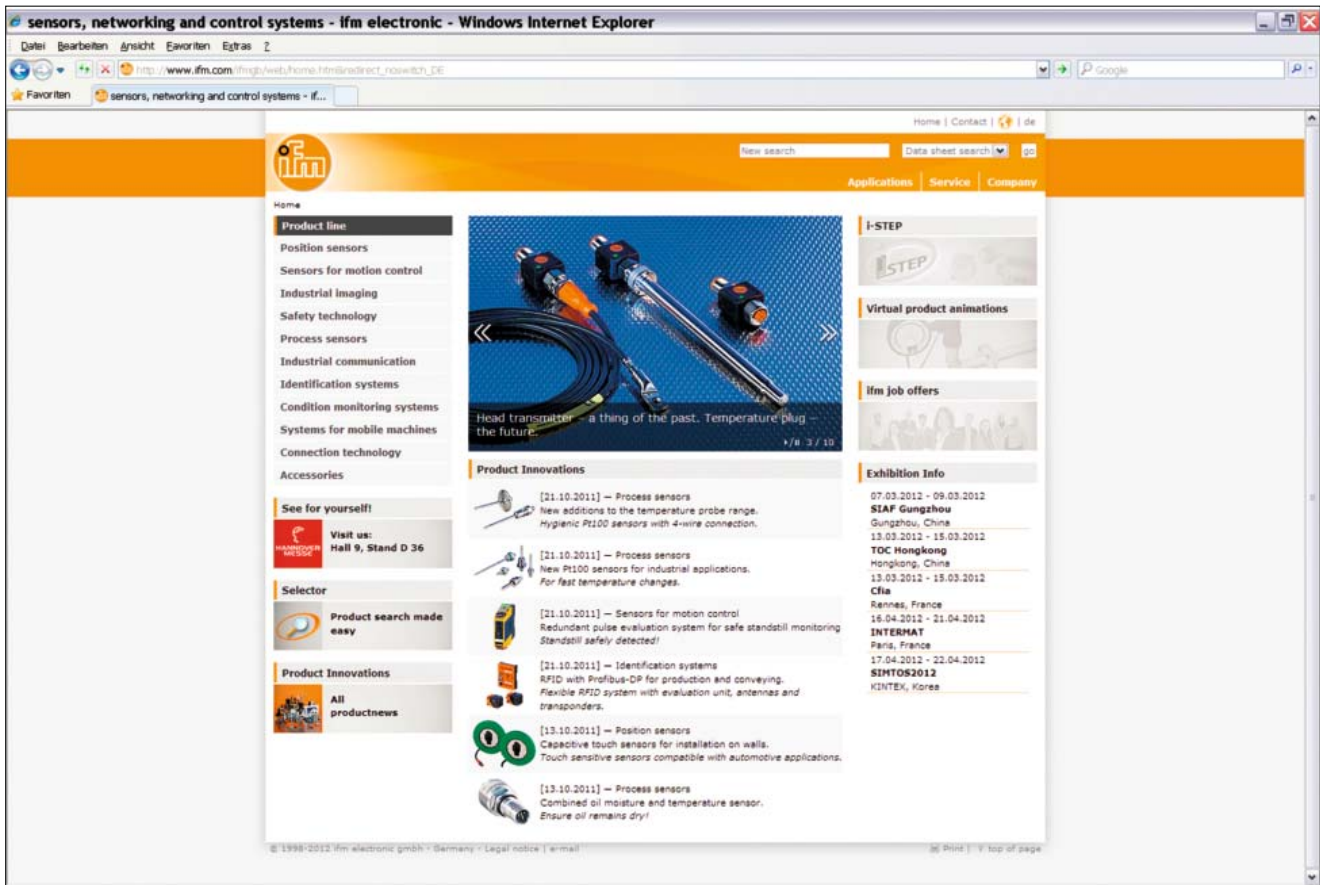


■ branch office
 ▨ trade partner



www.ifm.com

Information around the clock and around the globe in 23 languages on the internet.



