



Baumer

Passion for Sensors

Sensors for object detection and distance measurement

Product overview



Partnership.

Precise.

Pioneering.

Visibly better: Baumer sensors.

The Baumer Group is leading at international level in the development and production of sensors, shaft encoders, measuring instruments as well as components for automatic image processing. As an owner-managed family business, we employ about 2700 workers worldwide in 39 subsidiaries and 19 countries. With marked customer orientation, consistently high quality and vast innovation capability, Baumer develops specific solutions for many industries and applications worldwide.

Our standards – your benefits.

- Passion coupled with expertise – both have made us a sensor pioneer and technology leader
- Our range of services is hard to beat – we have the right product, developed by our own team, for every task
- Inspiring through innovation – a challenge Baumer employees take on every day
- Reliability, precision and quality – our customers' requirements are what drives us
- Partnership from the start – together with our customers we develop suitable solutions
- Always a step ahead – thanks to our production depth, our flexibility and our delivery reliability
- Available worldwide – Baumer is Baumer everywhere





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Inductive proximity switches

Cylindrical inductive proximity switches for factory automation

The proven solution for safe, non-contact detection of metal objects

- Very small sensors with all integrated evaluation electronics and large sensing distance
- Sturdy, maintenance-free and durable
- Always the right sensor thanks to a wide variety of variants



	IFRM 03 external electronics	IFRM 03	IFRM 04 Thread	IFRM 04	IFRM 05
category	Subminiatur	Subminiatur	Subminiatur	Subminiatur	Subminiatur
dimensions	ø 3 mm	ø 3 mm	M4	ø 4 mm	M5
housing length	12 mm	from 12 mm	from 22 mm	from 15 mm	from 15 mm
nominal sensing distance S_n	0,8 mm	0,8 ... 1 mm	0,8 mm	1 ... 1,6 mm	1 ... 1,6 mm
switching frequency	3 kHz	to 4 kHz	3 kHz	to 5 kHz	to 5 kHz
output signal	PNP NPN	PNP NPN	PNP NPN	PNP NPN	PNP NPN
connection types	flylead connector M8 (electronics in connector)	cable 2 m flylead connector M8 wires	cable 2 m flylead connector M8	connector M5 connector M8 cable 2 m flylead connector M8 wires	connector M5 connector M8 cable 2 m flylead connector M8 wires
housing material	stainless steel	stainless steel	stainless steel	stainless steel	stainless steel
operating temperature	-25 ... +75 °C	-25 ... +75 °C -10 ... +70 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67	IP 67
specific features					

Inductive proximity switches



	IFRM 06 IR06.PxxS	IFRM 08 IR08.PxxS	IFRM 12 IR12.PxxS	IFRM 18 IR18.PxxS	IFRM 30 IR30.PxxS
	Sub-/Miniatur	Sub-/Miniatur	Compact	Compact	Compact
	ø 6,5 mm	M8	M12	M18	M30
	from 22 mm	from 18 mm	from 30 mm	from 35 mm	from 35 mm
	2 ... 6 mm	2 ... 6 mm	4 ... 10 mm	8 ... 15 mm	10 ... 24 mm
	to 5 kHz	to 5 kHz	to 2 kHz	to 500 Hz	to 500 Hz
	PNP NPN	PNP NPN	PNP NPN	PNP NPN	PNP NPN
	connector M8 cable 2 m flylead connector M8	connector M8 connector M12 cable 2 m flylead connector M8	connector M8 connector M12 cable 2 m	connector M8 connector M12 cable 2 m	connector M12 cable 2 m
	stainless steel	stainless steel	brass nickel plated	brass nickel plated	brass nickel plated
	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C 0 ... +65 °C	-25 ... +75 °C
	IP 67	IP 67	IP 67	IP 67	IP 67
			■ variants with antivalent output (NO & NC)	■ variants with antivalent output (NO & NC)	■ variants with antivalent output (NO & NC)

Inductive proximity switches

Rectangular inductive proximity switches for factory automation

The proven solution for safe, non-contact detection of metal objects

- Very small sensors with all integrated evaluation electronics and large sensing distance
- Sturdy, maintenance-free and durable
- Millions of them in use - highest precision and guaranteed reliability thanks to over 40 years of experience



	IFFM 08	IFFM 04	IFFM 06	IFFM 08
category	Subminiatur	Subminiatur	Miniatur	Miniatur
dimensions (B × T × L)	8 × 4,7 × 16 mm	4 × 4 × 22 mm	6 × 6 × 20 ... 30 mm	8 × 8 × 20 ... 60 mm
nominal sensing distance S_n	2 mm	0,8 mm	1 mm	2 mm
switching frequency	5 kHz	3 kHz	5 kHz	5 kHz
output signal	PNP NPN	PNP NPN	PNP NPN	PNP NPN
connection types	cable 2 m flylead connector M8	cable 2 m	connector M5 cable 2 m	connector M8 cable 2 m flylead connector M8
housing material	die-cast zinc nickel plated	stainless steel	brass nickel plated	brass nickel plated die-cast zinc nickel plated
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67
specific features	■ extra flat design (4.7 mm)			

Inductive proximity switches



	IFFM 12	IFFM 20
	Compact	Compact
	12 × 8 × 28 mm	20 × 10 × 41 mm
	4 mm	5 ... 8 mm
	2 kHz	to 1 kHz
	PNP NPN	PNP NPN
	connector M5	connector M8
	brass nickel plated	brass nickel plated
	-25 ... +75 °C	-25 ... +75 °C
	IP 67	IP 67

Inductive proximity switches

Application-specific inductive sensors – Outdoor / high temperature

- Rugged Outdoor and Washdown sensors
- High shock and vibration resistance
- Sensors with extended temperature range up to 180 °C



Outdoor / Washdown	IFRM 12 / 18 Outdoor	IFRR 08 / 12 / 18 Washdown
features	<ul style="list-style-type: none"> ■ Rugged stainless steel (V4A) or all-metal housing ■ IP 69K long-term seal – <i>proTect+</i> ■ High signal quality in an extended temperature range 	
dimensions	M12 / M18	M8 / M12 / M18
nominal sensing distance S_n	6 ... 12 mm	3 ... 12 mm
switching frequency	0,4 ... 2 kHz	0,5 ... 3 kHz
housing material	brass nickel plated	stainless steel 1.4404 (V4A)
operating temperature	-40 ... +80 °C	-40 ... +80 °C
protection class	IP 67	IP 68/69K & <i>proTect+</i>
specific features		<ul style="list-style-type: none"> ■ Ecolab-tested ■ FDA-compliant ■ Vibration resistance EN 61373: 2010 (category 3) ■ Shock resistance EN 61373: 2010 (category 3)



High temperature up to +180 °C	IFRM 06 / 08 / 12 High temperature up to +100 °C	IFRD 06 / 08 / 12 / 18 High temperature up to +100 °C Full metal housing (<i>DuroProx</i>)	IFRH 06 / 08 / 12 High temperature up to +180 °C with separated electronics
features	<ul style="list-style-type: none"> ■ Sensors with extended temperature range up to 180 °C ■ Versions with integrated and separate evaluation electronics ■ High switching frequencies 		
dimensions	∅ 6,5 mm / M8 / M12	∅ 6,5 mm / M8 / M12 / M18	M8 / M12 / M18
nominal sensing distance S_n	2 ... 4 mm	2 ... 6 mm	1,5 ... 5 mm
switching frequency	2 ... 5 KHz	100 ... 150 Hz	1 ... 4 kHz
housing material	stainless steel brass nickel plated	stainless steel 1.4404 (V4A)	stainless steel brass nickel plated
operating temperature	-25 ... +100 °C	-25 ... +100 °C	-25 ... +180 °C
protection class	IP 67	IP 68 / IP 69K	IP 67

Application-specific inductive sensors – High pressure / magnetic field

- Pressure resistant up to 500 bar
- Immune to welding and magnetic fields up to 90 mT



High pressure resistant sensors	IFRP 12	IFRP 16	IFRP 18
features	<ul style="list-style-type: none"> ■ Pressure resistant up to 500 bar ■ Sensor surface made of zirconium oxide (ZrO₂/ceramics) ■ High switching frequencies 		
dimensions	M12	M16	M18
nominal sensing distance S_n	2 mm	2 mm	2 mm
switching frequency	5 kHz	3 kHz	3 kHz
housing material	stainless steel	stainless steel	stainless steel
sensing face	ZrO ₂ / ceramic	ZrO ₂ / ceramic	ZrO ₂ / ceramic
operating temperature	-25 ... +80 °C	-25 ... +80 °C	-25 ... +80 °C
protection class	IP 68/67	IP 68/67	IP 68/67



Sensors immune to welding and magnetic fields	IFRW 12	IFRW 18
features	<ul style="list-style-type: none"> ■ For magnetic fields up to 90 mT ■ PTFE-coated front ■ Chrome-plated brass housing ■ Resistant to welding sparks 	
dimensions	M12	M18
nominal sensing distance S_n	2 mm	5 mm
switching frequency	1 kHz	500 Hz
housing material	brass chromium plated	brass chromium plated
sensing face	PTFE-coated	PTFE-coated
operating temperature	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67

Inductive proximity switches

Application-specific inductive sensors – Large sensing distance / Factor 1

- Sensors with extended switching distance up to 24 mm
- Factor 1 sensors with the same switching distance on all metals



Large sensing distance	IR06.P03S IR06.P06S	IR08.P03S IR08.P06S	IR12.P06S IR12.P10S	IR18.P12S IR18.P15S	IR30.P18S IR30.P24S
category	Miniatur	Miniatur	Compact	Compact	Compact
features	<ul style="list-style-type: none"> ■ Large installation tolerances ■ Enhanced protection against mechanical damage ■ Cylindrical designs from Ø6.5 mm to M30 ■ Flush and non-flush variants 				
dimensions	Ø 6,5 mm	M8	M12	M18	M30
nominal sensing distance S_n	3 / 6 mm	3 / 6 mm	6 / 10 mm	15 / 18 mm	18 / 24 mm
switching frequency	2 kHz	2 kHz	1 kHz	400 Hz	500 Hz
housing material	stainless steel	stainless steel	brass nickel plated	brass nickel plated	brass nickel plated
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C 0 ... +65 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67	IP 67



Factor 1	IR06.P02F	IR08.P02F	IR12.P04F	IR18.P06F IR18.P08F
category	Miniatur	Miniatur	Compact	Compact
features	<ul style="list-style-type: none"> ■ Detection of stainless steel, aluminum and non-ferrous metals with the same sensing distance ■ High switching frequencies up to 3 kHz 			
dimensions	Ø 6,5 mm	M8	M12	M18
housing length	40 / 46 mm	40 / 46 mm	40 / 50 mm	50 / 60 mm
nominal sensing distance S_n	2 mm	2 mm	4 mm	6 / 8 mm
switching frequency	3 kHz	3 kHz	2 kHz	500 Hz
housing material	stainless steel	stainless steel	brass nickel plated	brass nickel plated
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67

Application-specific inductive sensors – ATEX / Hygienic

- Sensors for the Ex-area (ATEX-certified)
- Stainless steel sensors in hygienic design, EHEDG-certified



ATEX	IFRM 06X IFRM 08X	IFRM 12	IFRM 12X IFRM 18X
category	Miniatur	Compact	Compact
features	<ul style="list-style-type: none"> ■ For environments with flammable gas or dust ■ ATEX certified ■ High repeat accuracy < 0.01 mm ■ Compact design 		
dimensions	∅ 6,5 mm / M8	M12	M12 / M18
nominal sensing distance Sn	1,5 mm	4 mm	2 ... 8 mm
switching frequency	5 kHz	2 kHz	to 2 kHz
output circuit	NAMUR	PNP / NPN	NAMUR
operating temperature	-20 ... +60 °C	-25 ... +65 °C	-20 ... +60 °C
protection class	IP 67	IP 67	IP 67
approvals/certificates	ATEX 1G	ATEX 3D	ATEX 1G



Hygienic design	IFBR 06	IFBR 11	IFBR 17
category	Miniatur	Compact	Compact
features	<ul style="list-style-type: none"> ■ FDA compliant materials – EHEDG certified ■ High chemical resistance – Ecolab tested and LCP front cap ■ IP 68K long-term seal – <i>proTect+</i> ■ Flush and non-flush housings 		
dimensions	∅ 6,5 mm	∅ 11 mm	∅ 17 mm
nominal sensing distance Sn	3 mm	4 mm (flush) 6 mm (non-flush)	8 mm (flush) 12 mm (non-flush)
switching frequency	3 kHz	1 kHz	500 Hz
housing material	stainless steel 1.4404 (V4A)	stainless steel 1.4404 (V4A)	stainless steel 1.4404 (V4A)
operating temperature	-40 ... +80 °C, cleaning temperature to +100 °C	-40 ... +80 °C, cleaning temperature to +100 °C	-40 ... +80 °C, cleaning temperature to +100 °C
protection class	IP 68/69K & <i>proTect+</i>	IP 68/69K & <i>proTect+</i>	IP 68/69K & <i>proTect+</i>

Inductive proximity switches

Application-specific inductive sensors – Marine / for off-highway-machinery

- Inductive proximity switches for off-highway machinery – designed for reliability
- DNV-GL certified marine sensors



For off-highway-machines	IR12V.04S	IR18V.08S
category	compact	compact
features	<ul style="list-style-type: none"> ■ Designed for Reliability ■ Versions with flylead connector German ■ EN 13309, EN ISO 14982:2009, ISO 13766:2006 	
dimensions	M12	M18
nominal sensing distance S_n	4 mm	8 mm
switching frequency	2 kHz	450 kHz
housing material	brass nickel plated	brass nickel plated
operating temperature	-40 ... +85 °C	-40 ... +85 °C
protection class	IP 68 / IP 69K (face)	IP 68 / IP 69K (face)



Marine	IR12.P04S	IR18.P10S
category	compact	compact
features	<ul style="list-style-type: none"> ■ Versions with diagnostic input ■ Marine type approval (according to DNVGL-CG-0339) 	
dimensions	M12	M18
nominal sensing distance S_n	4 mm	10 mm
switching frequency	1 kHz	800 kHz
housing material	stainless steel 1.4404 (V4A)	brass nickel plated, chromium plated
operating temperature	-40 ... +75 °C	-40 ... +75 °C
protection class	IP 67	IP 67
specific features		<ul style="list-style-type: none"> ■ Ecolab-tested ■ FDA-compliant ■ Vibration resistance EN 61373: 2010 (category 3) ■ Shock resistance EN 61373: 2010 (category 3)

Inductive proximity switches



Capacitive sensors

Capacitive proximity sensors

For level detection of liquids or granules as well as non-conductive objects.

- High switching distance up to 15 mm even through non-metallic walls
- Absolutely reliable even when interfered by ambient conditions, e.g. ambient light or dirt
- Reliable detection even of wafers, PCBs and paper stacks



	CFAM 12	CFAM 18	CFAM 30	CFBM 20
category	cylindrical	cylindrical	cylindrical	rectangular
function				
detection of non-conductive media	■	■	■	■
liquids in direct contact				
fill level detection through container	■	■	■	■
object detection / bulk goods	■	■	■	■
dimensions / height	M12	M18	M30	20 × 35 × 12 mm
housing length	60 mm with cable 76 mm with connector	64 mm with cable 78,4 mm with connector	71 mm with cable 82 mm with connector	35 mm
nominal sensing distance S_n	4 mm	8 mm	15 mm	5 mm
switching frequency	50 Hz	50 Hz	50 Hz	50 Hz
output signal	PNP NPN	PNP NPN	PNP NPN	PNP NPN
connection types	cable 2 m connector M12	cable 2 m connector M12	cable 2 m connector M12	connector M8
housing material	brass nickel plated	brass nickel plated	brass nickel plated	brass nickel plated
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 65	IP 65	IP 65	IP 65
specific features	■ potentiometer	■ potentiometer	■ potentiometer ■ flush installation	■ fixed switching distance ■ flush installation

Capacitive sensors



	CFAK 12 with cap	CFAK 12	CFAK 18	CFDK 30	CFDK 25
	cylindrical	cylindrical	cylindrical	rectangular	rectangular flat design
			■	■	
			■	■	■
	■	■	■		
			■	■	
	M12	M12	M18	30 × 65 × 18,5 mm	25 × 52,4 × 6 mm
	39,5 mm	39 mm	63,5 mm		
	0,1 mm	0,5 mm	2 ... 15 mm	4 ... 15 mm	2 ... 15 mm
	15 Hz	15 Hz	50 Hz	50 Hz	35 Hz
	PNP NPN	PNP NPN	PNP NPN	PNP NPN	push-pull
	cable 2 m flylead connector M8	cable 2 m	cable 2 m	cable 2 m connector M12	cable 2 m flylead connector M8
	POM EPDM50	PBT	PBT	PBT	PA 12
	0 ... +50 °C	0 ... +70 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
	IP 67	IP 67	IP 67 / IP 65	IP 65	IP 65
	■ level sensor for contaminated media		■ potentiometer	■ potentiometer	■ switching distance fix by default ■ mounting flexibility thanks to innovative mounting frame

Light barriers and light sensors

Subminiature and miniature sensors

Unique reliable object detection and positioning with optical sensors

- Smart & Small – ultimate performance in smallest designs
- Find the optimum solution quickly through large portfolio
- Easy to set up with clever teach-in function
- Laser sensors for detection tasks in the 0.01 mm range



	FHDK 04	FxDK 07 FxCK 07	FxDM 08	FxAM 08
<i>x</i> = function principle <i>y</i> = light source				
features	<ul style="list-style-type: none"> ■ Mounting in rails ■ Fix sensing distance 	<ul style="list-style-type: none"> ■ World's smallest adjustable sensor family 	<ul style="list-style-type: none"> ■ Fix sensing distance ■ Robust metal housing 	<ul style="list-style-type: none"> ■ Fix sensing distance
dimensions (B × H × T)	4 × 44,8 × 6,2 mm	8 × 16,2 × 10,8 mm	8 × 58 × 12 mm	M8 × 56 mm
function principle (<i>x</i>) / ranges				
diffuse sensors with background suppression	30 mm / 50 mm (FHDK 04)	10 ... 60 mm (FHDK 07 / FHCK 07)		
diffuse sensor with background suppression		20 ... 150 mm (FZDK 07 / FZCK 07)	40 mm / 80 mm (FZDM 08)	40 mm / 80 mm (FZAM 08)
SmartReflect® light barriers without reflector		17 ... 45 mm (FNCK 07)		
SmartReflect® transparent				
retro-reflective sensors		800 mm (FPDK 07 / FPCK 07)		
transparent detection without reflector				
through beam sensors		2,5 m (FSDK 07 / FSCK 07) (FEDK 07 / FECK 07)	1 m / 3 m (FSDM 08 / FEDM 08)	3 m (FSAM 08 / FEAM 08)
light source (<i>y</i>)				
standard LED (R)	■	■		
pinPoint LED (P)				
infrarot (I)			■	■
laser (L)				
response time	< 0,5 ms	< 0,5 ms	< 1 ms	< 2,5 ms
output	push-pull	PNP NPN	PNP	PNP
connection types	cable 2 m flylead connector M8	cable 2 m flylead connector M8	cable 2 m connector M8	cable 2 m connector M8
housing material	plastic	plastic	aluminium	brass nickel plated
operating temperature	-10 ... +50 °C	-20 ... +50 °C	-25 ... +65 °C	-25 ... +65 °C
protection class	IP 65	IP 65	IP 65	IP 65

Light barriers and light sensors



IO-Link

	O200.xy	FxDM 12 OxDM 12 (laser)	FxAM 12
	<ul style="list-style-type: none"> ■ Sensors with single-lens or V-optics ■ Variations with line beam 	<ul style="list-style-type: none"> ■ Sensing distance adjustable ■ Sensors with single lens optics 	<ul style="list-style-type: none"> ■ Sensitivity adjustable with potentiometer
	8 × 21 × 14,1 mm	12,4 × 35 × 35 mm	M12 × 70,5 mm
	10 ... 175 mm (O200.Gy)	15 ... 300 mm (FHDM 12 / OHDM 12)	
	20 ... 200 mm (O200.ZR)		30 ... 200 mm (FZAM 12)
	25 ... 180 mm (O200.Sy)		
	15 ... 180 mm (O200.Sy.T)		
	4 m (O200.Ry)	8 m (FPDM 12 / OPDM 12)	
	1,2 m (O200.Ry.T)		
	6 m (O200.Ty / O200.Ey)	7,5 m (FSDM 12 / FEDM 12)	
	■	■	■
	■		
	■	■	
	< 0,25 ms < 0,05 ms (laser)	< 1 ms < 0,05 ms (laser)	< 1 ms
	push-pull PNP NPN	PNP NPN	PNP
	cable 2 m connector M8	cable 2 m connector M8	cable 2 m connector M12
	plastic	die-cast zinc	brass nickel plated
	-25 ... +50 °C -20 ... +50 °C (laser)	-25 ... +65 °C -20 ... +50 °C (laser)	-25 ... +65 °C
	IP 67	IP 67	IP 65

Light barriers and light sensors

Subminiature and miniature sensors

Unique reliable object detection and positioning with optical sensors

- Smart & Small – ultimate performance in smallest designs
- Find the optimum solution quickly through large portfolio
- Easy to set up with clever teach-in function
- Laser sensors for detection tasks in the 0.01 mm range



IO-Link



IO-Link



	O300.xy	O300.xy Line	OHDM 13 (laser)
<i>x</i> = function principle <i>y</i> = light source			
features	<ul style="list-style-type: none"> ■ Setting via wear-free <i>qTeach</i>® or IO-Link 	<ul style="list-style-type: none"> ■ Up to 100 mm long time 	<ul style="list-style-type: none"> ■ Sensing distance adjustable
dimensions (B × H × T)	12,9 × 32,3 × 23 mm	12,9 × 32,3 × 23 mm	13,4 × 48,2 × 40 mm
function principle (<i>x</i>) / ranges			
diffuse sensors with background suppression	30 ... 300 mm (O300.Gy)	30 ... 180 mm (O300.Gy)	50 ... 550 mm (OHDM 13)
diffuse sensor with background suppression	10 ... 400 mm (O300.Zy)		
<i>SmartReflect</i> ® light barriers without reflector	30 ... 300 mm (O300.Sy)	30 ... 120 mm (O300.Sy)	
<i>SmartReflect</i> ® transparent	30 ... 300 mm (O300.SP.T)		
retro-reflective sensors	6 m (O300.Ry)		
transparent detection without reflector	4 m (O300.RP.T)		
through beam sensors	15 m (O300.Ty / O300.Ey)		
light source (<i>y</i>)			
standard LED (R)	■	■	
pinPoint LED (P)	■	■	
infrarot (I)	■		
laser (L)	■	■	■
response time	< 0,25 ms < 0,1 ms (laser)	< 1,5 ms	< 5 ms
output	push-pull PNP NPN	push-pull	PNP NPN
connection types	cable 2 m connector M8 flylead connector	cable 2 m connector M8	connector M8
housing material	plastic	plastic	aluminum
operating temperature	-25 ... +60 °C -10 ... +60 °C (laser)	-25 ... +60 °C -10 ... +60 °C (laser)	0 ... +50 °C
protection class	IP 67	IP 67	IP 67



Light barriers and light sensors

Standard sensors – rectangular and cylindrical

Unique reliable object detection and positioning with optical sensors

- Find the optimum solution quickly through large portfolio
- Easy to set up with clever teach-in function
- Extremely accurate object positioning with 0.01 mm precision



	OxDK 14 (laser)	FxDM 16 OxDM 16 (laser)	OR18.xy	OR18.GR.F
<i>x</i> = function principle <i>y</i> = light source				
features	■ Sensors for transparent objects	■ Laser sensors for wafer detection	■ Setting via potentiometer, teach-in or <i>qTeach</i>	■ Fixed Focus
dimensions (B × H × T)	14,8 × 43 × 31 mm	15,4 × 50 × 50 mm	M18	M18 × 48,3 mm
function principle (<i>x</i>) / ranges				
diffuse sensors with background suppression	20 ... 350 mm (OHDK 14)	20 ... 600 mm (FHDM 16 / OHDM 16)	40 ... 200 mm (OR18.Gy)	50 mm (OR18.GR.F)
diffuse sensors with intensity difference	20 ... 350 mm (OZDK 14)	0 ... 400 mm (FZDM 16 / OZDM 16)	0 ... 800 mm (OR18.ZI)	
<i>SmartReflect</i> ® light barriers without reflector			55 ... 300 mm (OR18.SP)	
<i>SmartReflect</i> ® transparent				
retro-reflective sensors	5,2 m (OPDK 14)	12 m (FPDM 16 / OPDM 16)	16 m (OR18.RR)	
transparent detection without reflector			800 mm (OR18.RR.T)	
through beam sensors	10 m (OSDK 14 / OEDK 14)		60 m (OR18.TI / OR18.EI)	
light source (<i>y</i>)				
standard LED (R)		■	■	■
pinPoint LED (P)			■	
infrarot (I)			■	
laser (L)	■	■	■	
response time	< 0,25 ms	< 1 ms < 0,05 ms (laser)	< 0,5 ms < 0,1 ms (laser)	< 0,5 ms
output	push-pull PNP NPN	PNP NPN 4 ... 20 mA	PNP NPN	PNP NPN
connection types	cable 2 m connector M8 flylead connector M12	cable 2 m connector M12	cable 2 m connector M12 flylead connector M12	cable 2 m connector M12
housing material	plastic	die-cast zinc	plastic brass nickel plated	plastic
operating temperature	-25 ... +65 °C -10 ... +50 °C (laser)	-25 ... +65 °C -10 ... +50 °C (laser)	-25 ... +55 °C -10 ... +55 °C (laser)	-25 ... +55 °C
protection class	IP 67	IP 67	IP 67	IP 65 / IP 67

Light barriers and light sensors



	FxAM 18	O500.xy	OHDM 20 (Laser)	OxDK 25 (Laser)
	<ul style="list-style-type: none"> Compatible with glass fibre optics 	<ul style="list-style-type: none"> Setting via wear-free <i>qTeach</i>® or IO-Link 	<ul style="list-style-type: none"> Light / dark operate switchable 	<ul style="list-style-type: none"> Sensors with 2 output <i>qTeach</i>®
	M18	18 × 45 × 32 mm	20,6 × 65 × 50 mm	23,4 × 63 × 45 mm
		60 ... 550 mm (O500.Gy)	210 ... 1500 mm (OHDM 20)	100 ... 1750 mm (OHDK 25)
	60 ... 430 mm (FZAM 18)	20 ... 600 mm (O500.Zy)		
		60 ... 600 mm (O500.SP)		1900 mm (ONDK 25)
		60 ... 1000 mm (O500.Sy.T)		
		8 m (O500.Ry)		
		6 m (O500.RP.T)		
		40 m (O500.TR / O500.ER)		
	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">
	< 1 ms	< 0,25 ms	< 6 ms	10 ms
	PNP NPN	push-pull PNP NPN	PNP	push-pull
	cable 2 m connector M12	cable 2 m connector M12	connector M12	cable 2 m connector M12
	brass nickel plated	plastic	die-cast zinc	plastic
	-25 ... +55 °C	-25 ... +60 °C	0 ... +50 °C	0 ... +50 °C
	IP 67	IP 67	IP 67	IP 67

Light barriers and light sensors

Standard with extra power – O300/O500

Unique portfolio with extra performance for your application

- Beam shape as line or point allows for the optimum application-specific solution
- Enhanced processor performance for maximum detection reliability
- Easy implementation and operation, IoT-ready



IO-Link



IO-Link



IO-Link

O300.xy x = function principle y = light source	O300.xy	O300W.xy	O300H.xy
features	<ul style="list-style-type: none"> ■ Setting via wear-free <i>qTeach</i>[®] or IO-Link 	<ul style="list-style-type: none"> ■ Stainless steel housing in washdown design ■ Safe setting via wear-free <i>qTeach</i>[®] or IO-Link 	<ul style="list-style-type: none"> ■ Stainless steel housing in hygienic design ■ Safe setting via wear-free magnetic <i>qTeach</i>[®] or IO-Link
dimensions (B × H × T)	12,9 × 32,3 × 23 mm	16,5 × 34,7 × 28,2 mm	16,5 × 34,6 × 28,7 mm
function principle (x) / ranges			
diffuse sensors	30 ... 300 mm (O300.Gy)	30 ... 250 mm (O300W.Gy)	30 ... 250 mm (O300H.Gy)
background suppression (G)			
diffuse sensors with intensity difference (Z)	10 ... 400 mm (O300.Zy)		
<i>SmartReflect</i> [®] light barriers without a reflector (S)	30 ... 300 mm (O300.Sy)	30 ... 300 mm (O300W.Sy)	30 ... 300 mm (O300H.Sy)
<i>SmartReflect</i> [®] transparent (Sy.T)	30 ... 300 mm (O300.SP.T)	30 ... 300 mm (O300W.SP.T)	30 ... 300 mm (O300H.SP.T)
diffuse sensors (R)	6 m (O300.Ry)	6 m (O300W.Ry)	6 m (O300H.Ry)
retro-reflective sensors (Ry. T)	4 m (O300.RP.T)	4 m (O300W.RP.T)	4 m (O300H.Ry.T)
through beam sensors (T / E)	15 ... 75 m (O300.Ty / O300.Ey)	15 ... 75 m (O300W.Ty / O300W.Ey)	15 ... 75 m (O300H.Ty / O300H.Ey)
light source (y)			
standard LED (R)	■	■	■
pinPoint LED (P)	■	■	■
infrarot (I)	■		
laser (L)	■	■	■
response time	< 0,25 ms < 0,1 ms (laser)	< 0,25 ms < 0,1 ms (laser)	< 0,25 ms < 0,1 ms (laser)
output	push-pull PNP NPN	push-pull	push-pull
connection types	cable 2 m connector M8 flylead connector M8	connector M8	connector 2 m flylead connector M8
housing material	plastic	stainless steel, Ecolab-certified, FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant
operating temperature	-25 ... +60 °C -10 ... +60 °C (laser)	-25 ... +60 °C -10 ... +60 °C (laser)	-25 ... +60 °C -10 ... +60 °C (laser)
protection class	IP 67	IP 68 / IP 69K <i>proTect</i> ⁺	IP 68 / IP 69K <i>proTect</i> ⁺

Light barriers and light sensors



IO-Link



IO-Link



IO-Link

O500.xy x = function principle y = light source	O500.xy	O500W.xy	O500H.xy
features	<ul style="list-style-type: none"> Setting via wear-free <i>qTeach</i>[®] or IO-Link 	<ul style="list-style-type: none"> Stainless steel housing in washdown design Safe setting via wear-free <i>qTeach</i>[®] or IO-Link 	<ul style="list-style-type: none"> Stainless steel housing in hygienic design Safe setting via wear-free magnetic <i>qTeach</i>[®] or IO-Link
dimensions (B × H × T)	18 × 45 × 32 mm	20,2 × 47,2 × 37,2 mm	20,2 × 47,7 × 36,4 mm
function principle (x) / ranges			
diffuse sensors	60 ... 550 mm	60 ... 400 mm	60 ... 400 mm
background suppression (G)	(O500.Gy)	(O500W.Gy)	(O500H.Gy)
diffuse sensors with intensity difference (Z)	20 ... 600 mm		
	(O500.Zy)		
<i>SmartReflect</i> [®] light barriers without a reflector (S)	60 ... 600 mm	60 ... 600 mm	60 ... 600 mm
	(O500.SP)	(O500W.SP)	(O500H.SP)
<i>SmartReflect</i> [®] transparent (Sy.T)	60 ... 1000 mm	60 ... 1000 mm	60 ... 1000 mm
	(O500.SPT)	(O500W.SPT)	(O500H.SPT)
diffuse sensors (R)	8 m	8 m	8 m
	(O500.Ry)	(O500W.Ry)	(O500H.Ry)
retro-reflective sensors (Ry. T)	6 m	6 m	6 m
	(O500.RPT)	(O500W.RPT)	(O500H.RPT)
through beam sensors (T / E)	40 m	40 m	40 m
	(O500.TR / O500.ER)	(O500W.TR / O500W.ER)	(O500H.TR / O500H.ER)
light source (y)			
standard LED (R)	■	■	■
pinPoint LED (P)	■	■	■
infrarot (I)	■		
laser (L)			
response time	< 0,25 ms	< 0,25 ms	< 0,25 ms
output	push-pull PNP NPN	push-pull	push-pull
connection types	cable 2 m connector M12	connector M12	cable 2 m connector M12
housing material	plastic	stainless steel, Ecolab-certified, FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant
operating temperature	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C
protection class	IP 67	IP 68 / IP 69K <i>proTect</i> ⁺	IP 68 / IP 69K <i>proTect</i> ⁺

Light barriers and light sensors

Laser sensors

Precise control of fast processes and detection of very small objects

- Very precise object positioning to within 0.01 mm
- Detection of very small objects thanks to focused 0.1 mm laser spot
- Detection of fast objects thanks to short response times of < 0.1 ms



x = function principle	O200.xy	OxDM 12	OBDM 12 Difference sensors	OHDM 13
features	<ul style="list-style-type: none"> ■ Sensors with single-lens optics ■ Variations with line beam 	<ul style="list-style-type: none"> ■ Adjustable ranges ■ Sensors with single lens optics 	<ul style="list-style-type: none"> ■ 5 functions (e.g. window teach) 	<ul style="list-style-type: none"> ■ Adjustable ranges
dimensions (B × H × T)	8 × 21 × 15,8 mm	12,4 × 35 × 35 mm	12,4 × 37 × 34,5 mm	13,4 × 48,2 × 40 mm
function principle (x) / ranges				
diffuse sensors	20 .. 175 mm	17 ... 120 mm		50 ... 550 mm
background suppression	(O200.GL)	(OHDM 12)		(OHDM 13)
diffuse sensors with intensity difference				
SmartReflect® light barriers without a reflector	25 .. 180 mm			
retro-reflective sensors	1,2 m	8 m		
	(O200.RL.C)	(OPDM 12)		
retro-reflective sensors for transparent detection	1,2 m			
	(O200.RL.T)			
through beam sensors	6 m			
	(O200.TL / O200.EL)			
differential sensors			16 ... 120 mm	
			(OBDM 12)	
laser class	1	2	2	2
response time up	< 0,05 ms	< 0,05 ms	< 1 ms	< 5 ms
output	PNP NPN	PNP NPN	PNP NPN	PNP NPN
housing material	plastic	die-cast zinc	die-cast zinc	aluminum
operating temperature	-20 ... +50 °C	0 ... +50 °C	0 ... +50 °C	0 ... +50 °C
protection class	IP 67	IP 67	IP 67	IP 67

Light barriers and light sensors



IO-Link



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OxDK 14	O300.xL	O300W.xL	O300H.xL
<ul style="list-style-type: none"> Mechanical sensing distance adjustment 	<ul style="list-style-type: none"> Setting via wear-free magnetic <i>qTeach</i>® or IO-Link 	<ul style="list-style-type: none"> Setting via wear-free <i>qTeach</i>® or IO-Link 	<ul style="list-style-type: none"> Setting via wear-free magnetic <i>qTeach</i>® or IO-Link
14,8 × 43 × 31 mm	12,9 × 32,3 × 23 mm	16,5 × 34,7 × 28,2 mm	16,5 × 34,6 × 28,7 mm
20 ... 350 mm (OHDK 14)	30 ... 300 mm (O300.GL) 10 ... 400 mm (O300.ZL)	30 ... 250 mm (O300W.GL)	30 ... 250 mm (O300H.GL)
	30 ... 300 mm (O300.SL)	30 ... 300 mm (O300W.SL)	30 ... 300 mm (O300H.SL)
11 m (OPDK 14) 5,2 m (OPDK 14)	6 m (O300.RL)	6 m (O300W.RL)	6 m (O300H.RL)
	75 m (O300.TL / O300.EL)	75 m (O300W.TL / O300W.EL)	75 m (O300H.TL / O300H.EL)
2	1	1	1
< 0,15 ms	< 0,1 ms	< 0,1 ms	< 0,1 ms
PNP NPN	PNP NPN push-pull	push-pull	push-pull
plastic	plastic	stainless steel	stainless steel
-10 ... +50 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C
IP 67	IP 67 IP 68 / IP 69K <i>proTect+</i>	IP 67 IP 68 / IP 69K <i>proTect+</i>	IP 67 IP 68 / IP 69K <i>proTect+</i>

Light barriers and light sensors

Laser sensors

Precise control of fast processes and detection of very small objects

- Very precise object positioning to within 0.01 mm
- Detection of very small objects thanks to focused 0.1 mm laser spot
- Detection of fast objects thanks to short response times of < 0.1 ms



x = function principle	OxDM 16	OHDM 20	OxDK 25	OR18.EL/TL
features	■ Sensors for wafer detection	■ Large range	■ Sensors with two outputs	■ Short response time ■ Large range
dimensions (B × H × T)	15,4 × 50 × 50 mm	20,6 × 65 × 50 mm	23,4 × 63 × 45 mm	M18
function principle (x) / ranges				
diffuse sensors background suppression	25 ... 300 mm (OHDM 16)	210 ... 1500 mm	100 ... 1750 mm (OHDK 25)	
diffuse sensors with intensity difference	0 ... 250 mm (OZDM 16)			10 ... 300 mm (OR18.ZL)
SmartReflect® light barriers without a reflector			100 ... 1900 mm (ONDK 25)	
retro-reflective sensors	12 m (OPDM 16)			16 m (OR18.RL)
retro-reflective sensors for transparent detection through beam sensors				60 m (OR18.EL/TL)
differential sensors				
laser class	2	2	1	1
response time up	< 0,1 ms	< 6 ms	< 10 ms	< 0,34 ms
output	PNP NPN	PNP	push-pull	PNP NPN
housing material	die-cast zinc	die-cast zinc	plastic	brass nickel plated
operating temperature	-10 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C	-10 ... +55 °C
protection class	IP 67	IP 67	IP 67	IP 67



Light barriers and light sensors

Light barriers without reflector – *SmartReflect*®

Less is more – reduced operating costs with increased functional reliability

- Reliable barrier principle between the sensor and the machine part
- Suitable for objects of different color, surface or transparency
- Robust with dirt deposit in plastic, stainless steel or hygiene design



	FNDK 07 FNCK 07	O200.Sy O200.Sy.T	O300.Sy O300.Sy.T	O500.Sy O500.Sy.T
y = light source				
features	<ul style="list-style-type: none"> ■ Miniature sensor ■ Sensing distance adjustable 	<ul style="list-style-type: none"> ■ Miniature sensor ■ Sensing distance adjustable ■ Transparent detection versions 	<ul style="list-style-type: none"> ■ Miniature sensor ■ Transparent detection versions 	<ul style="list-style-type: none"> ■ Transparent detection versions
dimensions (B × H × T)	8 × 16,2 × 10,8 mm	8 × 21 × 15,8 mm	12,9 × 32,2 × 23 mm	18 × 45 × 32 mm
light source (y)				
standard LED (R)	17 ... 45 mm			
pinPoint LED (P)		25 ... 180 mm (O200.SP / O200.SPT)	30 ... 300 mm (O300.SP / O300.SPT)	60 ... 600 mm (O500.SP) 30 ... 1000 mm (O500.SPT)
infrarot (I)				
laser (L)		25 ... 180 mm (O200.SL / O200.SL.T)	30 ... 250 mm (O300.SL)	
response time	< 0,5 ms	< 0,25 ms	< 0,25 ms	< 0,25 ms
output	PNP NPN	push-pull PNP NPN	push-pull PNP NPN	push-pull PNP NPN
connection types	cable 2 m flylead connector M8	cable 2 m flylead connector M8	cable 2 m connector M8 flylead connector M8	cable 2 m connector M12
housing material	plastic	plastic	plastic	plastic
operating temperature	-20 ... +50 °C	-25 ... +50 °C -25 ... +50 °C (Laser)	-25 ... +60 °C	-25 ... +60 °C
protection class	IP 65	IP 67	IP 67	IP 67

Light barriers and light sensors



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	ONDK 25	OR18.SP	O300W.Sy O300W.Sy.T	O500W.Sy O500W.Sy.T
	<ul style="list-style-type: none"> Standard 	<ul style="list-style-type: none"> Standard sensor M18 	<ul style="list-style-type: none"> Washdown design Transparent detection versions 	<ul style="list-style-type: none"> Washdown design Transparent detection versions
	23,4 × 63 × 45 mm	M18 × 65 mm	16,5 × 34,7 × 28,2 mm	20,2 × 47,2 × 37,7 mm
		55 ... 300 mm	30 ... 300 mm (O300W.SP / O300W.SPT)	60 ... 600 mm (O500W.SP) 30 ... 1000 mm (O500W.SPT)
	1900 mm		30 ... 250 mm (O300W.SL)	
	< 10 ms	< 0,49 ms	< 0,25 ms	< 0,25 ms
	push-pull	push-pull PNP NPN	push-pull	push-pull
	cable 2 m connector M12	connector M12	connector M8	connector M12
	plastic	brass nickel plated	stainless steel, Ecolab- certified, FDA-compliant	stainless steel, Ecolab- certified, FDA-compliant
	0 ... +50 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C
	IP 67	IP 67	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>

Light barriers and light sensors

Light barriers without reflector – *SmartReflect*®

Less is more – reduced operating costs with increased functional reliability

- Reliable barrier principle between the sensor and the machine part
- Suitable for objects of different color, surface or transparency
- Robust with dirt deposit in plastic, stainless steel or hygiene design



	IO-Link O300H.Sy O300H.Sy.T	IO-Link O500H.Sy O500H.Sy.T
y = light source		
features	<ul style="list-style-type: none"> ■ Hygienic design ■ Version for transparency object detection 	<ul style="list-style-type: none"> ■ Hygienic design ■ Version for transparency object detection
dimensions (B × H × T)	16,5 × 34,6 × 28,7 mm	20,2 × 47,7 × 36,4 mm
light source (y)		
standard LED (R)		
pinPoint LED (P)	30 ... 300 mm (O300H.SP / O300H.SPT)	60 ... 600 mm (O500H.SP) 60 ... 1000 mm (O500H.SPT)
laser (L)	30 ... 250 mm (O300H.SL)	
response time	< 0,25 ms	< 0,25 ms
output	push-pull	push-pull
connection types	cable 2 m flylead connector M8	cable 2 m flylead connector M12
housing material	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant
operating temperature	–25 ... +60 °C	–25 ... +60 °C
protection class	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>



SmartReflect[®] – the light barrier without reflector

With *SmartReflect*[®] Baumer has reinvented the optical light barrier: The reflector as the weak point is eliminated and highly reliable object detection is still guaranteed even for transparent objects. That reduces your costs tremendously.

Your benefits

- Maximum system uptime and process safety
 - Very reliable object detection thanks to barrier principle
 - Elimination of the reflector as a potential source of error
 - No function impairment through dirt accumulation
 - Available in robust washdown or hygiene design
- Reduction of operating costs
 - No reflector means time saving installation
 - No need for a reflector eliminates exchange and wear
 - No need for a reflector eliminates cleaning effort
- Raising productivity
 - Sensing range up to 1.9 m or 1 m for transparent objects
 - High machine performance thanks to short response times of < 0.25 ms
 - Fast format changes, easy sensor exchange and additional usage data via IO-Link



Light barriers and light sensors

Transparent detection

The sensor solutions for the detection of bowls, bottles and foils

- Extremely safe and fast with a response time < 0.25 ms
- Unique range without reflector up to 1 m
- Up to 7 m range with retro-reflective light barriers



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	O200.Sy.T	O200.Ry.T	O300.SP.T	O300.RP.T
y = light source				
features	■ SmartReflect®	■ Retro-reflective sensors with single-lens optics	■ SmartReflect®	■ Retro-reflective sensors
dimensions (B × H × T)	8 × 21 × 15,8 mm	8 × 21 × 15,8 mm	12,9 × 32,3 × 23 mm	12,9 × 32,3 × 23 mm
light source (y)				
standard LED (R)				
pinPoint LED (P)			30 ... 300 mm	4 m
infrarot (I)	15 ... 180 mm	1,2 m		
laser (L)	25 ... 180 mm	1,2 m		
response time	< 0,25 ms	< 0,25 ms	< 0,25 ms	< 0,25 ms
output	push-pull	push-pull	push-pull	push-pull
connection types	cable 2 m flylead connector M8	cable 2 m flylead connector M8	cable 2 m connector M8	cable 2 m connector M8
housing material	plastic	plastic	plastic	plastic
operating temperature	-25 ... +50 °C -20 ... +50 °C (Laser)	-25 ... +50 °C -20 ... +50 °C (Laser)	-25 ... +60 °C	-25 ... +60 °C
protection class	IP 67	IP 67	IP 67	IP 67

Light barriers and light sensors



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	OPDK 14	FPDM 16	O500.SPT	O500.RPT
	■ Retro-reflective laser sensor	■ Retro-reflective sensors	■ <i>SmartReflect</i> ®	■ Retro-reflective sensors
	14,8 × 43 × 31 mm	15,4 × 50 × 50 mm	18 × 45 × 32 mm	18 × 45 × 32 mm
		7,2 m	60 ... 1000 mm	6 m
	5,2 m			
	< 0,25 ms	< 2,5 ms	< 0,25 ms	< 0,25 ms
	PNP NPN	PNP	push-pull	push-pull
	cable 2 m connector M8 connector M12	connector M12	cable 2 m connector M12	cable 2 m connector M12
	plastic	die-cast zinc	plastic	plastic
	-10 ... +50 °C	-25 ... +65 °C	-25 ... +60 °C	-25 ... +60 °C
	IP 67	IP 67	IP 67	IP 67

Light barriers and light sensors

Transparent detection in demanding environments

Robust stainless steel sensors for the detection of bowls, bottles and foils

- Extremely safe and fast with a response time < 0.25 ms
- Unique range without reflector up to 1 m
- Up to 7 m range with retro-reflective light barriers



IO-Link



IO-Link



IO-Link



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	O300W.SPT O300H.SPT	O300W.R.P.T O300H.R.P.T	O500W.S.P.T O500H.S.P.T	O500W.R.P.T O500H.R.P.T
y = light source				
features	<ul style="list-style-type: none"> ■ SmartReflect® ■ Stainless steel housing in washdown- (W) or hygienic design (H) 	<ul style="list-style-type: none"> ■ Retro-reflective sensors ■ Stainless steel housing in washdown- (W) or hygienic design (H) 	<ul style="list-style-type: none"> ■ SmartReflect® ■ Stainless steel housing in washdown- (W) or hygienic design (H) 	<ul style="list-style-type: none"> ■ Retro-reflective sensors ■ Stainless steel housing in washdown- (W) or hygienic design (H)
dimensions (B × H × T)	16,5 × 34,7 × 28,2 mm	16,5 × 34,7 × 28,2 mm	20,2 × 124 × 36,4 mm	20,2 × 124 × 36,4 mm
light source (y)				
standard LED (R)				
pinPoint LED (P)	30 ... 300 mm	4 m	60 ... 1000 mm	6 m
infrarot (I)				
laser (L)				
response time	< 0,25 ms	< 0,25 ms	< 0,25 ms	< 0,25 ms
output	push-pull	push-pull	push-pull	push-pull
connection types	cable 2 m connector M8	cable 2 m connector M8	cable 2 m connector M12	cable 2 m connector M12
housing material	stainless steel, Ecolab-certified, EHEDG-compliant (hygienic), FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant (hygienic), FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant (hygienic), FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant (hygienic), FDA-compliant
operating temperature	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C
protection class	IP 68 / IP 69K proTect+	IP 68 / IP 69K proTect+	IP 68 / IP 69K proTect+	IP 68 / IP 69K proTect+

Light barriers and light sensors



	OR18.W.RR.T
	<ul style="list-style-type: none"> ■ Retro-reflective sensors ■ Stainless steel housing in washdown- (W)
	M18 × 67,2 mm
	800 mm
	< 1 ms
	PNP NPN
	connector M12
	stainless steel
	-25 ... +55 °C
	IP 67/69K



The *proTect+* impermeability concept by Baumer ensures absolute dependability even under most adverse conditions. Thanks to the specifically conceived construction and the use of high-quality materials, sensors with *proTect+* provide IP 69K protection and ensure absolute stability even after countless temperature cycles. In order to achieve this, the sensors have been shock-tested over the entire temperature range. The *proTect+* concept ensures enhanced reliability and extended sensor service life.

More information at www.baumer.com/protect+

Light barriers and light sensors

Washdown design

- Robust stainless steel housing
- Long-term sealing thanks to *proTect+*
- IP 69K and Ecolab tested
- Different sizes and sensor principles



x = function principle y = light source	FKDR 14	O300W.xy IO-Link	O500W.xy IO-Link	OR18W.xy IO-Link
dimensions (B × H × T)	19,6 × 62,4 × 34,3 mm	16,5 × 34,7 × 28,2 mm	20,2 × 47,2 × 37,7 mm	M18
function principle (x) / ranges				
diffuse sensors with background suppression		30 ... 250 mm (O300W.GP / O300W.GL)	60 ... 400 mm (O500W.GP)	40 ... 120 mm (OR18W.GR)
diffuse sensors with intensity difference				0 ... 800 mm (OR18W.ZI)
<i>SmartReflect</i> ® light barriers without reflector		30 ... 300 mm (O300W.SP / O300W.SL)	60 ... 600 mm (O500W.SP)	
<i>SmartReflect</i> ® transparent		30 ... 300 mm (O300W.SPT)	60 ... 1000 mm (O500W.SPT)	
retro-reflective sensors		6 m (O300W.RP / O300W.RL)	8 m (O500W.RP)	4,5 m (OR18W.RR)
transparent detection without reflector		4 m (O300W.RPT)	6 m (O500W.RPT)	800 mm (OR18W.RR.T)
through beam sensors		15 m (O300W.TR / .TL) (O300W.ER / .EL)	40 m (O500W.TR / .TL) (O500W.ER / .EL)	20 m (OR18W.TI) (OR18W.EI)
contrast sensor	12,5 mm ±2 mm (FKDR 14)			
light source (y)				
standard LED (R)	■	■	■	■
pinPoint LED (P)		■	■	
infrarot (I)				■
laser (L)		■		
response time	<0,05 ms	< 0,25 ms < 0,1 ms (laser)	< 0,25 ms	< 1 ms
output	push-pull	push-pull	push-pull	PNP NPN
connection types	connector M12	connector M8	connector M12	connector M12
housing material	stainless steel, Ecolab-certified, FDA-compliant	stainless steel, Ecolab-certified, FDA-compliant	stainless steel, Ecolab-certified, FDA-compliant	stainless steel, Ecolab-certified, FDA-compliant
operating temperature	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +55 °C
protection class	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>	IP 67 / IP 69K

Hygienic design

- EHEDG certified, FDA-compliant, Ecolab tested
- Long-term sealing thanks to *proTect+*
- Different sizes and sensor principles
- Benefits through *SmartReflect®* light barrier without reflector



IO-Link



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x = function principle y = light source	FKDH 14	O300H.xy	O500H.xy
dimensions (B × H × T)	19,6 × 52,2 × 34,3 mm	16,5 × 34,6 × 28,7 mm	20,2 × 47,7 × 36,4 mm
function principle (x) / ranges			
diffuse sensors with background suppression		30 ... 250 mm (O300H.Gy)	60 ... 400 mm (O500H.Gy)
diffuse sensors with intensity difference			
<i>SmartReflect®</i> light barriers without reflector		30 ... 300 mm (O300H.Sy)	60 ... 600 mm (O500H.Sy)
<i>SmartReflect®</i> transparent		30 ... 300 mm (O300H.SPT)	60 ... 1000 mm (O500H.SPT)
retro-reflective sensors		6 m (O300H.Ry)	8 m (O500H.Ry)
transparent detection without reflector		4 m (O300H.RPT)	6 m (O500H.RPT)
through beam sensors		15 m (O300H.Ty) (O300H.Ey)	40 m (O500H.Ty) (O500H.Ey)
contrast sensor	12,5 m ±2 mm (FKDH 14)		
light source (y)			
standard LED (R)	■	■	■
pinPoint LED (P)		■	■
infrarot (I)			
laser (L)		■	
response time	<0,05 ms	< 0,25 ms <0,1 ms (laser)	< 0,25 ms
output	push-pull	push-pull	push-pull
connection types	connector 2 m flylead connector M12	connector 2 m flylead connector M8	connector 2 m flylead connector M12
housing material	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant	stainless steel, Ecolab-certified, EHEDG-compliant, FDA-compliant
operating temperature	-30 ... +60 °C	-25 ... +60 °C -10 ... +60 °C (Laser)	-25 ... +60 °C
protection class	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>

Light barriers and light sensors

Fork and angle sensors

- Through-beam photoelectric sensor integrated in a single device
- No alignment of transmitter and receiver
- No misalignment caused by vibration
- Laser variants for miniature parts and positioning within 1/100 mm range



IO-Link



IO-Link



IO-Link



IO-Link

	OGxxxU.R	OGxxxL.R	OGxxxU.R...VL	OGxxxU.L
category	Pulsed red LED Fork sensors	Pulsed red LED Fork sensors	Pulsed red LED Fork sensors Stainless steel	Pulsed red LED Fork sensors
features	<ul style="list-style-type: none"> ■ Potentiometer / IO-Link ■ Narrow, almost parallel light beam ■ Sensors are stackable 	<ul style="list-style-type: none"> ■ Special L design ■ Potentiometer / IO-Link ■ Narrow, almost parallel light beam ■ Sensors are stackable 	<ul style="list-style-type: none"> ■ Potentiometer / IO-Link ■ Narrow, almost parallel light beam ■ Sensors are stackable ■ Extra robust 	<ul style="list-style-type: none"> ■ Very high resolution ■ Extremely narrow laser light beam ■ High repeat accuracy ■ Potentiometer / IO-Link ■ Sensors are stackable
type	U profile	L profile	U profile	U profile
fork widths	10 mm 20 mm 30 mm 50 mm 80 mm 120 mm 170 mm	60 mm 100 mm 158 mm	30 mm 50 mm 80 mm 120 mm	30 mm 50 mm 80 mm 120 mm
object size	0,2 mm	0,2 mm	0,2 mm	0,03 mm
repeat accuracy	0,02 mm	0,02 mm	0,02 mm	0,01 mm
response / release time	0,06 ms	0,06 ms	0,06 ms	0,05 ms
connection types	connector M8	connector M8	connector M8	connector M8
housing material	die-cast zinc	die-cast zinc	stainless steel	die-cast zinc
operating temperature	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C
protection class	IP 67	IP 67	IP 67	IP 67
specific features				<ul style="list-style-type: none"> ■ Laser class 1

Light barriers and light sensors



Light barriers and light sensors

Differential, contrast and color sensors

- Differential sensors to monitor position tolerances
- Rapid print mark recognition
- Capturing even slightest contrast or shades of color
- Small dimensions, starting at 12 mm



	OBDM 12	OZDM 16	FKDK 14
features	<ul style="list-style-type: none"> ■ Difference sensors 	<ul style="list-style-type: none"> ■ Diffuse sensors with intensity difference with analog output - standard 	<ul style="list-style-type: none"> ■ White LED diffuse contrast sensors
dimensions (B × H × T)	12,4 × 37 × 34,5 mm	15,4 × 50 × 50 mm	14,8 × 43 × 31 mm
light source	laser	laser	white LED
sensing distance Tw	16 ... 120 mm	0 ... 250 mm	12,5 mm ±2 mm
response time	< 1 ms	< 0,1 ms	< 0,05 ms
output	PNP NPN	PNP 4 ... 20 mA	push-pull
connection types	connector M8	cable 2 m connector M8	cable 2 m connector M8 connector M12
housing material	die-cast zinc	die-cast zinc	plastic
operating temperature	0 ... +50 °C	-10 ... +50 °C	-25 ... +65 °C
protection class	IP 67	IP 67	IP 67
function	<ul style="list-style-type: none"> ■ monitoring of position tolerances ■ object detection on fluctuating conveyor belts ■ detection of minimum and maximum deviations in the process ■ variant for step / edge detection 	<ul style="list-style-type: none"> ■ detection of gradual changes, e. g. when polishing surfaces ■ fast and economical print mark recognition 	<ul style="list-style-type: none"> ■ detection of gradual changes, e. g. when polishing surfaces ■ fast and economical print mark recognition

Light barriers and light sensors



	FKDR 14	FKDH 14	OC50	OC60
	<ul style="list-style-type: none"> White LED diffuse contrast sensors Washdown design 	<ul style="list-style-type: none"> White LED diffuse contrast sensors Hygienic design 	<ul style="list-style-type: none"> RGB contrast sensor Intuitive adjustment Optional lenses for distances up to 18 mm 	<ul style="list-style-type: none"> RGB and UV contrast sensors Variation with color mode Intuitive adjustment Optional lenses for distances up to 40 mm
	19,6 × 51 × 34,3 mm	19,6 × 52,2 × 34,3 mm	31 × 53 × 80,1 mm	31,9 × 60,2 × 79mm
	white LED	white LED	RGB	RGB UV
	12,5 mm ±2 mm	12,5 mm ±2 mm	9 mm ±3 mm	9 mm ±3 mm 10 ... 50 mm (UV)
	< 0,05 ms	< 0,05 ms	< 0,033 ms	< 0,01 ms
	push-pull	push-pull	PNP NPN	PNP NPN 0 ... 5 VDC
	connector M12	cable 2 m flylead connector M12	connector M12	connector M12
	stainless steel	stainless steel	plastic	aluminum
	-25 ... +65 °C	-25 ... +60 °C	-10 ... +55 °C	-10 ... +55 °C
	IP 68 / IP 69K <i>proTect+</i>	IP 68 / IP 69K <i>proTect+</i>	IP 67	IP 67
	<ul style="list-style-type: none"> detection of gradual changes, e. g. when polishing surfaces fast and economical print mark recognition 	<ul style="list-style-type: none"> detection of gradual changes, e. g. when polishing surfaces fast and economical print mark recognition 	<ul style="list-style-type: none"> detection of gradual changes, e. g. when polishing surfaces fast and economical print mark recognition 	<ul style="list-style-type: none"> detection of gradual changes, e. g. when polishing surfaces fast and economical print mark recognition

Fiber optic sensors

Plastic fiber optic sensors and fiber optic cables

Always close to the action – detecting tiny objects in cramped or inaccessible places

- Detection reliability in high-dynamic processes
- Quick and easy configuration by teach-in feature or potentiometer



	Plastic fiber optic	FVDK 10 (FVDK 10N51/ FVDK 10P51)	FVDK 66 Standard (FVDK 10N66/ FVDK 10P66)	FVDK 66 High Sensitivity (FVDK 10N66Z/ FVDK 10P66Z)
features	<ul style="list-style-type: none"> ■ Extremely varied beam geometries: spot, coaxial, focused, line ■ Fiber optics resistant to chemicals ■ High temperature fiber ■ Lateral beam emission 	<ul style="list-style-type: none"> ■ Smallest fiber optic sensor ■ Sensitivity adjustable with potentiometer 	<ul style="list-style-type: none"> ■ Sensitivity adjustable with Teach-in ■ Minimized installation effort (master slave) ■ Logical output linking available (Duplex version) ■ Timer functions 	<ul style="list-style-type: none"> ■ Sensitivity adjustable with Teach-in ■ Increased sensitivity ■ High power mode ■ Timer functions
dimensions		10,4 × 27 × 19,5 mm	10 × 33,8 × 70,2 mm	10 × 33,8 × 70,2 mm
ranges (optical fiber dependent)				
with through beam (max.)		600 mm	1500 mm	3500 mm
with reflective (max.)		70 mm	130 mm	470 mm
response time		< 1 ms	0,25 ... 1 ms	0,25 ... 5 ms
output		NPN PNP	NPN PNP	NPN PNP
connection types		cable 2 m flylead connector M8	cable 2 m connector M8	cable 2 m connector M8
housing material		plastic (ASA)	polycarbonate / ABS	polycarbonate / ABS
operating temperature		-25 ... +55 °C	-20 ... +55 °C	20 ... +55 °C
protection class		IP 40	IP 40	IP 40
additional functions			■ external Teach-in	■ external Teach-in
specific features			■ master slave	



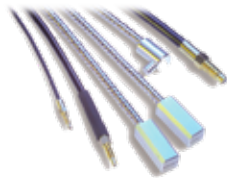
	OF10
	<ul style="list-style-type: none"> ■ Intuitive OLED display ■ Programmable input configuration ■ Timer functions ■ Enhanced remote programming
	10 x 27,8 x 93,1 mm
	840 mm
	210 mm
	0,05 ... 16 ms
	NPN PNP
	cable 2 m connector M8
	polycarbonate
	+5 ... +55 °C
	IP 50

Fiber optic sensors

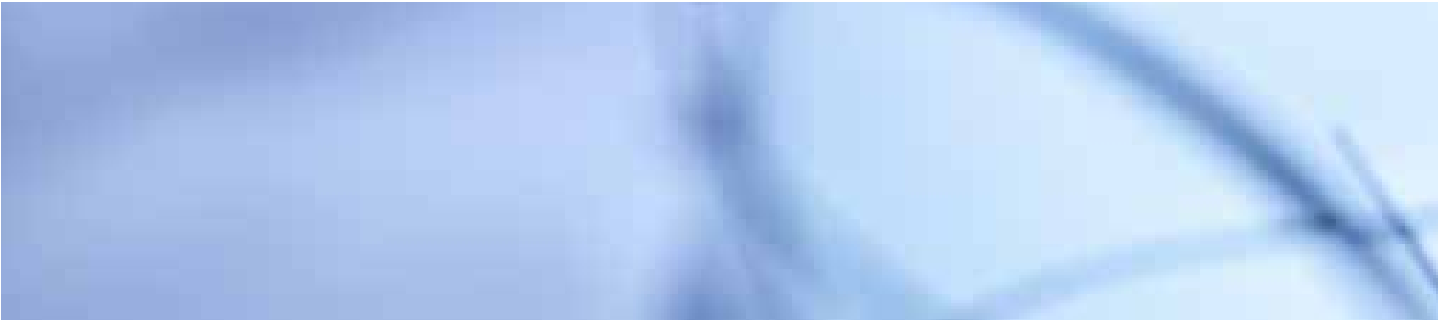
Glass fiber optic sensors and fiber optic cables

Always close to the action – detecting tiny objects in cramped or inaccessible places

- Robust metal housing
- Sensitivity configurable using potentiometer and Teach-in feature
- Specialized variants for long-range detection, high sensitivity and fast moving objects



	Glass fiber optic	FZAM 18	FZAM 30	FVDM 15
features	<ul style="list-style-type: none"> ■ Different beam geometries: spot, line ■ Fiber optics with robust metal sheath ■ High temperature fiber ■ Lateral beam emission 	<ul style="list-style-type: none"> ■ Sensitivity adjustable with Teach-in or potentiometer ■ Robust metal housing 	<ul style="list-style-type: none"> ■ Sensitivity adjustable with Teach-in or potentiometer ■ Robust metal housing ■ For large ranges 	<ul style="list-style-type: none"> ■ Sensitivity adjustable with potentiometer ■ Robust metal housing ■ Quick response and release times
dimensions		M18 × 50 mm	M30 × 50 mm	15 × 60 × 45 mm
ranges (optical fiber dependent)				
with through beam (max.)		800 mm	1400 mm	500 mm
with reflective (max.)		150 mm	230 mm	240 mm
response time		< 0,5 ms / < 1 ms	< 0,25 ms / < 2,5 ms	< 0,1 ms / < 1 ms
output		NPN PNP	NPN PNP	NPN PNP
connection types		cable 2 m connector M12	cable 2 m	cable 2 m connector M12
housing material		brass nickel plated / PC	brass nickel plated	die-cast aluminum
operating temperature		-25 ... +55 °C	0 ... +65 °C	-25 ... +55 °C
protection class		IP 67	IP 65	IP 65
specific features		■ infrared	■ fast version ■ infrared	■ fast version ■ infrared



Ultrasonic sensors

Miniaturized ultrasonic sensors

Small and light sensors for very cramped spaces

- Highest performance in the smallest design with best-in-class blind zone at a sensing distance up to 500 mm
- Narrow sonic cone for object detection even in the smallest openings
- Optimum sensor setting to the individual application with enhanced functions and filters



	UNAM 12 URAM 12	UNCK / UNDK 09 URCK / URDK 09	UNDK 10 / URDK 10
category	miniature		
features	<ul style="list-style-type: none"> ■ Narrow and wide sonic beam angles ■ Highspeed versions ■ Versions with beam columnator 	<ul style="list-style-type: none"> ■ Versions with beam columnator ■ Very flat housing ■ Lateral approach accuracy <1,5 mm 	<ul style="list-style-type: none"> ■ The world's smallest sensor ■ Weights only 4 grams ■ Narrow sonic beam angles
dimensions	M12	8,6 × 82 × 24,5 mm	10,4 × 27 × 14 mm
sensing range Sd / sensor principle			
proximity switch (UNxx / xx.PAO)	5 ... 400 mm	3 ... 200 mm	10 ... 200 mm
2 point proximity switch (UZxx)			
retro-reflective sensors (URxx / xx.RAO)	0 ... 70 mm	0 ... 200 mm	0 ... 200 mm
through beam sensors (UExx)			
response time	< 1,5 mm	< 0,5 mm < 1,5 mm	< 0,5 mm < 1,5 mm
output	NPN PNP	push-pull NPN PNP	NPN PNP
connection types	connector M12	cable 2 m connector M8	cable 2 m connector M8
housing material	brass nickel plated	plastic	plastic
operating temperature	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C
protection class	IP 67	IP 67	IP 67

UNxx / xx.PAO = proximity switch
 URxx / xx.RAO = retro-reflective sensors
 UZxx = 2 point proximity switch
 UExx = through beam sensors

Robust ultrasonic sensors with flexible parameterization

Extremely robust – U500 and UR18

- Highest process reliability due to hermetically sealed sensor element
- IO-Link functionality for flexible parameterization
- Short blind range of 20 mm with a sensing distance up to 1000 mm
- Superb quality with an affordable price tag



IO-Link



IO-Link



IO-Link

	U300	UR18	U500
category	miniature	robuste	
features	<ul style="list-style-type: none"> ■ Fastest threshold value detection based on extremely short response times ■ Flexible parameterization and additional diagnostic data thanks to IO-Link ■ Shortest blind zone of its class 	<ul style="list-style-type: none"> ■ Sensor element hermetical sealed ■ Ideal for level application ■ Very small blind zone ■ Ecolab certification 	<ul style="list-style-type: none"> ■ Proven slim design ■ Sensor element hermetical sealed ■ Very small blind zone
dimensions	12,9 x 32,2 x 23 mm	M18	15 x 45,1 x 32,2 mm
sensing range Sd / sensor principle			
proximity switch (Uxxx / xx.PAO)	15 ... 500 mm	20 ... 1000 mm	20 ... 1000 mm
2 point proximity switch (Uxxx)	15 ... 500 mm	20 ... 1000 mm	20 ... 1000 mm
retro-reflective sensors (Uxxx / xx.RAO)	0 ... 500 mm	0 ... 1000 mm	0 ... 1000 mm
through beam sensors (Uxxx)	0 ... 1000 mm	0 ... 2000 mm	0 ... 2000 mm
response time	< 0,5 mm	< 0,5 mm	< 0,5 mm
output	1 x push-pull 2 x push-pull	1 x push-pull 2 x push-pull	1 x push-pull 2 x push-pull
adjustable parameters	Switching points or switching windows for distance or counter, measuring range, sound beam, averaging, temperature compensation, output logic, switching hysteresis, input/ output logic, switch-off delay, output circuit, SSC / output assignment, LED behavior, teaching facilities		
process data	MDC: Distance, counter SSC: Distance, counter		
diagnostic data	Switching cycles, operating time, boot cycles, histograms of process data values and the operating voltage and device temperature		
connection types	connector M8, 4-Pol	connector M12, 5 pin	connector M12, 5 pin
housing material	plastic ASA	stainless steel V2A	plastic ASA
operating temperature	-25 ... +65 °C	-25 ... +65 °C	-25 ... +65 °C
protection class	IP 67	IP 69 (from front) IP 67 (from rear)	IP 67

Ultrasonic sensors

Ultrasonic sensors with Teach button

Undisturbed by difficult environmental conditions and varying object properties

- Cylindrical versions in M18 or M30 housings with connector or cable output
- Extremely compact, flat housing designs
- With teach-in or potentiometer
- Sensing distances up to 2000 mm



	UNAM 18	UNAM 30 UZAM 30	UNDK 20 URDK 20 UEDK 20
features	<ul style="list-style-type: none"> ■ Standardised installation due to M18 housing ■ Internal and external Teach-in ■ Cable and connector versions 	<ul style="list-style-type: none"> ■ Internal and external Teach-in ■ Cable and connector versions ■ Potentiometer versions 	<ul style="list-style-type: none"> ■ Flat type ■ Internal and external Teach-in ■ Narrow and wide sonic beam angles ■ M8 connector
dimensions	M18	M30	20 × 42 × 15 mm
sensing range Sd / sensor principle			
proximity switch (UNxx / xx.PAO)	100 ... 1000 mm	200 ... 1500 mm	10 ... 1000 mm
2 point proximity switch (UZxx)		100 ... 1000 mm	
retro-reflective sensors (URxx / xx.RAO)			0 ... 1000 mm
through beam sensors (UExx)			0 ... 1000 mm
response time	< 0,5 mm	< 0,5 mm	< 0,5 mm
output	NPN PNP	NPN PNP	NPN PNP
connection types	cable 2 m connector M12	cable 2 m connector M12	connector M8
housing material	brass nickel plated stainless steel	brass nickel plated	plastic
operating temperature	-10 ... +60 °C	-25 ... +60 °C -10 ... +60 °C	-10 ... +60 °C
protection class	IP 67	IP 67	IP 67

UNxx / xx.PAO = proximity switch
 URxx / xx.RAO = retro-reflective sensors
 UZxx = 2 point proximity switch
 UExx = through beam sensors



UNDK 30 / URDK 30
UZDK 30 / UEDK 30

- Compact type
- Large sensing range
- Teach-in on the sensor
- Potentiometer version
- Narrow and wide sonic beam angles

30 × 65 × 31 mm

30 ... 1000 mm

30 ... 2000 mm

0 ... 2000 mm

0 ... 700 mm

< 0,5 mm

NPN
PNP

cable 2 m
connector M12

plastic / die-cast zinc

-10 ... +60 °C

IP 67

Ultrasonic sensors

Application-specific ultrasonic sensors – High-speed / Chemically robust

- Highspeed sensors with only 1.3 ms response time
- Chemical robust stainless steel sensors with patented parylene coating



	UNAM 12 High-speed	URAM 12 High-speed	UNAR 12 URAR 12	UNAR 18 URAR 18
category	High-speed sensors		Chemically robust stainless steel sensors with parylene coating	
features	<ul style="list-style-type: none"> ■ Fastest ultrasonic sensor ■ External Teach-in 	<ul style="list-style-type: none"> ■ Fastest ultrasonic sensor ■ External Teach-in ■ Sensors with sonic nozzle for small openings 	<ul style="list-style-type: none"> ■ Miniature sensor for narrow designs ■ Patented all-round protection ■ FDA-compliant materials ■ Very short response time ■ Ecolab certification 	<ul style="list-style-type: none"> ■ M18 standard housing ■ FDA-compliant materials ■ Internal and external Teach-in ■ Ecolab certification
dimensions	M12	M12	M12	M18
sensing range Sd / sensor principle				
proximity switch (UNxx / xx.PAO)	0 ... 40 mm 10 ... 70 mm		30 ... 200 mm	60 ... 1000 mm
2 point proximity switch (UZxx)				
retro-reflective sensors (URxx / xx.RAO)		0 ... 40 mm 0 ... 70 mm	0 ... 200 mm	0 ... 400 mm
repeat accuracy	< 0,5 mm	< 1,5 mm	< 0,5 mm	< 0,5 mm
output	NPN PNP	NPN PNP	NPN PNP	NPN PNP
connection types	connector M12	connector M12	connector M12	connector M12
housing material	brass nickel plated	brass nickel plated	stainless steel	brass nickel plated stainless steel
operating temperature	-10 ... +60 °C	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C
protection class	IP 67	IP 67	IP 67	IP 67

UNxx / xx.PAO = proximity switch
 URxx / xx.RAO = retro-reflective sensors
 UZxx = 2 point proximity switch
 UExx = through beam sensors

Application-specific ultrasonic sensors – Sonic nozzles / Sensing distances

- Sensors with sonic nozzle for passages up to \varnothing 3 mm
- Sensors with long-range detection up to 6000 mm



	UNDK 09	UNAM / URAM 12	UNAM 50 URAM 50 UZAM 50	UNAM 70
category	with sonic nozzles		with large sensing distances	
features	<ul style="list-style-type: none"> ■ High resolution ■ Minimal blind zone ■ RS 232 ■ Various mounting options ■ Flat housing ■ Narrow sonic beam angle for detection in openings of up to 3 mm 	<ul style="list-style-type: none"> ■ Sonic nozzle for very narrow sonic beams ■ External Teach-in ■ Connector M12 	<ul style="list-style-type: none"> ■ Internal and external Teach-in ■ Cable and connector versions ■ Potentiometer versions 	<ul style="list-style-type: none"> ■ Internal and external Teach-in ■ Connector M12
dimensions	8,6 × 82 × 24,5 mm	M12	M30	M30
sensing range Sd / sensor principle				
proximity switch (UNxx / xx.PAO)	3 ... 200 mm	5 ... 400 mm	350 ... 2500 mm	
2 point proximity switch (UZxx)			350 ... 2500 mm	60 ... 6000 mm
retro-reflective sensors (URxx / xx.RAO)	0 ... 200 mm	0 ... 70 mm	0 ... 3000 mm	
response time	< 0,5 mm	< 0,5 mm	< 1 mm < 3 mm	< 3 mm
output	push-pull RS 232	NPN PNP	NPN PNP	NPN PNP
connection types	cable 2 m flylead connector M8	connector M12	cable 2 m connector M12	connector M12
housing material	plastic	brass nickel plated	brass nickel plated	brass nickel plated
operating temperature	0 ... +60 °C	-10 ... +60 °C	-25 ... +60 °C	-25 ... +60 °C
protection class	IP 67	IP 67	IP 67	IP 67

Magnetic and cylinder sensors

Magnetic proximity sensors

- Reliable and wear-free object detection
- Large sensing distances up to 60 mm
- Cylindrical and rectangular versions



	MFFM 08	MFRM 08	MFVM 08
features	<ul style="list-style-type: none"> ■ Acquisition of magnet location ■ Large sensing range ■ Object detection through container walls possible 	<ul style="list-style-type: none"> ■ Acquisition of magnet location ■ Large sensing range ■ Object detection through container walls possible 	<ul style="list-style-type: none"> ■ Full metall sensor ■ Sensing distance to 60 mm
dimensions	8 × 30 × 8 mm	M8	8 × 12 × 30 mm
nominal switching distance Sn typ.	to 60 mm	60 mm	60 mm
switching frequency	5 kHz	5 kHz	5 kHz
voltage supply range +Vs	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
output circuit	PNP NPN	PNP NPN	PNP NPN
connection types	cable 2 m	cable 2 m	cable 2 m
housing material	brass nickel plated	stainless steel	aluminum
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67

Cylinder sensors

- Detecting stop positions of pistons in every standard cylinder with C- or T-slots
- Different versions and versatile installation accessories for maximum flexibility
- Non-contact sensing and absolutely wear-free



	MZCK 03x1011 MZCK 03x1012	MZTK 06x1011 MZTK 06x1012 MZTK 06x1013
features	<ul style="list-style-type: none"> ■ For C slot cylinders ■ Oil- and salt water climate resistant 	<ul style="list-style-type: none"> ■ For T slot cylinders ■ Oil- and salt water climate resistant
dimensions	3,7 × 23 × 4,6 mm 3,7 × 11 × 19,5 mm	6,2 × 31 × 4,3 mm 6,5 × 21 × 9,4 mm 6,2 × 31,5 × 4,5 mm
nominal operation point / assured sensing distance Sa max.	4 mT	4 mT 2 mT (MZTK 06x1012)
switching frequency	200 kHz	200 kHz
voltage supply range +Vs	6 ... 30 VDC	6 ... 30 VDC
output circuit	PNP NPN	PNP NPN
connection types	cable 2,5 m flylead connector M8	cable 2,5 m flylead connector M8
housing material	PA 66	PA 66
operating temperature	-40 ... +70 °C	-40 ... +70 °C
protection class	IP 67	IP 67

Magnetic and cylinder sensors

Cylindrical and rectangular design.
Angular range 270...360°.

- Linearized analog output signals
- Resolution 0.09°
- Absolute sensing



	MDRM 18	MDRM 18	MDFM 20	MDFM 20
features	<ul style="list-style-type: none"> ■ Linear angular range 270° ■ Output signal 4...20 mA 	<ul style="list-style-type: none"> ■ Linear angular range 360° ■ Output signal 0...4.3 VDC 	<ul style="list-style-type: none"> ■ Linear angular range 270° ■ Output signal 4...20 mA ■ Resolution 0.09° 	<ul style="list-style-type: none"> ■ Linear angular range 360° ■ Output signal 0...4.3 VDC ■ Resolution 0.09°
dimensions (sensor head)	M18 x 1 (cylindrical threaded)		20 x 30 x 8 mm (rectangular)	
angular range	270° linear	360° linear	270° linear	360° linear
resolution	0,09°			
working distance max.	5 mm (with magnet rotor MSFS)			
output circuit	current output	voltage output	current output	voltage output
output signal	4...20 mA	0...4,3 VDC	4...20 mA	0...4,3 VDC
response time	<4 ms			
connection	cable 2 m mating connector M12		cable 2 m mating connector M8	
voltage supply	15...30 VDC	4,7...7,5 VDC	15...30 VDC	4,7...7,5 VDC
operating temperature	-40...+85 °C			
protection	IP 67			

Functional principle

The heart of a magnetic angle sensor is the integrated dual differential Hall element which builds an electrical parameter related to the flux direction of an exterior magnetic field. This magnetic field rotating about the element's center axis generates two sinusoids shifted by 90° which are utilized to detect the rotation angle for output as an absolute value. The integrated electronics evaluates the sinusoids into a linear voltage or current signal. The absolute detection principle ensures output of the correct rotation angle even after power failure.

Size up to 12 mm. Incremental.

- Scanning of gear wheels from module 1
- High switching frequency up to 15 kHz
- For dirty, humid and oily environments
- Wide temperature range up to +120 °C

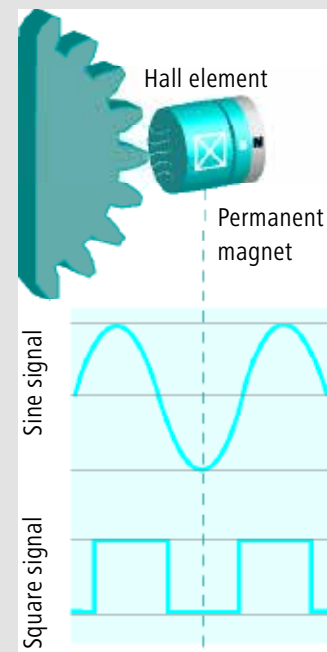


	MHRM 12 - 1 channel	MHRM 12 - 2 channels
features	<ul style="list-style-type: none"> ■ Cylindrical design M12 ■ 1-channel push-pull output ■ High switching frequency ■ Large temperature range 	<ul style="list-style-type: none"> ■ Cylindrical design M12 ■ 2-channel push-pull output ■ Detection of speed and rotational direction ■ High protection class and pressure resistance ■ Wide temperature range up to +120 °C
dimensions (sensor head)	M12 x 1 (cylindrical threaded)	
housing length	50 mm, 60 mm	60 mm
switching frequency	0...15 kHz	
gear size	from modul 1	
gear width	>6 mm	
working distance max	0.7 mm (module 1) 2.4 mm (module 3)	
output signal A	push-pull	push-pull
output signal B	–	push-pull
connection	cable, connector	cable
housing material	brass nickel plated	chrome-nickel steel
operating temperature	–40...+85 °C	–40...+120 °C
protection (sensing face)	IP 67	IP 68
protection (sensor)	IP 67	

Functional principle

Hall sensors operate on a current-carrying semiconductor which is biased by a permanent magnet installed behind. This magnetic field being penetrated by a ferromagnetic object

causes the semiconductor to change voltage, which is transformed by the integrated electronics into an amplified square signal.



Robust speed measurement

Hall sensors operate on non-contact sensing of ferromagnetic objects. Thanks to very high switching frequencies they are even capable of detecting the teeth at fast rotating gears. Space-saving and extremely robust, they provide eased speed feedback.

Edge measurement and detection

Edge measurement and detection

Our experts for precise object edge positions

- Web edge detection irrespective of color or surface
- Edge detection with wide measuring field
- Edge measurement even of transparent objects with large measuring range up to 1400 mm



	ZADM 023	ZADM 023	ParCon ZADM 034	ParCon ZADM 034
category	edge detection with wide measuring field	edge detection with wide measuring field	measurements of edge positions and object widths	measurements of edge positions and object widths
features	<ul style="list-style-type: none"> ■ Control of textile, plastic or paper edges ■ Capable of detecting transparent objects and foils 	<ul style="list-style-type: none"> ■ Control of textile, plastic or paper edges ■ Extremely large measuring field up to 875 mm in width ■ Capable of detecting transparent objects and foils 	<ul style="list-style-type: none"> ■ Measuring mode: edges, width ■ Broad and parallel light beam ■ High measuring frequency 	<ul style="list-style-type: none"> ■ Measuring mode: edges, width, sum of all dark areas ■ Broad and parallel light beam ■ High measuring frequency
dimensions	23 × 50 × 50 mm	23 × 50 × 50 mm	34 × 67 × 16,5 mm	34 × 67 × 16,5 mm
sensor principle	Line sensor	Line sensor	Line sensor	Line sensor
light source	pulsed infrared diode			
measuring range Sd	50 mm 200 mm 500 mm	60 ... 1400 mm	0 ... 40 mm	0 ... 200 mm
measuring field size	30 mm 150 mm 350 mm	400 ... 875 mm	24 mm	22 mm
resolution	< 0,15 mm	< 2 mm	< 0,05 mm	< 0,1 mm (S = 0 ... 150 mm) < 0,2 mm (S = 150 ... 200 mm)
output circuit	PNP NPN	RS485 PNP NPN	analog	analog
output signal	4 ... 20 mA	4 ... 20 mA	4 ... 20 mA	4 ... 20 mA
measuring frequency	> 500 Hz	> 500 Hz	> 1600 Hz	> 1100 Hz
connection types	connector M12 8 pin rotatable	connector M12 8 pin rotatable	connector M8 4 pin	connector M8 4 pin
housing material	die-cast zinc	die-cast zinc	aluminum	aluminum
operating temperature	0 ... +55 °C	0 ... +55 °C	0 ... +55 °C	0 ... +55 °C
protection class	IP 67	IP 67	IP 67	IP 67

Edge measurement and detection



ParCon ZADM 034

measurements of edge positions and object widths

- Switching version
- Detection of small objects
- Measuring range up to 24 × 40 mm

34 × 67 × 16,5 mm

Line sensor

0 ... 40 mm

24 mm

< 0,1 mm

PNP

4 ... 20 mA

> 4000 Hz

connector M8 4 pin

aluminum

0 ... +55 °C

IP 67

Edge measurement and detection

Edge measurement and detection

SCATEC – Edge measurement

- Reliable copy counting in the lap stream – up to 3 million copies per hour
- Single package detection at seamless product conveyance
- Single sheet detection from an edge thickness of 0.1 mm



	SCATEC-J	SCATEC-2	SCATEC-10	SCATEC-15
category	entry-level model edge thickness up 1,5 mm	standard edge thickness up 0,2 mm	precision class edge thickness up 0,1 mm	precision class edge thickness up 0,15 mm
dimensions	33 × 110 × 50 mm	33 × 110 × 50 mm	30 × 170 × 70 mm	30 × 170 × 70 mm
measuring distance	0 ... 55 mm	0 ... 120 mm	0 ... 90 mm	0 ... 120 mm
sensibility	single sheet/edge thickness 1,5 mm	single sheet/edge thickness 0,2 mm	single sheet/edge thickness 0,1 mm	single sheet/edge thickness 0,15 mm
counting rate	280'000 copies/h	600'000 copies/h	3'000'000 copies/h	3'000'000 copies/h
false pulse suppression		on/off switchable	4 program options	4 program options
connection types	connector M12	connector M12	DIN 45322 (main connector) DIN 45326 (interface)	DIN 45322 (main connector) DIN 45326 (interface)
housing material	PA 6	PA 6	die-cast zinc	die-cast zinc
operating temperature	0 ... +50 °C	0 ... +50 °C	0 ... +50 °C	0 ... +50 °C
protection class	IP 54	IP 54	IP 54	IP 54
specific features		<ul style="list-style-type: none"> ■ SCATEC-2 Box for counting of individual packages (in transport clamps) ■ Counting of double copies 		



Precision mechanical switches

Precision mechanical switches *MY-COM*[®]

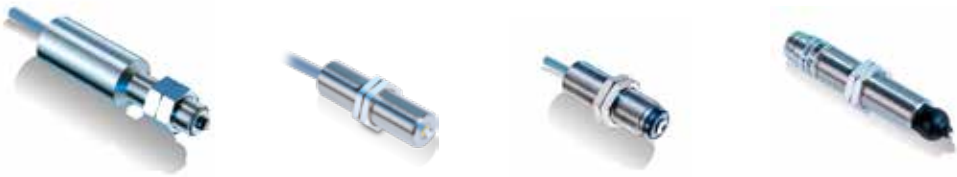
Micrometer precision – 70 times more accurate than a hair is thick

- Repeat accuracy of 1 micrometer – the most accurate mechanical limit switch in the world
- Compact design for very confined installation environment
- Mechanical (NC) and electrical (NO) output circuit



	MY-COM A	MY-COM B	MY-COM C	MY-COM D
features	<ul style="list-style-type: none"> ■ Conical housing front ■ M8 fine pitch thread 	<ul style="list-style-type: none"> ■ Brass housing ■ Flat housing front ■ M8 fine pitch thread 	<ul style="list-style-type: none"> ■ Flat brass housing ■ 2-hole mounting 	<ul style="list-style-type: none"> ■ Robust burnished brass housing ■ Spherical metal tip ■ Protection class IP 67 ■ Lateral approach possible to 30°
all mechanical	■	■	■	■
with amplifier				
for lateral approach				■
rugged IP 67				■
dimensions	M8 × 0,5	M8 × 0,5	8 × 12 × 30 mm	M16 × 0,5
repeat accuracy	< 1 µm	< 1 µm	< 1 µm	< 1 µm
output	NC (mechanical)	NC (mechanical)	NC (mechanical)	NC (mechanical) NO (PNP/NPN)
connection types	cable 0,8 m connector M8	cable 0,8 m connector S30	cable 0,8 m connector M8	cable 0,8 m connector M8
activating pin	zirconium oxide ZrO2	zirconium oxide ZrO2	zirconium oxide ZrO2	hardened steel
housing material	brass nickel plated	brass nickel plated	brass nickel plated	burnished brass
operating temperature	-20 ... +75 °C	-20 ... +75 °C	-20 ... +75 °C	-20 ... +75 °C
protection class	IP 50	IP 50	IP 50	IP 67

Precision mechanical switches



	MY-COM E	MY-COM F MY-COM G	MY-COM H MY-COM L	MY-COM M
	<ul style="list-style-type: none"> ■ Brass housing ■ M6 fine pitch thread ■ Spherical hard metal tip ■ Lateral approach possible to 30° 	<ul style="list-style-type: none"> ■ Brass housing ■ Long M8 fine pitch thread 	<ul style="list-style-type: none"> ■ Brass housing ■ M8 fine pitch thread ■ Spherical ruby tip ■ Protection class IP 67 	<ul style="list-style-type: none"> ■ Brass housing ■ M8 fine pitch thread ■ Protection class IP 67
	■	F	H	■
	■	G	L	■
	■		■	■
	M6 × 0,5	M8 × 0,5	M8 × 0,5	M8 × 0,5
	< 1 µm	< 1 µm	< 1 µm	< 1 µm
	NC (mechanical) NO (PNP/NPN)	NC (mechanical) NO (PNP/NPN)	NC (mechanical) NO (PNP/NPN)	NC (mechanical) NO (PNP/NPN)
	cable 0,8 m	cable 0,8 m connector M8	cable 0,8 m connector M8	cable 0,8 m connector M8
	hardened steel	zirconium oxide ZrO2	ruby	zirconium oxide ZrO2
	brass nickel plated	brass nickel plated	brass nickel plated	brass nickel plated
	-20 ... +75 °C	-20 ... +75 °C	-20 ... +75 °C	-20 ... +75 °C
	IP 50	IP 50	IP 67	IP 67

Distance measurement

Sensors for detecting distances and distance information from the μm range to over 60 m.



Distance measurement

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Laser distance sensors

Laser distance sensors

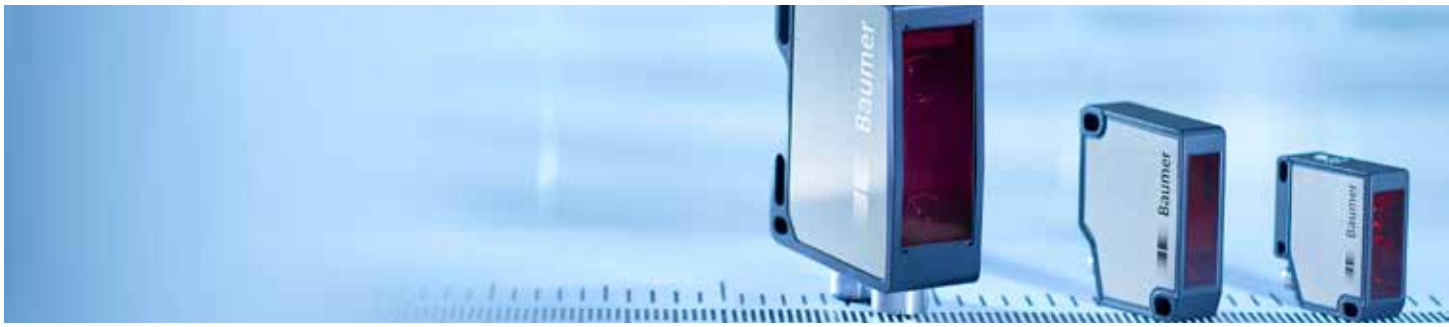
Precise distance, spacing and position measurements

- Best-in-class measurement performance for greater system availability
- Intuitive operating concept ensures shorter application development
- On-the-fly parameterization and additional data about all available digital interfaces



	O500.DI / DP	O300.DI / DP / DL	FADK 14 LED distanz sensor	OM20	OM30
category	standard sensors			performance sensors - miniature	
features	<ul style="list-style-type: none"> ■ Distance measurement value via IO-Link ■ Switching output ■ Red light, infrared LED 	<ul style="list-style-type: none"> ■ Distance measurement value via IO-Link in a miniature housing ■ Switching output ■ PinPoint LED, infrared LED or laser 	<ul style="list-style-type: none"> ■ Compact housing ■ LED light source 	<ul style="list-style-type: none"> ■ Measurement speed up to 5 kHz ■ Laser-point variations ■ Laser class 1 ■ Easy integration via IO-Link or RS485 with Modbus RTU protocol 	<ul style="list-style-type: none"> ■ Measurement speed up to 5 kHz ■ Laser-point variations & Laser-line variations ■ Laser class 2 ■ Easy integration via IO-Link or RS485 with Modbus RTU protocol
dimensions	18 × 45 × 32 mm	12,9 × 32,3 × 23 mm	14,8 × 43 × 31 mm	34,5 × 37 × 13 mm	40,3 × 49 × 13,6 mm
measuring distance	60 ... 550 mm	30 ... 300 mm (Infrared, PinPoint) 30 ... 250 mm (Laser)	50 ... 400 mm	16 ... 120 mm	50 ... 550 mm
linearity error	> ±5,9 MR	> ±5,7% MR	±1,15% MR	> ±0,08% MR	> ±0,08% MR
response time	< 0,49 ms	< 0,25 ms	< 3 ms	0,4 ms	0,4 ms
output signal	push-pull / IO-Link	push-pull / IO-Link	4 ... 20 mA 0 ... 10 V IO-Link	4 ... 20 mA / 2 ... 10 mA 0 ... 10 V / 0 ... 5 V IO-Link RS485	4 ... 20 mA / 2 ... 10 mA 0 ... 10 V / 0 ... 5 V IO-Link RS485
connection types	cable 2 m connector M12	cable 2 m connector M8	cable 2 m connector M12	connector M8 4-pin	connector M8 4-pin
housing material	plastic (ASA, PMMA)	plastic (ASA, PMMA)	plastic (ASA, MABS)	die-cast zinc	die-cast zinc
operating temperature	-25 ... +60 °C	-25 ... +60 °C -10 ... +60 °C (laser)	0 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C
protection class	IP 67	IP 67	IP 67	IP 67	IP 67
specific features	<ul style="list-style-type: none"> ■ cost-effective solution for simpler measuring tasks 	<ul style="list-style-type: none"> ■ cost-effective solution for simpler measuring tasks 	<ul style="list-style-type: none"> ■ cost-effective solution for simpler measuring tasks 	<ul style="list-style-type: none"> ■ Automatic adjustment of exposure time for precise measurements on changing materials ■ High immunity to ambient light for reliable measurements ■ Point beam shape for a precise measurement 	<ul style="list-style-type: none"> ■ Automatic adjustment of exposure time for precise measurements on changing materials ■ High immunity to ambient light for reliable measurements ■ Line beam shape for particularly robust measurement results on structured surfaces

Laser distance sensors



	OM70 Very high measuring accuracy	OM70 Large measuring distances	OM70 Tolerance measurement	OM70 Ethernet Very high measuring accuracy	OM70 Ethernet Large measuring distances
	high performance sensors				
	<ul style="list-style-type: none"> Selectable focus ranges Resolutions up to 0,7 μm Maximum measuring distances up to 250 mm Linearity deviations $\pm 0,06\%$ 	<ul style="list-style-type: none"> Selectable focus ranges Resolutions up to 1,4 μm Maximum measuring distances up to 1500 mm 	<ul style="list-style-type: none"> Selectable focus ranges Resolutions up to 0,7 μm Maximum measuring distances up to 250 mm Linearity deviations $\pm 0,06\%$ 	<ul style="list-style-type: none"> Configurable via web interface Selectable focus ranges Resolution up to 0.7 μm Max. measuring distance up to 250 mm Ethernet interface, OPC UA, Modbus TCP and Profinet 	<ul style="list-style-type: none"> Configurable via web interface Selectable focus ranges Resolution up to 0.7 μm Max. measuring distance up to 250 mm Ethernet interface, OPC UA, Modbus TCP and Profinet
	26 x 74 x 55 mm	26 x 74 x 55 mm	26 x 74 x 55 mm	26 x 74 x 55 mm	26 x 74 x 55 mm
	30 ... 250 mm	100 ... 1500 mm	30 ... 250 mm	30 ... 250 mm	100 ... 1500 mm
	> $\pm 0,06\%$ MR	> $\pm 0,12\%$ MR	> $\pm 0,06\%$ MR	> $\pm 0,06\%$ MR	> $\pm 0,12\%$ MR
	< 0,8 ms	< 0,8 ms	< 6 ms	< 0,8 ms	< 0,8 ms
	4 ... 20 mA 0 ... 10 V RS485	4 ... 20 mA 0 ... 10 V RS485	4 ... 20 mA 0 ... 10 V RS485	2 ... 10 mA 4 ... 20 mA 0 ... 5 V 0 ... 10 V Ethernet TCP/IP	2 ... 10 mA 4 ... 20 mA 0 ... 5 V 0 ... 10 V Ethernet TCP/IP
	connector M12	connector M12	connector M12	connector M12 connector M8	connector M12 connector M8
	aluminum	aluminum	aluminum	aluminum	aluminum
	-10 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C	-10 ... +50 °C
	IP 67	IP 67	IP 67	IP 67	IP 67
	<ul style="list-style-type: none"> selectable filtering configurable, digital switching output with adjustable hysteresis in millimeters various trigger modes, touch display changeover between current or voltage output 3 memory slots for parameter settings 	<ul style="list-style-type: none"> selectable filtering configurable, digital switching output with adjustable hysteresis in millimeters various trigger modes, touch display changeover between current or voltage output 3 memory slots for parameter settings 	<ul style="list-style-type: none"> selectable filtering configurable, digital switching output with adjustable hysteresis in millimeters various trigger modes, touch display changeover between current or voltage output 3 memory slots for parameter settings 	<ul style="list-style-type: none"> Beyond the Standard: Connectivity Easy system integration thanks to standardized interfaces Flexible parameterization via web interface Precise measurement of structured and smallest objects thanks to line and spot beam shapes 	<ul style="list-style-type: none"> Beyond the Standard: Connectivity Easy system integration thanks to standardized interfaces Flexible parameterization via web interface Precise measurement of structured and smallest objects thanks to line and spot beam shapes

Laser distance sensors

Laser distance sensors

Distance, spacing and position measurements for challenging requirements

- Large selection of performance classes, sizes, and beam shapes
- Reliable distance measurement even in rough ambient conditions
- Very large range with the help of the time-of-flight measurement principle



	OADM 20	OADM 20	OADM 21	OADM 250	OADM 250
category	performance sensors			long range sensors	
features	<ul style="list-style-type: none"> ■ High vibration resistance ■ Different measuring ranges teachable ■ High measuring rates 	<ul style="list-style-type: none"> ■ Extremely high mechanical robustness ■ Increased ambient light immunity 100K lux ■ Suitable for outdoor applications 	<ul style="list-style-type: none"> ■ High resolution at large measuring distance ■ Adjustable measuring range 	<ul style="list-style-type: none"> ■ High resolution ■ Measurement up to 4 m independent of colors ■ Alarm output ■ Adjustable measuring range 	<ul style="list-style-type: none"> ■ High resolution ■ Measurement up to 4 m independent of colors ■ Alarm output ■ Adjustable measuring range
dimensions	20,6 × 65 × 50 mm	20,6 × 65 × 50 mm	20,4 × 135 × 45 mm	25,4 × 66 × 51 mm	25,4 × 66 × 51 mm
measuring distance	30 ... 1000 mm	50 ... 1000 mm	100 ... 1000 mm	0,5 ... 4 m	0,5 ... 4 m
linearity error	> ±0,2% MR	> ±0,2% MR	> ±0,2% MR	> ±0,4% MR	> ±0,12% MR
resolution	≥ 4 μm	≥ 10 μm	≥ 10 μm	≥ 1,3 mm	≥ 1,3 mm
response time	< 0,9 ms	< 2,5 ms	< 5 ms	< 10 ms	< 10 ms
output	4 ... 20 mA 0 ... 10 V RS 485	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V
connection types	connector M12	connector 2 m	connector M12	connector M12	connector M12
housing material	die-cast zinc	die-cast zinc	aluminum	aluminum	aluminum
operating temperature	0 ... +50 °C	0 ... +50 °C	0 ... +50 °C	-25 ... +50 °C	-25 ... +50 °C
protection class	IP 67	IP 67	IP 67	IP 67	IP 67
specific features	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object ■ input for synchronizing measurements ■ laser diode can be switched on/off 	<ul style="list-style-type: none"> ■ missing measurement signals or incorrect measurements are suppressed 	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object ■ input for synchronizing measurements ■ laser diode can be switched on/off 	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object 	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object