• **Information**

- product innovations
- company news
- exhibition info
- locations
- jobs

• **Documentation**

- data sheets
- operating instructions
- manuals
- approvals
- CAD data

• **Communication***

- request for documents
- recall service
- live advice
- newsletter

• **Selection**

- interactive product selection aids
- configuration tools
- data sheet direct

• **Animation**

- virtual product animations
- flash movies (video sequences)

• **Application**

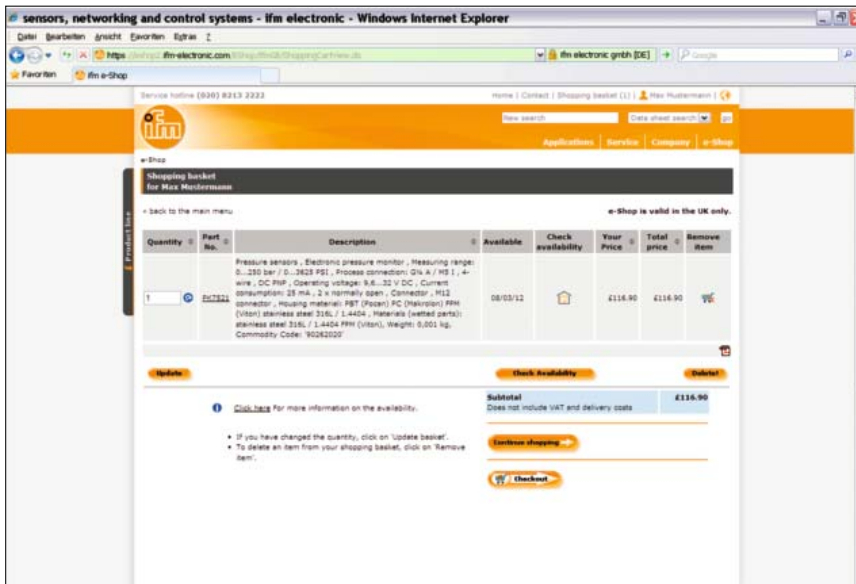
- applications
- product recommendations
- calculation aids

• **Transaction***

- e-shop processing
- e-procurement catalogues

*Some offered information is available country-specific

Convenient order processing via the e-shop** on the internet.