Robust stainless steel distance sensors

Sensors in hygienic and washdown design

- Stainless steel housing V4A
- *proTect+*® sealing concept
- Ecolab-tested and -certified
- EHEDG-compliant hygienic design resp. FDA-compliant washdown design



IO-Link

IO-Link

	FADR 14	FADH 14	OADR 20
category	■ robust stainless steel distance sensors		
features	<ul style="list-style-type: none"> ■ Washdown design ■ Adjustable measuring range ■ Point source LED 	<ul style="list-style-type: none"> ■ Hygienic design ■ Adjustable measuring range ■ Point source LED 	<ul style="list-style-type: none"> ■ Washdown design ■ Adjustable measuring range ■ Laser beam ■ Laser Point / Laser line ■ Vibration-resistant
dimensions	19,6 × 62,4 × 33,8 mm	19,6 × 99,5 × 33,6 mm	20,3 × 65 × 50 mm
measuring distance	50 ... 400 mm	50 ... 400 mm	30 ... 600 mm
linearity error	±1,15% MR	±1,15% MR	> ±0,2% MR
resolution	0,1 mm	0,1 mm	5 µm
response time	< 3 ms	< 3 ms	< 0,9 ms
output signal	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V
connection types	connector M12	cable 2 m flylead connector M12	connector M12
housing material	stainless steel 1.4404 (V4A)	stainless steel 1.4404 (V4A)	stainless steel 1.4404 (V4A)
operating temperature	0 ... +50 °C	0 ... +50 °C	0 ... +50 °C
protection class	IP 68 / IP 69K & <i>proTect+</i>	IP 68 / IP 69K & <i>proTect+</i>	IP 68 / IP 69K & <i>proTect+</i>
specific features	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object ■ service status indicator when soiled 	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object ■ service status indicator when soiled 	<ul style="list-style-type: none"> ■ alarm output to signalize any incorrect measuring operation or out-of-range object ■ input for synchronizing measurements ■ laser diode can be switched on/off

Radar sensors

Radar distance measuring sensors

Reliable measurements in the most extreme environments

- Smallest radar sensor with a very narrow beam cone and a measurement range up to 60 m
- Quick measurement (ms) also of moving objects
- Simple and precise adjustment to application requirements via IO-Link
- Available and approved in Europe and the USA



IO-Link



IO-Link



IO-Link

	RR30.DAF0 (122 GHz)	RR30.DAJ2 (122 GHz)	RR30.DA00 (122 GHz)
features	<ul style="list-style-type: none"> ■ Smallest radar sensor with a very narrow beam cone and a measurement range up to 60 m ■ Simple and precise adjustment to application requirements via IO-Link ■ Stable measuring signal, even in adverse ambient conditions and with soiled sensor cap (IP68/IP69K and <i>proTect+</i>) ■ Analog output and IO-Link 		
dimensions	M30 × 97 mm	M30 × 107 mm	M30 × 107 mm
measuring distance	0,2 ... 6 m (8,5 m with IO-Link)	0,3 ... 12 m (18 m with IO-Link)	0,5 ... 60 m (80 m with IO-Link)
Opening angle	12°	6°	6°
response time	< 2 mm	< 1 mm	< 1 mm
output	IO-Link 0 ... 10 V / 10 ... 0 V + push-pull	IO-Link 0 ... 10 V / 10 ... 0 V + push-pull	IO-Link 0 ... 10 V / 10 ... 0 V + push-pull
adjustable parameters	Measuring range, preset profiles, signal sensitivity, signal selection, switching points or switching window for distance or counter, switching hysteresis, output logic, various filters, other IO-LINK-specific functions and secondary data		
connection types	connector M12	connector M12	connector M12
housing material	stainless steel 1.4404 (V4A)	stainless steel 1.4404 (V4A)	stainless steel 1.4404 (V4A)
operating temperature	-40 ... +65 °C	-40 ... +65 °C	-40 ... +65 °C
protection class	IP 68/IP 69K & <i>proTect+</i>	IP 68/IP 69K & <i>proTect+</i>	IP 68/IP 69K & <i>proTect+</i>



Ultrasonic distance sensors

Miniaturized ultrasonic distance sensors

Fast design-in – highest performance with the most compact design

- Best-in-class blind zone with a measurement range up to 500 mm
- Optimum sensor setting to the individual application with enhanced functions and filters
- Efficient integration and additional data via the IO-Link interface
- Large selection of cylindrical and rectangular block designs



	UNAM 12	UNDK 09 UNCK 09	UNDK 10
category	miniature		
features	<ul style="list-style-type: none"> ■ Narrow and wide sonic beam angles ■ External Teach-in ■ M12 connector 	<ul style="list-style-type: none"> ■ High resolution ■ Minimal blind zone ■ RS 232 ■ Various mounting options ■ Flat housing ■ Narrow sonic beam angle for detection in openings of up to 3 mm 	<ul style="list-style-type: none"> ■ Smallest ultrasonic sensor ■ Internal and external Teach-in ■ Very low weight: 4 g ■ Narrow sonic beam angle ■ Cable and flylead connector versions
dimensions	M12	8,6 × 48,8 × 57,5 mm	10,4 × 27 × 14 mm
measuring distance	20 ... 400 mm	3 ... 200 mm	20 ... 200 mm
response time	< 10 ms	< 7 ms	< 15 ms
resolution	< 0,5 mm	< 0,1 mm	< 0,3 mm
repeat accuracy	< 0,5 mm	< 0,5 mm	< 0,5 mm
output	0 ... 10 mA / 10 ... 0 mA 0 ... 10 V / 10 ... 0 V	0 ... 10 V / 10 ... 0 V RS 232	0 ... 10 V / 10 ... 0 V
connection types	connector M12	cable 2 m flylead connector M8	cable 2 m connector M8 flylead connector M8
housing material	brass nickel plated	plastic	plastic
operating temperature	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C
protection class	IP 67	IP 67	IP 67
specific features	<ul style="list-style-type: none"> ■ with or w/o sonic nozzles 	<ul style="list-style-type: none"> ■ with or w/o sonic nozzles ■ cascable in 9 mm grid 	<ul style="list-style-type: none"> ■ wide range of accessories and installation options

Robust ultrasonic distance sensors with flexible parameterization

Extremely resistant and flexible parameterization for any application

- Highest process reliability due to hermetically sealed sensor element
- IO-Link functionality for flexible parameterization
- Short blind zone of 20 mm with a sensing distance up to 1000 mm
- Highest quality with high economic efficiency



IO-Link



IO-Link



IO-Link

	U300	UR18	U500
category	miniature	robuste	
features	<ul style="list-style-type: none"> ■ Best measurement performance based on the most precise measurement principle ■ Parallel output signal to the IO-Link channel via Dual Channel ■ Flexible parameterization and additional diagnostic data thanks to IO-Link ■ Shortest blind zone in its class 	<ul style="list-style-type: none"> ■ IO-Link interface ■ Robust sensor element ■ Push-pull measurement signal due to IO-Link 	
dimensions	12,9 x 32,2 x 23 mm	M18	15 x 45,1 x 32,2 mm
measuring distance	15 ... 500 mm	20 ... 1000 mm	20 ... 1000 mm
response time	16 ms	< 40 ms	< 40 ms
resolution	< 0,3 mm	< 0,3 mm	< 0,3 mm
repeat accuracy	< 0,5 mm	< 0,5 mm	< 0,5 mm
output	0 ... 10 V / 10 ... 0 V + push-pull	4 ... 20 mA / 20 ... 4 mA + push-pull 0 ... 10 V / 10 ... 0 V + push-pull	
adjustable parameters	Switching points or switching windows for distance or counter, measuring range, sound beam, averaging, temperature compensation, output logic, switching hysteresis, input/ output logic, switch-off delay, output circuit, SSC / output assignment, LED behavior, teaching facilities		
process data	MDC: Distance, counter SSC: Distance, counter		
diagnostic data	Switching cycles, operating time, boot cycles, histograms of process data values and the operating voltage and device temperature		
connection types	connector M8, 4 pin	connector M12, 5 pin	connector M12, 5 pin
housing material	plastic ASA	stainless steel V2A	plastic ASA
operating temperature	-25 ... +65 °C	-25 ... +65 °C	-25 ... +65 °C
protection class	IP 67	IP 69	IP 67

Ultrasonic distance sensors

Ultrasonic distance sensors with teach button

Unimpressed by difficult environmental conditions and varying object properties

- Cylindrical versions in M18 or M30 housings with connector or cable output
- Extremely compact, flat housing designs
- With teach-in or potentiometer
- Sensing distances up to 2000 mm



	UNAM 18	UNAM 30	UNDK 20	UNDK 30
category	standard	standard	standard	standard
features	<ul style="list-style-type: none"> ■ Internal and external Teach-in ■ M12 connector 	<ul style="list-style-type: none"> ■ Internal and external Teach-in ■ Cable and connector versions ■ Potentiometer versions 	<ul style="list-style-type: none"> ■ Flat type ■ Internal and external Teach-in ■ Narrow and wide sonic beam angles ■ M8 connector 	<ul style="list-style-type: none"> ■ Compact design ■ Large sensing range ■ Internal Teach-in ■ Potentiometer version ■ Narrow and wide sonic beam angles ■ Cable and connector versions
dimensions	M18	M30	20 × 42 × 15 mm	30 × 65 × 31 mm
measuring distance	100 ... 1000 mm	100 ... 1000 mm	20 ... 1000 mm	30 ... 2000 mm
response time	< 10 ms	< 100 ms	< 10 ms	
resolution	< 0,3 mm	< 0,3 mm	< 0,3 mm	< 0,3 mm
response time	< 0,5 mm	< 0,5 mm	< 0,5 mm	< 1 mm
output	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V
connection types	cable 2 m connector M12	connector M12 cable 2 m	connector M8	cable 2 m connector M12
housing material	stainless steel	brass nickel plated	plastic	plastic / die-cast zincs
operating temperature	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C	-10 ... +60 °C
protection class	IP 67	IP 67	IP 67	IP 67
specific features	<ul style="list-style-type: none"> ■ optional sonic deflection bracket mounting 			

Application-specific ultrasonic distance sensors – Chemically robust / for off-highway-machinery

- Chemical robust stainless steel sensors with patented parylene coating
- Ultrasonic distance sensors for off-highway-machinery - designed for reliability



	UNAR 12	UNAR 18	U750
category	Chemically robust stainless steel sensors with parylene coating		For off-highway-machinery
features	<ul style="list-style-type: none"> ■ Miniature sensor for narrow designs ■ Patented all-round protection ■ FDA-compliant materials ■ Very short response time 	<ul style="list-style-type: none"> ■ M18 standard housing ■ FDA-compliant materials ■ Internal and external Teach-in 	<ul style="list-style-type: none"> ■ Designed for reliability ■ Very small blind zone ■ For fill level application ■ 5 VDC power supply
dimensions	M12 × 70 mm	M18 × 91,5 mm	70 × 48 × 115 mm
measuring distance	20 ... 200 mm	60 ... 1000 mm	100 ... 2300 mm
response time	< 30 ms	< 80 ms	< 3000 ms
resolution	< 0,3 mm	< 0,3 mm	< 1 mm
repeat accuracy	< 0,5 mm	< 0,5 mm	< 5 mm
output	0 ... 10 mA / 10 ... 0 mA 0 ... 10 V / 10 ... 0 V	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V	0,5 ... 4,5 VDC
connection types	connector M12	connector M12	German connector DT13-4P 4 pin
housing material	stainless steel	stainless steel	plastic (PA 10T/X)
operating temperature	0 ... +60 °C	0 ... +60 °C	-20 ... +70 °C
protection class	IP 67	IP 67	IP 67

Ultrasonic distance sensors

Application-specific ultrasonic distance sensors – Sonic nozzles / measuring distance

- Sensors with sonic nozzle for tiny objects and very narrow passages
- Sensors with long-range detection up to 6000 mm



	UNAM 12	UNCK 09 UNDK 09	UNAM 50	UNAM 70
category	sensors with sonic nozzles		long ranges	
features	<ul style="list-style-type: none"> ■ External Teach-in ■ M12 connector ■ Beam columnator for very narrow sonic cone profile 	<ul style="list-style-type: none"> ■ High resolution ■ Minimal blind zone ■ RS 232 ■ Various mounting options ■ Flat housing ■ Narrow sonic beam angle for detection in openings of up to 3 mm 	<ul style="list-style-type: none"> ■ Large sensing range ■ Internal and external Teach-in ■ Cable and connector versions ■ Potentiometer versions 	<ul style="list-style-type: none"> ■ Large sensing range ■ Internal and external Teach-in ■ M12 connector
dimensions	M12	8,6 × 48,8 × 57,5 mm	M30	M30
measuring distance	20 ... 400 mm	23 ... 200 mm	400 ... 2500 mm	600 ... 6000 mm
resolution	< 0,3 mm	< 0,1 mm	< 0,3 mm	< 2 mm
repeat accuracy	< 0,5 mm	< 0,5 mm	< 1mm	< 1mm
output	0 ... 10 mA / 10 ... 0 mA 0 ... 10 V / 10 ... 0 V	0 ... 10 mA / 10 ... 0 mA RS 232	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V	4 ... 20 mA / 20 ... 4 mA 0 ... 10 V / 10 ... 0 V
connection types	connector M12	connector M12 cable 2 m	connector M12 cable 2 m	connector M12
housing material	brass nickel plated	plastic	brass nickel plated	brass nickel plated
operating temperature	-10 ... +60 °C	0 ... +60 °C	-10 ... +60 °C	-25 ... +60 °C
protection class	IP 67	IP 67	IP 67	IP 67



Inductive distance sensors – AlphaProx®

Inductive distance sensors – cylindrical

- High resolution and repeatability
- Wide measuring ranges
- High measuring speed
- Extra-short designs



	IWRM 04	IR06.DxxS	IR08.DxxS	IR12.DxxS
category	subminiature	sub-/miniature	sub-/miniature	compact
features	<ul style="list-style-type: none"> ■ Very high resolution ■ Quick response time ■ Fully integrated electronics ■ With M5 connector 	<ul style="list-style-type: none"> ■ Large measuring distance ■ Very high resolution ■ Quick response time ■ Fully integrated electronics ■ Short design 	<ul style="list-style-type: none"> ■ Large measuring distance ■ Very high resolution ■ Quick response time ■ Fully integrated electronics ■ Short design 	<ul style="list-style-type: none"> ■ Large measuring distance ■ Very high resolution ■ Quick response time ■ Linearized output calibration curves with Teach-in
dimensions	ø 4 mm	ø 6,5 mm	M8	M12
housing length	30 mm	up 22 mm	up 22 mm	up 40 mm
measuring distance Sd	0 ... 1 mm	0 ... 3 mm	0 ... 3 mm	0 ... 6 mm
resolution	1 µm	1 µm	1 µm	1 µm
repeat accuracy	5 µm	10 µm	10 µm	10 µm
response time	0,5 ms	0,5 ms	0,5 ms	1 ms
output signal	0 ... 10 V	0 ... 10 mA 0 ... 10 V	0 ... 10 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V
connection types	connector M5	cable 2 m connector M8	cable 2 m connector M8	cable 2 m connector M12
housing material	stainless steel	stainless steel	stainless steel	brass nickel plated
operating temperature	+10 ... +60 °C	-10 ... +70 °C	-10 ... +70 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67

Inductive distance sensors – AlphaProx®



	IR18.DxxS	IR30.DxxS
	compact	compact
	<ul style="list-style-type: none"> ■ Large measuring distance ■ Very high resolution ■ Linearized output calibration curves with Teach-in 	<ul style="list-style-type: none"> ■ Large measuring distance ■ Very high resolution ■ Linearized output calibration curves with Teach-in ■ Flush and non-flush designs
	M18	M30
	up 50 mm	60 mm
	0 ... 8 mm	0 ... 24 mm
	2 µm	5 µm
	15 µm	20 µm
	2 ms	2 ms
	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V
	cable 2 m connector M12	connector M12
	brass nickel plated	brass nickel plated
	-10 ... +70 °C	-25 ... +75 °C
	IP 67	IP 67

Inductive distance sensors – AlphaProx®

Inductive distance sensors – rectangular

- High repeat accuracy
- Large measuring range
- High measuring speed



	IWFM 05	IF08.D02S	IWFM 12	IWFM 18
category	subminiature	subminiature	compact	compact
features	<ul style="list-style-type: none"> ■ Very high resolution ■ Quick response time ■ Fully integrated electronics ■ With M5 connector 	<ul style="list-style-type: none"> ■ Very high resolution ■ Compact model ■ Fully integrated electronics ■ Through-hole for M3 bolt 	<ul style="list-style-type: none"> ■ Integrated current and voltage output ■ Fully integrated electronics 	<ul style="list-style-type: none"> ■ Integrated current and voltage output ■ Fully integrated electronics
dimensions (B × T × L)	5 × 5 × 32 mm	8 × 4,7 × 16 mm	12 × 12 × 60 mm	18 × 10 × 30 mm
measuring distance Sd	0 ... 1 mm	0 ... 2 mm	0 ... 4 mm	0 ... 4 mm
resolution	1 µm	1 µm	1 µm	1 µm
repeat accuracy	10 µm	20 µm	5 µm	5 µm
response time	0,5 ms	1 ms	2 ms	2 ms
output signal	0 ... 10 V	0 ... 10 V	0 ... 10 V 4 ... 20 mA	0 ... 10 V 4 ... 20 mA
connection types	connector M5	cable 2 m flylead connector M8 flylead connector M5	cable 2 m connector M8	connector M8
housing material	brass nickel plated	die-cast zinc nickel plated	brass nickel plated	brass nickel plated
operating temperature	+10 ... +60 °C	+10 ... +60 °C	-10 ... +70 °C	-10 ... +70 °C
protection class	IP 67	IP 67	IP 67	IP 67
specific features	<ul style="list-style-type: none"> ■ smallest inductive sensor with analog output 	<ul style="list-style-type: none"> ■ extremely low-profile version for front-side single-hole installation 		



	IWFM 20
	compact
	<ul style="list-style-type: none"> ■ Integrated current and voltage output ■ Fully integrated electronics
	20 × 12 × 35 mm
	2 ... 5 mm
	1 μm
	10 μm
	2 ms
	0 ... 10 V 1 ... 9 V 4 ... 20 mA
	connector M8 flylead connector M8
	brass nickel plated
	-10 ... +70 °C 0 ... +60 °C
	IP 67

Inductive distance sensors – AlphaProx®

Linearized characteristic curve

Simplified controller integration thanks to distance-proportional output signal

- Consistent sensitivity throughout the entire measuring range
- Configurable measuring range to optimally match the application
- Programmable digital output



linearized characteristic curve	IR06.DxxL	IR08.DxxL	IR12.DxxL	IR18.DxxL	IR30.DxxL
category	miniatur	miniatur	compact	compact	compact
features	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves ■ External Teach-in 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves ■ External Teach-in 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves ■ External Teach-in 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves ■ External Teach-in 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves ■ External Teach-in
dimensions	ø 6,5 mm	M8	M12	M18	M30
housing length	up 40 mm	up 40 mm	60 mm	60 mm	60 mm
measuring distance S _d	0 ... 3 mm	0 ... 3 mm	0 ... 6 mm	0 ... 8 mm	0 ... 24 mm
resolution	3 µm	3 µm	3 µm	8 µm	5 µm
repeat accuracy	10 µm	10 µm	10 µm	15 µm	20 µm
response time	2 ms	2 ms	1 ms	1 ms	5 ms
output signal	0 ... 10 V	0 ... 10 V	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V
connection types	cable 2 m connector M8	cable 2 m connector M8	connector M12	connector M12	connector M12
housing material	stainless steel	stainless steel	brass nickel plated	brass nickel plated	brass nickel plated
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67	IP 67

Inductive sensors with reduction factor 1

- Two to four times larger measuring range for aluminum
- Adjustable measuring range limits (teach)
- Particularly suitable for measurements on non-ferromagnetic metals
- Great flexibility in construction and installation



	IWFM 18	IWFK 20
	compact	compact
	<ul style="list-style-type: none"> ■ Integrated current and voltage output ■ Fully integrated electronics 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Teach-in button housing-integrated ■ Large measuring range ■ Plastic housing
	18 × 10 × 30 mm	20 × 15 × 42 mm
	0 ... 4 mm	0 ... 10 mm
	5 µm	10 µm
	10 µm	15 µm
	2,5 ms	3 ms
	0 ... 10 V	0 ... 10 VDC
	connector M8	connector M8
	brass nickel plated	plastic
	-10 ... +70 °C	-10 ... +70 °C
	IP 67	IP 67

factor 1	IR18.DxxF
category	compact
features	<ul style="list-style-type: none"> ■ Very high measurement sensitivity ■ Linearized output calibration curves ■ External Teach-in
dimensions	M18
housing length	60 mm
measuring distance Sd	0 ... 8 mm
resolution	20 µm
repeat accuracy	30 µm
response time	15 ms
output signal	0 ... 10 V
connection types	connector M12
housing material	brass nickel plated
operating temperature	-25 ... +75 °C
protection class	IP 67

Inductive distance sensors – AlphaProx®

High-precision sensors

High-precision and high-sensitivity inductive sensors

- Large signal change for even the smallest position changes
- Solutions for high-end applications with a resolution of up to 4 nm
- Completely integrated in compact housing
- Easy teach option



high-precision and high-sensitivity inductive sensors	IPRM 12	IR12.DxxK IR18.DxxK
category	High-precision sensors	High-sensitivity sensors
dimensions	M12	M12 M18
housing length	90 mm	60 mm
measuring distance Sd	0 ... 3 mm	0,25 mm (Teach-in between 0 ... 3 mm)
resolution	0,004 µm	0,25 µm
sensitivity		40 V/mm 64 mA/mm
repeat accuracy	1 µm	1 µm
response time	2 ms	3 ms
output signal	4 ... 20 mA	4 ... 20 mA 0 ... 10 V
connection types	connector M12	cable 2 m connector M12
housing material	steel nickel plated	steel nickel plated
operating temperature	0 ... +60 °C	-10 ... +60 °C
protection class	IP 67	IP 67

Sturdy sensors

Precise measurements even in demanding applications

- Rugged stainless steel housing
- Outdoor- and Washdown design
- Inductive distance sensors for Off-highway-machines
- Easy teach option



sturdy sensors	IWRP 16	IWRM 18	IWRR 18	designed for reliability	IR18V.D08L
category	High-pressure resistant sensors	Outdoor design	Outdoor design Washdown design	category	For Off-highway-machines
dimensions	M16	M18	M18	dimensions	M18
housing length	61 mm	60 mm	60 mm	housing length	50 mm
measuring distance Sd	0 ... 4 mm	0 ... 8 mm	0 ... 7 mm	measuring distance Sd	0 ... 8 mm
resolution	5 µm	5 µm	5 µm	resolution	8 µm
repeat accuracy	10 µm	15 µm	15 µm	repeat accuracy	16 µm
response time	1 ms	2 ms	2 ms	switching frequency	< 450 Hz
output signal	4 ... 20 mA	4 ... 20 mA	4 ... 20 mA	output signal	0,5 ... 4,5 VDC
connection types	connector M12	connector M12	connector M12	connection types	cabel flylead connector German
housing material	stainless steel	brass nickel plated	stainless steel 1.4404 (V4A)	housing material	brass nickel plated
operating temperature	-25 ... +75 °C	-40 ... +70 °C	-40 ... +70 °C	operating temperature	-40 ... +85 °C
protection class	IP 68 (from front) IP 67	IP 67	IP 68/69K & proTect+	protection class	IP 69K (face) IP 68
				approvals	EN 13309-2010 EN ISO 14982-2009 ISO 13766-2009

Inductive distance sensors – AlphaProx®

All-digital inductive sensors with IO-Link for additional value

- Outstanding measuring precision
- Additional process and diagnostic data
- Application-specific parameterization for optimal processes
- Measured value filtering for quick or precise applications



IO-Link



IO-Link



IO-Link



IO-Link



IO-Link

linearized characteristic curve	IR06.DxxL	IR08.DxxL	IR12.DxxL	IR18.DxxL	IR30.DxxL
category	miniatur	miniatur	compact	compact	compact
features	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves 	<ul style="list-style-type: none"> ■ Adjustable measuring range ■ Linearized output calibration curves
dimensions	ø 6,5 mm	M8	M12	M18	M30
housing length	46 mm	46 mm	50 mm	60 mm	60 mm
measuring distance Sd	0 ... 3 mm	0 ... 3 mm	0 ... 6 mm	0 ... 10 mm	0 ... 18 mm
resolution	5 µm	5 µm	3 µm	5 µm	10 µm
repeat accuracy	10 µm	10 µm	10 µm	15 µm	20 µm
min. cycle time	0,6 ms	0,6 ms	1 ms	1 ms	5 ms
output signal	Push-Pull / IO-Link				
adjustable parameters	Switching points or switching window for distance, frequency or counter, measuring range, output logic, switching hysteresis, input / output logic, switch-off delay, output circuit, measured value filter, SSC / output assignment, LED behaviour, teaching options				
process data	MDC: Distance, frequency or counter SSC1: Distance SSC2: Distance SSC3: Frequency SSC4: Counter				
diagnostic data	Switching cycles, operating time, booting cycles, histograms of process data, supply voltage and device temperature				
connection types	connector M8	connector M8	connector M12	connector M12	connector M12
housing material	stainless steel	stainless steel	brass nickel plated	brass nickel plated	brass nickel plated
operating temperature	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C	-25 ... +75 °C
protection class	IP 67	IP 67	IP 67	IP 67	IP 67

Inductive distance sensors – *AlphaProx*[®]



Linear bearingless encoders

Non-contact length measuring operations, cost-efficient and precise

- Non-contact magnetic sensing technology free from wear
- Resistant to dirt and vibrations
- Long-life by virtue of robustness in extreme ambient conditions
- For maximum machine and system uptime



	MIL10
category	Linear bearingless encoder
features	<ul style="list-style-type: none"> ■ Linear measuring system ■ Output signals A 90° B with index pulse ■ Output circuit push-pull or RS422
size (sensor head)	rectangular
dimensions (sensor head)	10 x 15 x 45,5 mm
sensing distance	0,1 ... 0,6 mm
interpolation	factor 20, 50, 100
movement speed	<5 m/s (resolution 5 µm) <10 m/s (resolution 10 µm) <25 m/s (resolution 25 µm)
output circuit	HTL/Push-pull TTL/RS422
output signal	A 90° B, R + inverted
total resolution	5 µm (factor 4 evaluation) 10 µm (factor 4 evaluation) 25 µm (factor 4 evaluation)
system-accuracy	±(0,02 mm +0,04 mm x magnetic belt length)
connection	cable 2 m cable 0,3 m with connector M12
voltage supply	10 ... 30 VDC, 5 VDC ±5 %
operating temperature	-40 ... +85 °C
protection class	IP 66, IP 67



Measuring wheel encoders

The efficient and reliable solution to length measurement.

Programmable incremental encoders used in conjunction with measuring wheels

- Particularly easy acquisition of position and speed with high flexibility
- Perfect for ink jet and laser printing applications thanks to precise optical sensing



	MA20
category	Compact, high-resolution measuring wheel system
features	<ul style="list-style-type: none"> ■ Measuring wheel encoder comprising encoder, tether arm and measuring wheel ■ Contact pressure fully adjustable
configurable parameters	16 pre-defined resolutions
configuration	HEX switch
sensing method	optical
dimensions	ø 40 mm (encoder)
voltage supply	4,75 ... 30 VDC
output stage	HTL/push-pull
output signals	A 90° B
shaft type	solid shaft ø 6 mm
connection types	flange connector M12, cable radial
pulses per revolution	100 ... 25 000
operating temperature	-20 ... +85 °C
protection class	IP 64
operating speed	≤ 3000 rpm
options	measuring wheels available with different rubber surface

	MR series
category	Measuring wheels
features	<ul style="list-style-type: none"> ■ The perfect grip at any surface ■ Different surface profiles to match the application best ■ Circumference 200, 300 or 500 mm ■ For shaft diameter 4 ... 12 mm

Measuring wheel encoders



	EIL580P-SC
category	Programming, incremental encoders combined with measuring wheel and programming device
features	<ul style="list-style-type: none"> ■ Solid shaft with pressure or servo flange ■ Programming resolutions and signals
configurable parameters	Pulses per revolution, output stage HTL or TTL, zero pulse, signal sequence
configuration	PC software / hardware adapter, handheld programmer
sensing method	optical
dimensions (flange)	ø 58 mm
voltage supply	4,75 ... 30 VDC
output stage	TTL/RS422 HTL/push-pull
output signals	A 90° B, R + inverted
shaft type	solid shaft ø 10 mm or ø 6 mm
connection types	flange connector M12, M23, radial / axial cable, radial / axial / tangential
pulses per revolution	1 ... 65536
operating temperature	-40 ... +100 °C
protection class	IP 65, IP 67
operating speed	≤ 12 000 rpm (IP 65) ≤ 6000 rpm (IP 67)
max. shaft load	≤ 40 N axial, ≤ 80 N radial
options	isolated hollow shaft, flange variant, connector variant

	Z-PA-EI-H
category	Handheld programmer for encoder EIL580P
features	<ul style="list-style-type: none"> ■ Simple and quick configuration ■ 4 user-assignable buttons ■ Intuitive menu navigation ■ Standard AA battery supply

Cable transducers

Robust design for outdoor use. Measuring length up to 20 m.

- Absolute position sensing integrated
- Redundant sensing and interface
- Analog and CANopen®
- Compact housing



	GCA3	GCA5	GCA8	GCA12	GCA20
features	<ul style="list-style-type: none"> ■ Measuring length up to 4.7 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Three-chamber design 	<ul style="list-style-type: none"> ■ Measuring length up to 7.8 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Three-chamber design 	<ul style="list-style-type: none"> ■ Measuring length up to 12 m ■ Absolute potentiometer sensing ■ Dirt skimmer ■ Three-chamber design 	<ul style="list-style-type: none"> ■ Measuring length up to 20 m ■ Absolute potentiometer sensing ■ Dirt skimmer ■ Three-chamber design 	
function principle	absolute				
interface					
- Analog / redundant	■ / ■	■ / ■	■ / ■		■ / ■
- CANopen® / redundant	■ / ■	■ / ■	■ / ■		■ / ■
sensing method	non-contact magnetic		potentiometric		
size	88 x 88 x 60.5 mm	88 x 88 x 65 - 70 mm	88 x 88 x 80.5 mm	126 x 126 x 98 mm	222 x 271 x 124 mm
voltage supply	8...30 VDC, 12...30 VDC (Analog), 10...30 VDC (CANopen®)				
measuring length max.	4.7 m	7.8 m	8 m	12 m	20 m
linearity (Interface-dependent)	±0.5 %	±0.5 %	±0.3 %		±1 %
connection					
- flange connector M12	radial				
- cable	radial				
resolution	up to 14 bits				
operating temperature	-40...+85 °C				
protection	IP 67	IP 67	IP 65		IP 65
materials	housing: Plastic cable: Stainless steel with coating		housing: Plastic/aluminium cable: Stainless steel with coating		housing: Aluminium cable: Stainless steel with coating
options	Integrated redundant inclination sensor	Integrated redundant inclination sensor Two-channel architecture	Integrated redundant inclination sensor		Integrated redundant inclination sensor

Integrated inclination sensor

Your added value:

- A single compact sensor to measure length and angle simultaneously
- Convenient length and inclination readout via CANopen®
- Ideal for boom position measurement by saving installation space and cabling effort

Modular system architecture – measuring range up to 50 Meter

- High combination flexibility of cable-transducer and basic encoder
- Every standard absolute interface
- High operational safety and long service life
- Precise metal housing
- Highest linearity



	GCA2	GCA4	GCA15	GCA50
features	<ul style="list-style-type: none"> ■ Measuring length 2.4 m ■ Absolute encoder ■ Cable-pull housing: plastic 	<ul style="list-style-type: none"> ■ Measuring length 3 m ■ Absolute encoder ■ Cable-pull housing: aluminum 	<ul style="list-style-type: none"> ■ Measuring length 5...15 m ■ Absolute encoder ■ Cable-pull housing: aluminum 	<ul style="list-style-type: none"> ■ Measuring length 30...50 m ■ Absolute encoder ■ Cable-pull housing: aluminum
interface				
- SSI	■	■	■	■
- CANopen®	■	■	■	■
- SAE J1939	■	■	■	■
- Profinet / Profibus-DP	■ / ■	■ / ■	■ / ■	■ / ■
- EtherCAT / EtherNet/IP	■ / ■	■ / ■	■ / ■	■ / ■
function principle	absolute			
sensing method	optical			
dimension	60 × 60 mm	96 × 96 × 56 mm	115 × 115 × 82,5 - 180,5 mm	200 × 200 × 268 - 333,5 mm
voltage supply	10 ... 30 VDC			
connection				
- flange connector M12, M23	radial, axial			
- cable	radial, axial			
- bus cover	radial			
measuring length	2,4 m	3 m	5 ... 15 m	30 ... 50 m
linearity	±0,01 %			
operating temperature	-20 ... +85 °C; options -40 ... +85 °C			
protection (encoder)	IP 50 (cable transducer), IP 65 (encoder)			
materials	cable-pull housing: plastic encoder: aluminium cable: stainless steel with coating	cable-pull housing: aluminum encoder: aluminium cable: stainless steel with coating		

Cables and connectivity

Cables & adapters



Cables & adapters	Plug connectors that can be configured on location	Connection lines	Connection cables
characteristics	<ul style="list-style-type: none"> ■ M8 and M12 ■ Straight or angled ■ 3-, 4- and 5-pole versions 	<ul style="list-style-type: none"> ■ M5, M8, M9, M12 or 8 mm snap-in ■ 3- or 12-pole versions ■ Straight or angled ■ Screened or unshielded ■ Sheath materials PUR, TPE, PVC ■ Lengths from 1 to 25 m 	<ul style="list-style-type: none"> ■ M5, M8, M12, RJ45 ■ 3- or 4-pole versions ■ Straight or angled ■ Sheath materials PUR, TPE, PVC ■ Lengths up to 25 m

Parameterization & IO-Link Master



Testing and parameterization characteristics	Sensor test equipment	Teach-in adapter
	<ul style="list-style-type: none"> ■ Display (V or mA) or. LED (PNP/ NPN) reading ■ Sensor programming using integrated teach key ■ Connection option for plug-in power supply (available as accessory) 	<ul style="list-style-type: none"> ■ Sensor programming with teach-in pin ■ Teach-in using key ■ For sensors with M12 connection



IO-Link



IO-Link

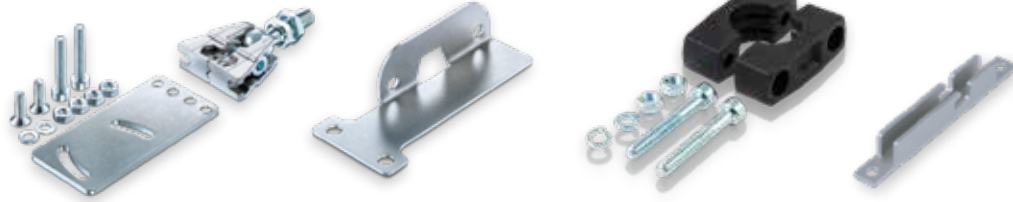


IO-Link

Network components characteristics	SensControl	IO-Link Master	USB-IO-Link Master
	<ul style="list-style-type: none"> ■ Wireless IO-Link Master (WLAN and Bluetooth LE) with integrated battery ■ Visual indication of device status and data processing activity ■ Easy, standardized and reproducible configuration ■ Diagnostics and analysis ■ Apps for iOS and mobile Android devices 	<ul style="list-style-type: none"> ■ 8 Port-Link Master for use in the field and control cabinets ■ Data transmission to Master: parameters, identification, process and diagnostic information ■ User-convenient parameterization via web interface ■ EtherNET/IP or Profinet interface ■ Multiprotocol (Modbus TCP, OPC-UA-capable) 	<ul style="list-style-type: none"> ■ Parameterization of IO-Link sensors ■ Windows-based software IO-Link device tool included ■ Full set including power supply unit

Accessories

Mounting accessories & reflectors



Mounting accessories	Mounting kits	Mounting bracket	Mounting bracket	Bracket for profiles
characteristics	<ul style="list-style-type: none"> ■ Sensofix Mounting sets ■ Robust metal version ■ Mounting sets for various sensor types ■ Easy, flexible alignment 	<ul style="list-style-type: none"> ■ Matching mounting brackets available for various sensor types ■ High quality metal ■ Compatible with flexible Sensofix 	<ul style="list-style-type: none"> ■ Easy, fast mounting of smooth and cylindrical sensors ■ Available from \varnothing 6,5 mm to \varnothing 20 mm 	<ul style="list-style-type: none"> ■ Mounting adapter for diverse sensor types ■ e.g. for mounting in profiles, slots, cylinders, etc.



Reflectors Lenses Apertures Glass	Reflectors	Reflective tapes	Apertures	Glass covers Filter Lens
characteristics	<ul style="list-style-type: none"> ■ Self-adhesive or screw-mount reflectors ■ Circular or rectangular ■ All-metal reflectors ■ Ecolab certified types, resistant to cleaning agents 	<ul style="list-style-type: none"> ■ Self-adhesive tapes ■ Various widths and lengths 	<ul style="list-style-type: none"> ■ Apertures for various sensor types 	<ul style="list-style-type: none"> ■ For various sensor types

Beam columnators & magnets



Beam columnators and deflector (Ultrasonic)	Beam columnators	Beam deflectors
characteristics	<ul style="list-style-type: none"> ■ Replacement nozzles for sensors with sonic nozzles 	<ul style="list-style-type: none"> ■ Ideal for cramped spaces ■ Bends the sound 90°



Magnets	Cylindrical magnets	Rectangular magnets and rotors
characteristics	<ul style="list-style-type: none"> ■ For all magnetic proximity switches ■ Magnets in various sizes and strengths ■ Magnetization along the cylinder axis ■ For ambient temperatures up to +180 °C 	<ul style="list-style-type: none"> ■ For magnetic rotary encoders ■ Magnets available individually or integrated in the rotor ■ Magnetization throughout the depth ■ For ambient temperatures up to +180 °C

Baumer – the strong partner.

We at Baumer are close to our customers, understand their needs and provide the best solution. Worldwide customer service for Baumer starts with on-the-spot personal discussions and qualified consultation. Our application engineers speak your language and strive from the start, through an interactive problem analysis, to offer comprehensive and user-compatible solutions.

We are close to you across the globe.

The worldwide Baumer sales organizations guarantee short delivery times and readiness to supply. Many of our customers are directly linked via our electronic order system with the JIT logistics process.

A worldwide network coupled with the most modern communication techniques enable us to deliver information quickly and transparently to decision makers in all Baumer locations.

Closeness to the customer for Baumer means being available for your needs anywhere and at any time.



Worldwide presence.



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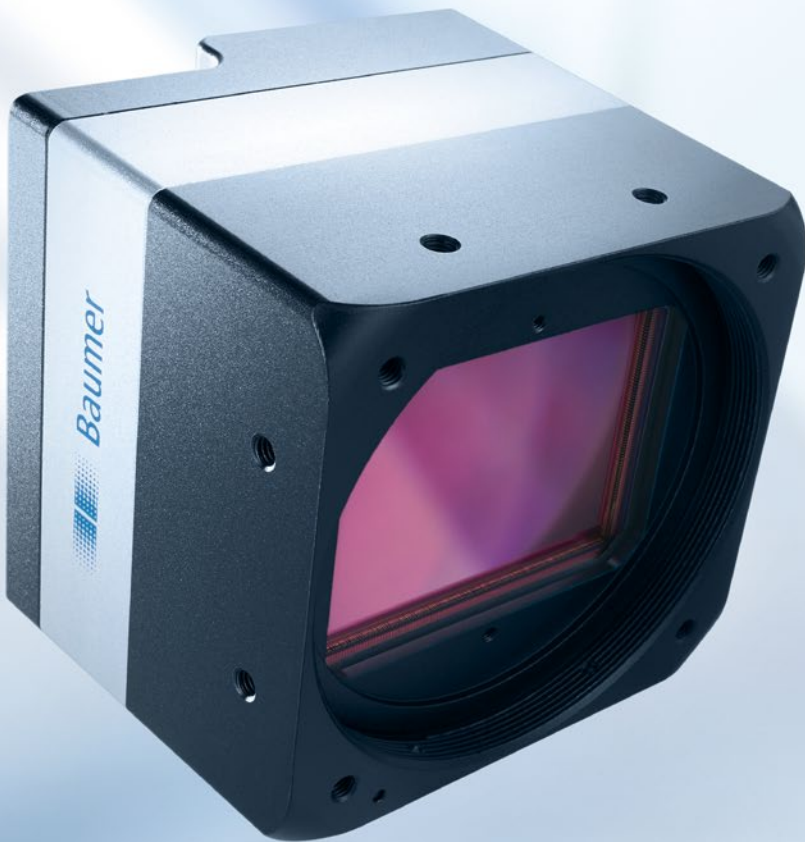
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Represented by:

Digital industrial cameras

Capture the essential.



Inspired by nature – our technology as evolution.



The human eye can discern about 100 shades of gray. Our cameras can distinguish more than 4,000.

We can see no more than 16 individual images per second, but our cameras can capture more than 1,000.

Our cameras never get tired.

Machine vision with expertise and passion.

Baumer is a global leader in sensor solutions for factory and process automation. More than 2,700 employees in 39 subsidiaries in 19 countries are at your service across the globe.

Industrial image processing is an important business for us. Leading in innovation, we have been providing high-performance digital cameras for PC-based image processing systems and intuitive vision sensors for over 20 years.

Merging cutting-edge technologies with customer-focused consultancy has made us a premier global provider of high-quality industrial cameras. Our customers benefit from a diverse portfolio of sophisticated products for many different applications across varied industries. We are committed to long-term availability of our cameras to make sure our customers will obtain a high return on their investments in vision systems.

We develop customer-focused products, anticipate trends and shape the market by pointing the way with technology innovations. We put a particular emphasis on high performance, outstanding quality and durability as well as easy system integration.

Where standard products come to their limits, we develop market-oriented, customized components in close cooperation with our customers. The result: Your decisive competitive edge.

High-performance industrial cameras.

High frame rates, exceptional image quality and ease of integration – that's what our industrial cameras stand for.

Featuring industrial designs, cutting-edge sensors, and clever solutions, our cameras provide the basis for precise and long-term stable image evaluation to allow you to successfully complete your inspection tasks.

The large selection of different cameras offers the right model for each industry and application. From cost-effective entry-level models to perfectly optimized standard cameras up to high-performance industrial cameras with maximum performance for the highest demands.



CX series

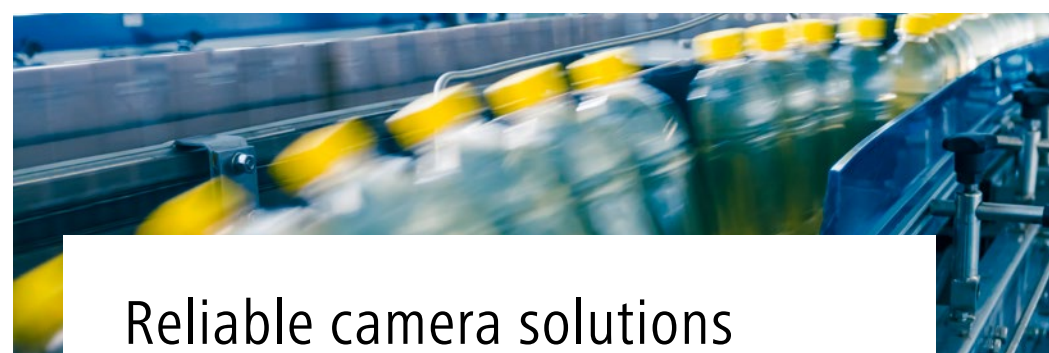
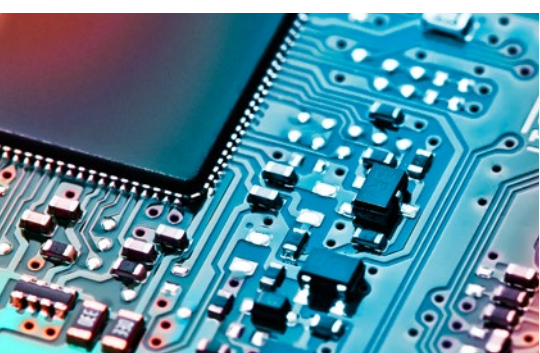
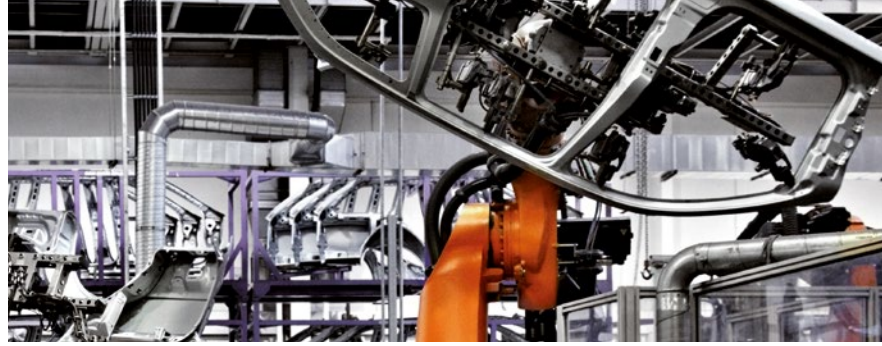
LX series



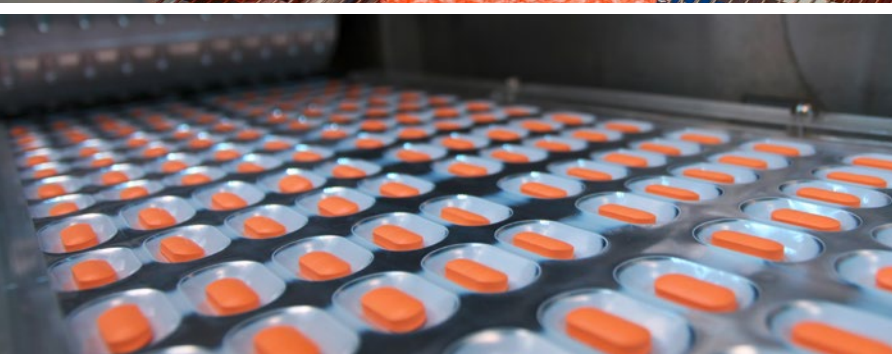
EX series

CX.I cameras

AX series



Reliable camera solutions
for cross-industry applications.



CX series

Latest global and rolling shutter CMOS cameras for the detection and evaluation of fast processes.

With the high-performance CX cameras you can rely on the most current Sony® Pregius™, Pregius S™, Polarsens™ and STARVIS™ CMOS sensor generations as well as onsemi® PYTHON, for the future-ready implementation of your applications.

In addition to many standard versions with an extensive range of functions, we offer you camera models with Precision Time Protocol (PTP) for precise time synchronization in Ethernet networks, with polarization sensor for the complete detection of the linear polarization state of surfaces, as well as global shutter, rolling shutter, or global reset shutter. Thanks to this great variety, you will be sure to find the right camera for each of your applications.



Technical highlights

- Exposure times from 1 μs
- Opto-decoupled inputs and outputs with automation voltage levels
- Burst Mode and integrated image memory for cost-sensitive applications
- GigE power supply: external 12 – 24 V or PoE

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [μm]	Full Frames [fps] ¹⁾
GigE Vision® 29 × 29 × 49 mm	VCXG-02	M C	1/4" CMOS	PYTHON300	640 × 480	4.8 × 4.8	573 403
	VCXG-04	M C	1/2.9" CMOS	IMX287	720 × 540	6.9 × 6.9	441 318
	VCXG-13	M C	1/2" CMOS	PYTHON1300	1280 × 1024	4.8 × 4.8	146 94
	VCXG-15	M C	1/2.9" CMOS	IMX273	1440 × 1080	3.45 × 3.45	121 79
	VCXG-23	M C	1/1.2" CMOS	IMX174	1920 × 1200	5.86 × 5.86	82 53
	VCXG-24	M C	1/1.2" CMOS	IMX249	1920 × 1200	5.86 × 5.86	38 38
	VCXG-25	M C	2/3" CMOS	PYTHON2000	1920 × 1200	4.8 × 4.8	59 53
	VCXG-32	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	56 39
	VCXG-51	M C	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	35 24
	VCXG-53	M C	1" CMOS	PYTHON5000	2592 × 2048	4.8 × 4.8	28 23
	VCXG-57 ²⁾	M C	1/1.8" CMOS	IMX548	2448 × 2048	2.74 × 2.74	25 25
	VCXG-82	M C	2/3" CMOS	IMX546	2848 × 2832	2.74 × 2.74	16 15

Your benefits

- Extensive scope of application thanks to a large variety of the latest CMOS sensor models
- With 1000 frames/s in Burst Mode and ROI you can reliably capture fast applications
- Up to 24 megapixel in a compact 29 × 29 mm housing, easily and flexibly integrated in tight installation settings
- Flexible application potential with temperature range from 0 °C to 65 °C

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [μm]	Full Frames [fps] ¹⁾	
GigE Vision® 29 × 29 × 49 mm	VCXG-91	M C	1" CMOS	IMX267	4096 × 2160	3.45 × 3.45	21 13	
	VCXG-124	M C	1.1" CMOS	IMX304	4096 × 3000	3.45 × 3.45	15 9	
	VCXG-127	M C	1/1.2" CMOS	IMX545	4096 × 2292	2.74 × 2.74	11 10	
	VCXG-204	M C	1.1" CMOS	IMX541	4480 × 4496	2.74 × 2.74	6 6	
	VCXG-241	M C	1.2" CMOS	IMX540	5312 × 4592	2.74 × 2.74	5 5	
Near Infrared Range	VCXG-13NIR	M –	1/2" CMOS	PYTHON1300	1280 × 1024	4.8 × 4.8	146 94	
	VCXG-53NIR	M –	1" CMOS	PYTHON5000	2592 × 2048	4.8 × 4.8	28 23	
Polarization	VCXG-50MP	M –	2/3" CMOS	IMX250MZR	2448 × 2048	3.45 × 3.45	35 24	
Rolling shutter and global reset shutter	VCXG-22.R	M C	1/2.8" CMOS	IMX290	1920 × 1080	2.9 × 2.9	89 58	
	VCXG-65.R	M C	1/1.8" CMOS	IMX178	3072 × 2048	2.4 × 2.4	29 19	
	VCXG-125.R	M C	1/1.7" CMOS	IMX226	4000 × 3000	1.85 × 1.85	15 10	
	VCXG-201.R	M C	1" CMOS	IMX183	5472 × 3648	2.4 × 2.4	9 6	
Precision Time Protocol IEEE 1588	VCXG-15.PTP	M C	1/2.9" CMOS	IMX273	1440 × 1080	3.45 × 3.45	121 79	
	VCXG-32.PTP	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	56 39	
	VCXG-51.PTP	M C	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	36 24	
	VCXG-124.PTP	M C	1.1" CMOS	IMX304	4096 × 3000	3.45 × 3.45	15 9	
USB3 Vision® 29 × 29 × 38 mm	VCXU-02	M C	1/4" CMOS	PYTHON300	640 × 480	4.8 × 4.8	892 891	
	VCXU-04	M C	1/2.9" CMOS	IMX287	720 × 540	6.9 × 6.9	434 430	
	VCXU-13	M C	1/2" CMOS	PYTHON1300	1280 × 1024	4.8 × 4.8	222 222	
	VCXU-15	M C	1/2.9" CMOS	IMX273	1440 × 1080	3.45 × 3.45	226 224	
	VCXU-23	M C	1/1.2" CMOS	IMX174	1920 × 1200	5.86 × 5.86	165 159	
	VCXU-24	M C	1/1.2" CMOS	IMX249	1920 × 1200	5.86 × 5.86	38 38	
	VCXU-25	M C	2/3" CMOS	PYTHON2000	1920 × 1200	4.8 × 4.8	167 167	
	VCXU-31	M C	1/1.8" CMOS	IMX252	2048 × 1536	3.45 × 3.45	120 114	
	VCXU-32	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	55 55	
	VCXU-50	M C	2/3" CMOS	IMX250	2448 × 2048	3.45 × 3.45	77 73	
	VCXU-51	M C	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	35 35	
	VCXU-53	M C	1" CMOS	PYTHON5000	2592 × 2048	4.8 × 4.8	73 73	
	VCXU-57 ²⁾	M C	1/1.8" CMOS	IMX548	2448 × 2048	2.74 × 2.74	70 70	
	VCXU-91	M C	1" CMOS	IMX267	4096 × 2160	3.45 × 3.45	32 32	
	VCXU-123	M C	1.1" CMOS	IMX253	4096 × 3000	3.45 × 3.45	31 29	
	VCXU-124	M C	1.1" CMOS	IMX304	4096 × 3000	3.45 × 3.45	29 28	
	VCXU-127 ³⁾	M C	1/1.2" CMOS	IMX545	4096 × 2292	2.74 × 2.74	29 29	
	VCXU-241 ³⁾	M C	1.2" CMOS	IMX540	5312 × 4592	2.74 × 2.74	15 15	
	Polarization	VCXU-50MP	M –	2/3" CMOS	IMX250MZR	2448 × 2048	3.45 × 3.45	77 73
	Rolling shutter and global reset shutter	VCXU-22.R	M C	1/2.8" CMOS	IMX290	1920 × 1080	2.9 × 2.9	60 138
VCXU-65.R		M C	1/1.8" CMOS	IMX178	3072 × 2048	2.4 × 2.4	47 47	
VCXU-125.R		M C	1/1.7" CMOS	IMX226	4000 × 3000	1.85 × 1.85	31 29	
VCXU-201.R		M C	1" CMOS	IMX183	5472 × 3648	2.4 × 2.4	20 15	

¹⁾ Burst Mode (image acquisition in the camera's internal memory) | interface

²⁾ available Q2/2022

³⁾ available Q1/2022



CX.I cameras

Extra power for added performance in demanding applications.

Thanks to their clever design and practical functional properties, the robust CX.I cameras offer extra power for your applications – a high operating temperature range, vibration and shock resistance, hard-anodized housings, as well as 4 power outputs with integrated lighting controller for the easy and cost-effective control of external lightings.



Technical highlights

- Hard-anodized surface, X-coded M12 connector and PoE
- Vibration 10 g and shock 100 g
- 4 power outputs with max. 120 W (max. 48 V / 2.5 A)

GigE Vision® 40 × 40 × 51 mm	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps] ¹⁾
Operating temperature 0 °C – 65 °C	VCXG-13.I	M C	1/2" CMOS	PYTHON1300	1280 × 1024	4.8 × 4.8	146 94
	VCXG-15.I	M C	1/2.9" CMOS	IMX273	1440 × 1080	3.45 × 3.45	121 79
	VCXG-25.I	M C	2/3" CMOS	PYTHON2000	1920 × 1200	4.8 × 4.8	59 53
	VCXG-32.I	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	56 39
	VCXG-51.I	M C	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	35 24
	VCXG-53.I	M C	1" CMOS	PYTHON5000	2592 × 2048	4.8 × 4.8	28 23
	VCXG-82.I ³⁾	M C	2/3" CMOS	IMX546	2848 × 2832	2.74 × 2.74	16 15
	VCXG-124.I	M C	1.1" CMOS	IMX304	4096 × 3000	3.45 × 3.45	15 9
	VCXG-127.I ³⁾	M C	1/1.2" CMOS	IMX545	4096 × 2292	2.74 × 2.74	11 10
	VCXG-241.I ³⁾	M C	1.2" CMOS	IMX540	5312 × 4592	2.74 × 2.74	5 5
Rolling Shutter	VCXG-201.R.I	M C	1" CMOS	IMX183	5472 × 3648	2.4 × 2.4	9 6
Precision Time Protocol IEEE 1588	VCXG-15.I.PTP	M C	1/2.9" CMOS	IMX273	1440 × 1080	3.45 × 3.45	121 79
	VCXG-32.I.PTP	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	56 39
	VCXG-51.I.PTP	M C	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	35 24
	VCXG-124.I.PTP	M C	1.1" CMOS	IMX304	4096 × 3000	3.45 × 3.45	15 9
Operating temperature -40 °C – 70 °C ²⁾	VCXG-13.I.XT	M C	1/2" CMOS	PYTHON1300	1280 × 1024	4.8 × 4.8	146 94
	VCXG-15.I.XT	M C	1/2.9" CMOS	IMX273	1440 × 1080	3.45 × 3.45	121 79
	VCXG-25.I.XT	M C	2/3" CMOS	PYTHON2000	1920 × 1200	4.8 × 4.8	59 53
	VCXG-32.I.XT	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	56 39
	VCXG-51.I.XT	M C	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	35 24
	VCXG-53.I.XT	M C	1" CMOS	PYTHON5000	2592 × 2048	4.8 × 4.8	28 23
	VCXG-124.I.XT	M C	1.1" CMOS	IMX304	4096 × 3000	3.45 × 3.45	15 9
Rolling Shutter	VCXG-201.R.I.XT	M C	1" CMOS	IMX183	5472 × 3648	2.4 × 2.4	9 6

¹⁾ Burst Mode (image acquisition in the camera's internal memory) | interface

²⁾ except VCXG-201.R.I.XT (-30 °C – 70 °C)

³⁾ available Q4/2021

Your benefits

- The need for cooling and heating measures is reduced thanks to the operating temperature range of -40 °C to 70 °C
- Integrated lighting controller with brightness control reduces system costs
- Varied accessories offer flexible solutions for individual applications in the food, beverage, and pharmaceutical industry



CX.XC cameras

Cameras with cooling pipe integrated into the housing.

With a cooling pipe for compressed air or liquids directly integrated into the housing, the CX.XC cameras dissipate heat immediately where it is created, allowing highly precise image capturing, even in warm environments.

The effective heat dissipation near the sensor and the lens compensates for the thermal pixel drift and provides images with very low noise, few defective pixels, and a high dynamic. This allows the efficient implementation of highly precise measurement and inspection tasks.

The integrated cooling also makes the cameras ideal solutions for applications with higher ambient temperatures. They can be used there directly without additional cooling components, saving time and costs during system integration.



GigE
VISION

Technical highlights

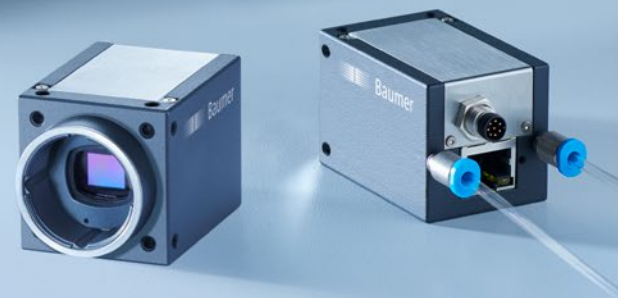
- Aluminum housing with M3 mounts at each side
- External power supply of 12 – 24 V or PoE
- Opto-decoupled inputs and outputs with voltage levels of automation technology
- Tested with compressed air in the 2 to 3 bar range and purity level ISO 8573-1:2010 [1:4:2]
- Tested with water up to 6 bar

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps] ¹⁾
GigE Vision® 36 × 36 × 47 mm	VCXG-51.XC ²⁾	M –	2/3" CMOS	IMX264	2448 × 2048	3.45 × 3.45	36 24

¹⁾ Burst Mode (image acquisition in the camera's internal memory) | interface

Your benefits

- Effective heat dissipation without thermal effects on the lens or the image characteristics
- Flexible integration in ambient conditions with limited space thanks to the cooling pipe integrated into the housing
- Without the need for additional cooling components, system integration becomes easy and cost-effective



AX series

Freely programmable smart cameras with NVIDIA® Jetson™ modules for AI applications.

The AX smart cameras are the solution for vision-at-the-edge computing and AI applications in a single device. AX cameras combine highest industrial grade quality, market-leading NVIDIA® Jetson™ modules, and powerful Sony® CMOS sensors to create a compact, flexible, and freely programmable image processing platform.

The integrated NVIDIA® Jetson™ Nano or Xavier NX modules feature special AI cores and graphic processors that also allow the flexible implementation of AI-based systems. For a stable and reliable image evaluation, the smart cameras with the latest Sony® CMOS sensors provide images with high quality and sensitivity, as well as low noise.



Technical highlights

- Compatible with GenICam™
- M12 Ethernet and RS232
- Micro HDMI, USB, and SD slots
- 4 power outputs with max. 120 W (max. 48 V / 2.5 A)
- Prepared for IP 65/67 protection with optional patented modular tube system

70 × 70 × 120 mm	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps]
NVIDIA® Jetson™ Nano	VAX-32.I.NVN	M C	1/1.8" CMOS	IMX265	2048 × 1536	3.45 × 3.45	55
NVIDIA® Jetson™ Xavier NX	VAX-50.I.NVX	M C	2/3" CMOS	IMX250	2448 × 2048	3.45 × 3.45	77

Your benefits

- Simply use and protect your own image processing algorithms
- Free choice of programming language thanks to Linux®
- A single component for image capturing and image evaluation
- Saving a PC for image processing limits space requirements, cuts down on system costs and integration effort and simplifies system design



LX series

High-resolution, fast cameras for precise inspections with a high production throughput.

The cameras of the LX series are the ideal basis for demanding inspection tasks with high requirements, both on the precision of image acquisition and the throughput. With excellent image quality, outstanding sensitivity, low dark noise, and a large dynamic range, they reliably capture high-speed processes.



Technical highlights

- Burst Mode and integrated image memory
- Multi ROI and Multi I/O, as well as PoE/PoCL
- Enhanced NIR sensitivity
- Lens mount for M58, M42, F-mount, C-mount

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps] ¹⁾
GigE Vision® 60 × 60 × 57 mm	LXG-20	M C	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	337 111
	LXG-40	M C	1" CMOS	CMV4000	2048 × 2048	5.5 × 5.5	180 59
	LXG-80	M C	4/3" CMOS	CMV8000	3360 × 2496	5.5 × 5.5	61 29
	LXG-120	M C	APS-C CMOS	CMV12000	4096 × 3072	5.5 × 5.5	50 19
	LXG-200	M C	35 mm CMOS	CMV20000	5120 × 3840	6.4 × 6.4	32 12
	LXG-250	M C	APS-H CMOS	PYTHON 25K	5120 × 5120	4.5 × 4.5	32 9
	LXG-500	M C	35 mm CMOS	CMV50000	7920 × 6004	4.6 × 4.6	15 5
Near infrared range	LXG-20NIR	M –	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	337 111
	LXG-40NIR	M –	1" CMOS	CMV4000	2048 × 2048	5.5 × 5.5	180 59
Camera Link® 60 × 60 × 46 mm	LXC-20	M –	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	337
	LXC-40	M –	1" CMOS	CMV4000	2048 × 2048	5.5 × 5.5	180
	LXC-120	M –	APS-C CMOS	CMV12000	4096 × 3072	5.5 × 5.5	63
	LXC-200	– C	35 mm CMOS	CMV20000	5120 × 3840	6.4 × 6.4	32
	LXC-250	M C	APS-H CMOS	PYTHON 25K	5120 × 5120	4.5 × 4.5	32
	LXC-500	M C	35 mm CMOS	CMV50000	7920 × 6004	4.6 × 4.6	15

¹⁾ GigE Vision®: Burst Mode (image acquisition in the camera's internal memory) | interface

Your benefits

- With a resolution of up to 48 megapixel, the finest details are reliably detected even in high-speed applications
- Outstanding sensitivity and excellent image quality allow precise, long-term stable evaluations
- Compact design, Multi I/O and PoE one-cable solution for easy system integration



LXT cameras

Robust, high-resolution 10 GigE cameras for fast image transfer and easy integration.

The LXT cameras combine a high bandwidth of 1.1 GB/s with an easy and cost-effective integration with long cable lengths for copper and even up to 10 km for fiber optic cables – without the need for frame grabbers or media converters. In addition, they are equipped with liquid lens support, Canon® EF control, 4 power outputs and high-performance features such as sequencer, Burst Mode, and the Precision Time Protocol IEEE 1588, which all support solutions for individual applications.



Technical highlights

- 10GBase-T for copper cables or SFP+ slot for optical cables
- 4 power outputs with max. 120 W (max. 48 V / 2.5 A)
- IP 65/67 protection with optional patented modular tube system
- Liquid lens support, Models with Canon® EF-mount
- High-performance functions such as HDR, shading correction, Multi ROI, 5x5 color calculation

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps] ¹⁾
10 GigE Vision® 60 × 60 × 100 mm	VLXT-06.I	M –	1/1.7" CMOS	IMX426	800 × 620	9 × 9	1578 1578
	VLXT-17.I	M –	1.1" CMOS	IMX425	1600 × 1100	9 × 9	660 660
	VLXT-28.I	M –	2/3" CMOS	IMX421	1920 × 1464	4.5 × 4.5	415 411
	VLXT-31.I	M C	1/1.8" CMOS	IMX252	2048 × 1536	3.45 × 3.45	216 216
	VLXT-50.I	M C	2/3" CMOS	IMX250	2448 × 2048	3.45 × 3.45	163 163
	VLXT-55.I	M C	1/1.8" CMOS	IMX537	2464 × 2048	2.74 × 2.74	259 243
	VLXT-71.I	M C	1.1" CMOS	IMX420	3200 × 2200	4.5 × 4.5	209 174
	VLXT-90.I	M C	1" CMOS	IMX255	4096 × 2160	3.45 × 3.45	95 95
	VLXT-123.I	M C	1.1" CMOS	IMX253	4096 × 3000	3.45 × 3.45	69 69
	VLXT-126.I	M C	1/1.1" CMOS	IMX535	4096 × 2992	2.74 × 2.74	119 100
	VLXT-240.I	M C	4/3" CMOS	IMX530	5312 × 4600	2.74 × 2.74	62 50
	VLXT-650.I	M C	2.3" CMOS	GMAX3265	9344 × 7000	3.2 × 3.2	23 18
Canon® EF mount	VLXT-650.I.EF	M C	2.3" CMOS	GMAX3265	9344 × 7000	3.2 × 3.2	23 18
SFP+ Slot for optical cables ²⁾	VLXT-31.FO	M –	1/1.8" CMOS	IMX252	2048 × 1536	3.45 × 3.45	217 217
	VLXT-50.FO	M C	2/3" CMOS	IMX250	2448 × 2048	3.45 × 3.45	163 163
	VLXT-90.FO	M –	1" CMOS	IMX255	4096 × 2160	3.45 × 3.45	95 95
	VLXT-123.FO	M –	1.1" CMOS	IMX253	4096 × 3000	3.45 × 3.45	69 69

¹⁾ Burst Mode (image acquisition in the camera's internal memory) | interface ²⁾ camera dimensions 60 × 60 × 80 mm

Your benefits

- Recognition of finest details in high-speed applications thanks to the excellent image quality with low noise and a dynamic range of more than 82 dB (HDR)
- 10 GigE Vision® for continuously fast image transfer at 1.1 GB/s and easy integration without special frame grabbers
- Bridging of large distances up to 10 km thanks to fiber-optic cables
- Dynamic focus control of liquid lenses and Canon® EF lenses

LXT cameras with integrated JPEG image compression

High-speed image processing at reduced bandwidth, low CPU load and with minor storage capacity requirements.

The LXT cameras with integrated JPEG image compression are ideal for the acquisition of long image sequences at high resolution and speed, where original images can be compressed, transmitted, and stored. The compression rate can be individually adjusted to match the application. Image compression straight in the camera's FPGA takes workload off the PC-based image processing system in the form of computing-intensive algorithms for image compression.



Technische Highlights

- Data reduction within the range 1:10 to 1:20
- Easy and flexible data transmission via GigE
- RS232 for controlling external devices
- PTP compliant to IEEE 1588 for precise time synchronization in Ethernet networks

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [μm]	Full Frames [fps] ¹⁾
10 GigE Vision®	VLXT-06.I.JP	M C	1/1.7" CMOS	IMX426	800 × 608	9 × 9	1622 1622
60 × 60 × 100 mm	VLXT-28.I.JP	M –	2/3" CMOS	IMX421	1920 × 1464	4.5 × 4.5	415 411
	VLXT-31.I.JP	– C	1/1.8" CMOS	IMX252	2048 × 1536	3.45 × 3.45	216 216
	VLXT-90.I.JP	M –	1" CMOS	IMX255	4096 × 2160	3.45 × 3.45	95 95

¹⁾ Burst Mode (image acquisition in the camera's internal memory) | interface

Your benefits

- JPEG image compression takes workload caused by computing-intensive algorithms off the image processing system
- Reduced storage capacity requirements allow for cost-efficient hardware
- Reliable image evaluation thanks to latest Sony® Pregius™ sensors with enhanced image quality, sensitivity and low noise



EX series

Focus on the essential:
small, high-performance cameras with
high Baumer quality at a low price.

Their focus on the essential, standard-compliant basic functionalities make the EX cameras ideally suited for many cost-sensitive standard machine vision applications. In combination with the CS mount, this allows you to lower your system costs in every aspect.



Technical highlights

- Robust 29 × 29 mm metal housing
- M3 mounts at each side
- 4-pin M8 connector
- GigE power supply: external 12 – 24 V

	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [μm]	Full Frames [fps]	
GigE Vision® 29 × 29 × 49 mm	VEXG-13	M –	1/2" CMOS	PYTHON1300	1280 × 1024	4.8 × 4.8	61	
	VEXG-25	M C	2/3" CMOS	PYTHON2000	1920 × 1200	4.8 × 4.8	41	
	Rolling shutter and global reset shutter	VEXG-52.R	M C	1/2.5" CMOS	MT9P031	2592 × 1944	2.2 × 2.2	14
		VEXG-100.R	M C	1/2.3" CMOS	MT9J003	3856 × 2764	1.67 × 1.67	7
USB3 Vision® 29 × 29 × 38 mm	VEXU-24	M C	1/1.2" CMOS	IMX249	1920 × 1200	5.86 × 5.86	38	

Your benefits

- Latest CMOS sensors for future-proof image processing applications
- CS-mount allows the use of cost-effective lenses for lower system costs
- Precise image analysis thanks to the industrial design up to 65 °C



Modular housing accessories

Tough and resilient: flexible protection for demanding applications.

With the specially developed and flexible housing accessories, you can protect the LXT and CX.I cameras as well as AX smart cameras in no time at all according to your individual application requirements.

Thanks to the patented modular tube system, lenses of different lengths and diameters are quickly and flexibly protected against dust, dirt or mechanical impact. This allows the cameras to offer IP 54, IP 65 or IP 67 protection levels.

Different housing sets up to IP 69K are available for applications in the splash and product contact area of the food, beverage and pharmaceutical industries. The hard anodized housing gives dirt traps no chance, while the stainless steel housing eliminates adhesions and withstands even chemically aggressive cleaning processes.



Technical highlights

- Patented modular tube system with variable number of intermediate rings
- Rounded, surface-finished housings withstand intensive cleaning cycles
- Stainless steel housing in washdown design with surface roughness of less than 0.8 µm

	Base set	Material	Thread tube	Cover glass tube	Extension rings
IP 65/67 protection, tube	–	aluminum, hard-anodized	M47	acrylic glass laminated safety glass ¹⁾	6 mm 12 mm 36 mm
	–	aluminum, hard-anodized	M62	acrylic glass laminated safety glass ¹⁾	6 mm 12 mm 36 mm
	–	aluminum, hard-anodized	M92	acrylic glass laminated safety glass ¹⁾	6 mm 12 mm 36 mm
IP 65/67 protection, round ²⁾	Base set A	aluminum, hard-anodized	M62	acrylic glass laminated safety glass ¹⁾	6 mm 12 mm 36 mm
	Base set C ⁴⁾	stainless steel	M62	acrylic glass laminated safety glass ¹⁾	6 mm 12 mm 36 mm
IP 69K protection ³⁾	Base set B	stainless steel	M60	acrylic glass	–

¹⁾ Corning® Gorilla® glass Generation 3 (chemically strengthened aluminosilicate glass with high scratch, impact and fracture resistance or for demanding applications)

²⁾ only for VCXG.I cameras

³⁾ only for VCXG, VCXU and VCXG.I cameras

⁴⁾ available Q4/2021

Your benefits

- Specially developed housing components with optimum price-performance ratio
- Modular tube protection for maximum flexibility in system design
- Ideal thermal tuning enables long-term stable image acquisition
- Developed in accordance with EHEDG guidelines for maximum reliability in hygienic areas



Customer-specific products for your applications.

When standard cameras reach their limits, we can develop customized image processing components for your applications – starting with the simple adaptation of our industrial cameras, through the complete development of an OEM product, to modifications of our software.

Your benefits

- Our know-how: you gain competitive advantage and save time
- Our practice-proven technologies: reliable solutions and investment security
- Our best price-performance ratio: cost reduction and profitability improvement

Made to match: modification of standard cameras.

Perfectly tailored to your application, we can modify our cameras and thus create the right component for your system. This covers:

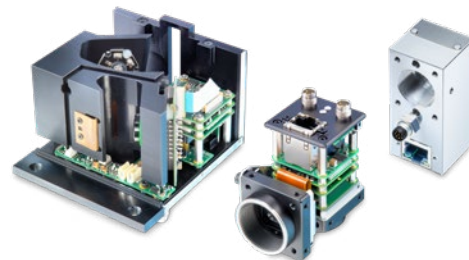
- Modification of hardware (e.g. adjustment of mechanical and electrical interfaces)
- Firmware adaptation (e.g. image preprocessing)
- Branding and labeling (e.g. application of trademarks)



Tailor-made for you: OEM development.

To meet your requirements, we develop OEM components with an optimum price-performance ratio. Our range of services covers:

- Development and production of image processing components
- Complete design of mechanical systems, hardware and software
- Long-term availability



Individually adapted: software & algorithms.

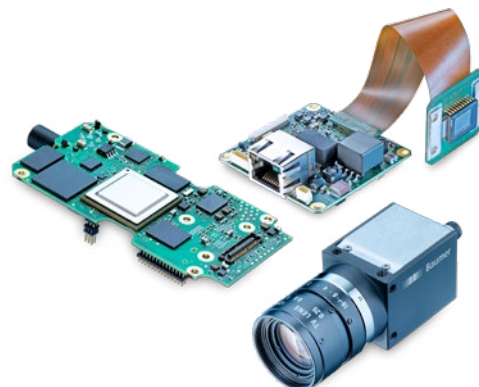
We can offer you different software solutions for optimum system performance, namely:

- Camera integration and image preprocessing with the Baumer GAPI SDK for Windows®, Linux® and Linux® ARM®
- FPGA-based image processing for image enhancement or data reduction in real time
- DSP- / x86- / ARM®-based image processing algorithms



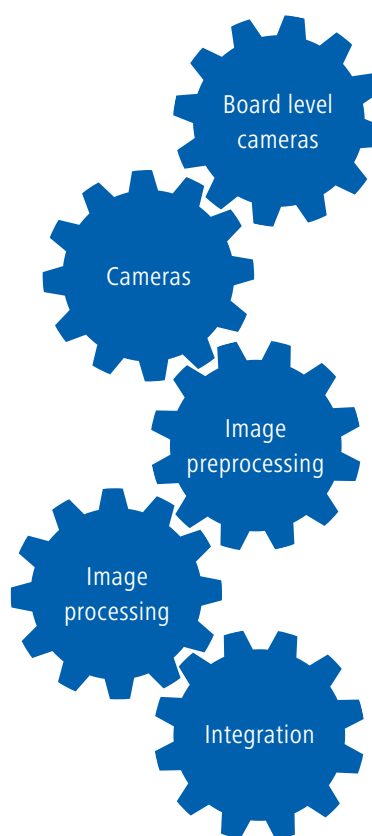
Precisely implemented embedded vision.

For the realization of your embedded vision application, we can offer you a large product portfolio and customer-specific products with long-term availability. In addition, the experienced staff at our Baumer Solution Center can support you with competent advice and feasibility analyses.



Your individual application – our versatile range of products.

- **High flexibility in small spaces:**
Flexible integration (MX series), for example in applications in medical technology, laboratory automation or in the retail trade
- **Large camera portfolio for many industries:**
Compact cameras (CX and LX series) with optional IP 65/67 protection class for applications in mechanical engineering, in the electronics industry, for traffic monitoring, or in microscopy
- **Real-time behavior without additional system components:**
FPGA-based real-time image processing (LX *VisualApplets* cameras) for image enhancement or data reduction, for example in the pharmaceutical, beverages or packaging industry
- **Powerful algorithms can be used flexibly on the latest processors:**
Patented Baumer *FEX*[®] image processor and powerful DSP- / ARM[®]-based algorithms in *VeriSens*[®] vision sensors
- **Quickly and easily integrated:**
Standard-compliant interfaces, protocols (e.g. real-time Ethernet) and flexible software integration under Windows[®], Linux[®] or Linux[®] ARM[®] (Baumer GAPI SDK) together with our accessories and starter kits



Your benefits

- Optimum price-performance ratio for series-type applications
- Long-term availability of customer-specific image processing components
- Support from the Baumer Solution Center
- Easy global procurement and competent support thanks to worldwide presence of Baumer

Intelligent software integration.

The Baumer GAPI and Camera Link® SDK offer you powerful software development kits (SDK) with a generic application programming interface (API) for the easy, quick, and platform-independent integration of our cameras into your application and software environment.

		neoAPI	GAPI SDK v2.x	Camera Link® SDK ¹⁾
Interfaces	GigE / 10 GigE / Dual GigE	▪	▪	—
	USB 3.0	▪	▪	—
	Camera Link®	—	—	▪
Hardware platforms	x86 / x64 Linux® ARM®	▪ ▪	▪ ▪	▪ —
Operating systems	Windows® 7 / 10 Linux®	▪ ▪	▪ ▪	▪ —
Programming languages	C++ C# Python™	▪ ▪ ▪	▪ ▪ —	▪ — —

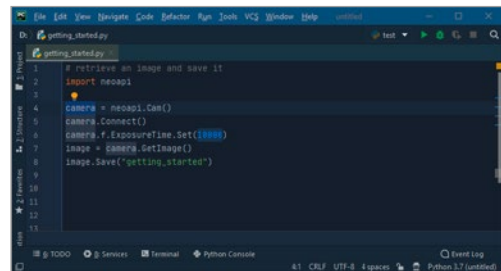
¹⁾ For LX cameras with Camera Link®. Other Baumer cameras with Camera Link® run with GAPI SDK v1.7.1.



Download
Software development kits
www.baumer.com/cameras/SDK

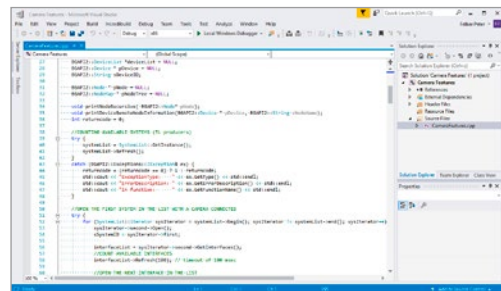
Baumer neoAPI for C++, C# and Python™

The modern, powerful and user-friendly Baumer neoAPI allows you to quickly and easily integrate our cameras in your PC and embedded systems. The integrated automatism cuts the amount of code required down to a minimum, e.g. six lines suffice for image capturing and storage. Auto-complete support not only suggests and completes code fragments but also GenICam™ camera features providing pop-up help windows. Based on the proven SDK Baumer GAPI, you will benefit from very high stability and performance.



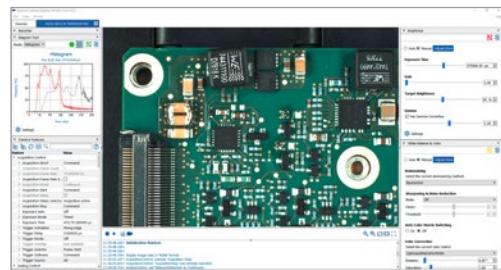
Baumer GAPI SDK for C++ and C#

Baumer GAPI, our popular SDK for single and multi-camera applications, has been proven many times in systems and meets the highest performance requirements at yet low processor load. Consistent GenICam™ and GenTL support enables flexible camera integration into your application and software environment.



Baumer Camera Explorer

Baumer Camera Explorer, the intuitive GUI application, allows for easy camera evaluation and configuration in an instant. The well-structured and clear user interface optimally supports getting to know, testing and configuration of the varied camera features.



Flexibility by compatibility.

Every task in image processing is unique and imposes individual requirements on both camera and related machine vision software. We meet them all.

Flexibility by standard compliance.

Hassle-free compatibility of GenICam™, the Baumer GAPI generic application programming interface, together with standard-optimized drivers for GigE Vision®, USB3 Vision® and Camera Link® simplify camera integration and allow for drop-in replacement across all series.



Third-party software support.

Full compliance to all relevant standards in camera engineering and development, regular compatibility tests and the close cooperation with our software partners give you the freedom to implement user-specific third party software and ensure trouble-free integration of our cameras in any of your application tasks.

Third-party software ¹⁾:



Software partnerships ²⁾:



¹⁾ The list informs you which third party software is compatible with Baumer industrial cameras. The list neither claims to be complete nor includes any recommendation for a specific provider.

²⁾ Software support of individual models may be provider-specific and is recommended for corresponding validation.

Making it all easy.

We provide you with everything you need to integrate our cameras quickly and easily into your systems: From proper network components and accessories up to individual Starter Kits, you will have everything that's necessary.

Matching accessories for your system.

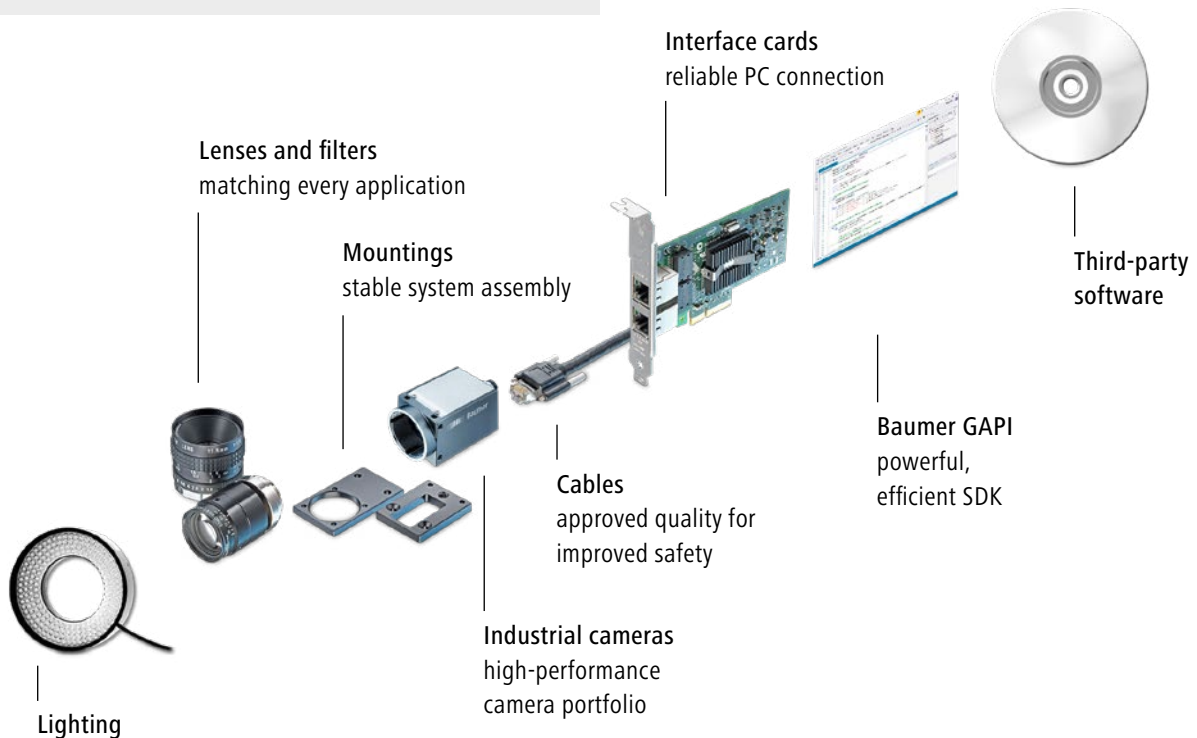
There is more to an image processing system than just a camera: cables, PCI interface cards, filters, adapters and mountings or lenses. We help you find the accessories that match your application and provide you with a comprehensive range of cross-interface accessories that are optimally harmonized. Since a system is only as reliable as its individual components, you can be sure our components have undergone comprehensive testing and inspection – for long-term longevity and reliability in the image processing application.

Starter Kits: Just unpack and go.

Our Starter Kits are individually compiled to match the related camera series and will support you in evaluating a camera. You can focus entirely on the solution while we provide you with everything required for set up – from cable to mountings on to software.



Your Starter Kit
Request your individual
Starter Kit today:
www.baumer.com/vision/starterkits



Proven cameras with long-term availability.

Baumer produces all industrial cameras in-house – giving you top product quality and maximum supply reliability. We thus also ensure the long-term availability of our proven camera series, which are deployed all around the world in countless applications. Rely on us – for years to come!



	Model	Mono Color	Sensor Type	Sensor	Resolution [px]	Pixel Size [µm]	Full Frames [fps]
QX series							
GigE Vision®	VQXT-120.HS	M C	APS-C CMOS	CMV12000	4096 × 3068	5.5 × 5.5	335 92 ¹⁾
LX series							
GigE Vision®							
3D laser triangulation	LXG-20.3D	M –	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	338 56 ¹⁾
JPEG image compression	LXG-20.JP	M C	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	140 56 ¹⁾
	LXG-40.JP	M –	1" CMOS	CMV4000	2048 × 2048	5.5 × 5.5	74 29 ¹⁾
	LXG-250.JP	M –	APS-H CMOS	PYTHON 25K	5120 × 5120	4.5 × 4.5	10 4 ¹⁾
MX series							
GigE Vision®	MXGC20	M –	2/3" CMOS	CMV2000	2040 × 1084	5.5 × 5.5	55
	MXGC40	M –	1" CMOS	CMV4000	2040 × 2044	5.5 × 5.5	29
LX VisualApplets cameras							
GigE Vision®	LXG-20.PS	M –	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	338 56 ²⁾
	LXG-40.P	M –	1" CMOS	CMV4000	2048 × 2048	5.5 × 5.5	74 29 ²⁾
VisiLine® series							
GigE Vision®							
	VLG-22	M C	2/3" CMOS	CMV2000	2040 × 1084	5.5 × 5.5	55
	VLG-23	M C	1/1.2" CMOS	IMX174	1920 × 1200	5.86 × 5.86	53
	VLG-24	M C	1/1.2" CMOS	IMX249	1920 × 1200	5.86 × 5.86	38
	VLG-40	M –	1" CMOS	CMV4000	2040 × 2044	5.5 × 5.5	29
IP 65/67 cameras	VLG-22.I	M C	2/3" CMOS	CMV2000	2040 × 1084	5.5 × 5.5	55
	VLG-40.I	M –	1" CMOS	CMV4000	2040 × 2044	5.5 × 5.5	29
HX series							
GigE Vision®							
	HXG20	M C	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	337 105 ¹⁾
	HXG40	M –	1" CMOS	CMV4000	2048 × 1088	5.5 × 5.5	180 56 ¹⁾
Near Infrared Range	HXG20NIR	M –	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	337 105 ¹⁾
Camera Link®							
	HXC20	M –	2/3" CMOS	CMV2000	2048 × 1088	5.5 × 5.5	337
	HXC40	M C	1" CMOS	CMV4000	2048 × 1088	5.5 × 5.5	180
Near Infrared Range	HXC40NIR	M –	1" CMOS	CMV4000	2048 × 1088	5.5 × 5.5	180

¹⁾ Burst Mode (image acquisition in the camera's internal memory) | interface ²⁾ Image acquisition and evaluation with VisualApplets | interface

Worldwide presence.



Africa

Algeria
Cameroon
Côte d'Ivoire
Egypt
Morocco
Reunion
South Africa

America

Brazil
Canada
Colombia
Mexico
United States
Venezuela

Asia

Bahrain
China
India
Indonesia
Israel
Japan
Kuwait
Malaysia
Oman
Philippines
Qatar
Saudi Arabia
Singapore
South Korea
Taiwan
Thailand
UAE

Europe

Austria
Belgium
Bulgaria
Croatia
Czech Republic
Denmark
Finland
France
Germany
Greece
Hungary
Italy
Malta
Martinique
Netherlands
Norway
Poland
Portugal
Romania
Russia
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom

Oceania

Australia
New Zealand



For more information
about our worldwide
locations go to:
www.baumer.com/worldwide

Represented by:

Force and strain sensors

2 solution approaches for force measurement, 7 designs,
unlimited force ranges



Force and strain sensors from Baumer combine tried and tested technologies with sophisticated innovations

For diverse requirements and specific applications, the product portfolio covers the entire scope of force and strain measurements. The product range contains all components of high performance sensors, intelligent evaluation, and application-specific solutions. Baumer offers the complete range of sensor technology from a single source – compatibility that pays off.

Two solution approaches for maximum flexibility



Force sensors



For smaller forces



Strain sensors



For larger forces

All-round solution for force measurement of the future – simulation, parameterization, intelligent evaluation

Further to the DLM force and the DST strain sensors, Baumer provides the entire measurement chain for force measurements with DAB industrial amplifiers. Thanks to many varied intelligent functions and secondary data, the smart measuring amplifiers and strain sensors with integrated amplifier electronics save valuable time in the setup force measurement solutions and, thanks to data pre-processing, significantly take processing load off the controller.

Quicker solutions to engineering tasks thanks to simulation and test options

- Simple testing of the machine without a physical sensor through remote access
- Simulation of amplification functions for easy commissioning

More cost effective due to flexibly parameterizable interfaces

- Simple and reproducible parameterization of sensors via IO-Link
- Individual matching to specific machines for even more precise measurements
- Analogue signal range can be freely parameterized and adjusted to the measurement range

Maximum machine efficiency thanks to smart additional functions

- Direct output of the process value in different units for simple measurement value monitoring
- Peak value memory for reliable maximum value recognition
- Sample & hold function for the time synchronization of measurement value recording by several sensors
- Low-pass filter for optimized signal/noise ratio

Intelligent functions and supplementary data



Diagnostic data



Input and output parameterizable



Teach by reference



Process value selectable



Alarm state adjustable



Peak detection



Digital switching points



Filter functions



Remote operation possible



Sample & hold



Adjustable measurement range

- Application-specific parameterization of the measurement range
- Setting of the sensitivity via IO-Link through teach by reference or teach by value



Remote operation

- Simple testing of the machine without a physical sensor through remote access
- Simulation of amplification functions for easy commissioning

Force sensors – intelligently coordinated portfolio of force range and installation options

Find the right force sensor for your application quickly and easily

1

- Coordinated portfolio of force range and installation options
- Maximum flexibility due to different connection options
- Uniform thread size within the series independent of the force range

2

Small and flexible force sensors

- Limited sensor diameter for limited spaces
- Simple integration due to various installation options

Robust force sensors for rough industrial environments

3

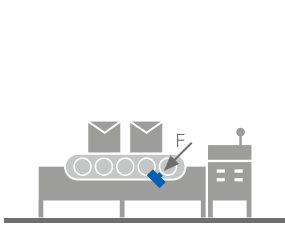
- Stainless steel sensor housing for reliable use in rugged industrial applications
- Hermetically sealed sensors with long service life

4

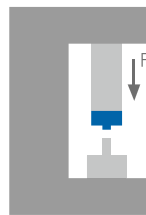
Clever sensor design for reliable force measurement

- Low-fatigue force sensors with 100% oscillatory width for dynamic applications across the entire measurement range

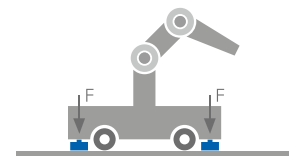
Various applications



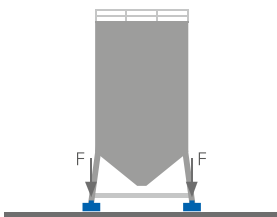
Component load monitoring for ball bearings



Monitoring of the assembly force



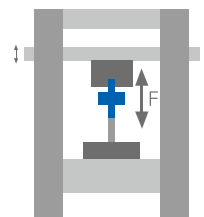
Overload protection



Determination of fill quantities



Monitoring retention forces



Force measuring for testing machines

Strain sensors – cost-efficient force measurement of large forces

For higher force ranges and large constructions, strain sensors are a suitable alternative to force sensors. As opposed to force sensors, strain sensors are not installed directly in the force flow but are screwed onto the surface of the corresponding component. The measured surface strain allows the force to be determined precisely without elaborate component adjustment.

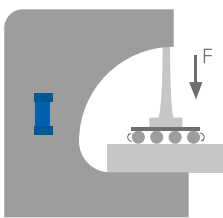


Long-term stable in the smallest design
In laboratory settings, strain gauges are often glued to a component to implement force measurement. However, to obtain constant and precise measurement results in serial production as well, it is easier to use screw-on strain sensors. The miniaturized DST20 strain sensor is a robust alternative for confined spaces.

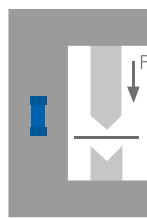
Advantages of strain sensors

- One sensor for different force ranges, machine sizes, and measurement tasks.
- Quick and easy implementation in existing machines and systems thanks to mounting in the force shunt.
- Solutions for industrial applications, robust outdoor applications, and applications in confined spaces.

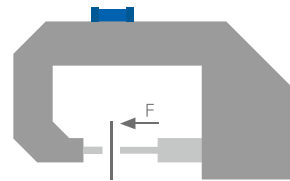
Strain measurement in industrial applications



Retention force regulation

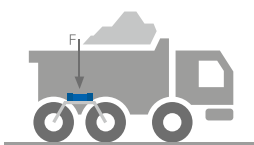


Process monitoring

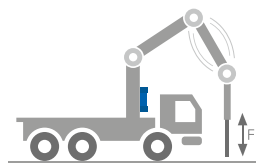


Force monitoring in the fusion process

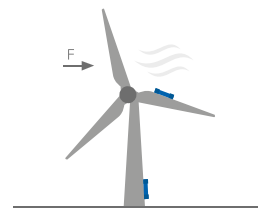
Strain measurement in rough outdoor applications



Weight measurement for construction vehicles



Vibration damping



Load monitoring in wind power plants

Intelligently coordinated portfolio – Find the right force sensor for your application quickly and easily

	Sensor	Product name	Measuring range	Size*	Mechanical connection	Electrical connection	Force direction
Force sensors		DLM20-BU	0 ... 2000 N	ø 19 × 11 mm	4 × M2 / separate	M5, 4-pin	Pressure
		DLM20-SO	0 ... 1000 N	ø 26 × 10 mm	4 × M2 / M4	M5, 4-pin	Compression/pressure
		DLM20-IN	0 ... 1000 N	ø 19 × 16 mm	M4 / M4	M5, 4-pin	Compression/pressure
		DLM30-BU	0 ... 10 000 N	ø 32 × 18 mm	4 × M3 / separate	M8, 4-pin	Pressure
		DLM30-SO	0 ... 5000 N	ø 39 × 18 mm	4 × M4 / M6	M8, 4-pin	Compression/pressure
		DLM30-IN	0 ... 5000 N	ø 26 × 23 mm	M6 / M6	M8, 4-pin	Compression/pressure
		DLM40-BU	0 ... 20 kN	ø 38 × 21 mm	4 × M3 / separate	M8, 4-pin	Pressure
		DLM40-SO	0 ... 20 kN	ø 60 × 26 mm	4 × M6 / M12	M8, 4-pin	Compression/pressure
		DLM40-IN	0 ... 20 kN	ø 41 × 35 mm	M12 / M12	M8, 4-pin	Compression/pressure
		L003	0 ... 100 kN	ø 155 × 46 mm	12 × M10 / M30	M12, 5-pin, Cables	Compression/pressure
Strain sensors		DST20	0 ... 1000 µm/m	28 × 12 × 10 mm	2 × M4	M5, 4-pin	Compression/pressure
		DST53	0 ... 2000 µm/m	70 × 26 × 17 mm	4 × M6	M12, 5-pin	Compression/pressure
		DST55R	0 ... 1000 µm/m	71 × 40 × 21 mm	2 × M8	M12, 5-pin	Compression/pressure
		DST76	0 ... 500 µm/m	89 × 25 × 10 mm	4 × M6	Cable	Compression/pressure

*Sensor height without threading

Customized solutions – force measurement optimally integrated in your application

Standard sensors are often not the right solution when it comes to larger force ranges or specific requirements. Professional project management, understanding of the application, and close collaboration from the idea to serial production decisively contribute to mutual success when developing customized solutions. With our optimized and flexible production processes we ensure reliable and consistent quality even for small or medium-sized production runs.

Our range of services

Force measurement in **industrial applications**

Optimized to your installation situation and application

Professional project management

Innovative development department

Many years of expertise solving customer-specific requirements

Security of investment due to long-term product availability

The path to your solution



Joint analysis of the starting position and development of solution options



Design and FEM analysis of prototypes



Construction of prototypes



Support during testing and commissioning



Serial production



For more information about our force and strain sensors visit:
www.baumer.com/forceandstrain

GAM900/GAM900S

Acceleration precisely measured and safely monitored



The benefits at a glance: Less sensors – more safety

Minimum size, maximum performance

Extremely reliable and robust

- IP 67 protection thanks to encapsulated electronics
- Temperature range $-40 \dots +85 \text{ }^{\circ}\text{C}$

Precise detection of acceleration

- Even at low frequencies of less than 0.5 Hz
- Compensation of temperature drift and installation errors

Fast and simple

- Mechanical integration due to compact design
- Electric integration with Analog and CANopen interface
- Safety chain integration due to limit monitoring with relay output

Simplified implementation of Machinery Directive
due to SIL2/PLd certificate



Precise acceleration for maximum control

Acceleration sensors GAM900 and GAM900S provide the control system with precise acceleration information via CANopen or Analog interface. This way, vibrations can be reduced prior to reaching critically high amplitudes. The selected capacitive MEMS sensors operate with highest precision, especially at small amplitudes, where measuring errors due to cross-axis-sensitivity can be neglected. Therefore, GAM900 and GAM900S are ideally suited for precise acquisition of vibrations e.g. at wind towers.

Configurable filters improve precision and eliminate distortions

Vibration caused measuring distortions can not be excluded, even if acceleration sensors are attached to solid, load-bearing machine parts. GAM900 and GAM900S utilize low-pass or band-pass filters of up to 8th order to efficiently suppress parasitic frequencies, as generated for example by yaw brakes in wind turbines. Offset errors caused by installation errors or temperature drift are efficiently compensated while significantly enhancing accuracy.