Secured authentication

Customer-related price indication

Real time availability check

Personal product favourites

Online parcel tracking

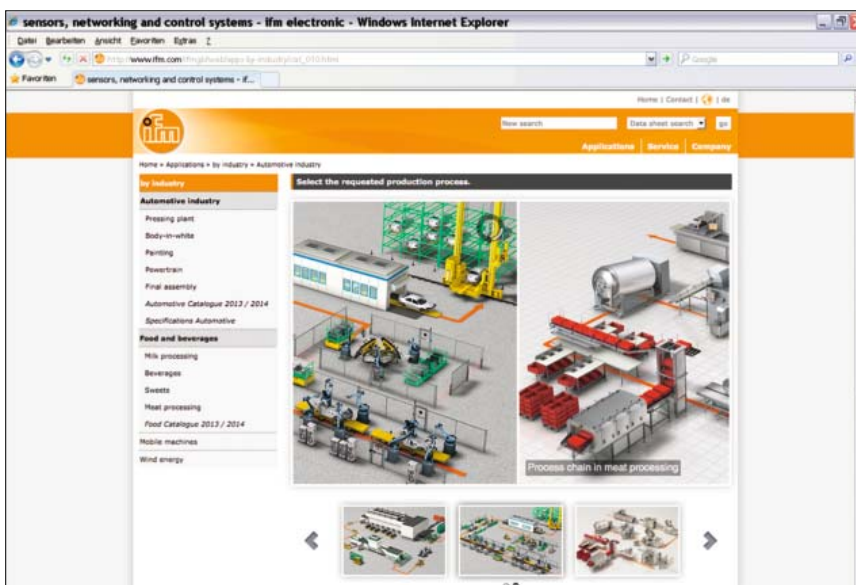
Individual order history

Convenient quick input form

Simple order processing

Management of shipping addresses

Confirmations by e-mail



ifm application database

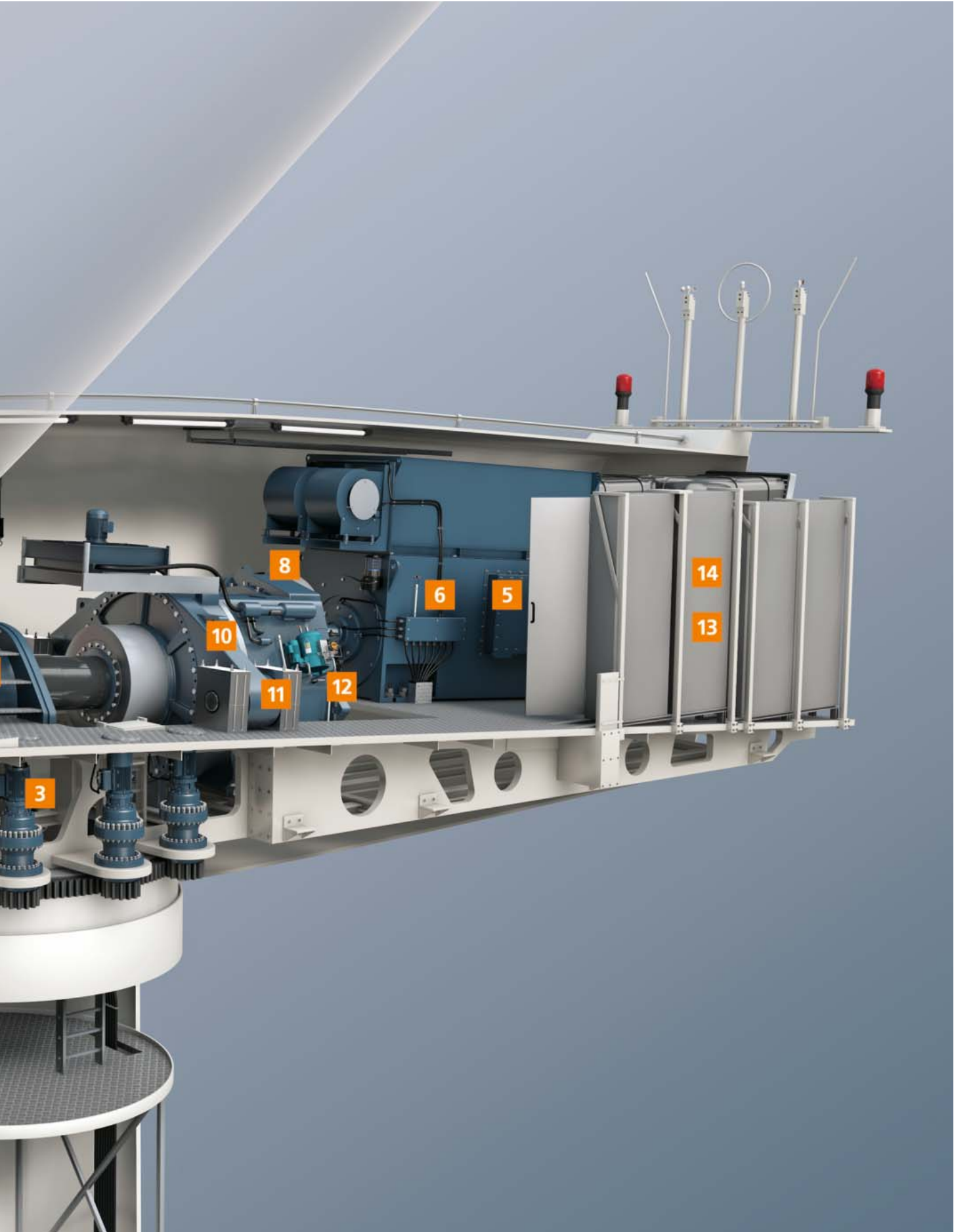
ifm's automation technology is used to for applications in many different types of plant in almost all industries. Learn how ifm can improve your production.

Application examples can be found on our website at:

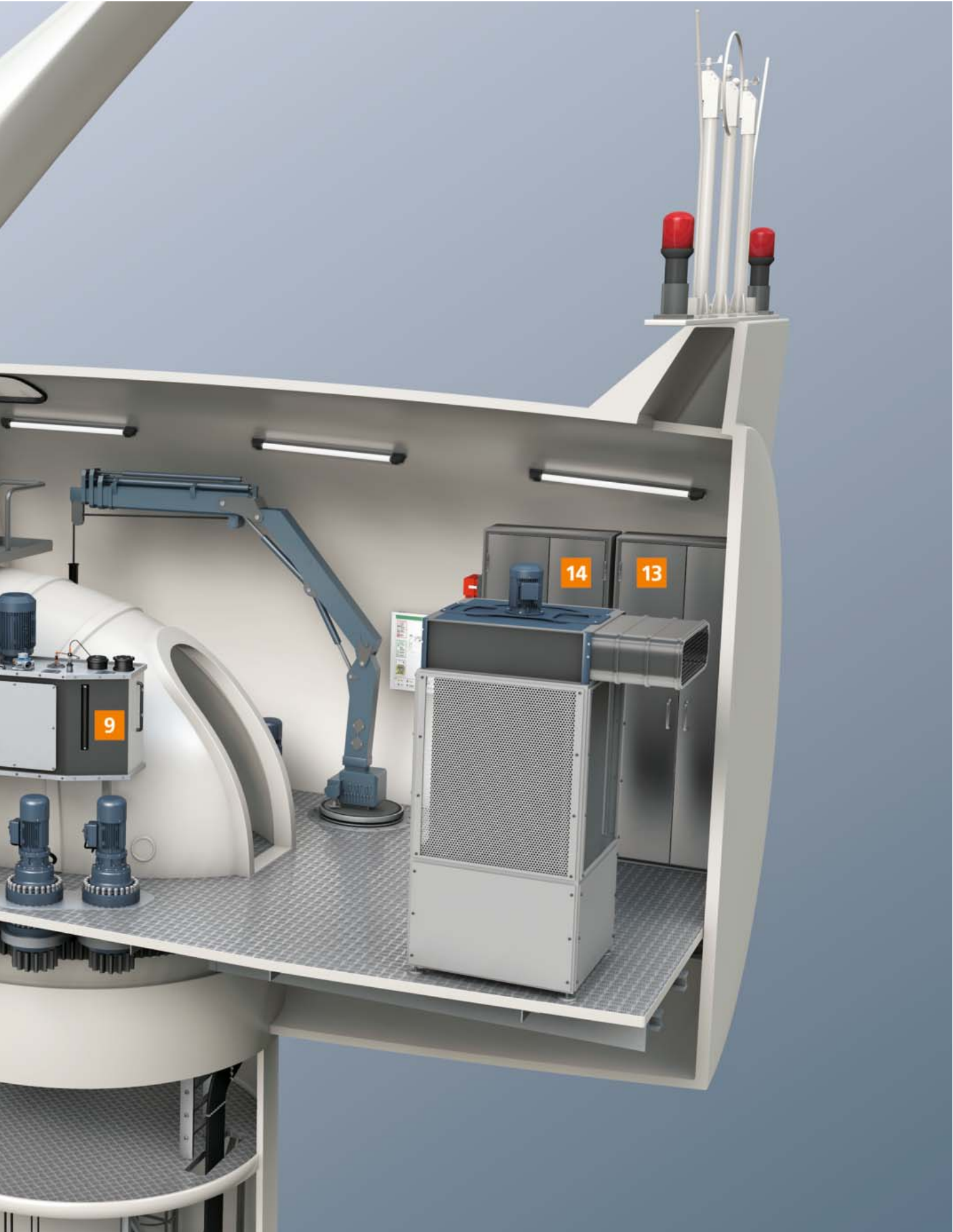
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** Already available in many countries.











Machine	Application	Product group
1 Hydraulic pitch system		
	Pressure detection cylinder	Pressure sensors
2 Electric pitch system		
	Position detection rotor blades	Encoders
	End position rotor blades	Inductive sensors
3 Azimuth drive		
	Position detection nacelle	Encoders
4 Speed monitoring low-speed side		
	Safe speed monitoring	Pulse evaluation systems
	Speed pick-up	Inductive sensors
5 Rotational speed monitoring generator		
	Rotational speed monitoring	Encoders
6 Temperature monitoring		
	Temperature monitoring generator	Temperature sensors
7 Rotor lock		
	Rotor lock sensor	Magnetic sensors

Machine	Application	Product group
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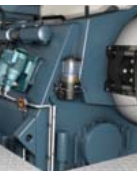
8 Breaking

	Wear monitoring brake linings	Magnetic sensors


9 Hydraulic power unit

	Pressure monitoring hydraulics	Pressure sensors


10 Gear box

	Point level monitoring	Level sensors
	Continuous level monitoring	Pressure sensors


11 Filter systems

	Differential pressure filter	Pressure sensors


12 Oil condition monitoring

	Oil moisture measurement	Systems for oil quality monitoring
	Oil condition monitoring	Systems for oil quality monitoring

13 Power supplies

	Voltage supply	24 V DC power supplies

14 Sockets for down to -40 °C with screen

	Connection technology	Sockets

Sensors and systems for wind turbines



To survive on the energy market, wind turbines need to be powerful and efficient. Besides high uptime, suitability for all climatic zones is absolutely necessary. Plant operators have special demands on the components installed to ensure that they stand up to different environmental conditions. Besides resistance to high temperature fluctuations this also includes shock and vibration resistance. The sensors and systems from ifm are optimised for these different, high demands on performance – at an excellent price / performance ratio.