Less components, simple integration

The PLd-certified acceleration sensor GAM900S is a 2 in 1 product. It replaces conventional sensors for monitoring of vibration and shock:

- Acceleration sensors for detection of two-dimensional tower vibration and
- mechanical limit switches with relay contact as part of the safety chain.

At the same time, it reduces cable routing effort down to a minimum. Convenient connection to any conventional control system is possible by Analog or CANopen interface. Easy integration into the safety chain is enabled by redundant relay contacts.

Certified components simplify implementation of the Machinery Directive

Based on limit monitoring with SIL2/PLd certificate, the acceleration sensor GAM900S simplifies the safety assessment of the installation and hence the implementation of the Machinery Directive 2006/42/EG.

GAM900S is the ideal sensor when it comes to the implementation of the safety function "protection against excessive shocks and tower vibrations". Due to the integrated limit monitoring including signal processing, there is no necessity for control-specific implementation of safety rated embedded software or application software.

One product, many benefits



Less components, easy integration



Precise acceleration, maximum control



Easy implementation of the Machinery Directive





GAM900 – maximum flexibility

Permanent vibration monitoring is required in many fields of application:

- Anti-sway control at gantry cranes
- Side-sway monitoring at working platforms
- Vibration monitoring at giant machines and installations
- Swing detection at bucket excavators in the mining industry
- Nacelle torsion monitoring at wind turbines

In such applications, GAM900 offers numerous possibilities for configuration for example:

- Free filtering (low-pass, band-pass)
- Adjustable relay switching thresholds
- Definition of the measuring direction

Configuration is a mere child's play.

The PC software GAM900 Configurator enables convenient configuration and diagnostics within few minutes. Predefined configuration files allow for easy and quick parameterization of several sensors.





GAM900S – maximum safety

Vibrations are an everyday occurrence at machines and installations. Acceleration sensor GAM900S detects both vibration and shock to provide the machine control with the information via CANopen or Analog output. The safety relay output can be integrated in any safety system and will be activated as soon as the defined default limit is exceeded.

Four factory-configured frequency bands with different filters enable perfect tuning to the requirements of the individual type of installation.

In wind turbines, the acceleration sensor GAM900S is predestined for implementation of the safety function "protection against excessive shocks and tower vibrations". Permanent monitoring prevents damage or even destruction of the installation.

For corrosive environments of the C5M category, the housing design made of glass-fiber reinforced plastic is ideal and ensures safe longterm operation in offshore installations.



Transmission of the acceleration information via Analog or CANopen interface

Control System

Limit verification by redundant safety relays

Safety System

GAM900S – safety with certificate

Safety rated embedded software and 2-channel hardware with EC type examination

Simplify the implementation of the Machinery Directive – GAM900S as “logic unit for safety functions”.

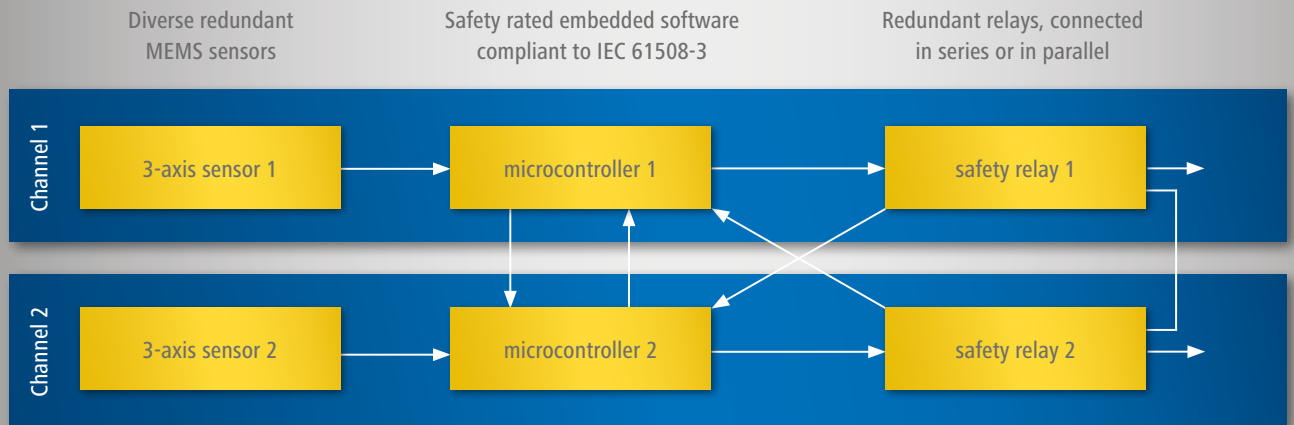
According to Machinery Directive annex IV, logic units for safety functions must comply with increased requirements of the conformity assessment procedure, since in the event of failure their functionality might entail substantial hazards. Compliance to the requirements must be made either by full quality assurance according to annex X or by EC type-examination by a notified body according to annex IX of the Machinery Directive (see safety-relevant information and work sheet No. 300 050, “Logic units for functional safety”, BGIA manual lfg 1/10, II/2010).

The EC type-examination of the acceleration sensor GAM900S by the notified body TÜV Rheinland certifies the compliance with the increased requirements of the conformity assessment procedure according to the Machinery Directive. Further SIL2/PLd certified encoders complete the Baumer portfolio and simplify safety certification of the installation.



A close-up photograph of a hand holding a wooden mallet, about to strike a wooden block. The block has the text 'Certified Functional Safety' printed on it in black. The background is blurred, showing a person in a dark suit jacket.

**Certified
Functional Safety**



Safe detection by diverse redundant sensors

GAM900S incorporates two precise MEMS sensors to reliably detect shock and vibration as prevailing for example at wind towers:

- Diverse redundant sensors to ensure systematic suitability and mandatory identification of common-cause failures.*
- Components from different manufacturers are used, with different designs and different methods of signal processing.

Safe processing by certified software compliant to IEC 61508-3

From specification to validation, the GAM900S safety rated embedded software (SRESW) is compliant with the requirements of the safety standard IEC 61508-3:

- Extensive testings and detailed documentation of the safety-relevant software.
- Guaranteed independence of safety and standard software e.g. used for CANopen communication.
- Certified by TÜV Rheinland: Full compliance to safety integrity levels SIL2/PLd.

Safe monitoring by redundant relays

GAM900S utilizes two relays with readback contact:

- 2-channel addressing of relay and status cross-checked by the SRESW.
- Activation of the test input will identify any undetected error affecting the two relays, resulting for example from welded contacts.
- Depending on customer requirements, the relay contacts are either internally connected in series or available at two separate connectors.

*See IFA position paper "Using standard components or safety components to implement safety functions of machinery", May 2011

Product overview



	GAM900S	GAM900
Sensing principle	2× MEMS capacitive, diverse redundant, 3-axis	1× MEMS capacitive, 3-axis
Band width	0...30 Hz	
Interfaces	Analog (4 ... 20 mA or 0 ... 10 V) and CANopen	
Relay output	Max. 4×, thereof 1× safe, internally redundant, SIL2/PLd compliant	Max. 2 ×
Dimensions W × H × L	55 × 30 × 90 mm	
Material	Glass-fiber reinforced plastic (offshore-capable) or aluminum	
Voltage supply	10 ... 30 VDC	
Connection	1× or 2× M12 connector, 12-pin	
Measuring range	±2 g	
Resolution	<4 mg	
Operating temperature	−40 ... +85 °C	
Protection	IP 67	
Certificates	SIL2/PLd compliant to IEC 61508/ISO 13849-1 UL approval / E63076	UL approval / E63076
Optional	Customer-specific filter and relay configuration	Band width up to 150 Hz

Learn more about our acceleration sensors at:
www.baumer.com/gam



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Baumer

Passion for Sensors

Compact inclination sensors.
Precise. Reliable. Robust.

GIM500R



Angular measurements even in harsh environments.

Acting as a kind of electronic water scale, inclination sensors by Baumer are the perfect alternative to conventional angular measuring technology, particularly where rotation shafts are not accessible. Baumer inclination sensors substantially contribute towards increased safety, for example on vehicles in mobile automation. The robust and seawater-resistant aluminum housing with IP 69K protection makes them ideal for use in harsh environments.

Thanks to ISO 13849 – compliant firmware, it is possible to integrate the inclination sensors into safety functions up to PLd. Final system classification and PLd approval (hardware & software) must only be carried out by the corresponding supervisory authorities.

GIM500R – reliable and precise

Technical highlights

- Absolute accuracy up to $\pm 0.1^\circ$
- Extended temperature range $-40\dots+85^\circ\text{C}$
- High protection against shocks and vibration up to 200 g / 20 g
- Protection rating up to IP 69K
- Corrosion resistance CX (C5-M)
- E1 compliant design
- Applicable up to PLd (ISO 13849)
- Possible redundant use
- User-configurable low-pass filter

Your benefits at a glance

- Accurate positioning thanks to high measuring precision
- Absolute operation reliability in harsh environments
- Maximum flexibility by versatile connection technology
- Excellent price-performance ratio
- Use in safety functions up to performance level PLd
- Output signal reliability by user-configurable filter



High protection



Low temperatures



Extremely high EMC immunity



Extremely robust and compact.

Thanks to their extremely robust and resilient design, the inclination sensors of the GIM500R series are ideal in any environment, particularly in mobile automation. In a saltwater-resistant aluminium housing and with fully encapsulated electronics they ensure operation safety with IP 69K rating.

In addition, the sensors guarantee absolute operation reliability at temperatures from -40 °C to +85 °C. Further optimized enclosure coating makes the sensors endure corrosion up to CX (C5-M) in permanent outdoor deployment.

Thanks to the very compact aluminium housing, the inclination sensors are not only extremely cost-efficient but also provide maximum flexibility in your application design.

The new GIM500R series is ideal for the most limited installation space in heavy machinery and vehicles in mobile automation.



GIM500R: vehicle leveling and boom angle positioning

Easy connection and networking with high flexibility.

Inclination sensors of the GIM500R series excel by simple and convenient connection technology. They are available with the commonly used SAE J1939 and CANopen® DS410 interface and as analog variants with 4...20 mA, 0.5...4.5 V, 0...5 V and 0...10 V. Connection is optionally provided by one or two M12 flange connectors (CAN-in, CAN-out), cable outlet or with DEUTSCH connector fitted to the cable end. Also the variants with analog interface enable calibration to the zero position for compensating installation tolerances.

CANopen®

4...20 mA / 0...5 V
0.5...4.5 V / 0...10 V

SAE J1939

MEMS technology

The Baumer inclination and acceleration sensors operate on the capacitive MEMS technology (micro-electro-mechanical). Compared with alternative technologies, capacitive MEMS sensing components excel by their small size, no moving parts and high cost-effectiveness while in parallel ensuring absolute operation reliability in the harshest environments. The capacitive MEMS sensing elements deployed by Baumer are particularly designed for tough applications in mobile automation, and their long-term availability is assured.

Product overview GIM500R



	GIM500R 1-dimensional	GIM500R 2-dimensional
Sensing method	MEMS capacitive	
Size (housing)	48 × 24 × 52 mm	
Sensing range	0...90° 0...120° 0...180° 0...270° 0...360°	±10° ±30° ±45° ±60° ±90°
Interface	8...36 VDC / CANopen® (Option: terminating resistor integrated) 8...36 VDC / SAE J1939 (Option: terminating resistor integrated) 8...36 VDC / analog 0...5 V / 0.5...4.5 V / 0...10 V 8...36 VDC / analog 4...20 mA	
Connection	Cable 1 m (default 4×2×0.14 mm²) Flange connector M12, 5-pin, male contacts Flange connector M12, 8-pin, male contacts Flange connector 2× M12, 5-pin, male and female contacts Option: resilient 0.34 mm² core cross section matching also cables with mobile automation connection technology (e.g. DEUTSCH)	
Total resolution	0.01° (CANopen®, SAE J1939), 12 bits (Analog)	
Accuracy	Typ. ±0.1° (+25 °C)	
Operating temperature	-40...+85 °C	
Protection	IP 66, IP 67, IP 68, IP 69K	
Filter	The customer-configurable low-pass filter supports compensation of external interference and vibration. Limit frequency configurable within 0.1...25 Hz	

Learn more about our GIM500R series at:
www.baumer.com/inclination

Dynamic inclination sensors GIM700DR.

Enhanced efficiency and control

The motion-compensated GIM700DR inclination sensors set new standards in terms of signal quality and response time especially in dynamic applications. Thanks to sensor data fusion of 6-degree-of-freedom MEMS sensors for acceleration and gyroscope, they are extremely responsive and precise, especially when external accelerations are involved. The rugged design offers highest availability under harshest environmental conditions.

Highest precision in dynamic applications

- Uniaxial and biaxial inclination measurement with compensation of external accelerations
- High signal quality and fast response time due to powerful, field-proven sensor fusion algorithms
- Six-degree-of-freedom inertial measurement unit (IMU)
- Output of raw data for acceleration and rotation rate for additional applications

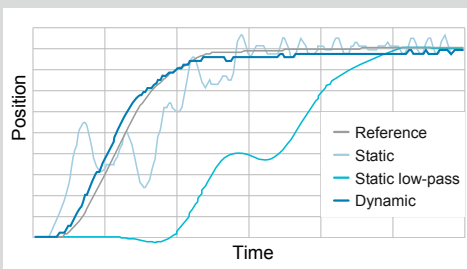
Extremely durable and space-saving design

- Robust R-series for use under the toughest environment conditions
- Protection up to IP 67 & IP 69K, corrosion protection CX (C5-M)
- E1 compliant design
- Extended temperature range -40 ... +85 °C
- Flat design (27 mm) for use in confined spaces
- Configuration flexibly adaptable to the application



Principal fields of application

- Mobile machines
- Off-highway machinery
- Cranes & construction machines
- Agriculture & forest machinery
- Fire-fighting & municipal vehicles
- Automatic guided vehicles (AGV)
- Automatic assembling & boring / drilling machines
- Robotics applications



Motion compensated position

The reliable, precise and fast measurement of the angular position of moving machine parts in real time is the key to maximum dynamics, control and safety. The GIM700DR enables this position measurement with highest dynamics and precision through unsurpassed signal quality, robustness, high resolution and minimal following error. This is results in increased efficiency, reduced wear, and improved ease of use.

Product overview GIM700DR



	GIM700DR 1-dimensional	GIM700DR 2-dimensional	GIM700DR 2-dimensional
Installation	Vertical	Horizontal	Vertical
Measuring range	0 ... 360°	±90° / ±180°	±90° / ±180°
Size (housing)	77 x 62 x 27 mm		
Sensing method	MEMS (6 degrees-of-freedom) Acceleration 3-axial ±6 g Gyroscope 3-axis up to ±250° / sec		
Voltage supply / interface	8 ... 36 VDC / CANopen® 8 ... 36 VDC / SAEJ1939		
Connection	Flange connector 2 x M12, 5-pin (plug, socket)		
Resolution	0.01°		
Accuracy (typ., 25 °C)	±0.3° static ±0.5° dynamic		
Operating temperature	-40 ... +85 °C		
Protection	IP 67 / IP 68 / IP 69K		
Comfort functions	Low pass filter, configurable		

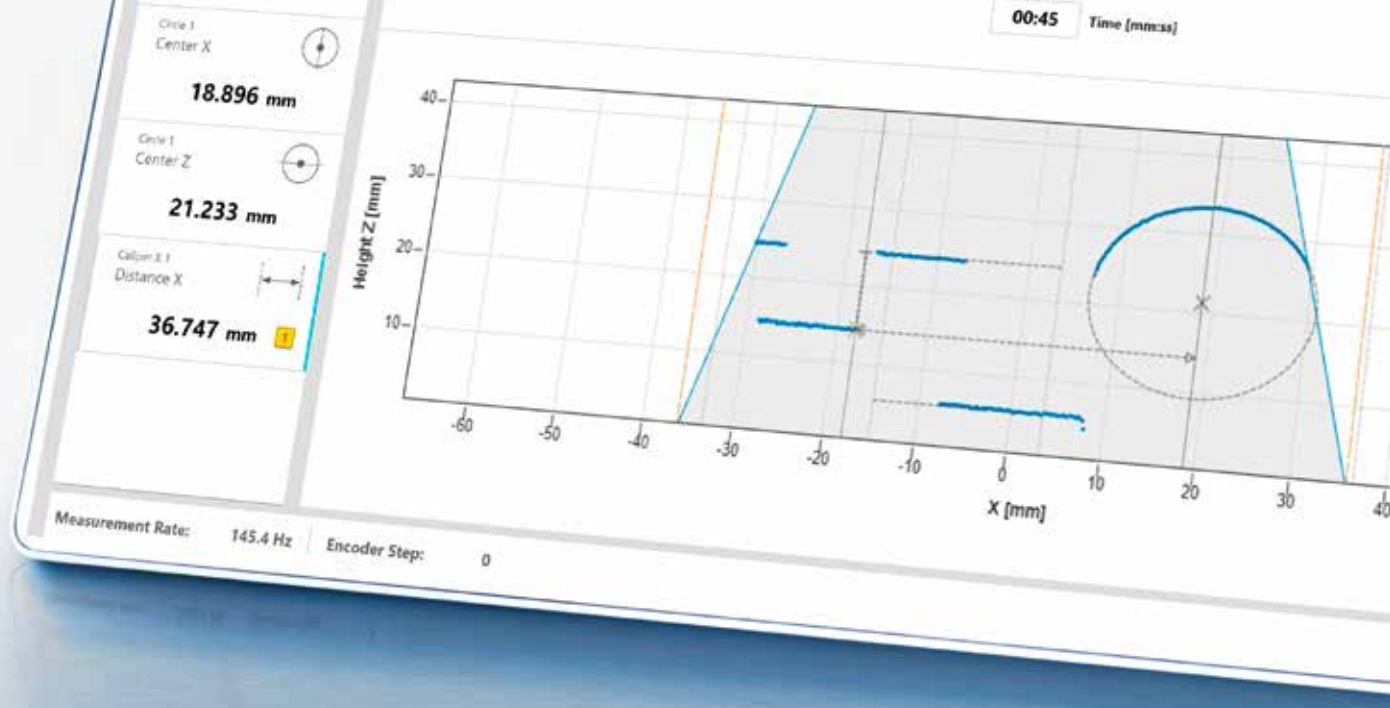
Learn more about our GIM700DR series at:
www.baumer.com/dynamic-inclination

Find your local Partner: www.baumer.com/worldwide

Simply intelligent checking and controlling

OX200 – Smart profile sensors for efficient inline checks and multidimensional control tasks.





OX200 – Unique multi-tool profile sensors

The smart profile sensors of the OX200 family allow efficient profile analysis with an almost unlimited operating range. The profile sensor OXP200 is optimized for integration into image processing systems. Thanks to the freely available SDK (software development kit), the sensor can be individually adjusted to every application.

With the multi-tool profile sensor OXM200, Baumer offers uniquely simple handling. Featuring an extensive set of integrated measurement functions, it supports efficient inline or offline tests without detailed image processing expertise.

Applications

Checking and inspection

- Checks and verification of object geometries (e.g., height measurement of seals, inspection of surfaces, etc.)
- Inline quality controls of object geometries in the 1/10 mm range

Measuring operations

- Axial diameter measurements
- Edge, crack, and gap and flush measurements

Control and regulation tasks

- Position control of feed parts
- Vision Guided Robotics (control of the robot positioning)
- Pick & Place (control of robot grabber arms)
- Position control of parts



Smart all-in-one multi-tool for the quick resolution of individual measurement tasks

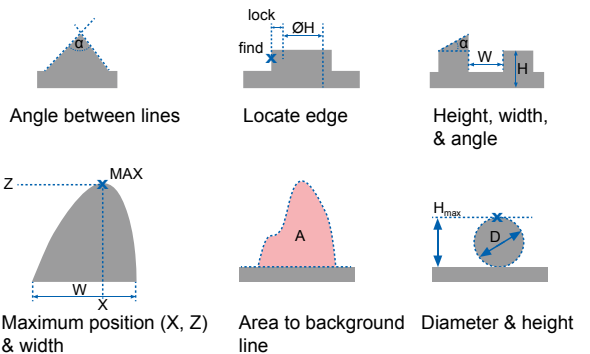
Smart multi-tool

- Integrated measurement functions (multi-tools) for extensive profile analysis
- Linking of measurement tools for multifaceted analysis
- Free configuration of up to 7 measured values in the web browser
- Position tracking of evaluation windows for checking varying positions of a measured part

Compact measuring instrument

- Compact, light design with IP 65 housing and simple wiring for mounting on robot arm
- No external illumination required
- Thanks to Power-over-Ethernet (POE) functionality, the sensor can be used with a single cable

Example of smart measurement functions



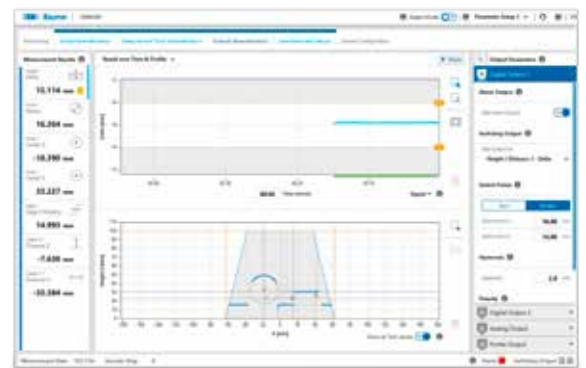
Best-in-class usability and live analysis

Easy setup and handling

- Configuration of the required measurement task with graphic support via the intuitive Baumer web interface
- Storage of up to 32 sets of parameters in the sensor; additional sets can be stored externally
- Quick commissioning of the calibrated sensors (plug & play functionality) without software installation or special expertise

Live analysis and monitoring

- Seeing with the eyes of the sensor – in real time
- Quick analysis through intuitive visual feedback of the algorithms



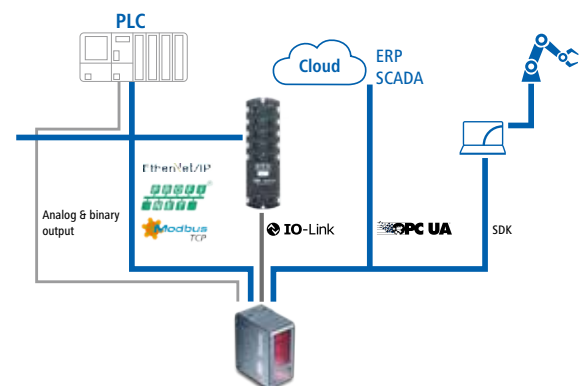
Easy integration into automation systems and additional data for condition monitoring

Connected Smart Sensor

- Easy integration into the automation environment thanks to large selection of interfaces and protocols (PROFINET, EtherNet/IP, Modbus TCP, IO-Link, analog output)
- Direct connection to IT and cloud integration with OPC UA as well as to image processing systems with an SDK (profile data via UDP streaming)
- Encoder input for the correlation of the collected measurement data and profiles with external processes

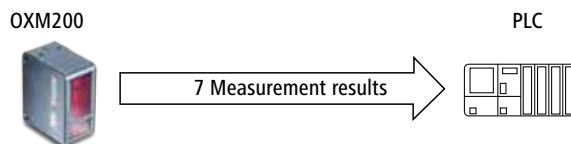
Diagnostic data

- Simple access to various digital diagnosis data such as, e.g., temperature or operating hours for increased equipment effectiveness (OEE)



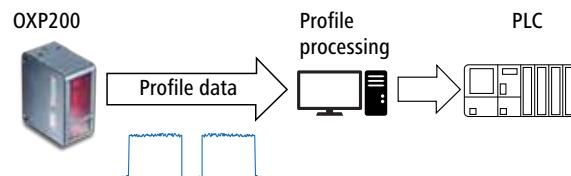
OXM200 – Integrated smart functions

- The sensor is equipped with smart measurement functions and integrated image processing and delivers results in mm
- Various measuring functionalities: e.g. height, edge, width, gap, angle, distances
- Combination of different measurement values
- Region of interest (ROI) tracking



OXP200 – Profile data for image processing systems

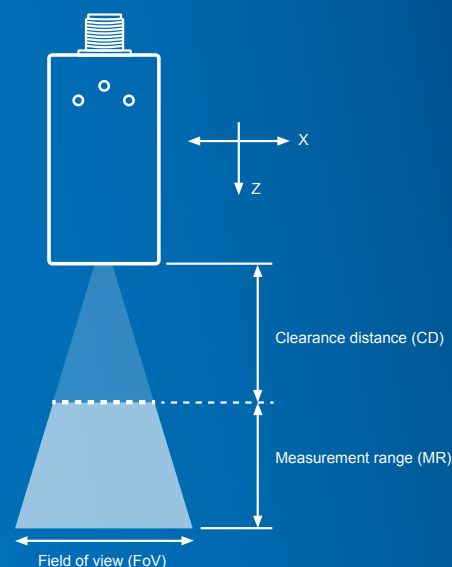
- Output of calibrated 2D point cloud for further external PC processing
- Sensor parameterization via intuitive web interface or freely available SDK with sample code
- Integrated encoder input to synchronize profile image of moving objects with belt speed



Product overview OX200



	OXP200-R05C OXM200-R05A	OXP200-R10C OXM200-R10A
Measurement range (MR)	50 mm	100 mm
Clearance distance (CD)	100 mm	150 mm
Field of view (FoV)	48 ... 72 mm	75 ... 125 mm
Resolution X (points per profile)	600 px	
Resolution Z _{ave} (µm)	8 ... 15 µm	12 ... 18 µm
Laser class	2	
Wavelength	Red (660 nm)	



More information can be found at: www.baumer.com/OX200

Find your local partner: www.baumer.com/worldwide

Process sensors

Product overview



Partnership.

Precise.

Pioneering.

Visibly better: Baumer sensors.

The Baumer Group is leading at international level in the development and production of sensors, shaft encoders, measuring instruments as well as components for automatic image processing. As an owner-managed family business, we employ about 2700 workers worldwide in 39 subsidiaries and 19 countries. With marked customer orientation, consistently high quality and vast innovation capability, Baumer develops specific solutions for many industries and applications worldwide.

Our standards – your benefits.

- Passion coupled with expertise – both have made us a sensor pioneer and technology leader
- Our range of services is hard to beat – we have the right product, developed by our own team, for every task
- Inspiring through innovation – a challenge Baumer employees take on every day
- Reliability, precision and quality – our customers' requirements are what drives us
- Partnership from the start – together with our customers we develop suitable solutions
- Always a step ahead – thanks to our production depth, our flexibility and our delivery reliability
- Available worldwide – Baumer is Baumer everywhere



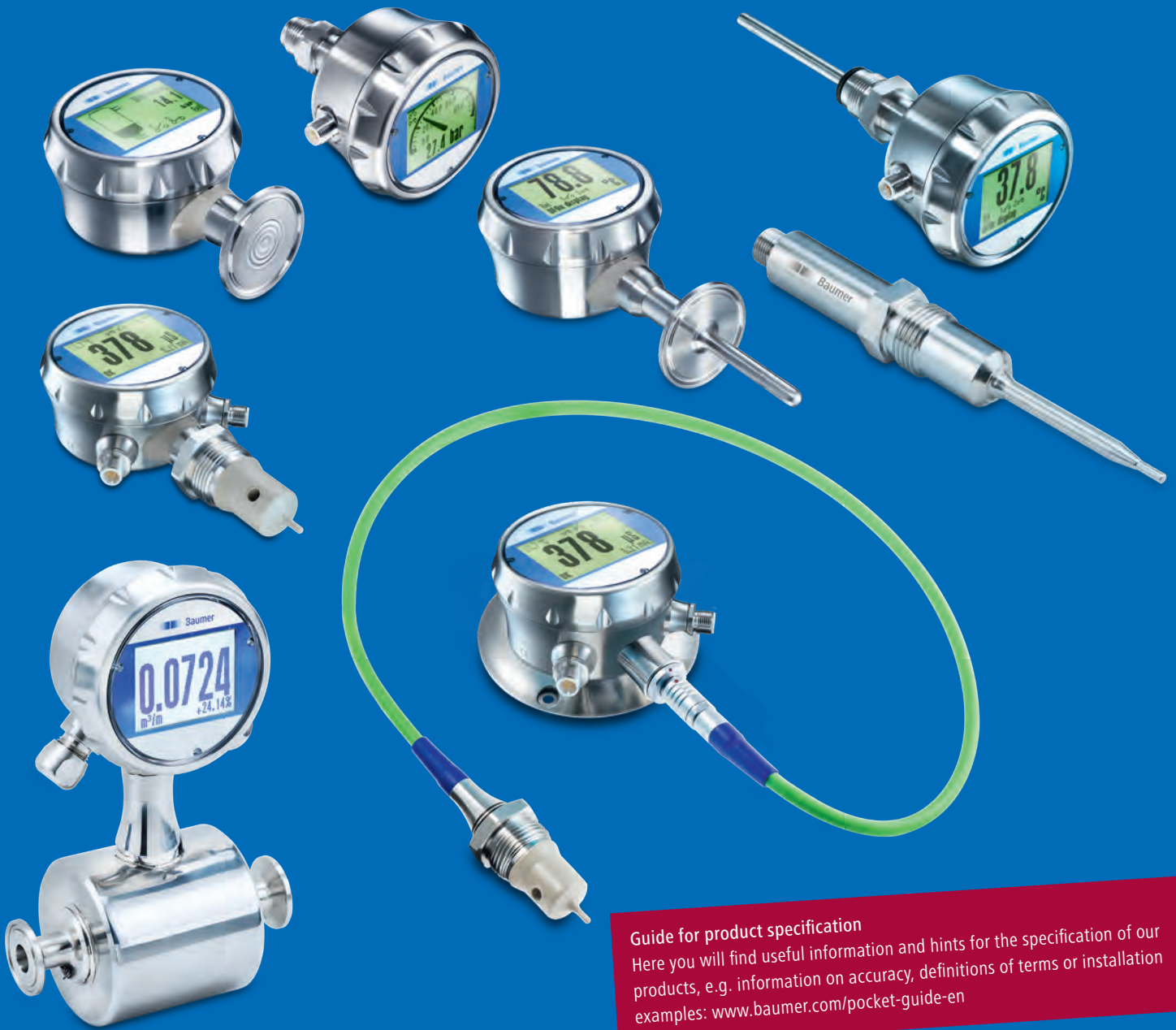


Baumer – rely on our technological advantage

Sophisticated and proven products, top precision and expert consultancy – Baumer meets all these demands in every respect. Our broad product portfolio provides optimally suited, dependable solutions, which provide a one-stop solution to meet your individual requirements. Our longstanding expertise, practical insights and technological supremacy give you the control you need to maximize production and equipment performance as well to reduce downtime and maintenance to a minimum.

Customization – our understanding of individual needs

Operating worldwide and present across the globe, we are always close to provide you with competent on-site support. The customer is at the very heart of our services, and our level of commitment is characterized by taking swift and effective action to respond to our customers' needs. Furthermore, beside our standard portfolio, we are specialized to produce your individual product in terms of your application demands.



Guide for product specification
 Here you will find useful information and hints for the specification of our products, e.g. information on accuracy, definitions of terms or installation examples: www.baumer.com/pocket-guide-en

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Hygienic pressure sensors

- Fast and high-precision pressure measurement
- Safety thanks to certified hygiene design, 3-A, FDA-compliant, EHEDG-certified
- Intuitive handling and simple process implementation
- All standard hygiene connections available
- Pressure measuring ranges from -1 ... 0 bar to 0 ... 400 bar



IO-Link



IO-Link

	PP20H	CombiPress® PFMH	PBMH hygienic
Product highlights	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ Resistant to all conventional CIP cleaning media ■ Condensation-resistant measuring cell ■ Optional with IO-Link (parallel to 4 ... 20 mA) ■ Space-saving installation from DN 25 	<ul style="list-style-type: none"> ■ Resistant to all conventional CIP cleaning media and SIP-enabled ■ Programmable via touchscreen ■ Optional with additional relay outputs 	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ 3-A sanitary standards, FDA-compliant, EHEDG-certified ■ Resistant to all conventional CIP cleaning media and SIP-enabled ■ Surface roughness $\leq 0.8 \text{ Ra}$
Measuring ranges	-1 ... 40 bar	-1 ... 0 bar to 0 ... 60 bar	-1 ... 0 bar to 0 ... 40 bar
Media temperature	-20 ... +125 °C	-40 ... +125 °C -40 ... +200 °C (with cooling section)	-40 ... +125 °C -40 ... +200 °C (with cooling section)
Technology	Piezoresistive pressure measurement	Silicon piezoresistive	Silicon piezoresistive
Material of the parts in contact with the media	AISI 316L (1.4404)	AISI 316L (1.4404) AISI 316L (1.4435)	AISI 316L (1.4404) AISI 316L (1.4435)
Precision (max. measurement error)	$\pm 0.5 \%$ FSR $\pm 1.0 \%$ FSR, 0 ... 0.4 bar	$\leq 0.1 \%$ FS (NP $\geq 400 \text{ mbar}$) $\leq 0.25 \%$ FS	$\leq 0.1 \%$ FS (NP $\geq 400 \text{ mbar}$) $\leq 0.25 \%$ FS
Output signal	4 ... 20 mA 2-conductor IO-Link 1.1	4 ... 20 mA + HART®	4 ... 20 mA 0 ... 10 V IO-Link 1.1
Overload limit	Factor 2	$> 3 \times \text{NP}$	$> 3 \times \text{NP}$
Electrical connection	M12-A, 4-pin M12-A, 5-pin	M12-A, 5-pin M12-A, 8-pin Cable screw connection, M16	M12-A, 4-pin DIN 43650 Shielded cable
Protection category	IP 67, without plug connection M12-A, 4-pin IP 69, with suitable cable	IP 67, IP 69K	IP 65, IP 67
Conformity and approvals	3-A EHEDG UL EAC	ATEX 3-A EHEDG UL EAC	ATEX 3-A EHEDG UL EAC
Process connections	For various process connection options see the enclosed selection guide		
Additional information		<ul style="list-style-type: none"> ■ External programming with FlexProgram ■ Optional electropolished process connection 	<ul style="list-style-type: none"> ■ External programming of the zero point and measuring range with FlexProgram

Pressure sensors for industrial applications with flush membrane

- Process connection with cavity-free design
- Compact installation from G 1/2 A
- Absolute pressure, relative pressure and vacuum measurement

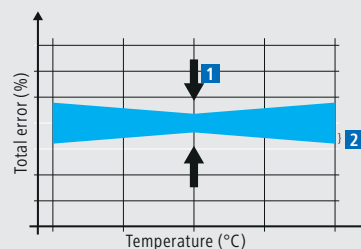


IO-Link

	CombiPress® PFMN	PBMN flush
Product highlights	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ Programmable via touchscreen ■ Dead space-free process connection ■ Optional with relay outputs 	<ul style="list-style-type: none"> ■ Flush-mounted diaphragm ■ Fully welded version ■ Robust stainless steel housing ■ High overpressure resistance
Measuring ranges	-1 ... 0 bar to 0 ... 400 bar	-1 ... 0 bar to 0 ... 400 bar
Media temperature	-40 ... +125 °C -40 ... +200 °C (with cooling section)	-40 ... +125 °C -40 ... +200 °C (with cooling section)
Technology	Silicon piezoresistive	Silicon piezoresistive
Material of the parts in contact with the media	AISI 316L (1.4404) AISI 316L (1.4435)	AISI 316L (1.4404) AISI 316L (1.4435)
Precision (max. measurement error)	≤ 0.1 % FS (NP ≥ 400 mbar) ≤ 0.25 % FS	≤ 0.1 % FS (NP ≥ 400 mbar) ≤ 0.25 % FS
Output signal	4 ... 20 mA + HART® 2× PNP switching output	4 ... 20 mA 0 ... 10 V IO-Link 1.1
Overload limit	3× NP, max. 690 bar	3× NP, max. 690 bar
Electrical connection	M12-A, 5-pin M12-A, 8-pin Cable screw connection, M16	M12-A, 4-pin M12-A, 5-pin DIN 43650 Shielded cable
Protection category	IP 67, IP 69K	IP 65, IP 67
Conformity and approvals	ATEX	ATEX, UL, EAC
Process connections	For various process connection options see the enclosed selection guide	
Additional information	<ul style="list-style-type: none"> ■ Internal setting of the zero point ■ External programming with FlexProgram 	<ul style="list-style-type: none"> ■ External programming of the zero point and measuring range with FlexProgram

Pressure sensors from Baumer are exceptionally precise

The total error band indicates the maximum measurement error (zero point and measured range error, non-linearity, hysteresis, and non-repeatability according to EN 61298-2) and the temperature drift across a temperature range.



- 1 Max. measuring error at ambient temperature
- 2 Thermal drift

Pressure sensors for industrial applications

- For applications in gases, fluids and hydraulics
- Robust and durable even under extreme conditions
- Simple process implementation
- All standard industry connections available
- Pressure measuring ranges from -1 ... 0 bar to 0 ... 1600 bar



IO-Link



	CombiPress® PFMN	PBMN low pressure	PBMN high pressure	PBSN
Product highlights	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ Programmable via touchscreen ■ Dead space-free process connection ■ Optional with relay outputs 	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ Excellent precision and active temperature compensation for precise pressure measurements ■ Universally applicable thanks to fully welded and robust stainless steel housing 	<ul style="list-style-type: none"> ■ Relative pressure measurement ■ Precision measurement from 60 to 1600 bar ■ Excellent thermal stability ■ High overpressure resistance 	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ Robust stainless steel housing and abrasion-resistant ceramic cell for harsh ambient conditions
Measuring ranges	-1 ... 0 bar to 0 ... 400 bar	-1 ... 0 bar to 0 ... 40 bar	0 ... 60 bar to 0 ... 1600 bar	-1 ... 0 bar to 0 ... 600 bar
Media temperature	-40 ... +125 °C -40 ... +200 °C (with cooling section)	-40 ... +120 °C	-40 ... +120 °C	-40 ... +125 °C
Technology	Silicon piezoresistive	Silicon piezoresistive	Metal thin film	Ceramic thick film
Material of the parts in contact with the media	AISI 316L (1.4404) AISI 316L (1.4435)	AISI 316L (1.4404)	AISI 316L (1.4404)	AISI 316L (1.4404) Ceramic (96 % Al2O3) NBR, EPDM, FKM
Precision (max. measurement error)	≤ 0.1 % FS (NP ≥ 400 mbar) ≤ 0.25 % FS	≤ 0.1 % FS (NP ≥ 400 mbar) ≤ 0.25 % FS	≤ 0.1 % FS ≤ 0.25 % FS	≤ 0.5 % FS ≤ 0.7 % FS
Output signal	4 ... 20 mA + HART®	4 ... 20 mA 0 ... 10 V IO-Link 1.1	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V
Overload limit	3× NP, max. 690 bar	3× NP	> 2× NP	> 2× NP, max. 600 bar
Electrical connection	M12-A, 5-pin M12-A, 8-pin Cable screw connection, M16	M12-A, 4-pin M12-A, 5-pin DIN 43650 Shielded cable	M12-A, 4-pin DIN 43650 Shielded cable	M12-A, 4-pin DIN 43650 Shielded cable
Protection category	IP 67, IP 69K	IP 65, IP 67	IP 67, IP 69K	IP 65, IP 67
Conformity and approvals	ATEX	ATEX UL EAC	ATEX UL EAC	
Process connections	For various process connection options see the enclosed selection guide			
Additional information	<ul style="list-style-type: none"> ■ Internal setting of the zero point ■ External programming with FlexProgram 	<ul style="list-style-type: none"> ■ External programming of the zero point and measuring range with FlexProgram 	<ul style="list-style-type: none"> ■ External programming of the zero point and measuring range with FlexProgram 	<ul style="list-style-type: none"> ■ External programming of the zero point and measuring range with FlexProgram

Customized solutions are our passion! One of our strengths is to match our products to your individual demands.





	PBM4	CTL/CTX	CPX
Product highlights	<ul style="list-style-type: none"> ■ Relative pressure measurement ■ Application in hydraulics ■ Fully welded dry measurement cell ■ CANopen as an option 	<ul style="list-style-type: none"> ■ Relative pressure and vacuum measurement ■ Robust ceramic cell ■ Stainless steel housing ■ Compact design 	<ul style="list-style-type: none"> ■ Absolute pressure, relative pressure and vacuum measurement ■ OEM applications ■ 2 switching outputs: PNP transistors ■ Compact and robust stainless steel housing
Measuring ranges	0 ... 10 bar to 0 ... 1000 bar	-1 ... 0 bar to 0 ... 200 bar	-1 ... 0 bar to 0 ... 600 bar
Media temperature	-40 ... +150 °C	-40 ... +100 °C	-20 ... +100 °C
Technology	Metal thin film	Ceramic thick film	Ceramic thick film
Material of the parts in contact with the media	AISI 630 (1.4548)	CTL: brass CTX: AISI 316L (1.4404) Ceramic (96 % Al ₂ O ₃) NBR, EPDM, FKM	AISI 316L (1.4404) Ceramic (96 % Al ₂ O ₃) NBR, EPDM, FKM
Precision (max. measurement error)	≤ 0.5 % FS	≤ 0.5 % FS (BFSL)	≤ 0.5 % FS (BFSL)
Output signal	4 ... 20 mA 1 ... 6 V 0 ... 5 V 0 ... 10 V 0.5 ... 4.5 V ratiometric	4 ... 20 mA 0 ... 10 V 1 ... 5 V 0.5 ... 4.5 V ratiometric	2× PNP switch
Overload limit	> 2× NP, max. 1200 bar	> 2× NP, max. 360 bar	> 2× NP, max. 500 bar
Electrical connection	M12-A, 5-pin	M12-A, 4-pin DIN 43650 Shielded cable	M12-A, 5-pin DIN 43650
Protection category	IP 67	IP 65, IP 67	IP 65, IP 67
Conformity and approvals	ATEX UL	UL	
Process connections	For various process connection options see the enclosed selection guide		
Additional information			<ul style="list-style-type: none"> ■ External programming of the switching thresholds with FlexProgram

Autoclavable pressure sensors

- High-precision and stable pressure measurement
- Safety thanks to certified hygiene design
- Fully autoclavable pressure sensor
- Pressure measuring ranges from -1 ... 0 bar to 0 ... 40 bar



PBMH autoclavable

Product highlights	<ul style="list-style-type: none"> ■ For standard sterilization processes ■ High temperature resistance ■ Surface roughness $\leq 0.8 \text{ Ra}$ ■ Fully welded compact design for residue-free cleaning processes
Measuring ranges	-1 ... 0 bar to 0 ... 40 bar
Media temperature	-10 ... +125 °C -10 ... +200 °C (with cooling section)
Technology	Silicon piezoresistive
Material of the parts in contact with the media	AISI 316L (1.4435)
Precision (max. measurement error)	$\leq 0.1 \% \text{ FS}$ $\leq 0.25 \% \text{ FS}$
Output signal	4 ... 20 mA 0 ... 10 V IO-Link 1.1
Overload limit	$> 3 \times \text{NP}$
Electrical connection	M12-A, 4-pin M12-A, 5-pin Fischer connection, 4-pin
Protection category	IP 67
Conformity and approvals	3-A EHEDG UL EAC
Process connections	For various process connection options see the enclosed selection guide
Additional information	<ul style="list-style-type: none"> ■ External programming with FlexProgram ■ Optional electropolished process connection

Railway-certified pressure sensors

- Safety thanks to EN 50155 certification
- Secured long-term product availability
- Extensive expertise in railway applications
- Pressure measuring ranges from -1 ... 40 bar to 0 ... 250 bar



	EF6	PBMR	PP20R
Product highlights	<ul style="list-style-type: none"> ■ Robust stainless steel housing for harsh ambient conditions ■ High EMV protection ■ Maintenance-free 	<ul style="list-style-type: none"> ■ Excellent precision and long-term stability up to $\leq 0.1\%$ FS ■ Active temperature compensation across the entire operational temperature range ■ Sensor element fully welded with the stainless steel housing 	<ul style="list-style-type: none"> ■ High insulation strength of 1 kV AC exceeds the standard EN 50155 ■ High precision across an extensive temperature range (-40 ... 125 °C) through active temperature compensation ■ Enhanced EMV strength compared to EN 50121-3-2 ■ Traceability according to GS1 standard
Measuring ranges	0 ... 2.5 bar to 0 ... 250 bar	-1 ... 0 bar to 0 ... 40 bar	-1 ... 400 bar
Media temperature	-40 ... +125 °C	-40 ... +120 °C	-40 ... +125 °C
Technology	Ceramic thick film	Silicon piezoresistive	Ceramic thick film
Material of the parts in contact with the media	AISI 316L (1.4404) Ceramic (96 % Al ₂ O ₃) FVMQ, NBR, EPDM, FKM	AISI 316L (1.4404) AISI 316L (1.4435)	AISI 304 (1.4301) Ceramic (96 % Al ₂ O ₃) FVMQ, NBR, EPDM, FKM-(VitonR)
Precision (max. measurement error)	$\leq 0.5\%$ FS	$\leq 0.1\%$ FS (NP ≥ 400 mbar) $\leq 0.25\%$ FS $\leq 0.5\%$ FS	$\pm 0.3\%$ FSR $\pm 0.5\%$ FSR $\pm 1.0\%$ FSR
Output signal	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 10 V	4 ... 20 mA 0 ... 2 V 1 ... 5 V 0 ... 10 V
Overload limit	$> 2 \times$ NP	$> 3 \times$ NP	32 bar (approx. factor 2 depending on the pressure area)
Electrical connection	M12-A, 4-pin DIN 43650 Shielded cable	M12-A, 4-pin DIN 43650	M12-A, 4-pin DIN EN 175301-803 A (DIN 43650 A), 4-pin
Protection category	IP 65, IP 67	IP 65, IP 67	IP 65, IP 67, IP 69K
Conformity and approvals	EN 50155 (railway applications)	EN 50155 (railway applications) UL EAC	EAC EN 50155 (railway applications)
Process connections	For various process connection options see the enclosed selection guide		

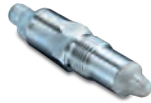
Level switch *CleverLevel*[®]

Easy and universal point level detection for all media

- Independent of the media: liquid, pasty, viscid, or solid
- Differentiates foam and liquid, recognizes separating layers
- Simple cleaning and maintenance
- Compact sensor for very small installation areas



 IO-Link



CleverLevel[®] PL20 Adaptive-Trigger

Product highlights	<ul style="list-style-type: none"> ■ Active adaptation to medium, no parameterization ■ Analog output ■ Two adjustable switching outputs ■ Minimal immersion depth ■ Application-specific switching functions ■ Unaffected by adhesion ■ Multi-color 360° LED activity indicator
Application examples	For all point level applications, especially suited for adhering media, CIP cleaning, and for media with different dk values
Media temperature	-40 ... +135 °C max. (t < 1 h)
Output signal	PNP, NPN, Digital (push-pull), 4 ... 20 mA, programmable IO-Link 1.1
Material of the parts in contact with the media	PEEK AISI 316L (1.4404)
Protection category	IP 67, IP 69K
Conformity and approvals	3-A EHEDG EN 50155 (railway applications)
Process connections	For various process connection options see the enclosed selection guide
Additional information	<ul style="list-style-type: none"> ■ Multiple trigger functions in one sensor



	<i>CleverLevel</i> [®] LBFS	<i>CleverLevel</i> [®] LBFI	<i>CleverLevel</i> [®] LBFH	<i>CleverLevel</i> [®] LFFS
Product highlights	<ul style="list-style-type: none"> ■ Certified hygienic design ■ SIP/CIP capacity ■ Minimal immersion depth ■ Detects all types of media (liquid, viscous, sticky or solid) ■ Compact and light-weight ■ 360° LED activity indicator 	<ul style="list-style-type: none"> ■ Compact and robust stainless steel housing ■ On-site adjustment with <i>qTeach</i>[®] ■ Minimal immersion depth ■ Two adjustable switching outputs ■ Multi-color 360° LED activity indicator 	<ul style="list-style-type: none"> ■ Certified hygienic design ■ On-site adjustment with <i>qTeach</i>[®] ■ SIP/CIP capacity ■ Minimal immersion depth ■ Foam detection or blanking ■ Unaffected by adhesion ■ Two adjustable switching outputs ■ Multi-color 360° LED activity indicator 	<ul style="list-style-type: none"> ■ Certified hygienic design ■ SIP/CIP capacity ■ Minimal immersion depth ■ Detects all types of media (liquid, viscous, sticky or solid) ■ 360° LED activity indicator ■ Visible from a long distance
Application examples	Point level detection in containers, empty pipe monitoring, overflow protection Leakage detection, high temperature applications up to 200 °C	Point level detection in containers, empty pipe monitoring, max./min. Liquid level detection Separating layer detection	Control of CIP processes, point level detection in containers, empty pipe monitoring, separating layer detection	Point level detection in containers, empty pipe monitoring, overflow protection Leakage detection
Media temperature	-40 ... +115 °C -40 ... +200 °C (shiftable connection)	-40 ... +115 °C -40 ... +135 °C max. (t < 1 h)	-40 ... +115 °C -40 ... +135 °C max. (t < 1 h)	-40 ... +115 °C -40 ... +200 °C (shiftable connection)
Output signal	1× programmable switching output	2× programmable switching output IO-Link 1.1	2× programmable switching output IO-Link 1.1	1× programmable switching output
Material of the parts in contact with the media	PEEK AISI 316L (1.4404) AISI 304 (1.4301) (optional)	PEEK AISI 316L (1.4404)	PEEK AISI 316L (1.4404)	PEEK AISI 316L (1.4404)
Protection category	IP 67, IP 69K	IP 67, IP69K	IP 67, IP 69K	IP 67
Conformity and approvals	ATEX 3-A EHEDG WHG EN 50155 (railway applications) DNV-GL Lloyd's register CCS	ATEX cULus WHG	ATEX cULus 3-A EHEDG WHG	ATEX 3-A EHEDG WHG
Process connections	For various process connection options see the enclosed selection guide			
Additional information	<ul style="list-style-type: none"> ■ M18×1 directly replaces a capacitive sensor ■ Available with shiftable connection 250 mm ■ Suspended version for silos 			<ul style="list-style-type: none"> ■ Available with shiftable connection 100 mm and 250 mm

Level switch

- Conductive level detectors with hygiene design with up to 4 measuring points



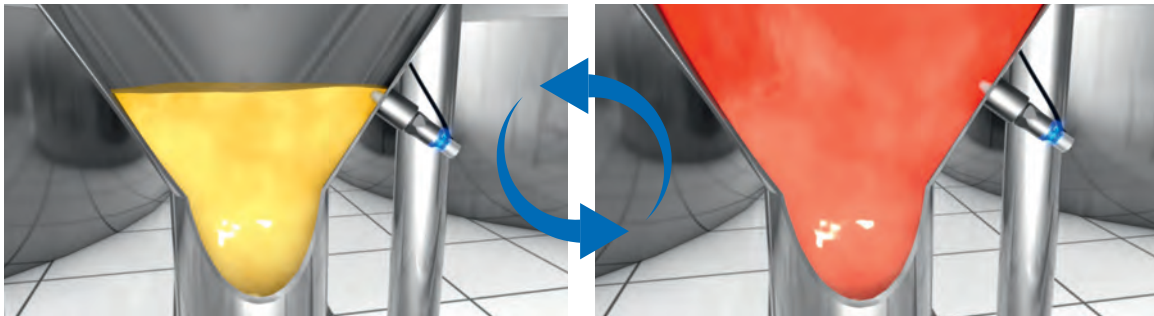
	LSKx2x	LSKx5x
Product highlights	<ul style="list-style-type: none"> ■ Can be installed on top or the side ■ Rod can be shortened on location ■ PTFE coating for foamy media ■ Robust stainless steel connecting head 	<ul style="list-style-type: none"> ■ Multiple-point level detection ■ Rod can be shortened on location ■ PTFE coating for foamy media ■ Robust stainless steel connecting head
Application examples	Point level detection in containers, overflow protection	Multiple-point level detection in containers Overflow protection
Media temperature	-20 ... +140 °C	-20 ... +140 °C
Measuring ranges	20 ... 2000 mm	20 ... 2000 mm
Output signal	Electrode connection PNP switching output (with LKP100)	2x ... 4x electrode connection
Material of the parts in contact with the media	PEEK PTFE (with coating) AISI 316L (1.4404)	PEEK PTFE (with coating) AISI 316L (1.4404)
Protection category	IP 67	IP 67
Conformity and approvals	3-A	3-A
Process connections	For various process connection options see the enclosed selection guide	
Additional information	<ul style="list-style-type: none"> ■ Adapter for other hygienic connections available 	<ul style="list-style-type: none"> ■ Adapter for other hygienic connections available ■ Evaluation unit DNGA-230.100 available as an accessory

CleverLevel® PL20

- Adaptive point level detection without parameterization

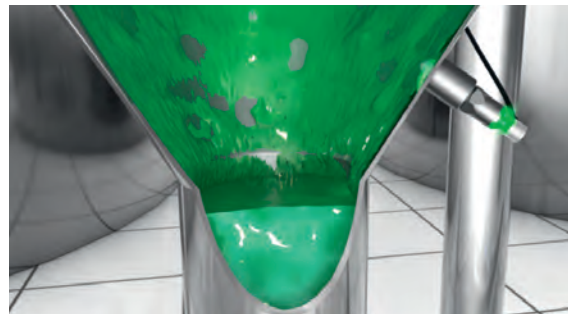
Automatic adaptation to medium

For applications in food and beverage with changing recipes or batch production, the *CleverLevel*® PL20 offers true added value thanks to adaptive setting of the switching point. Without any parameterization effort, the sensor adapts the switching point to the medium for reliable detection. This ensures maximum flexibility and minimized set-up time.