Diverse approvals certify their reliable operation. Wind energy systems in a 'cold climate' design are not uncommon today. These systems are operational at down to -30 °C, but the survival temperature for a safe standby condition goes down to -40 °C. ifm has developed sensors to meet this special challenge. They are marked in this brochure by the CCV symbol (snowflake).

ifm – close to you!


Hydraulic pitch system



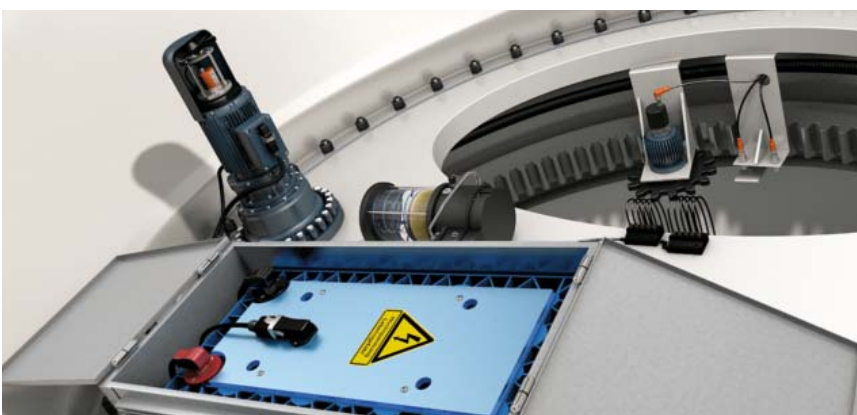
Hydraulic pitch system

The rotational speed of the wind turbine is controlled via the angle of the rotor blades. The hydraulic adjustment (pitch) is monitored using pressure sensors.

PT pressure transmitter with analogue output 4...20 mA

Type	Process connection	Display	Measuring range [bar]	P _{overload} max. [bar]	P _{bursting} min. [bar]	U _b DC [V]	Order no.
	G 1/4 male	–	0...400	1000	1700	8.5...36	PT5400


Electric pitch system




Electric pitch system

Robust encoders detect the angle of the rotor blades, even at temperatures down to -40 °C. Robust, inductive sensors serve for end position detection.

Absolute multiturn encoder with CANopen interface

Type	Resolution	U _b [V]	Detection	I _{load} [mA]	Shaft [mm]	Ambient temperature [°C]	Cable entry	Order no.
	24 bits	10...30	–	–	10	-40...85	axial	RM9000

Inductive sensors for CCV areas

Type	Dimensions [mm]	Sensing range [mm]	Material	U _b [V]	Protection	f [Hz]	I _{load} [mA]	Order no.
	M18 / L = 60	8 f	Brass	10...30	IP 65 / IP 66 / IP 67 / IP 68 / IP 69K	400	100	IG5232

f = flush / nf = non flush


Azimuth drive



Position of the nacelle

High-resolution absolute encoders detect the angle of rotation (azimuth) of the nacelle. Even after power failure, the absolute encoders immediately detect the position; no referencing is required.

Absolute multiturn encoder with SSI interface

Type	Resolution	U _b [V]	Detection	I _{load} [mA]	Shaft [mm]	Ambient temperature [°C]	Cable entry	Order no.
	4096	4.5...30	-	-	10	-40...85	axial	RM8002


Speed monitoring low-speed side




Speed monitoring rotor

To prevent destruction caused by over-speed, the rotational speed is detected using inductive sensors and evaluated by a safety-related speed monitor. The inductive sensors operate reliably at down to -40 °C.

Safe speed monitor down to -40 °C

Type	U _b [V]	In-puts	Input function	Setting range [puls. / min.]	Setting range [Hz]	Out-puts analogue	Out-puts relays	Out-puts transist.	Order no.
	24 DC	1	PNP / NPN / Namur	-	-	1	2	2	DD1115

Inductive sensors for CCV areas with normally closed function

Type	Dimensions [mm]	Sensing range [mm]	Material	U _b [V]	Protection	f [Hz]	I _{load} [mA]	Order no.
	M18 / L = 60	8 f	Brass	10...30	IP 65 / IP 66 / IP 67 / IP 68 / IP 69K	400	100	IG5240

f = flush / nf = non flush


Rotational speed monitoring generator



Rotational speed detection on the generator

Hollow or solid shaft encoders are installed on the generator shaft with a coupling and monitor its rotational speed. ifm offers versions with SSI, CANopen or Profibus interface.

Absolute multiturn encoder with SSI interface

Type	Resolution	U _b [V]	Detection	I _{load} [mA]	Shaft [mm]	Ambient temperature [°C]	Cable entry	Order no.
	4096	4.5...30	-	-	12	-40...85	axial	RM8003


Temperature monitoring




Temperature monitoring

ifm offers Pt100 / Pt1000 temperature sensors for different power units as probe or contact sensors. The head transmitter converts the Pt100 / Pt1000 signals into an analogue signal in accordance with the standard.

Pt100 probe sensors

Type	Measuring range [°C]	Diameter [mm]	Cable material	Sensor element	Dynamic response T05 / T09 [s]	Order no.
	-40...90	Ø 10 mm	PUR cable	1 x Pt 100	6 / 25	TS5089

Head transmitter for Pt100 / Pt1000 probe sensors with analogue output 4...20 mA


Type	Factory setting [°C / °F]	Process connection	U _b [V]	Ambient temperature [°C]	Measuring element	Order no.
	-50...150 / -	M12	20...32	-25...70	for Pt100 and Pt1000 measuring elements	TP3231


Rotor lock



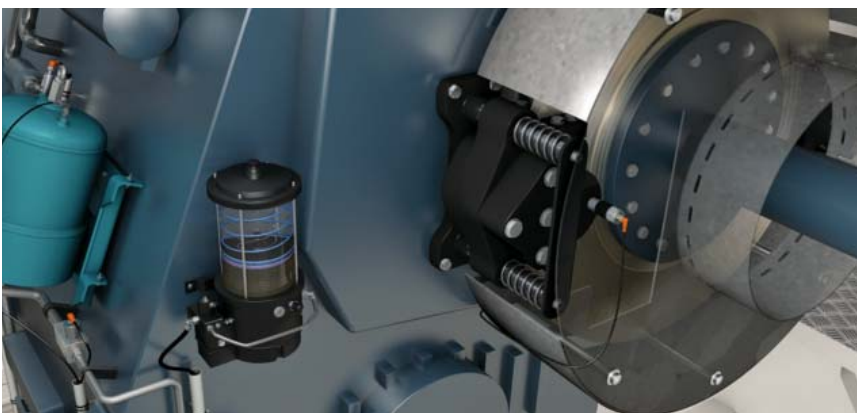
Lock monitoring rotor lock

The rotor is locked for maintenance reasons. To ensure that the rotor lock is in place, the magnetic sensor M95004 with its 3 programmable switch points can signal the current condition (locked / partly locked / unlocked).

 Mechatronic rotor lock sensor with 3 switch points


Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Order no.
	Ø 40	52...137	Brass	10...36	IP 20 / IP 67	0.5	80	M95004


Braking



Wear monitoring brake linings

Brakes are important components of wind energy systems. The magnetic sensor with its 2 switch points (early warning / main alarm) signals the condition of the brake linings to the controller.

 Mechatronic brake sensor with 2 switch points

Type	Dimensions [mm]	Sensing range [mm]	Material	U_b [V]	Protection	f [Hz]	I_{load} [mA]	Order no.
	Special design	17...32	Brass	10...55	IP 20 / IP 67	0.5	100	M95001


Hydraulic power unit



Pressure monitoring hydraulics

With too low an oil pressure, for example, the rotor blade pitch or the hydraulic brake system no longer works reliably. In this case, electronic pressure sensors send alarm signals to the controller.

PP pressure sensor

Type	Process connection	Display	Measuring range [bar]	Poverload max. [bar]	Pbursting min. [bar]	U _b DC [V]	Order no.
	G ¼ male / M5 female	Operation	0...400	600	1000	9.6...36	PP7550


Gear box




Level monitoring, gear box

The oil level in the gear can be continuously monitored using a hydrostatic pressure sensor (PA) or point level sensor (LMT). The LMT is adjustable via its IO-Link interface and makes this sensor resistant to foam and deposits.