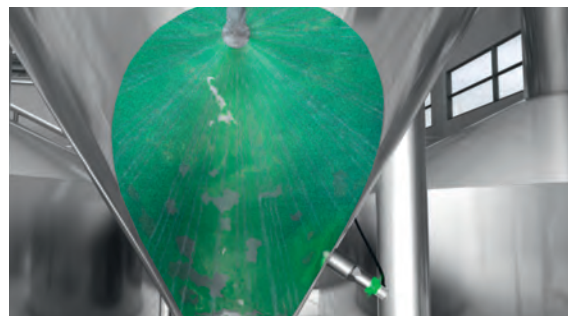
Unaffected by adherence

Even adherence typically present in pasty media will not impair the sensor performance. In the event of any adherence, the sensor adapts the switching level without the need for any parameterization and hence will increase process safety.



Optimized for cleaning processes

During cleaning processes, such as CIP cleaning, sensors frequently switch incorrectly as they cannot differentiate between the process media and the cleaning media. The *CleverLevel*® PL20 masters this challenge by ignoring cleaning media such as caustic soda solution and acids during the cleaning process.



Conductivity measurement

Precise analysis and exact differentiation of fluid media

- Choice of output of conductivity or concentration
- Large touchscreen with varied presentation of process variables
- Short reaction time and quick temperature compensation
- Integrated programmable switching output
- Available with IO-Link interface or HART® protocol



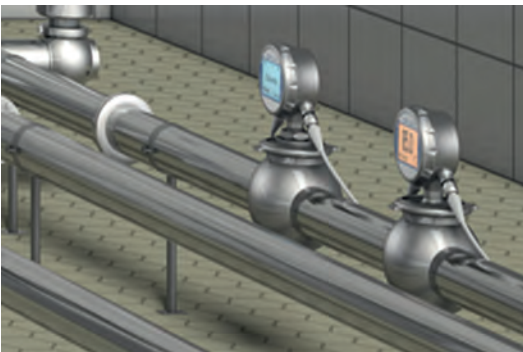
IO-Link



IO-Link

	CombiLyz® AFI4	CombiLyz® AFI5
Product highlights	<ul style="list-style-type: none"> ■ Output for conductivity or concentration ■ Quick internal temperature compensation ■ Short reaction time ■ High precision ≤ 1 % ■ Programmable via touchscreen, FlexProgram, IO-Link or HART® 	<ul style="list-style-type: none"> ■ Remote sensor with cable up to 10 m ■ Output for conductivity or concentration ■ Quick internal temperature compensation ■ Short reaction time ■ High precision ≤ 1 % ■ Programmable via touchscreen, FlexProgram, IO-Link or HART®
Application examples	Concentration measurement Monitoring of ingredients, phase separation	Concentration measurement Monitoring of ingredients, phase separation
Media temperature	–20 ... +140 °C, permanent –20 ... +150 °C max. (t < 1 h)	–20 ... +140 °C, permanent –20 ... +150 °C max. (t < 1 h)
Measuring ranges	14 configurable measuring ranges 0 ... 500 µS/cm up to 0 ... 1000 mS/cm	14 configurable measuring ranges 0 ... 500 µS/cm up to 0 ... 1000 mS/cm
Material of the parts in contact with the media	PEEK	PEEK
Output signal	2 × 4 ... 20 mA (galvanically separated) IO-Link HART® 2 × relay output	2 × 4 ... 20 mA (galvanically separated) IO-Link HART® 2 × relay output
Precision	≤ 1 % of the selected area	≤ 1 % of the selected area
Step response time-tempe- rature, T90	≤ 15 s	≤ 15 s
Protection category	IP 67, IP 69K	IP 67, IP 69K
Conformity and approvals	3-A EHEDG UL cULus	3-A EHEDG UL cULus
Process connections	G 1 hygienic connection; For various process connection options see the enclosed selection guide	
Additional information	■ Adapter for other hygienic connections available	■ Adapter for other hygienic connections available

Typical application



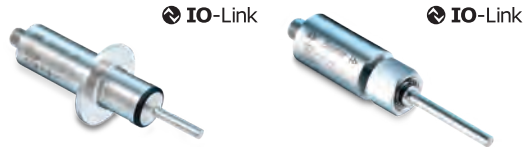
Phase separation at the quality measuring point

Fast, temperature-compensating conductivity measurement is a prerequisite for optimum use of detergents and phase changes with pinpoint accuracy. The conductivity sensor *CombiLyz*[®] AFI supports CIP cleaning by a technology that is outstanding on the market. The resilient, all-PEEK sensor body with integrated temperature compensation delivers measured values faster than any other sensor. Signal quality, together with the measured values from temperature and flow detection ensure safe CIP cleaning.

Flow sensors

Efficient monitoring of flow velocity and media temperature

- Robust and compact design
- Completely made of stainless steel
- For aqueous media in closed systems
- Various process connections and sensor lengths



	<i>FlexFlow</i> [®] PF20H	<i>FlexFlow</i> [®] PF20S
Product highlights	<ul style="list-style-type: none"> ■ Hygienic design ■ SIP/CIP capacity ■ Flow and temperature measurement in a single sensor ■ Compact and robust ■ Two analog outputs or IO-Link plus programmable output ■ No movable parts 	<ul style="list-style-type: none"> ■ Industrial process connections ■ Flow and temperature measurement in a single sensor ■ Compact and robust ■ Two analog outputs or IO-Link plus programmable output ■ No movable parts
Application examples	Flow control, control of CIP processes	Flow control, control of CIP processes
Media	Water Beverages Cleaning agents	Water Water-glycol mix (max. 30 % glycol)
Media temperature	-25 ... +150 °C 40 bar max.	-25 ... +150 °C 100 bar max.
Measuring ranges	10 ... 400 cm/s -25 ... +125 °C	10 ... 400 cm/s -25 ... +125 °C
Material of the parts in contact with the media	AISI 316L (1.4404)	AISI 316L (1.4404)
Output signal	Programmable switching output IO-Link 1.1 4 ... 20 mA 0 ... 10 V	Programmable switching output IO-Link 1.1 4 ... 20 mA 0 ... 10 V
Precision	≤ 2 % (FS)	≤ 2 % (FS)
Protection category	IP 67, IP 68, IP 69K	IP 67, IP 68, IP 69K
Conformity and approvals	cULus FDA EHEDG	cULus
Process connections	For various process connection options see the enclosed selection guide	

Electromagnetic flow meters

- Precision measurements with up to 0.2 % accuracy
- No energy loss thanks to unobstructed measuring tube without narrowings
- For media conductivity > 5 µS/cm
- Selection flexibility in process connections and pipe diameters



	PF55S	CombiFlow® PF75S	CombiFlow® PF75H
Product highlights	<ul style="list-style-type: none"> ■ Volume, velocity and temperature measurement in one sensor ■ Precision up to 0.5 % ■ Compact, robust and resistant to temperature jumps ■ No moving parts 	<ul style="list-style-type: none"> ■ Volume and velocity measurement in one sensor ■ Precision up to 0.5 % ■ Robust and resistant to temperature jumps ■ No energy loss thanks to unobstructed measuring tube without narrowings ■ No moving parts 	<ul style="list-style-type: none"> ■ Volume and velocity measurement in one sensor ■ Precision up to 0.2 % ■ Hygiene design for SIP / CIP applications ■ No energy loss thanks to unobstructed measuring tube without narrowings ■ No moving parts
Application examples	<ul style="list-style-type: none"> ■ Detection and monitoring of continuous flow ■ Monitoring of cooling circuits 	<ul style="list-style-type: none"> ■ Detection and monitoring of continuous flow ■ Volume measurement in tanks ■ High-precision filling and dosing of fluids 	<ul style="list-style-type: none"> ■ Detection and monitoring of continuous flow ■ Volume measurement in tanks ■ High-precision filling and dosing of fluids
Media	Conductive media with a conductivity of > 50 µS/cm	Conductive media with a conductivity of > 5 µS/cm	Conductive media with a conductivity of > 5 µS/cm
Media temperature	-10 ... +100 °C	-20 ... +100 °C	-20 ... +100 °C -20 ... +130 °C (max. 30 min)
Measuring ranges	0 ... 72 m³/h 0.4 ... 10 m/s -10 ... +100 °C	0 ... 1770 m³/h 0.4 ... 10 m/s	0 ... 280 m³/h 0.4 ... 10 m/s
Material of the parts in contact with the media	PTFE/FPM, AISI 316, FPM, AISI 304	PTFE, Rilsan, Ebonit, PP, FKM	PTFE, PFA, FKM, AISI 316L, EPDM
Output signal	1× 4 ... 20 mA 2× pulse and frequency outputs Digital input	1× 4 ... 20 mA 2× pulse and frequency outputs Digital input	1× 4 ... 20 mA 2× pulse and frequency outputs Digital input
Precision (max. measuring error)	± 1 % (opt. 0.5 %) ± 2 °C	± 0.8 % (opt. 0.5 %)	± 0.5 % (opt. 0.2 %)
Protection category	IP 67	IP 65, IP 67	IP 65, IP 67
Conformity and approvals	CE DGRL PED	CE DGRL PED WRAS	CE DGRL PED 3A FDA EHEDG 1935/2004
Process connections	For various process connection options see the enclosed selection guide		

Temperature sensors for hygienic applications

- 3-A sanitary standards, FDA-compliant, EHEDG-certified
- Efficient and quick temperature measurement
- SIP-compatible without limitations



	CombiTemp® TFRH	TE2	TER8	PT20H
Product highlights	<ul style="list-style-type: none"> ■ Certified hygienic design ■ SIP/CIP capacity ■ Immersion depth up to 3000 mm ■ Touch display with alarm signals via background colors 	<ul style="list-style-type: none"> ■ Compact design ■ Hygienic and industrial process connections ■ SIP/CIP capacity ■ Immersion depth up to 3000 mm ■ Integrated 4 ... 20 mA transmitter or Pt100 output ■ Simple process implementation from DN 25 or in the tank 	<ul style="list-style-type: none"> ■ Flush-mounted or immersion depth 20 mm, 50 mm ■ Certified hygienic design ■ SIP/CIP capacity ■ Optimal placement also for agitators and scraper systems ■ Integrated 4 ... 20 mA transmitter or Pt100 output ■ Short reaction time ■ 3-A compliant without elastomers 	<ul style="list-style-type: none"> ■ Integrated 4 ... 20 mA transmitter with high accuracy ■ Fast power-up time < 2 s ■ Short response time < 1.1 s ■ Fully welded and compact design
Application examples	Control of CIP processes, pasteurization system control, pharmaceutical systems	Control of CIP processes, temperature monitoring, pasteurization system control	Ice cream and cooking containers with skimmer, scraping systems	Control of temperature in tanks CIP processes Pasteurization systems Pharmaceutical systems
Measuring ranges	-50 ... +250 °C -50 ... +400 °C (with cooling section)	-50 ... +125 °C -50 ... +250 °C (with cooling section)	-40 ... +115 °C -40 ... +135 °C max. (t < 1 h)	-50 ... +125 °C -50 ... +200 °C (process temperature with cooling zone, sensing tip ø 3 mm) -50 ... +250 °C (process temperature with cooling zone, sensing tip ø 6 mm)
Sensor element	Pt100	Pt100	Pt100	Pt100
Precision class (EN 60751)	1/6 B, AA, A, B	1/6 B, AA, A, B	1/6 B, AA, A, B	1/6 B, AA, A, B
Output signal	4 ... 20 mA + HART® Pt100	4 ... 20 mA Pt100	4 ... 20 mA Pt100	4 ... 20 mA
Material of the parts in contact with the media	AISI 316L (1.4404)	AISI 316L (1.4404) (PEEK)	PEEK	AISI 316L (1.4404)
Step response time-temperature	T50: < 1.5 s (ø 4 mm) < 6.1 s (ø 6 mm) < 7.6 s (ø 8 mm)	T90: < 3.0 s (ø 3 mm) < 3.6 s (ø 4 mm) < 8.5 s (ø 6 mm)	T90: < 6.5 s (20 mm) < 6.7 s (50 mm) < 66 s (front-flush)	T90 with transmitter: < 1.1 s, short response tip (ø 3 mm) < 8.9 s, standard response tip (ø 6 mm)
Protection category	IP 67, IP 69K	IP 65, IP 67	IP 67, IP 69K	IP 65, IP68, IP69K
Conformity and approvals	ATEX 3-A	3-A EN 50155 (railway applications)	3-A	3-A
Process connections	For various process connection options see the enclosed selection guide			



Hygienic cable sensor

Product highlights	<ul style="list-style-type: none"> ■ Compact and light-weight ■ Hygienic design ■ Pt100 sensor element
Application examples	Piping systems, pasteurization systems control
Measuring ranges	-50 ... +205 °C
Sensor element	Pt100
Precision class (EN 60751)	1/6 B, AA, B
Material of the parts in contact with the media	AISI 316L (1.4404)
Protection category	IP 65
Process connections	For various process connection options see the enclosed selection guide

Temperature sensors for industrial applications

- Robust, compact and durable
- Cost-saving by standard designs
- Extensive portfolio of process connections



	CombiTemp® TFRN	TCR6	TE2	CombiTemp® TFR5
Product highlights	<ul style="list-style-type: none"> ■ Process connections with thread ■ Immersion depth up to 3000 mm ■ Touch display with alarm signals via background colors 	<ul style="list-style-type: none"> ■ Housing DIN Form B ■ Immersion depth up to 3000 mm ■ 4 ... 20 mA + HART®, Pt100 or Pt1000 output 	<ul style="list-style-type: none"> ■ Compact design ■ Hygienic and industrial process connections ■ SIP/CIP capacity ■ Immersion depth up to 3000 mm ■ Integrated 4 ... 20 mA transmitter or Pt100 output ■ Simple process implementation from DN 25 or in the tank 	<ul style="list-style-type: none"> ■ Wall or pipe installation ■ Internal and external application ■ Cable sensors or fixed sensors ■ Touch display with alarm signals via background colors
Application examples	Monitoring of cooling circuits, heat exchanger control, Laboratory equipment	Monitoring of cooling circuits, pumps and compressors, marine applications	Control of CIP processes, temperature monitoring, pasteurization system control	Piping systems, Room temperature measurement, Refrigerator monitoring
Measuring ranges	-50 ... +250 °C -50 ... +400 °C (with cooling section)	-50 ... +400 °C -50 ... +600 °C (with cooling section)	-50 ... +125 °C -50 ... +250 °C (with cooling section)	-30 ... +80 °C -200 ... +850 °C (with detachable sensor)
Sensor element	Pt100	Pt100, Pt1000	Pt100	Pt100
Precision class (EN 60751)	1/6 B, AA, A, B	1/6 B, AA, A, B	1/6 B, AA, A, B	1/6 B, AA, A, B
Output signal	4 ... 20 mA + HART® Pt100	4 ... 20 mA + HART® Pt100 Pt1000	4 ... 20 mA Pt100	4 ... 20 mA + HART® Pt100 Pt1000
Material of the parts in contact with the media	AISI 316L (1.4404)	AISI 316L (1.4404)	AISI 316L (1.4404) (PEEK)	
Step response time-temperature	T50: < 1.5 s (ø 4 mm) < 6.1 s (ø 6 mm) < 7.6 s (ø 8 mm)	T50: < 1.5 s (ø 4 mm) < 6.1 s (ø 6 mm) < 7.6 s (ø 8 mm) < 11.1 s (ø 10 mm)	T90: < 3.0 s (ø 3 mm) < 3.6 s (ø 4 mm) < 8.5 s (ø 6 mm)	
Protection category	IP 67, IP 69K	IP 65	IP 65, IP 67	IP 67
Conformity and approvals	ATEX	ATEX EN50155 (railway applications)	3-A EN50155 (railway applications)	ATEX
Process connections	For various process connection options see the enclosed selection guide			



PT20S	Universal cable sensor
<ul style="list-style-type: none"> ■ High transmitter accuracy ■ Fast power-up time < 2 s ■ Short response time ■ Fully welded and compact design 	<ul style="list-style-type: none"> ■ Air temperature or protective pipe installation ■ Cable length according to customer specifications ■ Pt100 or Pt1000 sensor element
Transportation, water treatment, energy generation, oil temperature monitoring	Heating systems, HVAC
-50 ... +125 °C -50 ... +200 °C (process temperature with cooling zone, sensing tip ø 3 mm) -50 ... +250 °C (process temperature with cooling zone, sensing tip ø 6 mm)	-50 ... +205 °C
Pt100	Pt100 Pt1000
1/6 B, AA, A, B	1/6 B, AA, B
4 ... 20 mA	
AISI 316L (1.4404)	AISI 316Ti (1.4571)
T90 with transmitter: < 1.1 s, short response tip (ø 3 mm) < 8.9 s, standard response tip (ø 6 mm)	
IP 65, IP68, IP69K	IP 65

Temperature transmitters

Components for OEM sensor manufacturers

- Programmable transmitters for RTD and C/T
- 4 ... 20 mA with optional HART interface
- Sensor calibration on location



	FlexTop 2202	FlexTop 2203	FlexTop 2204
Product highlights	<ul style="list-style-type: none"> ■ Specifically for Pt100 ■ ATEX explosion protection ■ DIN Form B housing installation 	<ul style="list-style-type: none"> ■ Specifically for T/C ■ ATEX explosion protection ■ DIN Form B housing installation 	<ul style="list-style-type: none"> ■ Specifically for Pt500 ■ ATEX explosion protection ■ DIN Form B housing installation
Application examples	OEM applications	OEM applications	OEM applications
Precision	< 0.25 °C	< 3 ... 5 °C	< 0.25 °C
Measuring ranges	Pt100: -200 ... +850 °C R: 0 ... 500 Ohm	T/C: -100 ... +1820 °C U: -10 ... 100 mV	Pt500: -100 ... +160 °C R: 0 ... 1000 Ohm
Input	Pt100, R	T/C, U	Pt500, R
Output	4 ... 20 mA	4 ... 20 mA	4 ... 20 mA
Protection category	IP 40	IP 40	IP 40
Conformity and approvals	ATEX	ATEX	ATEX

Transmitter with your individual logo and the desired housing color.





	FlexTop 2212	FlexTop 2222
Product highlights	<ul style="list-style-type: none"> ■ Automatic cable resistance compensation ■ Temperature deviation < 0.1 °C ■ Parameterization directly via USB connection 	<ul style="list-style-type: none"> ■ Automatic cable resistance compensation ■ Temperature deviation < 0.1 °C ■ Parameterization directly via USB connection
Application examples	Temperature insert for form B DIN housing	Temperature insert for form B DIN housing
Precision	< 0.1 °C	< 0.1 °C
Measuring ranges	RTD: -200 ... +850 °C T/C: -250 ... +2310 °C U: -500 ... 2000 mV R: 0 ... 7000 Ohm	RTD: -200 ... +850 °C T/C: -250 ... +2310 °C U: -500 ... 2000 mV R: 0 ... 7000 Ohm
Input		
Output	4 ... 20 mA 2-conductor 20 ... 4 mA 2-conductor	4 ... 20 mA 2-conductor + HART®
Protection category	IP 55	IP 55
Conformity and approvals	Namur NE21	Namur NE21

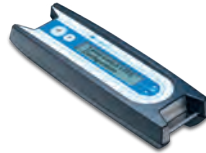


HART® enhances the tried and tested 4...20 mA interface with digital communication for data transfer and parameterization. The standardization and interoperability is appreciated and used around the world. A special advantage is the continued use of existing cabling when there is a need for retrofitting additional digital options. This is especially of interest in explosive environments. A large number of standard components is available for linking to higher bus systems. This makes HART® a key component of Industry 4.0.

User interfaces

Process data at a glance

- Display for presenting errors and threshold values
- Configuration tools for process sensors



	<i>CombiView</i> [®] DFON	FlexProgrammer 9701	USB IO-Link Master	<i>SensControl</i>
Product highlights	<ul style="list-style-type: none"> ■ Large digits and symbols, readable from a distance ■ Configurable via touch-screen or FlexProgram ■ Changing background color, depending on the alarm setting ■ 3 configurable background colors 	<ul style="list-style-type: none"> ■ Simple configuration by menu control ■ Data transfer from the PC to the device via USB connection ■ Configuration of a device on location without PC ■ Robust synthetic housing with digital display and keys ■ Rechargeable battery (USB) ■ Free FlexProgram updates via the Baumer website 	<ul style="list-style-type: none"> ■ IO-Link Device Tool, Windows-based software ■ Complete set incl. power supply unit 	<ul style="list-style-type: none"> ■ Wireless (WLAN and Bluetooth LE) IO-Link master with integrated battery ■ App for iOS and Android mobile devices
Application examples	Remote monitoring, value visualization, alarm actuation	Sensor parameterization Setup duplication, data monitoring and logging	Parameterization of IO-Link sensors via IO-Link master with USB interface	<ul style="list-style-type: none"> ■ Visualization of device status information and process data ■ Uniform, simple and reproducible parameterization ■ Diagnosis and analysis
Communication interfaces			IO-Link V1.0 and V1.1, USB	IO-Link V1.0 and V1.1, WLAN or Bluetooth LE
Number of IO-Link ports			1	1
IO-Link port type			Class A	Class A
Baud rate			4.8 kBaud (COM1) 38.4 kBaud (COM2) 230.4 kBaud (COM3)	4.8 kBaud (COM1) 38.4 kBaud (COM2) 230.4 kBaud (COM3)
Power supply			USB connection, wall power supply	
Supply voltage	Current loop supply	Via USB connection	Via USB connection, wall power supply	USB connection, external IO-Link master, integrated battery
Precision	0.1% ± 1 point			
Output signal	2× PNP switches	Sensor interface		
Ambient conditions	-30 ... +80 °C	0 ... +50 °C, rel. humidity < 90%	-25 ... +45 °C	0 ... +40 °C
Protection category	IP 67	IP 42	IP 20	IP 20
Software		FlexProgram FDT/DTM-based	FlexProgram IO-Link Device Tool	<i>SensControl</i> app for iOS and Android
Conformity and approvals	ATEX			



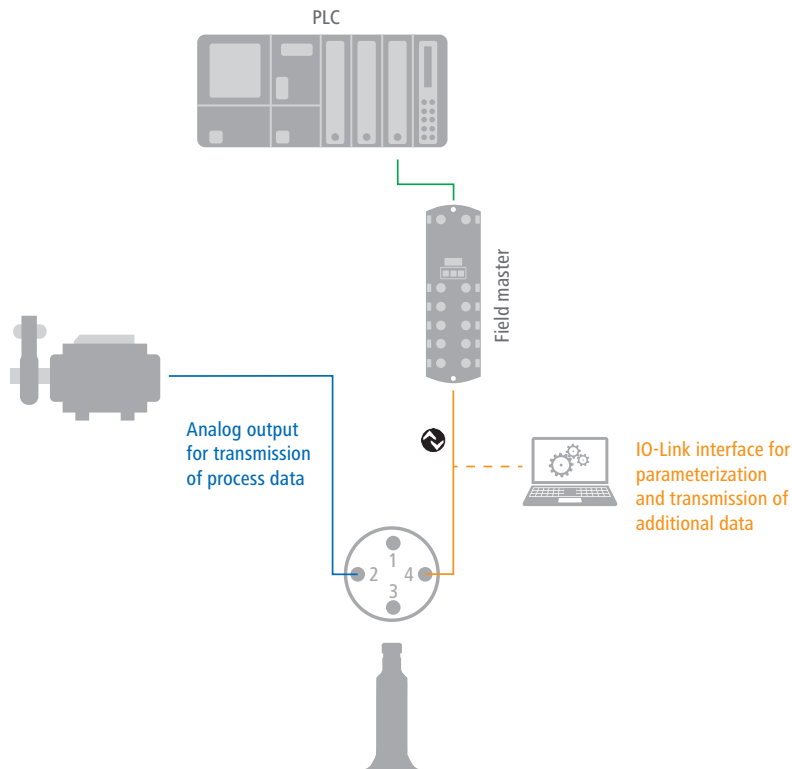
The bridge to the digital future

Added value by digital sensor data

- Easy and quick commissioning
- Secondary data for process optimization

Digital and analog interface benefits all at once thanks to Dual Channel:

Thanks to Dual Channel with analog output, the sensor is capable of both conventional control architectures and digital interface communication. In other words, the sensors feature 4 ... 20 mA analog output and digital IO-Link interface. The benefits of IO-Link can therefore be used during sensor commissioning, which considerably simplifies the parameterization, yet the sensor is capable of process control via the 4 ... 20 mA analog output.



Additional benefits of digital sensor data:

1 Easy and quick commissioning

- Parameterization either via controller or input device
- Automated parameter adoption at restart or in the event of sensor exchange
- Easy parameter adjustment when changing profiles or formats increases flexibility and machine uptime

2 Secondary data

- Diagnostic, analytical and identification data
- Sensor data monitoring such as temperature of the electronics cuts down on malfunction risk and is basic for preventive maintenance
- Readout of additional process parameters and verification of other sensors

Process connections

The Baumer BCID system: suitable for every process

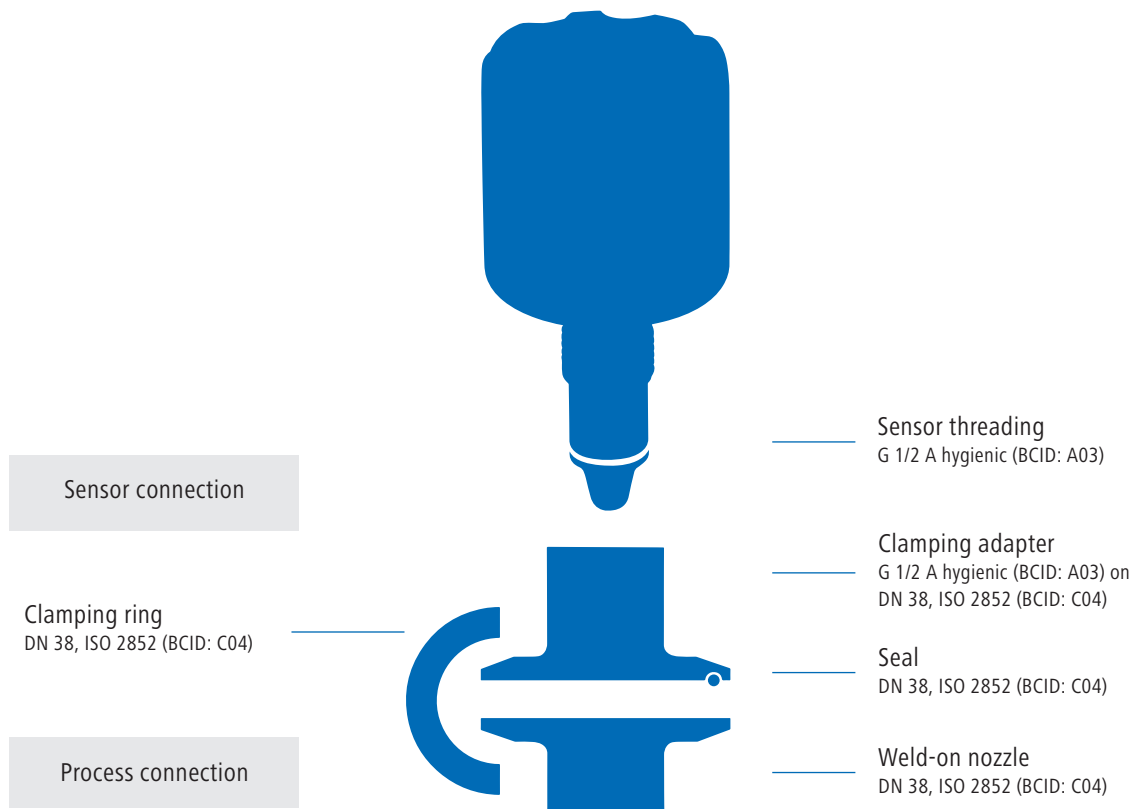
- Clearly allocated accessories for various process connections
- Compatible with standard and high brand process connections
- Simple installation considerably expedites commissioning
- Connections ensure full functionality, high precision and durability

The sensors from Baumer are suitable for almost all process connections. Thanks to our more than 40 connection types you do not have to change your system design at all. The Baumer Connection Identifier (BCID) offers a convenient and safe system for the identification of the correct process adapter for the integration of your Baumer sensor into the respective application.

How to find the suitable adapter for your sensor

First you have to decide if it should be a threaded connection, a clamp connection or a welded connection. For further information regarding this see the next page. In the sensor data sheet you can then find the BCID code for the selected connection type. This encoding is also found on the product data sheets. Accessories with the same BCID code always match – whether adapters, welded parts, clamping rings, or seals.

Examples of the Baumer BCID system



Threaded connections		BCID	
Hygienic cone connection	G 1/8 B external thread, hygienic	A01	
	M12×1.5 hygienic	A02	
	G 1/2 A hygienic	A03	
	G1 A hygienic	A04	
Industrial standard	G 1/4 A ISO 228-1	G03	
	G 1/2 A ISO 228-1	G06	
	G 1/2 A ISO 228-1 BSC	G07	
	G 1/2 A ISO 228-1 with cone	G08	
	G 1/2 A DIN 3852-E with front O-ring	G09	
	G 3/4 A ISO 228-1	G10	
	G 1 A ISO 228-1	G11	
	G 1 A DIN 3852-E with front O-ring	G12	
	G 1 1/4 A ISO 228-1	G13	
	G 1 1/2 A ISO 228-1	G14	
	G 2 A ISO 228-1	G16	
	G 1/8 A ISO 228-1 internal thread	G20	
	G 1/4 A ISO 228-1 internal thread	G21	
	G 1/2 A ISO 228-1 internal thread	G23	
	G 3/4 A ISO 228-1 internal thread	G24	
	G 1/4 B EN 837-1	G30	
	G 1/2 B EN 837-1	G31	
	G 3/8 B EN 837-1	G32	
	G 1/2 A DIN 3852-A	G44	
	G 1/4 A DIN 3852-E	G50	
	G 1/2 A DIN 3852-E	G51	
	G 1/2 A DIN 3852-E, opening Ø 10 mm	G52	
	Tuning fork replacement	Rd52 (EH FTL EE2)	T02
		G 1 A ISO 228-1 (EH FTL GW2)	T03
		G 3/4 A ISO 228-1 (EH FTL GQ2)	T04
		G 3/4 A ISO228-1 (VS Ø 21.3)	T06
		G 1 A ISO228-1 (VS Ø 21.3)	T07
UNI D65 (Ø 44 × 39.5)		T08	
Reverse installation	G 1/2 A ISO 228-1 for internal installation	T10	
Coupling nut	Seal cone M18×1.5	T44	
	Clamp screw connection Ø 6	T52	
	Protective sleeve Ø 5.8 mm	T64	
	Protective sleeve Ø 6 mm	T65	
	Protective sleeve Ø 8 mm	T66	
	Protective sleeve Ø 10 mm	T67	
Metric	M12×1.5, metric fine thread, DIN 837	M02	
	M14×1.5, cone 60°	M05	
	M18×1.5 ISO 261 / ISO 965	M07	
	M20×1.5 ISO 261 / ISO 965	M08	
	M18×1 ISO 261 / ISO 965	M11	
UTS (Unified Thread Standard)	7/16-20 UNF with cone (SAE 4)	U01	
	7/16-20 UNF with O-Ring (SAE 4)	U02	
	9/16-18 UNF with O-Ring (SAE 6)	U04	
NPT (ANSI/ASME B1.20.1)	1/4-18 NPT	N01	
	1/2-14 NPT	N02	
	3/4-14 NPT	N03	
	1-11.5 NPT	N04	
Whitworth pipe thread	R 1/2 ISO 7/1	R01	
	R 1 1/4 ISO 7/1	R02	
	R 1/4 BSP - Tr	R03	

Clamp and coupling nut connections

BCID

Baumer hygienic connection	BHC 3A DN 38 BHC 3A DN 76	B01 B02
ISO 2852 (Tri-Clamp)	DN 21.3, Ø 34.0 DN 25, Ø 50.5 DN 33.7; 38, Ø 50.5 DN 40; 51, Ø 64.0	C02 C03 C04 C05
DIN 32676-A (Tri-Clamp)	DN 20, Ø 34.0 DN 25; 32; 40, Ø 50.5 DN 50, Ø 64.0	C02 C04 C05
DIN 32676-B (Tri-Clamp)	DN 26.9, Ø 50.5 DN 33.7, Ø 50.5 DN 42.4; 48.3, Ø 64.0	C03 C04 C05
DIN 32676-C (Tri-Clamp)	DN 3/4", Ø 24.9 DN 1", Ø 50.5 DN 1 1/2", Ø 50.5 DN 2", Ø 64.0	C01 C03 C04 C05
DIN 11851 (Dairy pipe screw joint)	DN 25 DN 32 DN 40 DN 50 DN 65	D01 D02 D03 D04 D05
DIN 11864-1-A (Aseptic screwed pipe connection)	DN 40 DN 50	H03 H04
DIN 11864-3-A (Aseptic clamp)	DN25, Ø 50.5	H41
SMS 1145	SMS 1145, DN 38 SMS 1145, DN 51	S01 S02
VARIVENT®	VARIVENT® DN 25; 1" (Typ F), Ø 50 VARIVENT® DN 32 ... 125; 1 1/2" ... 6" (Typ N), Ø 68	V01 V02

Welded connections

BCID

Thin walled tanks	Ø 16 × 12.2 Ø 25 × 17 Ø 45 × 34	W01 W05 W20
Thick walled tanks	Ø 26.5 × 15 Ø 26.5 × 25 Ø 30 × 26 Ø 30 × 34 Ø 35 × 20 Ø 50 × 23 Ø 55 × 23 Ø 60 × 20.5 Ø 55 × 32 Ø 120 × 32	W07 W08 W10 W21 W35 W45 W46 W50 W65 W70
Slanted installation	Ø 35 × 34 Schweisskegel Ø 16	W30 W31
Pipes without extrusion	DN 25, Ø 16	W02
Pipes with extrusion	DN 25 ... 50, Ø 29 × 36.5 DN 65 ... 150, Ø 30 × 36.5 DN 40 ... 50, Ø 40 × 28 DN 65 ... 150, Ø 41 × 28 DN 38, Ø 38 × 40	W25 W26 W40 W41 W60

Baumer – the strong partner.

We at Baumer are close to our customers, understand their needs and provide the best solution. Worldwide customer service for Baumer starts with on-the-spot personal discussions and qualified consultation. Our application engineers speak your language and strive from the start, through an interactive problem analysis, to offer comprehensive and user-compatible solutions.

We are close to you across the globe.

The worldwide Baumer sales organizations guarantee short delivery times and readiness to supply. Many of our customers are directly linked via our electronic order system with the JIT logistics process.

A worldwide network coupled with the most modern communication techniques enable us to deliver information quickly and transparently to decision makers in all Baumer locations.

Closeness to the customer for Baumer means being available for your needs anywhere and at any time.

Other sensors, rotary encoders, measuring instruments as well as components for automated image processing from Baumer can be found at www.baumer.com



Worldwide presence.



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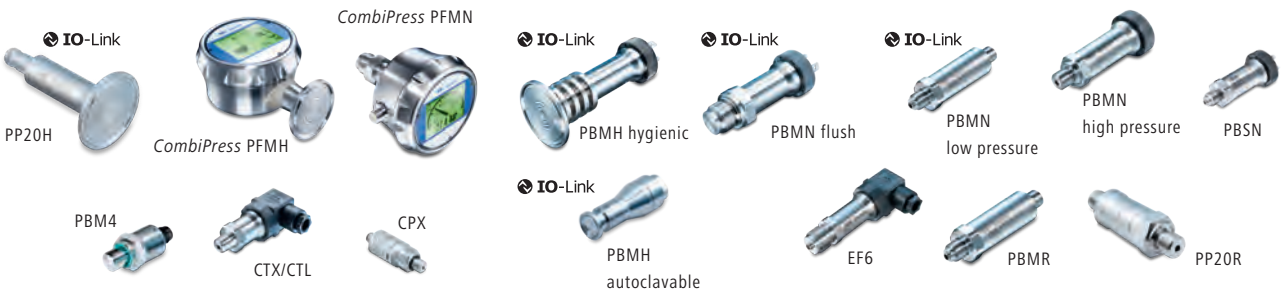
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Process sensors

Selection Guide

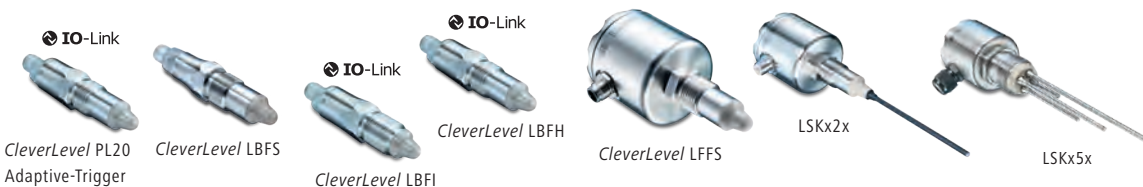
Pressure measurement

	Measuring range (bar)	Min. span (bar)	Accuracy (±% FS)	Absolute pressure	Media temperature ≥ 125 °C	Dry cell (no liquids)	PNP switch	Current Loop 4 ... 20 mA	Voltage output	HART	Display	IO-Link	ATEX	EN50155 (Railway)	Type	Page
Hygienic/front-flush	-1 ... 40	0.4	0.2; 0.5	■	■		■	■			■				PP20H	6
Hygienic/front-flush	-1 ... 68	0.05	0.1; 0.25	■	■		■	■	■		■				CombiPress® PFMH	6
Hygienic/front-flush	-1 ... 40	0.1	0.1; 0.25	■	■		■	■			■	■			PBMH hygienic	6
Front-flush	-1 ... 400	0.05	0.1; 0.25	■	■		■	■	■		■				CombiPress® PFMN	7/8
Front-flush	-1 ... 400	0.1	0.1; 0.25	■	■		■	■			■	■			PBMN flush	7
General industrial	-1 ... 40	0.1	0.1; 0.25	■	■		■	■			■	■			PBMN low pressure	8
General industrial	0 ... 1600	60	0.1; 0.25		■	■	■	■				■			PBMN high pressure	8
General industrial	-1 ... 600	1.0	0.5; 0.7	■	■	■	■	■							PBSN	8
Hydraulics	0 ... 1000	10.0	0.5		■	■	■	■							PBM4	9
General industrial	-1 ... 200	1.0	0.5 (BFSL)			■	■	■							CTX/CTL	9
General industrial	-1 ... 600	1.0	0.5 (BFSL)	■		■									CPX	9
Hygienic/front-flush	-1 ... 40	0.4	0.1; 0.25	■	■		■	■			■				PBMH autoclavable	10
Railway	0 ... 250	1.0	0.5		■	■	■	■						■	EF6	11
Railway	-1 ... 40	0.1	0.1; 0.25	■	■		■	■						■	PBMR	11
Railway	0 ... 16	0.25	0.3; 0.5; 1.0	■	■		■	■						■	PP20R	11



Level measurement

	Immersion depth (mm)	Point level	Continuous level	Bulk solids	Hygienic	PC programmable	LED indicator	LED indicator multicolor	Direct teach-in	qTeach	Electrode terminal	PNP/NPN switch	IO-Link	Current Loop 4 ... 20 mA	ATEX	Type	Page
Frequency sweep		■	■	■	■	■	■	■	■	■	■	■	■	■	■	CleverLevel® PL20 Adaptive-Trigger	12
Frequency sweep	0 ... 250	■	■	■	■	■	■	■	■	■	■	■	■	■	■	CleverLevel® LBFS	13
Frequency sweep		■	■	■	■	■	■	■	■	■	■	■	■	■	■	CleverLevel® LBFH	13
Frequency sweep		■	■	■	■	■	■	■	■	■	■	■	■	■	■	CleverLevel® LBFH	13
Frequency sweep	0 ... 250	■	■	■	■	■	■	■	■	■	■	■	■	■	■	CleverLevel® LFFS	13
Conductive single rod	0 ... 2000	■		■					■	■						LSKx2x	14
Conductive multi rod	0 ... 2000	■		■					■	■						LSKx5x	14



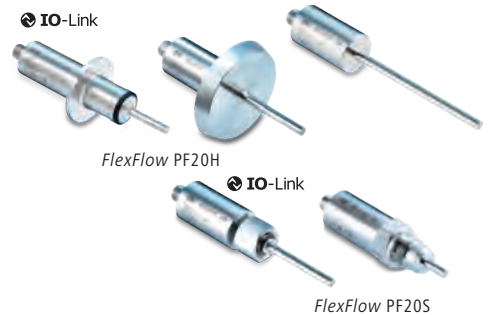
Conductivity measurement

	Measuring range (mS/cm)	Min. span (mS/cm)	PNP switch	Current Loop 4 ... 20 mA	HART	IO-Link	Type	Page
Compact version	0 ... 1000	0.5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiLyz® AF14	16
Separate version	0 ... 1000	0.5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiLyz® AF15	16



Flow measurement

	Measuring range cm/s	Immersion depth (mm)	PNP / NPN switch	IO-Link	Current Loop 4 ... 20 mA	Type	Page
Hygienic	10 ... 400	32 ... 50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	FlexFlow® PF20H	18
General industrial	10 ... 400	16 ... 100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	FlexFlow® PF20S	18



Volume measurement

	Measuring range ml/s	Pipe diameters	PNP / NPN switch	HART	Current Loop 4 ... 20 mA	Pulse output (frequency)	Type	Page
General industrial	0.4 ... 10	DN 10 ... 50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PF55S	19
General industrial	0.4 ... 10	DN 25 ... 250	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiFlow® PF75S	19
Hygienic	0.4 ... 10	DN 3 ... 100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiFlow® PF75H	19



Temperature measurement

	Measuring range (°C)	Accuracy class (EN 60751)	Transmitter accuracy (± °C)	Fit for mounting head transmitter	Compact OEM version	RTD resistance output	Wall or pipe mounted	Remote sensor	PNP switch	Current Loop 4 ... 20 mA	HART	Display	ATEX	EN 50155 (Railway)	Type	Page
Hygienic	-50 ... +250	1/6 B, AA, A, B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiTemp® TFRH	20
Hygienic and general industrial	-50 ... +125	1/6 B, AA, A, B	0,25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TE2	20, 22
Hygienic	-40 ... +115	1/6 B, AA, A, B	0,25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TER8	20
Hygienic	-50 ... +125	1/6 B, AA, A, B	0,05	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PT20H	20
Hygienic	-50 ... +205	1/6 B, AA, A, B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Hygienic cable sensor	21
General industrial	-50 ... +250	1/6 B, AA, A, B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiTemp® TFRN	22
General industrial	-50 ... +400	1/6 B, AA, A, B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	TCR6	22
General industrial	-30 ... +80	1/6 B, AA, A, B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	CombiTemp® TFR5	22
General industrial	-50 ... +125	1/6 B, AA, A, B	0,05	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PT20S	23
HVAC, general industrial	-50 ... +205	1/6 B, AA, B		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Universal cable sensor	23



Temperature transmitter

	Measuring range (°C)	Accuracy (± °C)	Pt100	Pt500	Pt1000	T/C	Current Loop 4 ... 20 mA	HART	ATEX	Type	Page
Head transmitter	-200 ... +850	0.25 (0.1% FS)	■				■		■	FlexTop 2202 (Pt100)	24
Head transmitter	-100 ... +1820	3.0; 4.0; 5.0				■	■		■	FlexTop 2203 (T/C)	24
Head transmitter	-100 ... +160	0.25		■			■		■	FlexTop 2204 (Pt500)	24
Head transmitter	-250 ... +2300	0.06 (Pt100); 1.0; 2.0 (T/C)	■	■	■	■	■		■	FlexTop 2212 (Universal)	25
Head transmitter	-250 ... +2300	0.06 (Pt100); 1.0; 2.0 (T/C)	■	■	■	■	■	■	■	FlexTop 2222 (HART)	25



HART
COMMUNICATION PROTOCOL

Interfaces

	ATEX	Type	Page
Graphics display	■	CombiView® DFON	26
USB programming interface		FlexProgrammer 9701	26
IO-Link programming interface		USB IO-Link Master	26
Wireless IO-Link Master		SensControl	26



Process connections & accessories

	Type
Hygienic adapters	ZPH1, ZPH3
Weld-in sleeves	ZPW1, ZPW2, ZPW3
Vibronic level switch replacement	ZPH1-32xx
Standard threaded adapters	ZP11
Blind plugs, welding mandrels	ZPX5, ZPX6
Additional parts, gaskets, o-rings	ZPX2, ZPX3
Evaluation unit for LSK	DNGA
ATEX barrier for LxFS	PROFSI3



Compliance and approvals

Baumer products meet international industrial standards. Where appropriate or selected by options, they are FDA compliant, fulfil the requirements of the respective 3-A Sanitary Standards or comply with EU regulations 1935/2004, 10/2011 and 2023/2006. In addition certain products are EHEDG certified. For hazardous environments you have a choice of ATEX approved products. Please refer to the related data sheets for details.



Information on product characteristics may relate to defined product options. Only the applicable product data sheet is of relevance.

Process connections

	Hygienic interfacing																											
	BCID	A01	A02	A03	A04	B01	B02	C01	C02	C03	C04	C05	D01	D02	D03	D04	D05	H03	H04	H41	S01	S02	V01	V02	G03	G06	G07	G08
Process connection	G 1/8 B male thread hygienic M12x1.5 hygienic G 1/2 A hygienic G1 A hygienic BHC 3A DN 38 BHC 3A DN 76 Tri-Clamp Ø 24.9 Tri-Clamp Ø 34.0 Tri-Clamp Ø 50.5, ID ≤ 23.7 Tri-Clamp Ø 50.5, ID ≥ 26.0 Tri-Clamp Ø 64.0 DIN 11851 (dairy pipe connection), DN 25 DIN 11851 (dairy pipe connection), DN 32 DIN 11851 (dairy pipe connection), DN 40 DIN 11851 (dairy pipe connection), DN 50 DIN 11851 (dairy pipe connection), DN 65 DIN 11864-1-A (aseptic screwed union), DN 40 DIN 11864-1-A (aseptic screwed union), DN 50 DIN 11864-3-A (Aseptic Clamp), DN25, Ø 50.5 SMS 1145, DN 38 SMS 1145, DN 51 Varivent® DN 25; 1" (Type F), Ø 50 Varivent® DN 32 ... 125; 1 1/2" ... 6" (Type N), Ø 68 G 1/4 A ISO 228-1 G 1/2 A ISO 228-1 G 1/2 A ISO 228-1 B5C																											
PP20H				■	■	●				■	●	■	●	●	■	■	●	■	■		●	●	■	■				
CombiPress® PFMH						■	■				■	■												■				
PBMH hygienic						■	■	■	■	■	■	■									■			■	■			
CombiPress® PFMN				■	■	●				●	●	●	●	●	●	●	●	●	●	●		●	●	●	●			
PBMN flush				■	■	●				●	●	●	●	●	●	●	●	●	●	●		●	●	●	●			
PBMN low pressure																												
PBMN high pressure																												
PBSN																												
PBM4																												
CTL																												
CTX																												
CPX																												
PBMH autoclavable								■	■	■	■	■									■							
EF6																												
PBMR																												
PP20R																												
CleverLevel® PL20				■	●	●				●	●	●	●			●	●		●	●			●	●	●			■
CleverLevel® LBFS				■	●	●				●	●	●	●			●	●		●	●			●	●	●			■
CleverLevel® LBF1				■	●	●				●	●	●	●			●	●		●	●			●	●	●			■
CleverLevel® LBFH				■	●	●				●	●	●	●			●	●		●	●			●	●	●			
CleverLevel® LFFS				■	●	■				●	●	●	●			●	●		●	●			●	●	●			
LSKx2x				■	●	●				●	●	●	●			●	●		●	●			●	●	●			
LSKx5x					■						●	●		●	●	●	●		●	●		●	●		●	●		
CombiLyz® AF14					■						●	●		●	●	●	●		●	●		●	●	●				
CombiLyz® AF15					■						●	●		●	●	●	●		●	●		●	●	●				
FlexFlow® PF20H				■	●	■		■	■	■	■	■			■	■		●	●			●	■	■				
FlexFlow® PF20S																									●	●		
CombiTemp® TFRH				■	●	■				■	■	■	●		●	●		●	●			●	●	■				
TE2		■	■	■	●	■		■		■	■	●	●		●	●		●	●			●	●	●			■	
TER8				■	●	●				●	●	●	●		●	●		●	●			●	●	●				
CombiTemp® TFR5																							●	●	■			
CombiTemp® TFRN																							●	●	■			
TCR6																											■	
Hygienic cable sensor		■																										
Universal cable sensor																											■	
PT20S																												
PT20H			■	■	●	■				■	■	●	●		●	●		●	●			●	●	●				

Rotary encoders / angle sensors

Product overview



Partnership.

Precise.

Pioneering.

Visibly better: Baumer sensors.

The Baumer Group is leading at international level in the development and production of sensors, shaft encoders, measuring instruments as well as components for automatic image processing. As an owner-managed family business, we employ about 2700 workers worldwide in 38 subsidiaries and 19 countries. With strong customer orientation, consistently high quality and vast innovation capabilities, Baumer develops specific solutions for many industries and applications worldwide.

Our standards – your benefits.

- Passion coupled with expertise – both have made us a sensor pioneer and technology leader
- Our range of services is hard to beat – we have the right product, developed by our own team, for every task
- Inspiring through innovation – a challenge Baumer employees take on every day
- Reliability, precision and quality – our customers' requirements are what drives us
- Partnership from the start – together with our customers we develop suitable solutions
- Always a step ahead – thanks to our production depth, our flexibility and our adherence to delivery dates
- Available worldwide – Baumer is Baumer everywhere





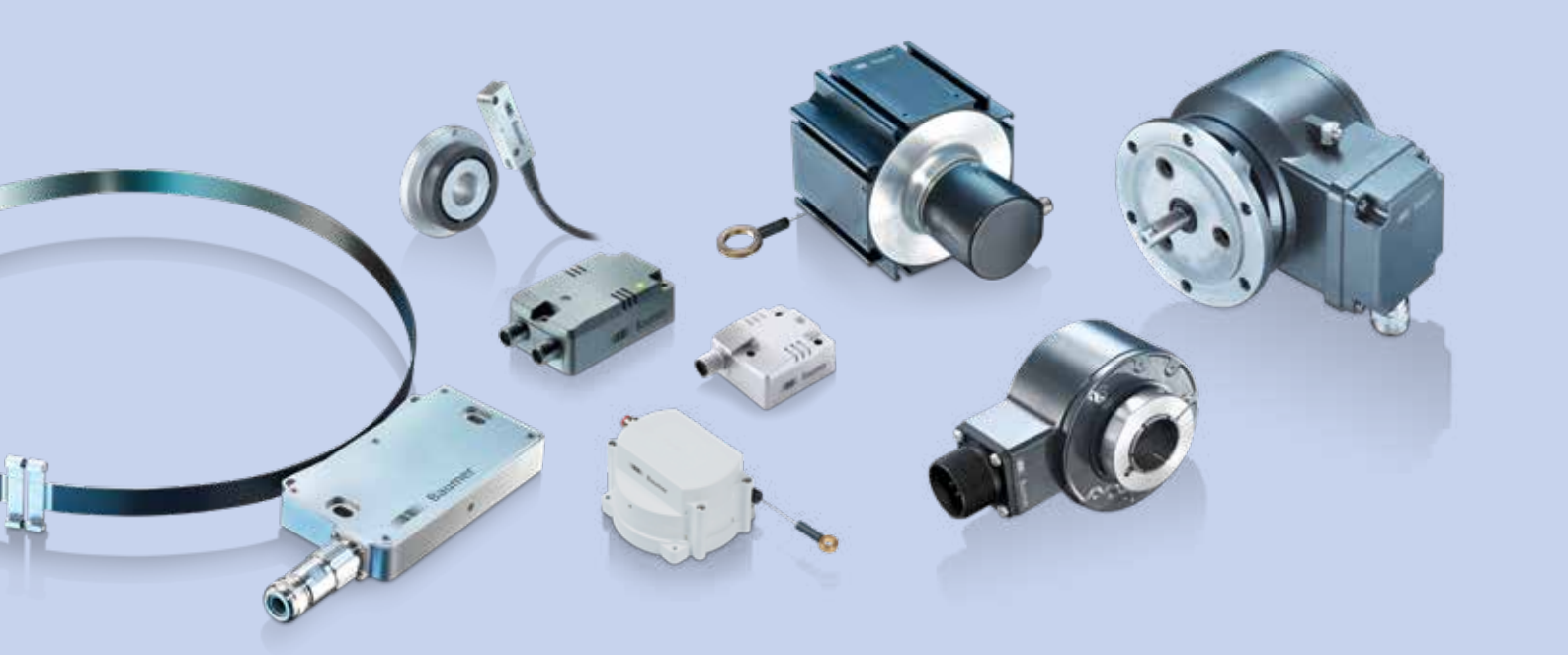
Baumer sensors – precise, compact and reliable.

Baumer offers a broad portfolio of standard products based on a multitude of sensor technologies. Our customers benefit from the comprehensive consultation and reliable service we provide around the world. In close collaboration with them we develop specific solutions with distinct advantages in cost and performance. Our customers benefit from our international development teams, the high vertical integration of our production facilities, and optimized business processes. These guarantee the greatest possible flexibility and speed in the implementation of customer requirements.



Data sheets for download and more information on our products are accessible at

www.baumer.com/motion



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Flexible,
robust and
precise.



OptoPulse® EIL580-SC
with clamping flange and flange box M23

Industrial encoders incremental



Incredibly versatile.

From cost-efficient standard products to high-resolution variants with 80 000 pulses per revolution: In our portfolio you always will encounter the matching incremental encoder. Our passion for sensor technology forms the basis for these innovative products, which we offer in various sizes and with robust magnetic or precise optical sensing. Optionally with HTL, TTL or sine signals and all common mechanical interfaces.

The range extends from particularly compact sizes with $\varnothing 24$ mm to large hollow shafts with $\varnothing 85$ mm. Programmable rotary encoders are suitable for a wide range of applications and thus help to reduce maintenance and warehousing costs.



Service

OptoPulse® – quickly available within short lead times.

OptoPulse® also sets new standards in delivery times, since many variants ship directly from stock right on the ordering day.

Optimal process coordination allows us to deliver even more stock variants at quantities up to 10 units within a few working days.

Industrial encoders incremental

Size up to $\varnothing 24$ mm

Precise optical sensing.

Up to 1024 pulses per revolution.

- Solid shaft or blind hollow shaft
- Ideal where space is tight



Features	<ul style="list-style-type: none"> ■ Size $\varnothing 24$ mm ■ Solid shaft with synchro flange 	<ul style="list-style-type: none"> ■ Size $\varnothing 24$ mm ■ Blind hollow shaft
Product family	ITD 01 B14	ITD 01 A 4 Y 1
Sensing principle	Optical	
Size (housing)	$\varnothing 24$ mm	
Voltage supply	5 VDC $\pm 5\%$, 8...30 VDC	
Output stage		
- TTL/RS422	■	■
- HTL/push-pull	■	■
Output signals	A 90° B, R + inverted	A 90° B, R
Shaft type		
- Solid shaft	$\varnothing 4$ mm	–
- Blind hollow shaft	–	$\varnothing 4$ mm
Connection		
- Cable	Radial / axial	Radial
Pulses per revolution	30...1024	
Operating temperature	-20...+85 °C	
Protection class	IP 54	
Operating speed	$\leq 18\,000$ rpm	$\leq 10\,000$ rpm
Max. shaft load	≤ 5 N axial, ≤ 8 N radial	–

Industrial encoders incremental

Size ø58 mm

Precise optical sensing. Flexibly programmable.
Up to 65 536 pulses per revolution.

- Solid shaft, blind or through hollow shaft
- Robust all-metal housing

www.baumer.com/incremental

OptoPulse®



Features	■ Solid shaft with clamping flange		■ Solid shaft with synchro flange		■ Blind hollow shaft		■ Through hollow shaft	
Product family	EIL580-SC	EIL580P-SC	EIL580-SY	EIL580P-SY	EIL580-B	EIL580P-B	EIL580-T	EIL580P-T
Programmable	–	■	–	■	–	■	–	■
Sensing principle	Optical							
Size (housing)	ø58 mm							
Voltage supply	5 VDC ±5 %, 8...30 VDC, 4.75...30 VDC	4.75...30 VDC	5 VDC ±5 %, 8...30 VDC, 4.75...30 VDC	4.75...30 VDC	5 VDC ±5 %, 8...30 VDC, 4.75...30 VDC	4.75...30 VDC	5 VDC ±5 %, 8...30 VDC, 4.75...30 VDC	4.75...30 VDC
Output stage								
- TTL/RS422	■		■		■		■	
- HTL/push-pull	■		■		■		■	
Output signals	A 90° B, R + inverted							
Shaft type								
- Solid shaft	ø10 mm		ø6 mm		–		–	
- Blind hollow shaft	–		–		ø8...15 mm		–	
- Through hollow shaft	–		–		–		ø8...15 mm	
Connection								
- Flange box M12, M23	Radial / axial						Radial	
- Cable	Radial / axial / tangential						Radial / tangential	
Pulses per revolution	100...5000	1...65 536	100...5000	1...65 536	100...5000	1...65 536	100...5000	1...65 536
Operating temperature	-40...+85 °C (optional: +100 °C)							
Protection class	IP 65, IP 67							
Operating speed	≤12 000 rpm (IP 65) ≤6000 rpm (IP 67)				≤8000 rpm (IP 65) ≤6000 rpm (IP 67)		≤6000 rpm (IP 65) ≤3000 rpm (IP 67)	
Max. shaft load	≤40 N axial, ≤80 N radial				–		–	
Options	Approval ATEX II 3 D, zone 22 (ExEIL580, ExEIL580P) square flange 2.5 inch SIL2 certification (EIL576S-S)				Isolated hollow shaft, hybrid bearing Operating temperature up to +120 °C (ITD21H00) SIL3/SIL2 certification (EIL576S-T)			

OptoPulse®

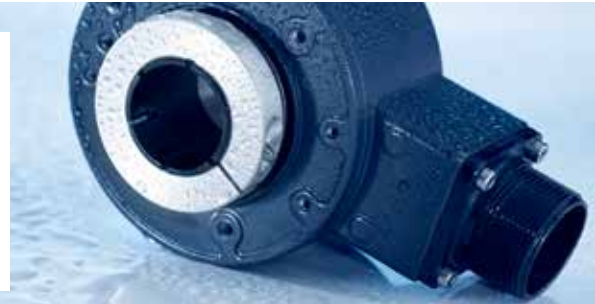
The innovative optical sensing method utilized by *OptoPulse*® incremental encoders ensures ultra-high accuracy and consistently high signal quality throughout the entire temperature range. The heart of this technology is a monolithic OptoASIC with high integration density particularly conceived for high-precision encoders. Thanks to the limited number of discrete components, reliability in the application is decisively improved when it comes to shocks and vibrations.

Industrial encoders incremental

Large hollow shaft

Precise optical sensing. Flexibly programmable.
Up to 80 000 pulses per revolution.

- Blind or through hollow shaft
- Easy installation



Features	<ul style="list-style-type: none"> ■ Blind hollow shaft $\varnothing 10 \dots 16$ mm ■ Up to 2048 pulses per revolution 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 20 \dots 27$ mm ■ Up to 2048 pulses per revolution 	<ul style="list-style-type: none"> ■ Through hollow shaft ■ Protection class up to IP 67 ■ Up to 80 000 pulses per revolution ■ Isolated shaft 	<ul style="list-style-type: none"> ■ Through hollow shaft ■ Protection class up to IP 67 ■ Programmable 1...8192 pulses per revolution ■ Isolated shaft
Product family	ITD 40 A 4	ITD 40 A 4 Y79	HS35F	HS35P
Programmable	–	–	–	■
Sensing principle	Optical			
Size (housing)	$\varnothing 80$ mm		$\varnothing 3.15''$ ($\varnothing 80$ mm)	
Voltage supply	5 VDC $\pm 5\%$, 8...30 VDC		4.75...30 VDC	
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
Output signals	A 90° B, R + inverted			
Shaft type				
- Through hollow shaft		$\varnothing 20 \dots 27$ mm	$\varnothing 0.375 \dots 1''$ ($\varnothing 9.525 \dots 25.4$ mm)	
- Blind hollow shaft	$\varnothing 10 \dots 16$ mm			
Connection				
- Flange box M23	–	Radial	–	–
- Flange box MIL	–	–	Radial, 7-/10-pin	Radial, 7-/10-pin
- Cable	Radial / axial	Radial		
Pulses per revolution	200...2048		1024...80 000	1...8192
Operating temperature	-20...+70 °C, -20...+100 °C		-40...+100 °C (-40...+212 °F)	
Protection class	IP 54, IP 65		IP 54, IP 65, IP 67	
Operating speed	≤ 8000 rpm ≤ 5000 rpm (>70 °C)	≤ 5000 rpm ≤ 3000 rpm (>70 °C)	≤ 5000 rpm	
Options	Torque support electrically isolated Stainless steel variant		SinCos output signals (HS35S)	

Industrial encoders incremental

Large hollow shaft

Precise optical sensing.
Up to 2500 pulses per revolution.

- Through hollow shaft
- Easy installation

www.baumer.com/incremental



Features	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 65$ mm ■ Very flat size ■ B-side clamping ■ Stainless steel variant 	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 65$ mm ■ B-side clamping 	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 85$ mm ■ Bearingless variant
Product family	ITD 70 A 4 Y 7	ITD 70 A 4 Y 9	ITD 75 A 4
Sensing principle	Optical		
Size (housing)	$\varnothing 150$ mm		
Voltage supply	5 VDC $\pm 5\%$, 8...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	■	■
Output signals	A 90° B, R + inverted		
Shaft type			
- Through hollow shaft	$\varnothing 40 \dots 65$ mm		$\varnothing 60 \dots 85$ mm
Connection			
- Flange box M23	–	Radial	–
- Cable	Radial	–	Radial
Pulses per revolution	1000...2500		
Operating temperature	-20...+70 °C		
Protection class	IP 54		
Operating speed	≤ 4000 rpm	≤ 4000 rpm	≤ 3000 rpm
Options	Cable with connector		

Industrial encoders incremental

Sine/Cosine

Precise optical sensing. Highest signal quality.

- Size ø58...80 mm
- Maximum speed 6000 rpm
- Robust all-metal housing



Features	<ul style="list-style-type: none"> ■ Through hollow shaft ■ Tangential cable outlet ■ SIL2/SIL3 certification 	<ul style="list-style-type: none"> ■ Through hollow shaft ■ Inch dimensions ■ Protection class up to IP 67 	<ul style="list-style-type: none"> ■ Through hollow shaft
Product family	EIL576S-T	HS355	ITD 42 A 4
Sensing principle	Optical / <i>LowHarmonics</i>		
Size (housing)	ø58 mm	ø3.15" (ø80 mm)	ø80 mm
Voltage supply	5 VDC ±10 %	4.75...30 VDC	5 VDC ±10 %, 8...30 VDC
Output stage	SinCos 1 Vpp		
Shaft type			
- Through hollow shaft	ø10 mm, ø12 mm, ø14 mm	ø0.375...1" (ø9.525...25.4 mm)	ø10 ... 16 mm
Connection			
- Flange box MIL	–	Radial, 7-/10-pin	–
- Cable	Tangential	Radial	Radial / axial
Sine periods per revolution	1024...2048	1024...5000	1024...2048
Operating temperature	-30...+100 °C	-40...+100 °C (-40...+212 °F)	-20...+85 °C
Protection class	IP 65	IP 54, IP 65, IP 67	IP 65
Operating speed	≤6000 rpm	≤5000 rpm (IP 65)	≤8000 rpm
Options	Suitable for SIL3 / PLe certified speed monitors GMM240S / GMM246S See chapter SIL speed monitor Cable with connector	HTL/TTL output signals (HS35F) Programmable (HS35P)	–

LowHarmonics

LowHarmonics is leading cutting-edge technology by generating *sine* signals with negligible harmonic content. Sine encoders with *LowHarmonics* ensure improved control quality, less drive heating and higher energy efficiency.

Industrial encoders incremental Sine/Cosine



www.baumer.com/incremental



Compact high performance.



Absolute rotary encoders in size $\varnothing 58$ mm:
EAL580 with clamping flange

Industrial encoders absolute



Absolutely universal – reliable position feedback without referencing in both singleturn and multiturn technology.

At Baumer, you will always find the right absolute encoder - whether with classic point-to-point or real-time Ethernet interface, with precise optical or robust magnetic sensing, from compact housing with $\varnothing 28$ mm to industrial standard with $\varnothing 58$ mm. The performance-optimized products are optimal for use in demanding applications, where they contribute to higher productivity.

Reliable quality and flexible supplies of any interface and product variant: This involves qualified and committed people, intelligent technologies and the latest production methods.



Sensing technologies

Optical or magnetic sensing

Optical encoders ensure ultimate precision and maximum magnetic field immunity in parallel.

They enable a resolution of up to 18 bits per revolution and an accuracy of up to ± 0.01 degrees.

The purely magnetic encoders of the *MAGRES* series are particularly robust and always work reliably even under very strong shock and vibration loads or under condensation.



Industrial encoders absolute

Size up to $\varnothing 36$ mm

Robust, precise magnetic sensing.

- Solid shaft or blind hollow shaft
- Compact designs for tight spaces
- Shock resistant up to 500 g
- Angular accuracy up to $\pm 0.15^\circ$



Features	<ul style="list-style-type: none"> ■ Solid shaft with flat mounting flange ■ Redundant sensing and interface 	<ul style="list-style-type: none"> ■ Solid shaft ■ Blind hollow shaft ■ Radial or axial cable / connector connection ■ Angular accuracy up to $\pm 0.15^\circ$ 	<ul style="list-style-type: none"> ■ Solid shaft with synchro flange 	<ul style="list-style-type: none"> ■ Solid shaft with synchro flange ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)
Product family	EAM280	EAM300	EAM360-SW	EAM360R-SW

Interface

- SSI / SSI + incremental	–	■ / –	■ / ■	–
- Analog / redundant	■ / ■	– / –	– / –	■ / –
- CANopen® / redundant	■ / ■	■ / –	■ / –	■ / –
- CANopen® lift	–	■	■	–
- SAE J1939	–	–	–	■

Function	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Sensing principle	Magnetic						
Size (housing)	$\varnothing 28.6$ mm	$\varnothing 30$ mm		$\varnothing 36$ mm			
Voltage supply	10...30 VDC (CANopen®) 8...30 VDC / 12...30 VDC (analog) 5 VDC $\pm 5\%$ (analog)	4.5...30 VDC (SSI) 10...30 VDC (CANopen®)		4.5...30 VDC (CANopen®, SAE J1939, SSI) 8...30 VDC / 14...30 VDC (analog - type-dependent)			
Shaft type	$\varnothing 6$ mm	$\varnothing 5$ mm, $\varnothing 6$ mm, $\varnothing 8$ mm		$\varnothing 10$ mm		$\varnothing 10$ mm	
- Solid shaft	$\varnothing 6$ mm	$\varnothing 5$ mm, $\varnothing 6$ mm, $\varnothing 8$ mm		$\varnothing 10$ mm		$\varnothing 10$ mm	
- Blind hollow shaft	–	$\varnothing 6$ mm		–		–	
Connection							
- Flange box M12	Cable 0.3 m with M12, 5-pin, male	Radial		Radial		Radial	
- Cable	Radial (0.25 mm ²)	Radial (0.09 mm ²)		Radial (0.14 mm ²)		Radial (0.5 mm ²)	
Steps per revolution	4096/12 bits (analog) 16384/14 bits (CANopen®)	$\leq 16384/14$ bits		$\leq 65536/16$ bits			
Number of revolutions	–	$\leq 262144/18$ bits –		$\leq 262144/18$ bits –		$\leq 262144/18$ bits –	
Absolute accuracy	Up to $\pm 1.0^\circ$	Up to $\pm 0.15^\circ$					
Operating temperature	-40...+85 °C						
Protection class	IP 65, IP 67	IP 65, IP 67		IP 65, IP 67		IP 67	
Operating speed	≤ 800 rpm	≤ 6000 rpm					
Max. shaft load	≤ 10 N axial, ≤ 10 N radial	≤ 10 N axial, ≤ 10 N radial		≤ 40 N axial, ≤ 80 N radial			
Options	Cable with industry standard connector (DEUTSCH, AMP,...) Redundant design (2-channel architecture)	Diagnosis function DATA-VALID		Additional incremental signals (SSI, CANopen®) Corrosion protection CX		Cable with DEUTSCH connector	

Industrial encoders absolute

Size up to $\varnothing 36$ mm

CANopen

SAE J1939

SSI

HTL / TTL



0...10 V
0.5...4.5 V
4...20 mA

MAGRES

www.baumer.com/absolute



Features	<ul style="list-style-type: none"> Blind hollow shaft 	<ul style="list-style-type: none"> Blind hollow shaft E1 compliant design Corrosion protection CX Applicable up to PLd (ISO 13849) 		
Product family	EAM360-B	EAM360R-B		
Interface				
- SSI	■ / ■	–		
- Analog	–	■		
- CANopen® / redundant	■ / –	■ / –		
- CANopen® lift	■	–		
- SAE J1939	–	■		
Function	Multiturn	Singleturn	Multiturn	Singleturn
Sensing principle	Magnetic			
Size (housing)	$\varnothing 36$ mm			
Voltage supply	4.5 ... 30 VDC (CANopen®, SAE J1939, SSI) 8 ... 30 VDC / 14 ... 30 VDC (analog - type-dependent)			
Shaft type				
- Blind hollow shaft	$\varnothing 10...15$ mm			
Connection				
- Flange box M12	Radial			
- Cable	Radial (0.14 mm ²)		Radial (0.5 mm ²)	
Steps per revolution	$\leq 65536/16$ bits			
Number of revolutions	$\leq 262144/18$ bits	–	$\leq 262144/18$ bits	–
Absolute accuracy	Up to $\pm 0.15^\circ$			
Operating temperature	-40...+85 °C			
Protection class	IP 65, IP 67		IP 67	
Operating speed	≤ 6000 rpm			
Max. shaft load	≤ 40 N axial, ≤ 80 N radial			
Options	Additional incremental signals (SSI, CANopen®) Corrosion protection CX		Cable with DEUTSCH connector	

Industrial encoders absolute

Size ø58 mm

Robust, precise magnetic sensing.
Integrated interface and modular bus covers.

- Solid shaft or blind hollow shaft
- Shock resistant up to 500 g
- Angular accuracy up to $\pm 0.15^\circ$



MAGRES



Features	<ul style="list-style-type: none"> ■ Solid shaft with clamping or synchro flange 	<ul style="list-style-type: none"> ■ Solid shaft with clamping or synchro flange ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849) 	<ul style="list-style-type: none"> ■ Blind hollow shaft 	<ul style="list-style-type: none"> ■ Blind hollow shaft ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)
Product family	EAM580-S	EAM580R-S	EAM580-B	EAM580R-B

Interface

- SSI / SSI + incremental	■ / ■	–	■ / ■	–
- Analog	–	■	–	■
- CANopen® / redundant	■ / –	■ / ■	■ / –	■ / ■
- CANopen® lift	■	–	■	–
- SAE J1939	–	■	–	■
- Profinet	■	–	■	–
- EtherCAT / EtherNet/IP	■ / ■	– / –	■ / ■	– / –

Function	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Sensing principle	Magnetic							
Size (housing)	ø58 mm							
Voltage supply	4.5...30 VDC (CANopen®, SAE J1939, SSI), 8...30 VDC / 14...30 VDC (analog - type-dependent), 10...30 VDC (Ethernet)							
Shaft type								
- Solid shaft	ø6 mm, ø10 mm				–			
- Blind hollow shaft	–				ø10...15 mm			
Connection								
- Flange box M12	Radial		Radial		Radial		Radial	
- Flange box M23	Radial		–		Radial		–	
- Cable	Radial (0.14 mm ²)		Radial (0.5 mm ²)		Radial (0.14 mm ²)		Radial (0.5 mm ²)	
Steps per revolution	≤65536/16 bits		≤65536/16 bits		≤65536/16 bits		≤65536/16 bits	
Number of revolutions	≤262144/18 – bits		≤262144/18 – bits		≤262144/18 – bits		≤262144/18 – bits	
Absolute accuracy	Up to $\pm 0.15^\circ$							
Operating temperature	-40...+85 °C							
Protection class	IP 65, IP 67		IP 67		IP 65, IP 67		IP 67	
Operating speed	≤6000 rpm							
Max. shaft load	≤40 N axial, ≤80 N radial							
Options	Additional incremental signals (SSI, CANopen®) Corrosion protection CX		Cable with DEUTSCH connector Two-channel architecture		Additional incremental signals (SSI, CANopen®) Corrosion protection CX		Cable with DEUTSCH connector Two-channel architecture	

Industrial encoders absolute

Size $\varnothing 58$ mm

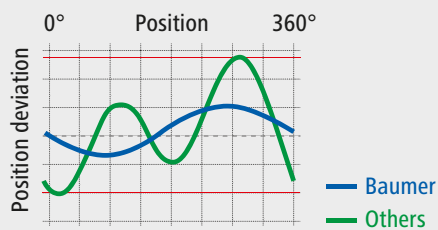
MAGRES

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MAGRES – Robust precision

The latest generation of our absolute encoders *MAGRES* is based on an innovative, patented magnetic singleturn and multiturn sensing method with proven but even further improved robustness and durability.

Thanks to optimally harmonized components and supreme, sophisticated signal processing, these encoders operate with a precision that previously only optical encoders could achieve.



R series for extreme applications

Your benefits

- CX corrosion protection for high durability in outdoor use
- E1-compliant design for high electromagnetic compatibility
- Applicable up to PLd (ISO 13849)
- Robust strand cross-section 0.5 mm² for cable with DEUTSCH connector

Our qualified and experienced experts would be glad to support you in the design of your safety-relevant application and its certification by the notified body.

Industrial encoders absolute

Size ø58 mm

Precise optical sensing.

- Resolution up to 18 bits per revolution
- High accuracy up to $\pm 0.01^\circ$
- Operating temperature up to -40°C
- LED status indicators



OptoTurn



Features	■ Solid shaft with clamping or synchro flange		■ Blind or through hollow shaft		■ Solid shaft with clamping or synchro flange		■ Blind or through hollow shaft	
Product family	EAL580-SC	EAL580-SV	EAL580-B	EAL580-T	EAL580-SC	EAL580-SV	EAL580-B	EAL580-T
Interface	Up to 18 bits singleturn resolution				Up to 13 bits singleturn resolution			
- Profinet	■	■	■	■	■	■	■	■
- EtherCAT	■	■	■	■	■	■	■	■
- EtherNet/IP	■	■	■	■	■	■	■	■
Function	Multiturn / Singleturn							
Sensing principle	Optical							
Size (housing)	ø58 mm							
Voltage supply	10...30 VDC							
Flange	Clamping flange	Synchro flange	Blind hollow shaft	Through Hollow shaft	Clamping flange	Synchro flange	Blind hollow shaft	Through Hollow shaft
Shaft type								
- Solid shaft	ø10 mm	ø6 mm	–	–	ø10 mm	ø6 mm	–	–
- Blind hollow shaft	–	–	ø10...15 mm	–	–	–	ø10...15 mm	–
- Through hollow shaft	–	–	–	ø10...14 mm	–	–	–	ø10...14 mm
Connection	Flange box 3xM12							
Steps per revolution	≤262 144/18 bits				≤8192/13 bits			
Number of revolutions	≤8192/13 bits				≤65536/16 bits			
Absolute accuracy	±0.01°				±0.025°			
Protection class	IP 54, IP 65, IP 67							
Operating temperature	-40...+85 °C (depending on product and variant)							
Operating speed	≤6000 rpm							
Max. shaft load	≤20 N axial, ≤40 N radial		–		≤20 N axial, ≤40 N radial		–	
Options	Preset / Reset button (not for EtherCAT)							

Industrial encoders absolute

Size ø58 mm



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Features	■ Solid shaft with clamping flange		■ Solid shaft with synchro flange		■ Blind hollow shaft	■ Through hollow shaft
Product family	GM400	GA240	GM401	GA241	GXM2S	GOM2H
Interface						
- SSI / SSI + incremental	■	■	■	■	■	■
Function	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Multiturn
Sensing principle	Optical					
Size (housing)	ø58 mm					
Voltage supply	10...30 VDC					
Shaft type						
- Solid shaft	ø10 mm		ø6 mm		–	–
- Blind hollow shaft	–		–		ø12...15 mm	–
- Through hollow shaft	–		–		–	ø10...14 mm
Connection	Flange box M12, M23 or cable (depending on product and variant)					
Steps per revolution	≤16384/14 bits					
Number of revolutions	≤65536/16 bits –		≤65536/16 bits –		≤4096/12 bits	
Absolute accuracy	±0.025°					
Protection class	IP 54, IP 65				IP 54 (IP 65 optional)	IP 54
Operating temperature	-40...+85 °C (depending on product and variant)					
Operating speed	≤6000 rpm					
Max. shaft load	≤20 N axial, ≤40 N radial				–	
Options	Stainless steel / offshore design					

1) BISS C, CANopen®, RS485, Modbus on request

Tough where it's rough.
Precise in performance.



Incremental encoder HOG 10
with blind hollow shaft



HeavyDuty encoders, speed switches, tacho generators and combinations.

For decades, Baumer HeavyDuty encoders have been proving unrivalled reliability under most adverse conditions. Whether at gantry cranes, vertical lift bridges, steel plants or wind power plants – these encoders are extremely robust, reliable and durable.

Product combinations merging several sensing methods or twin encoders can take over specific tasks and safety functions. For drive applications where additional control signals besides the speed information are required, HeavyDuty product combinations of encoders, tacho generators and speed switches will provide the decisive impulses thanks to their integrated additional functions.

Durable and reliable thanks to proven HeavyDuty technology.

- Solid aluminium or stainless steel housings
- Bearings at both shaft ends
- HeavyDuty connection technology
- Isolated against shaft currents
- Protection against sea air, abrasive dust or tropical conditions

HUBNER
BERLIN
A Baumer Brand

Baumer Hübner

Hübner Berlin, now Baumer Hübner, is the Baumer Group competence center for HeavyDuty sensors particularly conceived for drive technology. We have been world-leading in this industry for more than 50 years, setting new benchmarks for reliable encoders, tacho generators and speed switches in HeavyDuty technology. Our unrivalled robust products are optimized to match your individual application and merge longtime branch expertise with cutting-edge technology. For dependable operation you can always rely on.

HeavyDuty encoders incremental

Size up to $\varnothing 120$ mm / solid shaft

Solid shaft with EURO flange B10.

- Precision signals in drive engineering
- Robust electrical and mechanical design
- Redundant scanning / twin encoder
- Second shaft end for centrifugal force/speed switch
- Integrated Enhanced Monitoring System EMS



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Housing uncoated 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Corrosion protection C4 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Shallow installation depth <70 mm 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 5000
Product family	POG 86E	POG 86	OG 9	POG 9
Sensing principle	Optical			
Size (housing)	$\varnothing 115$ mm			
Voltage supply	5 VDC $\pm 5\%$, 9...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	–	–	–	–
- HTL-P (Power Linedriver)	■	■	■	■
- LWL (fiber-optic cable)	With LWL converter (outdoor box)			
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Solid shaft	$\varnothing 11$ mm			
Flange	EURO flange B10			
Connection	Terminal box, rotatable			
Pulses per revolution	512...2500	500...5000	1...1250	300...5000
Operating temperature	-40...+100 °C		-30...+100 °C	
Protection class	IP 56		IP 55	
Operating speed	$\leq 12\,000$ rpm			
Max. shaft load	≤ 250 N axial, ≤ 450 N radial			
Options	Corrosion protection C4	Enhanced Monitoring System EMS Second shaft end Centrifugal switch (FSL) Ex II 3G IIC / 3D IIIC (ATEX)	Ex II 3G IIC / 3D IIIC (ATEX)	Enhanced Monitoring System EMS Second shaft end Speed switch (FSL, ESL) Twin encoder incremental POG 9 G Ex II 3G IIC / 3D IIIC (ATEX)

High-power signal output drivers

To ensure optimum HTL or TTL signal quality via RS422 even at extended cable length we deploy short circuit proof power drivers with max. 300 mA peak current. This allows for direct TTL signal supply in extended transmission length of more than 500 m and yet extremely compact housings. Our HTL-P high current power drivers are fully compatible with HTL/push-pull. This enables them to drive particularly robust HTL levels over 350 m line length.

HeavyDuty encoders incremental

Size up to ø120 mm / solid shaft

Durable & reliability thanks to proven HeavyDuty technology.

- Solid aluminium or stainless steel housings
- Bearings at both shaft ends
- Isolated against shaft currents
- Protection against seawater and tropical conditions



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Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 10800 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 5000 ■ High protection class IP 66 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Corrosion protection CX 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ IECEx certification
Product family	POG 90	POG 10	POG 11	EEx OG 9
Sensing principle	Optical			
Size (housing)	ø115 mm			ø120 mm
Voltage supply	5 VDC ±5 %, 9...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL-P (Power Linedriver)	■	■	■	■
- LWL (fiber-optic cable)	With LWL converter (outdoor box)			
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Solid shaft	ø11 mm			
Flange	EURO flange B10			
Connection	Terminal box, rotatable			
Pulses per revolution	1024...10800	300...5000		25...5000
Operating temperature	-20...+85 °C	-40...+100 °C -50...+100 °C (optional)		-40...+55 °C (<500 ppr) -50...+55 °C (<500-2500 ppr) -25...+55 °C (>3072 ppr)
Protection class	IP 66	IP 66	IP 67	IP 56
Operating speed	≤12 000 rpm			<6000 rpm
Max. shaft load	≤300 N axial, ≤450 N radial			≤200 N axial, ≤350 N radial
Options	Second shaft end Centrifugal switch (FSL) Speed switch (ESL) Housing foot B3 Ex II 3G IIC / 3D IIIC (ATEX)	Enhanced Monitoring System EMS Redundant (POG 10M) Centrifugal switch (FSL) Speed switch (ESL) Housing foot B3 Ex II 3G IIC / 3D IIIC (ATEX)	Enhanced Monitoring System EMS Redundant (POG 11M) Housing foot B3 Ex II 3G IIC / 3D IIIC (ATEX)	Sine/Cosine version: EExOG 9 S Ex II 2G IIC (ATEX/IECEx)



EURO flange B10

EURO flange B10 is the global mounting standard for HeavyDuty shaft encoders.

HeavyDuty encoders incremental

Size up to $\varnothing 105$ mm / hollow shaft

Blind hollow shaft or cone shaft.

- Precision signals in drive engineering
- Robust electrical and mechanical design
- Redundant sensing
- Integrated Enhanced Monitoring System EMS



Features	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Rotatable terminal box ■ Isolated ball bearings 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Rotatable terminal box ■ Corrosion protection C4 ■ Isolated ball bearings 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 5000 ■ Isolated ball bearings
Product family	HOG 86E	HOG 86	HOG 9
Sensing principle	Optical		
Size (housing)	$\varnothing 99$ mm	$\varnothing 99$ mm	$\varnothing 97$ mm
Voltage supply	5 VDC $\pm 5\%$, 9...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	—	—	—
- HTL-P (Power Linedriver)	■	■	■
- LWL (fiber-optic cable)	With LWL converter (outdoor box)		
Output signals	K1, K2, K0 + inverted		
Shaft type			
- Cone shaft 1:10	$\varnothing 17$ mm		
- Blind hollow shaft	$\varnothing 12...16$ mm		
Connection	Terminal box rotatable, Flange box M23	Terminal box rotatable, Flange box M23 or cable	Flange box M23
Pulses per revolution	512...2500	500...5000	300...5000
Operating temperature	-40...+100 °C		-30...+100 °C
Protection class	IP 66		IP 56
Operating speed	$\leq 10\,000$ rpm		
Max. shaft load	≤ 350 N axial, ≤ 450 N radial		≤ 400 N axial, ≤ 500 N radial
Options	Corrosion protection C4 Ex II 3G IIC / 3D IIIC (ATEX)	Enhanced Monitoring System EMS hybrid bearing Redundant (HOG 86M) Ex II 3G IIC / 3D IIIC (ATEX)	Enhanced Monitoring System EMS Ex II 3G IIC / 3D IIIC (ATEX)

Redundant sensing

Devices with redundant, i.e. double-channel sensing master demanding applications requiring maximum system uptime and functional safety. Our qualified and experienced experts would be happy to support you in the design of your safety-relevant application and its certification by the notified body.

HeavyDuty encoders incremental

Size up to ø105 mm / hollow shaft



Tough where it's rough, precise in performance

- Unmatched durability and reliability – Original Hübner Berlin
- Proven HeavyDuty principle with bearing at both shaft ends
- Precise speed signals for higher control quality and process control
- Avoid time-consuming outages and high downtime costs
- Benefit from more than 60 years of experience of the world market leader

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Features	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 5000 ■ Hybrid bearings in standard products ■ Corrosion protection CX 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Corrosion protection CX ■ Hybrid bearings in standard products ■ Protection class IP 67 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 10 000 ■ Hybrid bearings in standard products
Product family	HOG 10	HOG 11	HOG 100
Sensing principle	Optical		
Size (housing)	ø105 mm		
Voltage supply	5 VDC ±5 %, 9...30 VDC		5 VDC ±5 %, 9...26 VDC, 9...30 VDC
Output stage			
- TTL/RS422	■	■	■
- HTL-P (Power Linedriver)	■	■	■
- LWL (fiber-optic cable)	With LWL converter (outdoor box)		
Output signals	K1, K2, K0 + inverted		
Shaft type			
- Cone shaft 1:10	ø17 mm		
- Blind hollow shaft	ø12...20 mm		
Connection	Terminal box axial, radial		
Pulses per revolution	300...5000		1024...10 000
Operating temperature	-40...+100 °C (-50...+100 °C optional)		-30...+85 °C
Protection class	IP 66	IP 67	IP 66
Operating speed	≤6000 rpm		
Max. shaft load	≤450 N axial, ≤600 N radial		
Options	Enhanced Monitoring System EMS Redundant (HOG 10M) Sealing system for tropical environments Ex II 3G IIC / 3D IIIC (ATEX)	Enhanced Monitoring System EMS Redundant (HOG 11M) DNV certificate Ex II 3G IIC / 3D IIIC (ATEX)	Centrifugal switch (FSL) Speed switch (ESL) Ex II 3G IIC / 3D IIIC (ATEX)



Outstanding corrosion protection

Thanks to selection of optimum materials and highly resistant coatings, Baumer encoders and sensors are ideally suited for corrosive environments as present in permanent outdoor use at sea or in mobile automation. Their corrosion protection is determined by elaborate salt spray tests and usually corresponds to the highest corrosiveness category CX (C5-M) based on EN ISO 12944.

HeavyDuty encoders incremental

Large hollow shaft

Hollow shaft up to $\varnothing 75$ mm.

- Precise optical encoders for large drive shafts
- Outstanding high mechanical reserve capacity
- For use in permanently oily-wet environments
- Hybrid bearings in standard products



Features	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 38$ mm ■ Corrosion protection CX 	<ul style="list-style-type: none"> ■ Through hollow shaft ■ Rotatable terminal box ■ Operating speed up to 6000 rpm ■ Corrosion protection CX ■ Pulses per revolution up to 5000
Product family	HOG 16	HOG 163
Sensing principle	Optical	
Size (housing)	$\varnothing 158$ mm	$\varnothing 158$ mm
Voltage supply	5 VDC $\pm 5\%$, 9...30 VDC	
Output stage		
- TTL/RS422	■	■
- HTL-P (Power Linedriver)	■	■
- LWL (fiber-optic cable)	With LWL converter (outdoor box)	
Output signals	K1, K2, K0 + inverted	
Shaft type		
- Through hollow shaft	$\varnothing 20...38$ mm	$\varnothing 38...75$ mm
Connection	Terminal box rotatable	
Pulses per revolution	250...2500	250...5000
Operating temperature	-40...+100 °C	-40...+85 °C (-50...+100 °C optional)
Protection class	IP 66	IP 56
Operating speed	≤ 6000 rpm	
Max. shaft load	≤ 450 N axial, ≤ 600 N radial	≤ 350 N axial, ≤ 500 N radial
Options	Redundant (HOG 16M) Blind hollow shaft Hybrid bearings Ex II 3G IIC / 3D IIIC (ATEX)	Redundant (HOG 163M) Ex II 3G IIC / 3D IIIC (ATEX)

Hybrid bearings

Hybrid bearings consist of a steel race hosting high-strength ceramic balls. Hybrid bearings enable 5 times the service life of conventional steel bearings. Hybrid bearings provide a high-voltage proof isolation of the encoder shaft.

HeavyDuty encoders incremental

Large hollow shaft

Magnetic ring encoder for HeavyDuty applications up to $\varnothing 740$ mm. Up to 32 768 pulses per revolution.

- Square and SinCos signals
- Wear-free operation and wide axial tolerance ± 3 mm
- Magnetic wheel mounting by axial screw mounting, heat shrinking, clamping set mounting, clamping ring mounting

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HDmag



Features	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 16 \dots 80$ mm ■ Installation depth ≤ 40 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 50 \dots 180$ mm ■ Installation depth ≤ 40 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 70 \dots 340$ mm ■ Installation depth ≤ 40 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 650 \dots 740$ mm ■ Installation depth ≤ 40 mm
Product family	MHGE 100	MHGE 200	MHGE 400	MHGE 800
Sensing principle	Magnetic			
Magnetic wheel diameter	$\varnothing 99.9$ mm	$\varnothing 201.7$ mm	$\varnothing 405.4$ mm	$\varnothing 813$ mm
Mounting type magnetic wheel	Axial screw mounting, hot shrinking, clamping set mounting, clamping ring mounting			
Dimensions (sensor head)	100 x 40 x 65 mm			
Voltage supply	Square: 4.75...30 VDC, Sine: 5 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
- SinCos 1 Vpp	■	■	■	■
Output signals	A 90° B, R + inverted			
Output frequency	≤ 300 kHz			
Shaft type				
- Through hollow shaft	$\varnothing 16 \dots 80$ mm	$\varnothing 50 \dots 180$ mm	$\varnothing 70 \dots 340$ mm	$\varnothing 650 \dots 740$ mm
Connection				
- Flange box M23	Tangential			
- Terminal box	Cable screw connection M20, tangential			
Pulses per revolution	64...4096	128...8192	256...16 384	512...32 768
Sine periods per revolution	64	128	256	512
Operating temperature	$-40 \dots +100$ °C			
Protection class	IP 66, IP 67			
Operating speed	≤ 8000 rpm	≤ 4000 rpm	≤ 2000 rpm	≤ 1000 rpm
Options	DNV certificate			DNV certificate, stainless steel wheel

HDmag

HDmag stands for HighDefinition and HeavyDuty in equal measure and combines precision with extreme robustness. Bearingless HDmag encoders are based on high resolution sensing of a precision material measure combined with real-time digital signal processing. HDmag encoders are available as incremental and absolute variants, provide outstanding high resolution and fit virtually any shaft diameter at minimized installation depth. For decades, Baumer HeavyDuty encoders have been providing unrivalled reliability under most adverse conditions. Whether at gantry cranes, vertical lift bridges, steel plants or wind power plants – these encoders are extremely robust, reliable and durable.

HeavyDuty encoders incremental

Sine/Cosine

Solid shaft with EURO flange B10. Blind hollow shaft.

- Precise optical sensing
- Extremely high signal quality



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Sine periods per revolution up to 5000 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft up to $\varnothing 20$ mm
Product family	POGS 90	HOGS 100
Sensing principle	Optical	
Size (housing)	$\varnothing 115$ mm	$\varnothing 105$ mm
Voltage supply	5 VDC $\pm 10\%$, 9...30 VDC	
Output stage		
- SinCos 1 Vpp	■	■
Output signals	K1, K2, K0 + inverted	
Shaft type		
- Solid shaft	$\varnothing 11$ mm	–
- Cone shaft 1:10	–	$\varnothing 17$ mm
- Blind hollow shaft	–	$\varnothing 12...20$ mm
- Through hollow shaft	–	–
Flange	EURO flange B10	–
Connection	Terminal box, rotatable	
Sine periods per revolution	720...5000	1024...5000
Operating temperature	-20...+85 °C	
Protection class	IP 66	
Operating speed	$\leq 10\,000$ rpm	
Max. shaft load	≤ 250 N axial, ≤ 350 N radial	≤ 450 N axial, ≤ 600 N radial
Options	Second shaft end Ex II 3G IIC / 3D IIIC (ATEX)	Centrifugal switch (FSL) Speed switch (ESL) Ex II 3G IIC / 3D IIIC (ATEX)

LowHarmonics

LowHarmonics is leading cutting-edge technology by generating *sine* signals with negligible harmonic content. Sine encoders with LowHarmonics ensure improved control quality, less drive heating and higher energy efficiency.

HeavyDuty encoders incremental Sine/Cosine

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HeavyDuty encoders absolute

Size up to $\varnothing 115$ mm

Solid shaft with EURO flange B10. Hollow shaft or cone shaft.