LMT point level sensor

Type	Process connection	Process pressure max. [bar]	Application	Protection	Order no.
	G ½ male	-1...40	liquid, viscous and powdery media	IP 68 / IP 69K	LMT121

PA pressure sensor

Type	Process connection	Display	Measuring range [bar]	Poverload max. [bar]	Pbursting min. [bar]	U _b DC [V]	Order no.
	G ¼ female	-	0...0.25	10	30	9.6...32	PA3028


Filter systems



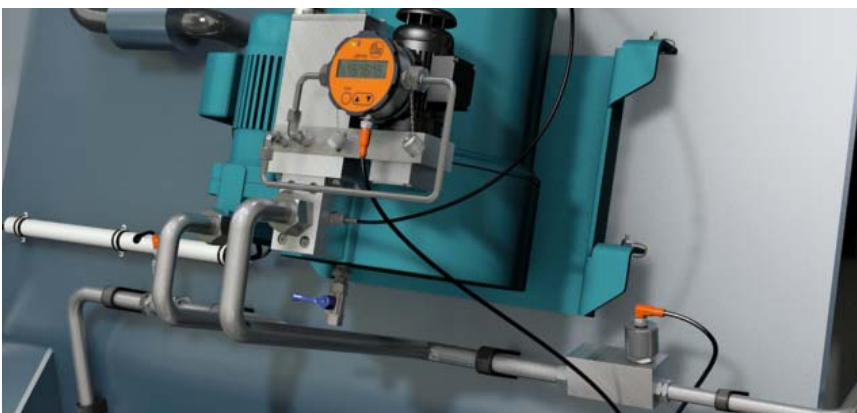
Differential pressure monitoring on the oil filter

The oil is permanently filtered for smooth operation and long maintenance intervals, PT series pressure transmitters monitor the degree of soiling of the filter.

 Pressure sensor for differential pressure monitoring

Type	Process connection	Display	Measuring range [bar]	P overload max. [bar]	P bursting min. [bar]	U _b DC [V]	Order no.
	G ¼ male	–	0...10	25	300	8.5...36	PT5404


Oil condition monitoring




Condition monitoring of oil

ifm offers different sensors for monitoring the oil quality in the different power units: LDH100 is a combined oil moisture and temperature sensor. LDP100 however detects smallest particles in the oil.

Oil moisture sensor

Type	Process connection	Process pressure max. [bar]	Application	Protection	Order no.
	G ¾	10	Mineral oils, synthetic esters, biodegradable oils, air	IP 67	LDH100

Oil particle sensor

Type	Process connection	Process pressure max. [bar]	Application	Protection	Order no.
	Minimes M16 x 2	–	Mineral oils (e.g. HLP), ester oils (e.g. HEES), biodegradable oils (e.g. HETG)	IP 67	LDP100


Power supplies



Outstanding performance

Power is required for the generation of power. Our power supplies are available with an output power of 1A DC up to 40A DC. These primary switched-mode power supplies provide an intelligent power reserve.

Power supplies

Type	Current [A]	Output voltage [V]	Nominal voltage [V]	Mains buffering time [ms]	Efficiency typ. [%]	Order no.
	20	24...28 DC	3 x 400 AC	22 (400 V AC; 50 Hz) / 22 (480 V AC; 60 Hz)	95	DN4034


Sockets for down to -40 °C with screen



Well screened

The connections between plug and socket of the sensor must be perfectly tight even in case of -40°C, moisture, oil and other environmental influences. The screen protects the data to be transmitted from external interference.

M12 sockets, screened for down to -40 °C, straight / angled

Type	Cable	Wire specification	Material housing / nut	U [V]	T _a [°C]	Pro-tection	LEDs	Order no.
	5 m black PUR cable	4 x 0.34 mm ² , Ø 4.9 mm	TPU / Brass	50 AC 60 DC	-25...90	IP 65 / IP 67	–	EVC539
	5 m black PUR cable	4 x 0.34 mm ² , Ø 4.9 mm	TPU / Brass	50 AC 60 DC	-25...90	IP 65 / IP 67	–	EVC542

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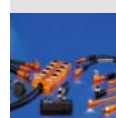
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