- Extremely robust design with bearings at both shaft ends
- Highly robust, magnetic singleturn sensing
- Energy self-sufficient MicroGen revolution counter
- Additional incremental signals with zero pulse
- Integrated speed switch optional

Programmable
by WLAN adapter



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends ■ Programmable 	<ul style="list-style-type: none"> ■ Cone shaft or hollow shafts ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends 	<ul style="list-style-type: none"> ■ Cone shaft or hollow shafts ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends ■ Programmable
Product family	PMG 10	PMG 10P	HMG 10	HMG 10P

Interface

- SSI / SSI + incremental	■ / ■	■ / ■	■ / ■	■ / ■
- TTL/RS422 ¹⁾	■	■	■	■
- HTL-P (Power Linedriver) ¹⁾	■	■	■	■
- Profinet / Profibus-DP	■ / ■	■ / ■	■ / ■	■ / ■
- EtherCAT / EtherNet/IP	■ / ■	■ / ■	■ / ■	■ / ■
- CANopen [®] / DeviceNet	■ / ■	■ / ■	■ / ■	■ / ■

Function	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Programmable	–	–	■	■	–	–	■	■

Sensing principle	Magnetic							
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Size (housing)	$\varnothing 115$ mm				$\varnothing 105$ mm			
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Voltage supply	10...30 VDC (SSI 4.75...30 VDC)							
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Shaft type

- Solid shaft	$\varnothing 11$ mm				–			
- Cone shaft 1:10	–		–		$\varnothing 17$ mm			
- Blind hollow shaft	–		–		$\varnothing 16...20$ mm			
- Through hollow shaft	–		–		$\varnothing 16...20$ mm			

Connection	Bus cover, terminal box, fuse box M12 or M23							
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Steps per revolution	$\leq 1\,048\,576/20$ bits (additionally 1...131 072 pulses per revolution)							
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Number of revolutions	$\leq 1\,048\,576/20$ bits	–	$\leq 1\,048\,576/20$ bits	–	$\leq 1\,048\,576/20$ bits	–	$\leq 1\,048\,576/20$ bits	–
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Protection class	IP 66, IP 67							
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Operating temperature	-40...+95 °C (fieldbus: -40...+85 °C)							
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Operating speed	$\leq 12\,000$ rpm (fieldbus: $\leq 6\,000$ rpm)							
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Max. shaft load	≤ 450 N axial, ≤ 650 N radial							
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Options	Additional incremental signals with zero pulse Integrated speed switch WLAN adapter for easy programming Sealing system for tropical environments							
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1) Any combination with other interfaces

HeavyDuty encoders absolute

Size up to ø160 mm



www.baumer.com/HD-absolute



Features	<ul style="list-style-type: none"> ■ Through hollow shaft ■ Corrosion resistant and seawater resistant ■ Axial torque plate
Product family	HMG 161
Interface	
- SSI	■
- Profinet / Profibus-DP	- / ■
- CANopen® / DeviceNet	■ / ■
Function	Multiturn Singleturn
Programmable	-
Sensing principle	Optical
Size (housing)	ø160 mm
Voltage supply	9...30 VDC
Shaft type	
- Cone shaft 1:10	-
- Blind hollow shaft	-
- Through hollow shaft	ø38...70 mm
Connection	Bus cover, terminal box
Steps per revolution	≤8192/13 bits
Number of revolutions	≤65 536/16 bits -
Protection class	IP 56
Operating temperature	-20...+85 °C
Operating speed	≤5000 rpm
Max. shaft load	≤350 N axial, ≤500 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)
Options	Additional incremental signals Isolated storage

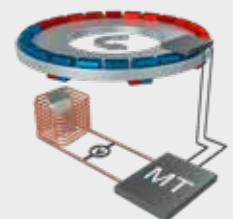
Programming / monitoring

With the compact programming Wifi adapter, you can intuitively parameterize your HeavyDuty encoder HMG 10 and PMG 10 using a PC, tablet or smartphone – even if it is already installed in the system. The monitoring function clearly visualises the current encoder signals, for example during commissioning.



MicroGen

The patented *MicroGen* revolution counter is the heart of the HeavyDuty absolute encoders. *MicroGen* operates without battery or gears, generating energy straight from the encoder shaft movement. *MicroGen* has been standing the test of time for more than 10 years in tough HeavyDuty applications. Characterized by simple design, the counter is immune against magnetic fields, and combines wear-free operation over a large temperature range with leading edge robustness.



HeavyDuty speed switches / monitors

Mechanical / electronic

Mechanical centrifugal switches or electronic speed switches.

- Mechanical centrifugal switches that are energy-self sufficient
- Solid shaft with EURO flange B10



Features	<ul style="list-style-type: none"> ■ Mechanical centrifugal switch ■ Operating temperature up to +130 °C 	<ul style="list-style-type: none"> ■ Electronic speed switch ■ Speed up to 6000 rpm 	<ul style="list-style-type: none"> ■ Electronic speed switch ■ 3 outputs
Product family	FS 90	ES 90	ES 93
Voltage supply	–	–	–
Switching outputs	1 output, Speed controlled	1 output, Speed controlled	3 outputs, Speed controlled
Output switching capacity	≤6 A / 230 VAC ≤1 A / 125 VDC	≤6 A / 250 VAC ≤1 A / 48 VDC	–
Minimum switching current	50 mA	100 mA	40 mA
Size (housing)	ø115 mm		
Shaft type	– Solid shaft		
- Solid shaft	ø11 mm		
Flange	EURO flange B10		
Connection	Terminal box		
Operating temperature	-40...+130 °C	-20...+85 °C	
Protection class	IP 55		
Operating speed (n)	≤1.25 x ns	≤6000 rpm	≤5000 rpm
Switching speed range (ns) ¹⁾	850...4500 rpm	650...6000 rpm	200...5000 rpm
Max. shaft load	≤150 N axial, ≤250 N radial		
Options	Combination with rotary encoder or tacho generator		

1) Any selected switching speed as a permanent factory setting

Mechanical centrifugal switches and electronic speed switches are ideally suited for the simple and fast implementation of safety functions when exceeding or falling below any speed limits at drives, machines and systems. The following device types flexibly support the diverse requirements of safety architectures in OEM and retrofit applications: speed switch, encoder-speed switch combination, encoder with integrated speed switch and stand-alone signal evaluation devices.

When designing and certifying your safety-relevant application in close cooperation with a notified body, our qualified and experienced experts would be glad to support you.

HeavyDuty speed switches / monitors

Mechanical / electronic



Digital speed switch

- Proven, robust HeavyDuty principle with bearing at both shaft ends
- As stand-alone device or integrated in encoder
- Freely programmable switch-off and switch-on speeds as well as switching delay - or fixed at the factory

www.baumer.com/HD-speed



Features	<ul style="list-style-type: none"> ■ Hollow blind, through or cone ■ Programmable or fixed at the factory ■ Switch-off and switch-on speeds, switching delay 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Programmable or fixed at the factory ■ Switch-off and switch-on speeds, switching delay
Product family	HMG10D - incremental	PMG10D - incremental
Voltage supply	4.75...30 VDC	
Switching outputs	1 output, speed controlled	
Output switching capacity	30 VDC; ≤100 mA	
Minimum switching current	–	
Size (housing)	ø105 mm	ø115 mm
Shaft type		
- Solid shaft	–	ø11 mm
- Hollow shaft	ø16...20 mm Blind or through	–
- Cone shaft 1:10	ø17 mm	–
Flange	Support plate for torque arm, 360° freely positionable	EURO flange B10 housing foot B3
Connection	Terminal box Flange box M23	
Operating temperature	-40...+95 °C	
Protection class	IP 66 / IP 67	
Operating speed (n)	≤12000 rpm	
Switching speed range (ns) ¹	±2...12000 rpm	
Max. shaft load	≤450 N axial, ≤650 N radial	
Options	Freely programmable or fixed at the factory Incremental output Optimized seal for dusty, oily-wet or tropical environments	

HeavyDuty speed switches / monitors

Digital / Stand-alone

Stand-alone product for outdoor and switchboard installation.

- Monitoring of HTL/TTL, PNP and SinCos signals
- Configurable switching thresholds
- Integrated speed display
- Standard component or safety component certified up to SIL3 / PLc



The overview of safe speed monitors with SIL3/PLc certification can be found in the SIL speed monitor section.

HeavyDuty speed switches / monitors

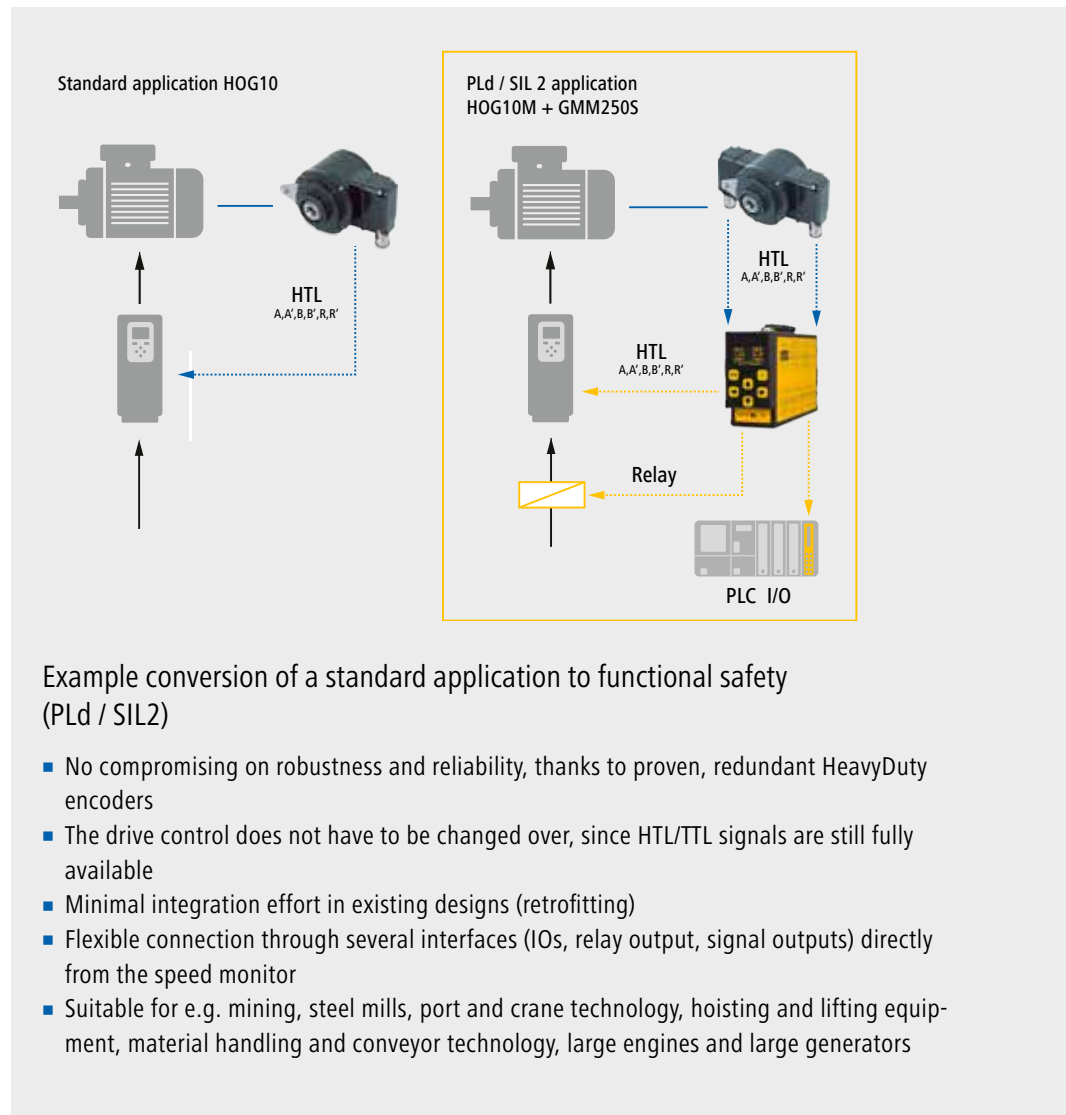
Digital / Stand-alone

Safe speed monitoring with SIL2/PLd certification

- Monitoring of ramps, underspeed, overspeed, standstill and rotational direction
- 2 x non-safety encoders / sensors or 1 x safety encoder
- Easy integration into existing systems



www.baumer.com/HD-speed



HeavyDuty speed switches / monitors

Digital / integrated in encoder

Incremental encoders with digital speed switch.

- Blind or through hollow shaft
- Space-saving integration into encoder housing
- User-configurable on/off switching speeds
- Up to three switching outputs

Configurable
by PC software



Features	<ul style="list-style-type: none"> ■ Blind hollow shaft ■ 2 switching outputs 	<ul style="list-style-type: none"> ■ Through hollow shaft ■ 2 switching outputs
Product family	HOG 10+DSL.E	HOG 165+DSL.E
Sensing principle	Optical	
Size (housing)	ø105 mm	ø165 mm
Voltage supply	9...30 VDC	
Output stage		
- TTL/RS422	■	■
- HTL-P (Power Linedriver)	■	■
Output signals	K1, K2, K0 + inverted	
Shaft type		
- Blind hollow shaft	ø16 mm	ø25 mm
Connection	Terminal box	
Pulses per revolution	512...2500	512...4096
Operating temperature	-30...+85 °C	
Protection class	IP 66	IP 67
Operating speed (n)	≤6000 rpm	
Switching speed range (ns)	3...6000 rpm	
Max. shaft load	≤250 N axial, ≤450 N radial	≤500 N axial, ≤650 N radial
Switching outputs	2 relay outputs individually speed controlled, 1 relay output as control output	2 relay outputs individually speed controlled, 1 relay output as control output
Output switching capacity	≤0.25 A at 230 VAC/VDC per output	≤0.25 A at 230 VAC/VDC per output
Options	Ex II 3G IIC / 3D IIIC (ATEX)	

HeavyDuty speed switches / monitors

Digital / integrated in encoder

Incremental encoders with digital speed switch.

- Solid shaft with EURO flange B10
- Space-saving integration into encoder housing
- User-configurable on/off switching speeds
- Up to three switching outputs



www.baumer.com/HD-speed



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ 2 switching outputs
Product family	POG 10+DSL.E
Sensing principle	Optical
Size (housing)	ø120 mm
Voltage supply	9...30 VDC
Output stage	
- TTL/RS422	■
- HTL-P (Power Linedriver)	■
Output signals	K1, K2, K0 + inverted
Shaft type	
- Solid shaft	ø11 mm
Flange	EURO flange B10
Connection	Terminal box
Pulses per revolution	512...2500
Operating temperature	-30...+85 °C
Protection class	IP 66
Operating speed (n)	≤6000 rpm
Switching speed range (ns)	3...6000 rpm
Max. shaft load	≤300 N axial, ≤450 N radial
Switching outputs	2 relay outputs individually speed controlled, 1 relay output as control output
Output switching capacity	≤0.25 A at 230 VAC/VDC per output
Options	Ex II 3G IIC / 3D IIIC (ATEX)

HeavyDuty speed switches / monitors

Digital / integrated in encoder

Incremental encoders with digital speed switch.

- Housing-integrated to save space
- User-configurable on/off switching speeds
- Operating temperature -40...+95 °C and corrosion protection CX
- Additional incremental signals with zero pulse



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ 1 switching output ■ 2 incremental outputs 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ 1 switching output ■ Programmable ■ 2 incremental outputs 	<ul style="list-style-type: none"> ■ Cone shaft or hollow shaft ■ 1 switching output ■ 2 incremental outputs 	<ul style="list-style-type: none"> ■ Cone shaft or hollow shaft ■ 1 switching output ■ Programmable ■ 2 incremental outputs
Product family	PMG 10D incremental	PMG 10PD incremental	HMG 10D incremental	HMG 10PD incremental
Programmable	-	■	-	■
Interface				
- TTL/TTL/HTL push-pull (Vin = Vout)	■	■	■	■
- HTL-P (Power Linedriver) ¹⁾	■	■	■	■
Sensing principle	Magnetic			
Size (housing)	ø115 mm		ø105 mm	
Voltage supply	9...30 VDC			
Shaft type				
- Solid shaft	ø11 mm		-	-
- Cone shaft 1:10	-	-	ø17 mm	
- Blind hollow shaft	-	-	ø16...20 mm	
- Through hollow shaft	-	-	ø16...20 mm	
Flange	EURO flange B10		-	-
Connection	Terminal box, fuse box M23			
Pulses per revolution	1...131 072, individual for both outputs			
Protection class	IP 66, IP 67			
Operating temperature	-40...+95 °C			
Operating speed (n)	≤12000 rpm			
Switching speed range (ns)	2...12 000 rpm			
Max. shaft load	≤450 N axial, ≤650 N radial			
Switching outputs	1 transistor output speed controlled			
Output switching capacity	≤100 mA at 30 VDC			
Options	Additional incremental signals Incremental signals and speed switch configurable Tropical climate protection	Additional incremental signals and speed switches configurable Tropical climate protection WLAN adapter for easy programming	Additional incremental signals Incremental signals and speed switch configurable Tropical climate protection	Additional incremental signals Incremental signals and speed switch configurable Tropical climate protection WLAN adapter for easy programming

1) Any combination with other interfaces

HeavyDuty speed switches / monitors

Digital / integrated in encoder

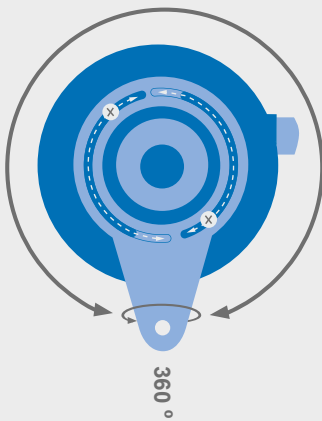
Variety and flexibility. Individual configuration.

- Number of pulses per revolution
- Speed switching limits
- Switching characteristics / hysteresis
- SSI settings for absolute position



www.baumer.com/HD-speed

New torque plate



- Best compatibility with HOG10 mounting
- Improved corrosion resistance due to stainless steel
- Standard screws
- 360° rotatable thanks to clever design

Intelligent HeavyDuty encoders

Intelligent HeavyDuty encoders with integrated speed switch deliver position information and signals for speed feedback and speed limit monitoring in harsh environments.

Your benefits

- Fast integration into your application
- Flexible parameterization and convenient signal monitoring
- Programming WLAN adapters for smartphone, tablet and PC
- Integrated web server for access without software installation



HeavyDuty tachogenerators

Tachogenerators

Solid shaft with EURO flange B10.

Idle voltage up to 200 mV/rpm.

- Ultimate lifetime thanks to *LongLife* commutator with embedded silver track
- Real-time acquisition of speed and rotational direction
- Operating temperature up to +130 °C



Features	■ Solid shaft with EURO flange B10		■ Solid shaft with EURO flange B10, ø85 mm ■ Dual tachometer with redundant output (TDPZ)		■ Solid shaft with EURO flange B10 ■ Dual tachometer with redundant output (TDPZ)		■ Solid shaft with EURO flange B10, ø120-175 mm ■ Dual tachometer with redundant output (TDPZ)	
Product family	GTF 7.08	GTF 7.16	TDP 0.09	TDPZ 0.09	TDP 0.2	TDPZ 0.2	TDP 13	TDPZ 13
Voltage supply	none							
Size (housing)	ø115 mm		ø85 mm		ø115 mm		ø120...175 mm	
Shaft type	- Solid shaft							
	ø11 mm		ø6 mm		ø7...14 mm		ø14...18 mm	
Flange	EURO flange B10							
Idle voltage	10...60 mV per rpm		10...60 mV per rpm		10...150 mV per rpm		20...100 mV per rpm	
					10...200 mV per rpm			
Performance								
- Speed ≥5000 rpm	0.3 W	0.6 W	-	-	-	-	-	-
- Speed ≥3000 rpm	-	-	1.2 W	2 x 0.3 W	12 W	2 x 3 W	-	-
- Speed ≥2000 rpm	-	-	-	-	-	-	40 W	2 x 20 W
Rotor moment of inertia	0.4 kg/cm ²	0.6 kg/cm ²	0.25 kg/cm ²	0.29 kg/cm ²	1.1 kg/cm ²	1.2 kg/cm ²	17 kg/cm ²	20 kg/cm ²
Connection	Connector		Terminal box					
Operating temperature	-30...+130 °C							
Protection class	IP 55		IP 56		IP 55			
Operating speed	≤9000 rpm		≤10 000 rpm		≤10 000 rpm		≤6000 rpm	
Max. shaft load	≤150 N axial, ≤250 N radial		≤40 N axial, ≤60 N radial		≤60 N axial, ≤80 N radial		≤80 N axial, ≤100 N radial	
Options	-		-		Sea/tropical climate protection Second shaft end Protection class IP 56		-	

LongLife

LongLife technology for HeavyDuty tachogenerators is based on a silver track embedded in the commutator. This reduces the wear of the commutator to almost zero. *LongLife* tachogenerators combine very high signal quality for optimum dynamic control with outstanding robustness and unrivalled service life.



HeavyDuty tachogenerators

Tachogenerators

HÜBNER Berlin, now Baumer Hübner, has stood for robust tachogenerators for almost 70 years and still supplies a wide variety of models to machine manufacturers and spare parts in OEM quality.



www.baumer.com/HD-tacho



Features	<ul style="list-style-type: none"> ■ In industrial NEMA 12 housing ■ For direct replacement of "PY" or "BC" style tachometers ■ CSA / C / US approved 	<ul style="list-style-type: none"> ■ In industrial NEMA 12 housing ■ For direct replacement of "PY" or "BC" style tachometers ■ CSA / C / US approved
Product family	APY	FAPY
Voltage supply	none	
Size (housing)	4.528"	3.88"
Shaft type	- Solid shaft	
	.312" DIA / .318" DIA solid shaft	
Flange	NEMA 12 mounting flange	NEMA 12 housing with foot mounting
Idle voltage	20...100 mV per rpm	50...100 mV per rpm
Performance	- Speed ≥ 3000 rpm	
	12 W	
Rotor moment of inertia	1.1 kg/cm ²	
Connection	Terminal box with 1/2" – 14 NPT connection thread	
Operating temperature	-30...+130 °C (-22...266 °F)	
Protection class	IP 55	
Operating speed	$\leq 10\,000$ rpm	
Max. shaft load	≤ 60 N axial, ≤ 80 N radial	

Even though analog tachogenerators have long since been replaced by digital rotary encoders in modern control concepts, LongLife tachogenerators still today stand out as an alternative due to the following properties:

Special signal quality and service life

- LongLife commutator thanks to silver track with constantly low contact resistance for high signal quality
- Specially adapted brushes for maintenance-free operation and long service life
- Wide adjustable speed range

Cost effective

- Signal transmission with two-core cable, requiring no electrical auxiliary energy and power supply
- Cost-effective complete package of tachogenerators, cable and evaluation electronics

Reliable and safe

- Real-time detection of speed and direction of rotation thanks to analog signal technology
- Highest availability and unmatched service life under the toughest ambient conditions
- Proven HeavyDuty principle, bearing at both shaft ends, HeavyDuty connection technology

Reliability in any environment

- Extremely resistant housing with large wall thickness, outstanding corrosion protection, lasting impermeability concept
- Wide temperature range from -30 °C ... $+130$ °C
- Reliable protection against bearing damage

Flexible and future-proof

- Combinations with common shaft are possible: tachogenerator + rotary encoder, tachogenerator + speed switch
- Matching spare parts in OEM quality, even for obsolete models, other makes and special designs

HeavyDuty tachogenerators

Tachogenerators

Bearingless design with hollow shaft or cone shaft.

Idle voltage up to 60 mV/rpm.

- Ultimate lifetime thanks to *LongLife* commutator with embedded silver track
- Operating temperature up to +130 °C
- Very high accuracy over the entire speed range



Features	<ul style="list-style-type: none"> ■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft 	<ul style="list-style-type: none"> ■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft 	<ul style="list-style-type: none"> ■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft 	<ul style="list-style-type: none"> ■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft
Product family	GT 5	GT 7.08 GT 7.16	GT 9	GTB 9.06 GTB 9.16
Voltage supply	none			
Size (housing)	ø52 mm	ø85 mm	ø89 mm	ø95 mm
Shaft type				
- Cone shaft 1:10	–	–	ø17 mm	ø17 mm
- Blind hollow shaft	ø8...12 mm	ø12...16 mm	ø12...16 mm	ø12...16 mm
Idle voltage	7...10 mV per rpm	10...60 mV per rpm	10...20 mV per rpm	10...20 mV per rpm 60 mV per rpm
Performance				
- Speed ≥5000 rpm	0.075 W	0.3 W 0.6 W	0.3 W	0.3 W
Rotor moment of inertia	0.05 kg/cm ²	0.4 kg/cm ² 0.55 kg/cm ²	0.95 kg/cm ²	0.95 kg/cm ² 1.95 kg/cm ²
Connection	Plug-in terminals	Connector	Plug-in terminals	Connector
Operating temperature	-30...+130 °C			
Protection class	IP 20	IP 55	IP 0	IP 68
Operating speed	≤10 000 rpm	≤9000 rpm		
Options	–	Cable 0.6 m	Protection class IP 44 with cover	–

HeavyDuty tacho generators

Tacho generators



www.baumer.com/HD-tacho



Features	<ul style="list-style-type: none"> ■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft 	<ul style="list-style-type: none"> ■ Tacho generator ■ Blind hollow shaft
Product family	GTR 9	KTD 4
Operating voltage/frequency	none	
Size (housing)	ø95 mm	ø86 mm
Shaft type		
- Blind hollow shaft	ø16 mm	ø10...16 mm
Idle voltage	20...60 mV per rpm	10...40 mV per rpm
Performance		
- Speed ≥ 5000 rpm	0.9 W	–
Rotor moment of inertia	1.95 kg/cm ²	600 g/cm ²
Connection	Connector	Cable, radial
Operating temperature	-30...+130 °C	-15...+100 °C (-30...+100 °C optional)
Protection class	IP 56	IP 54
Operating speed	≤ 9000 rpm	≤ 6000 rpm

Worldwide presence and competent support in consultation, sales and service.

That's what Baumer stands for, also when it comes to tacho generators.

Thanks to our decades of experience as a manufacturer of tacho generators, we can find the right spare parts and accessories in OEM quality for you, whether for:

- Obsolete products
- Products of other brands
- Special variants

You may also have the tacho generators in use revised in our factory. We are committed to improve our customers' competitiveness by maximum system uptime.

HeavyDuty combinations

Incremental twin encoder

Two encoders share one common shaft.
Solid, blind hollow or cone shaft.

- Each encoder with optional redundant sensing
- Integrated Enhanced Monitoring System EMS



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Maximum speed up to 12 000 rpm 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Corrosion protection CX 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Maximum speed up to 10 000 rpm ■ Isolated ball bearings 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Corrosion protection CX ■ Hybrid ball bearings as standard
Product family	POG 86 G POG 9 G	POG 10 G POG 11 G	HOG 9 G	HOG 10 G HOG 11 G
Sensing principle	Optical			
Size (housing)	ø115 mm	ø115 mm	ø97 mm	ø105 mm
Voltage supply	5 VDC ±5 %, 9...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL-P (Power Linedriver)	■	■	■	■
Shaft type				
- Solid shaft	ø11 mm	ø11 mm	–	–
- Cone shaft	–	–	ø17 mm	ø17 mm
- Blind hollow shaft	–	–	ø16 mm	ø16...20 mm
Flange	EURO flange B10	EURO flange B10	–	–
Connection	Terminal box		Flange box M23	Terminal box
Pulses per revolution	300...5000	300...5000	300...5000	300...5000
Operating temperature	-40...+100 °C, -25...+100 °C (>3072 ppr)			
Protection class	IP 56	IP 66 IP 67	IP 56	IP 66 IP 67
Operating speed	≤12 000 rpm	≤6000 rpm	≤10 000 rpm	≤6000 rpm
Max. shaft load	≤250 N axial, ≤350 N radial	≤300 N axial, ≤450 N radial	≤400 N axial, ≤500 N radial	≤450 N axial, ≤600 N radial
Explosion protection	Ex II 3G IIC / 3D IIC (ATEX)			
Options	Enhanced Monitoring System EMS	Enhanced Monitoring System EMS Redundant sensing with two terminal boxes per encoder	Enhanced Monitoring System EMS	Enhanced Monitoring System EMS Redundant sensing with two terminal boxes per encoder

Combinations 1 + 1 = 1

1 + 1 = 1 translates into HeavyDuty product combinations where HeavyDuty encoders, tachogenerators and speed switches are combined into a robust unit. Hence, besides speed feedback, the application may involve more signals for drive regulation. In parallel, HeavyDuty combinations provide different output signals and sharing a common shaft to save space, they excel with ultimate reliability and service life.

HeavyDuty combinations

Tacho generator



With mechanical centrifugal switch, electronic speed switch or incremental encoder.

- Energy self-sufficient speed switch powered by centrifugal force / tacho principle
- Electronic speed switch ESL with 1 or 3 switching outputs
- Mechanical centrifugal switch FSL with one switching output

www.baumer.com/HD-combi



Features	<ul style="list-style-type: none"> ■ Tacho generator with mechanical centrifugal switch ■ Solid shaft with EURO flange B10 	<ul style="list-style-type: none"> ■ Tacho generator with mechanical centrifugal switch ■ Solid shaft with EURO flange B10 	<ul style="list-style-type: none"> ■ Tacho generator with electronic speed switch ■ Solid shaft with EURO flange B10 	<ul style="list-style-type: none"> ■ Tacho generator with rotary encoder ■ Solid shaft with EURO flange B10 		
Product family	TDP 0.09+FSL	TDP 0.2+FSL	TDPZ 0.2+FSL	TDP 0.2+ESL	TDPZ 0.2+ESL	TDP 0.2+OG9
Sensing principle	Optical					
Size (housing)	ø85 mm		ø115 mm			
With centrifugal switch	■	■	–		–	
With speed switch	–		■		–	
Voltage supply	none		none		12 VDC ±10 % (TDP 0.2 +ESL 93 only)	
Idle voltage	10...60 mV per rpm	10...150 mV per rpm	20...100 mV per rpm	10...150 mV per rpm	20...100 mV per rpm	10...150 mV per rpm
Performance (speed >3000 rpm)	1.2 W	12 W	2 x 3 W	12 W	2 x 3 W	12 W
Shaft type	- Solid shaft					
- Solid shaft	ø6 mm	ø7...14 mm		ø7...14 mm		ø11 mm
Flange	EURO flange B10					
Connection	Terminal box					
Operating temperature	-30...+130 °C		-30...+130 °C		-25...+85 °C	
	-30...+100 °C -25...+100 °C(>3072 ppr)					
Protection class	IP 56		IP 55		IP 55	
Operating speed (n)	≤1.25 x ns		≤1.25 x ns		≤6000 rpm	
Switching speed range (ns) ¹	850...4500 rpm		850...4500 rpm		200...6000 rpm	
Max. shaft load	≤40 N axial, ≤60 N radial		≤60 N axial, ≤80 N radial			
Switching outputs (speed controlled)	1 output		1 output		1 or 3 outputs	
Output circuit	Opener / Closer		Opener / Closer		Transistor outputs: High: 12 V, Low: 0 V Switching current: ≤40 mA	
Options	–		Redundant output (TDPZ)		Redundant output (TDPZ)	

1) Any selected switching speed as a permanent factory setting

HeavyDuty combinations

Incremental encoders with speed switch

Mechanical centrifugal switch or electronic speed switch.

- Energy self-sufficient speed switch powered by centrifugal force / tachometer principle
- Electronic speed switch ESL with 1 or 3 switching outputs
- Mechanical centrifugal switch FSL with one switching output



Features	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Pulses per revolution 500...5000 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Pulses per revolution 300...5000 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 	<ul style="list-style-type: none"> ■ Solid shaft with EURO flange B10 ■ Corrosion protection CX ■ For use in salty, oil-wet environments
Product family	POG 86+FSL	POG 9+FSL POG 9+ESL	POG 10+FSL POG 10+ESL	POG 11+FSL POG 11+ESL
Sensing principle	Optical			
Size (housing)	ø115 mm			
With centrifugal switch	■	■	–	■
With speed switch	–	–	■	■
Voltage supply	5 VDC ±5 %, 9...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL-P (Power Linedriver)	■	■	■	■
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Solid shaft	ø11 mm			
Flange	EURO flange B10			
Connection	Terminal box			
Pulses per revolution	500...5000	300...5000		
Operating temperature	-30...+100 °C	-30...+100 °C -20...+85 °C	-40...+100 °C -20...+85 °C	-40...+100 °C -20...+85 °C
Protection class	IP 56	IP 56	IP 66	IP 67
Operating speed	≤6000 rpm			
Switching speed range (ns) ¹	850...4500 rpm (FSL), 200...6000 rpm (ESL)			
Max. shaft load	≤300 N axial, ≤450 N radial			
Switching outputs (speed controlled)	1 output	1 output	1 or 3 outputs	1 output 1 or 3 outputs
Output circuit	Opener/Closer	Opener/Closer	Transistor Outputs	Opener/Closer Transistor Outputs
Options	Enhanced Monitoring System EMS		Enhanced Monitoring System EMS Redundant sensing	

1) Any selected switching speed as a permanent factory setting

HeavyDuty combinations

Incremental encoders with speed switch



Mechanical centrifugal switch or electronic speed switch.

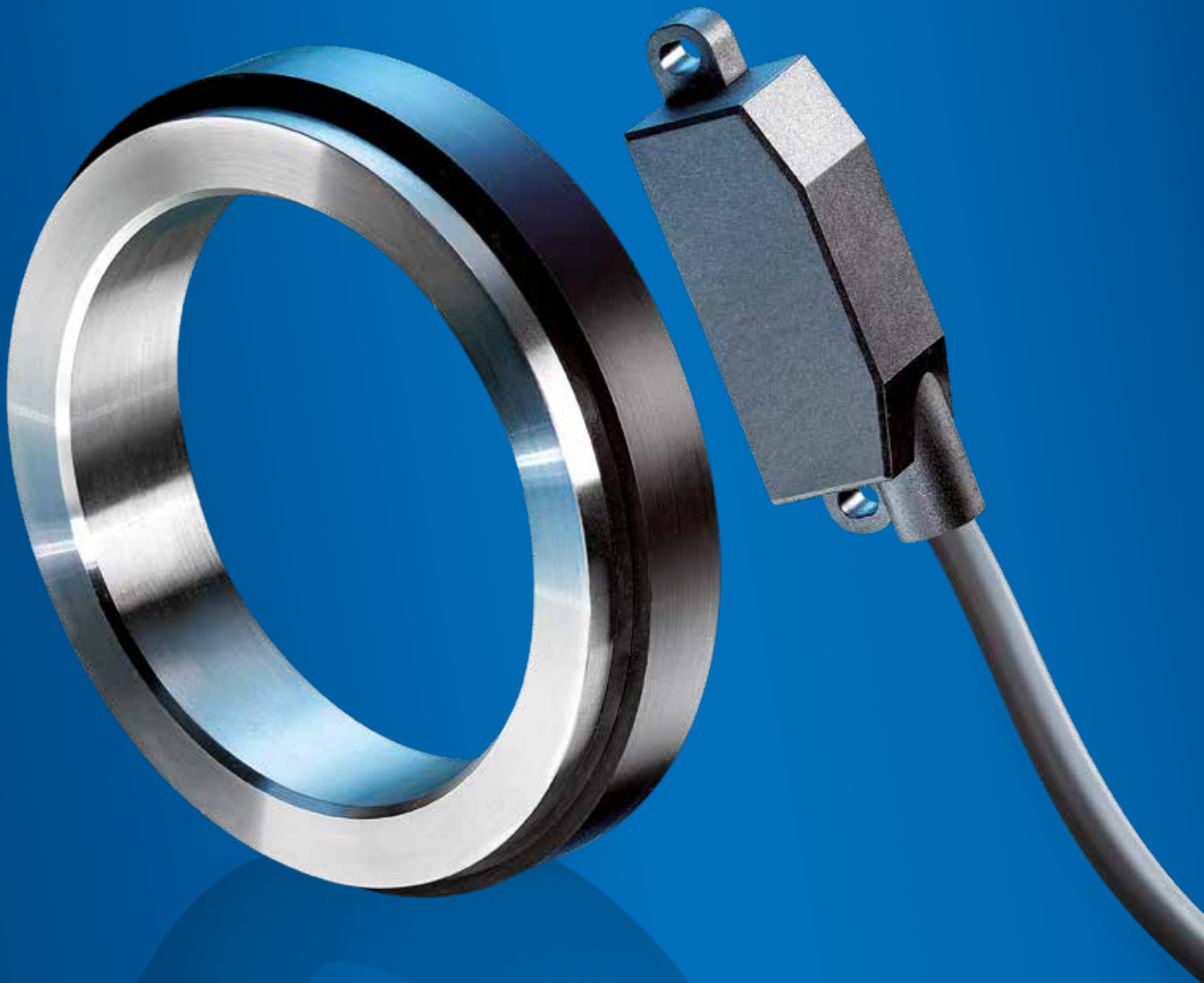
- Energy self-sufficient speed switch powered by centrifugal force / tachometer principle
- Electronic speed switch ESL with 1 or 3 switching outputs
- Mechanical centrifugal switch FSL with one switching output

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Features	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Sealed separately against solid impurities 	<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ Corrosion protection CX ■ For use in salty, oil-wet environments
Product family	HOG 86+FSL	HOG 10+FSL HOG 10+ESL	HOG 11+FSL HOG 11+ESL
Sensing principle	Optical		
Size (housing)	ø99 mm	ø105 mm	
With centrifugal switch	■	■ –	■ –
With speed switch	–	– ■	– ■
Voltage supply	5 VDC ±5 %, 9...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL-P (Power Linedriver)	■	■	■
Output signals	K1, K2, K0 + inverted		
Shaft type			
- Cone shaft 1:10	ø17 mm		
- Blind hollow shaft	ø16 mm	ø16...20 mm	
Connection	Terminal box		
Pulses per revolution	500...5000	300...5000	
Operating temperature	-40...+100 °C	-40...+100 °C -20...+85 °C	-40...+100 °C -20...+85 °C
Protection class	IP 66	IP 66	
Operating speed	≤6000 rpm		
Switching speed range (ns) ¹	850...4500 rpm	850...4500 rpm (FSL) 200...6000 rpm (ESL)	850...4500 rpm (FSL) 200...6000 rpm (ESL)
Max. shaft load	≤350 N axial, ≤450 N radial	≤450 N axial, ≤600 N radial	
Switching outputs (speed controlled)	1 output	1 output 1 or 3 outputs	1 output 1 or 3 outputs
Output circuit	Opener/Closer	Opener/Closer Transistor Outputs	Opener/Closer Transistor Outputs
Options	Enhanced Monitoring System EMS Redundant sensing		

Durable and space-saving.



Bearingless incremental encoder:
ITDx9



Non-contact, wear-free and compact.

Bearingless encoders by Baumer operate on the non-contact principle and mainly utilize magnetic sensing and virtually all are free from wear. No dust, dirt or condensation will impair reliable operation. They even withstand harmful fibres dominating the environments of the textile industry. Our bearingless encoders are extremely resistant to shocks and vibrations and provide virtually unlimited service life.

Forgoing any mechanical components prone to wear, these encoders master also highspeed applications. The portfolio comprises incremental encoders with square and sine signals as well as absolute product variants with most common interfaces.

Easy integration - reduced overall costs

Their extremely shallow installation depth, sometimes a mere 10 mm, make bearingless encoders with magnetic wheel and sensor the ideal choice for tight installation space – no matter whether on shafts with 6 or 600 mm diameter. The narrow magnetic wheel and the lean sensor head even allow for attachment to the A-end of the shaft, for example between drive and gearing.

Bearingless encoders

Incremental

Magnetic ring encoder for industry up to $\varnothing 140$ mm.
Up to 8192 pulses per revolution.

- Square and sine signals
- Non-contact, wear-free operation
- Low installation depth for easy integration
- Immune against dust, dirt, fibres and fluids



IO-Link

Features	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 43.5$ mm ■ Pulses per revolution up to 1024 ■ IO-Link 	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 43.5$ mm ■ Pulses per revolution up to 4096 ■ Zinc die-cast sensor housing 	<ul style="list-style-type: none"> ■ Through hollow shaft up to $\varnothing 28$ mm ■ Pulses per revolution up to 2048
Product family	EB200E	MIR10	ITD49H ITD49H sine
Sensing principle	Magnetic		
Magnetic wheel diameter	$\varnothing 30.5...56$ mm	$\varnothing 30.5...56$ mm	$\varnothing 40$ mm
Mounting type magnetic wheel	Radial screw connection		Hot shrinking, bonding, radial screw connection
Dimensions (sensor head)	12 x 16 x 48 mm	10 x 15 x 45.5 mm	12 x 16 x 48 mm
Voltage supply	8...30 VDC	10...30 VDC 5 VDC $\pm 5\%$	5 VDC $\pm 5\%$ 5 VDC $\pm 10\%$ 8...26 VDC
Output stage			
- TTL/RS422	–	■	■ –
- HTL/push-pull	■	■	■ –
- SinCos 1 Vpp	–	–	– ■
Output signals	A 90° B, IO-Link, SIO	A 90° B, R + inverted	A 90° B, R / A 90° B, R + inv.
Output frequency	≤ 160 kHz	≤ 350 kHz	≤ 300 kHz (TTL) ≤ 180 kHz ≤ 160 kHz (HTL)
Shaft type			
- Through hollow shaft	$\varnothing 6...43.5$ mm	$\varnothing 6...43.5$ mm	$\varnothing 8...28$ mm
Connection			
- Cable	Tangential		
Pulses per revolution	32...1024	320...4096	64...2048 –
Sine periods per revolution	–	–	– 64
Operating temperature	-25...+85 °C	-40...+85 °C	-40...+100 °C
Protection class	IP 67	IP 66, IP 67	IP 67
Operating speed	$\leq 6\,000$ rpm	$\leq 20\,000$ rpm	$\leq 18\,000$ rpm
Options	Cable end with connector Several mounting options Magnetic shields Redundant sensing of a magnetic wheel with two sensor heads		

Bearingless encoders

Incremental

Bearingless encoders by Baumer operate on non-contact sensing technology and are virtually wearfree. They withstand shocks and vibrations and are ideal for applications where space is tight.

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Features	<ul style="list-style-type: none"> Through hollow shaft up to $\varnothing 65$ mm Pulses per revolution up to 4096 	<ul style="list-style-type: none"> Through hollow shaft up to $\varnothing 150$ mm Pulses per revolution up to 8192 		
Product family	ITD69H	ITD69H sine	ITD89H	ITD89H sine
Sensing principle	Magnetic			
Magnetic wheel diameter	$\varnothing 81.3$ mm		$\varnothing 162$ mm	
Mounting type magnetic wheel	Hot shrinking, bonding, radial screw connection		Hot shrinking, bonding	
Dimensions (sensor head)	12 x 16 x 48 mm			
Voltage supply	5 VDC ± 5 % 8...26 VDC	5 VDC ± 10 %	5 VDC ± 5 % 8...26 VDC	5 VDC ± 10 %
Output stage				
- TTL/RS422	■	—	■	—
- HTL/push-pull	■	—	■	—
- SinCos 1 Vpp	—	■	—	■
Output signals	A 90° B, R / A 90° B, R + inverted			
Output frequency	≤ 300 kHz (TTL) ≤ 180 kHz ≤ 160 kHz (HTL)		≤ 300 kHz (TTL) ≤ 180 kHz ≤ 160 kHz (HTL)	
Shaft type				
- Through hollow shaft	$\varnothing 40...65$ mm		$\varnothing 70...140$ mm	
Connection				
- Cable	Tangential			
Pulses per revolution	128...4096	—	256...8192	—
Sine periods per revolution	—	128	—	256
Operating temperature	-40...+100 °C			
Protection class	IP 67			
Operating speed	$\leq 10\,000$ rpm		≤ 5000 rpm	
Options	Cable end with connector Several mounting options Magnetic shields Redundant sensing of a magnetic wheel with two sensor heads			

Redundant sensing

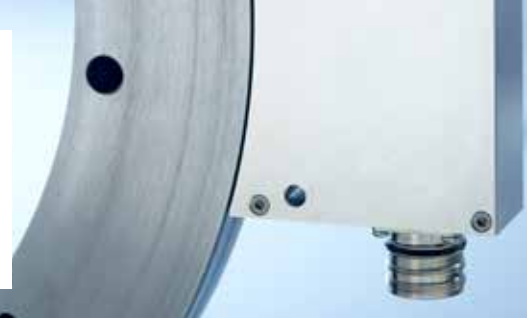
Maximum application uptime and safety is provided by redundant sensing of a magnetic ring by two sensor heads. Our qualified and experienced experts would be happy to support you in the design of your safety-relevant application and its certification by the notified body.

Bearingless encoders

Incremental

Magnetic ring encoder for HeavyDuty applications up to $\varnothing 740$ mm. Up to 32 768 pulses per revolution.

- Square and SinCos signals
- Wear-free operation and wide axial tolerance ± 3 mm
- Magnetic wheel mounting by axial screw mounting, heat shrinking, clamping set mounting, clamping ring mounting



Features	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 16...80$ mm ■ Installation depth ≤ 40 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 50...180$ mm ■ Installation depth ≤ 40 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 70...340$ mm ■ Installation depth ≤ 40 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 650...740$ mm ■ Installation depth ≤ 40 mm
Product family	MHGE 100	MHGE 200	MHGE 400	MHGE 800
Sensing principle	Magnetic			
Magnetic wheel diameter	$\varnothing 99.9$ mm	$\varnothing 201.7$ mm	$\varnothing 405.4$ mm	$\varnothing 813$ mm
Mounting type magnetic wheel	Axial screw mounting, hot shrinking, clamping set mounting, clamping ring mounting			
Dimensions (sensor head)	100 x 40 x 65 mm			
Voltage supply	Square: 4.75...30 VDC, Sine: 5 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
- SinCos 1 Vpp	■	■	■	■
Output signals	A 90° B, R + inverted			
Output frequency	≤ 300 kHz			
Shaft type				
- Through hollow shaft	$\varnothing 16...80$ mm	$\varnothing 50...180$ mm	$\varnothing 70...340$ mm	$\varnothing 650...740$ mm
Connection				
- Flange box M23	Tangential			
- Terminal box	Cable screw connection M20, tangential			
Pulses per revolution	64...4096	128...8192	256...16384	512...32768
Sine periods per revolution	64	128	256	512
Operating temperature	$-40...+100$ °C			
Protection class	IP 66, IP 67			
Operating speed	≤ 8000 rpm	≤ 4000 rpm	≤ 2000 rpm	≤ 1000 rpm
Options	DNV certificate			DNV certificate, stainless steel wheel

HDmag

HDmag stands for *HighDefinition* and *HeavyDuty* in equal measure and combines precision with extreme robustness. Bearingless HDmag encoders are based on high resolution sensing of a precision material measure combined with real-time digital signal processing. HDmag encoders are available as incremental and absolute variants, provide outstanding high resolution and fit virtually any shaft diameter at minimized installation depth. Baumer HeavyDuty encoders have been offering unmatched reliability under the toughest operating conditions for decades. Whether at gantry cranes, vertical lift bridges, steel plants or wind power plants - the devices are extremely robust, reliable and durable.

Bearingless encoders

Incremental



Magnetic ring encoder for HeavyDuty applications up to $\varnothing 340$ mm. Up to 524 288 pulses per revolution.

- Square and SinCos signals
- Wear-free operation and wide axial tolerance ± 3 mm
- Outstanding signal quality thanks to FPGA signal processing

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Features	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 16 \dots 80$ mm ■ Installation depth ≤ 35 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 50 \dots 180$ mm ■ Installation depth ≤ 35 mm ■ Stainless steel wheel 	<ul style="list-style-type: none"> ■ Through hollow shaft $\varnothing 70 \dots 340$ mm ■ Installation depth ≤ 35 mm ■ Stainless steel wheel
Product family	MHGP 100	MHGP 200	MHGP 400
Sensing principle	Magnetic		
Magnetic wheel diameter	$\varnothing 99.9$ mm	$\varnothing 201.7$ mm	$\varnothing 405.4$ mm
Mounting type magnetic wheel	Axial screw mounting, hot shrinking, clamping set mounting, clamping ring mounting		
Dimensions (sensor head)	120 x 30 x 90 mm	120 x 30 x 78 mm	
Voltage supply	4.5...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	■	■
- SinCos 1 Vpp	■	■	■
Output signals	A 90° B, R + inverted		
Output frequency	≤ 2 MHz		
Shaft type			
- Through hollow shaft	$\varnothing 16 \dots 80$ mm	$\varnothing 50 \dots 180$ mm	$\varnothing 70 \dots 340$ mm
Connection			
- Flange box M23	Tangential		
Pulses per revolution	64...131 072	128...262 144	256...524 288
Sine periods per revolution	8192	16384	32768
Operating temperature	$-20 \dots +85$ °C		
Protection class	IP 66, IP 67		
Operating speed	≤ 8000 rpm	≤ 4000 rpm	≤ 2000 rpm



Baumer Hübner

Hübner Berlin, now Baumer Hübner, is the Baumer Group competence center for HeavyDuty sensors particularly conceived for drive technology. We have been world-leading in this industry for more than 50 years, setting new benchmarks for reliable encoders, tacho generators and speed switches in HeavyDuty technology. Our unrivalled robust products are optimized to match your individual application and merge longtime branch expertise with cutting-edge technology. For dependable operation you can always rely on.

Bearingless encoders

Absolute

Magnetic ring encoder for HeavyDuty up to $\varnothing 340$ mm.
Singleturn variant.

- SSI and CANopen® interface
- Additional square and SinCos signals
- Wide axial backlash ± 3 mm
- Non-contact, wear-free operation

HDmag



Features	<ul style="list-style-type: none"> ■ Wear-free rotary encoder ■ Through hollow shaft $\varnothing 16 \dots 80$ mm ■ Stainless steel wheel ■ Integrated FPGA signal processing 	<ul style="list-style-type: none"> ■ Wear-free rotary encoder ■ Through hollow shaft $\varnothing 50 \dots 180$ mm ■ Stainless steel wheel ■ Integrated FPGA signal processing 	<ul style="list-style-type: none"> ■ Wear-free rotary encoder ■ Through hollow shaft $\varnothing 70 \dots 340$ mm ■ Stainless steel wheel ■ Integrated FPGA signal processing
Product family	MHAP 100	MHAP 200	MHAP 400
Sensing principle	Magnetic		
Interface			
- SSI	■	■	■
- CANopen®	—	—	—
Function	Singleturn		
Magnetic wheel diameter	$\varnothing 101.3$ mm	$\varnothing 203.1$ mm	$\varnothing 406.8$ mm
Mounting type magnetic wheel	Axial screw mounting, hot shrinking, clamping set mounting, clamping ring mounting		
Dimensions (sensor head)	120 x 30 x 90 mm	120 x 30 x 78 mm	120 x 30 x 78 mm
Voltage supply	4.5...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	■	■
- SinCos 1 Vpp	■	■	■
Output signals	A 90° B + inverted		
Shaft type			
- Through hollow shaft	$\varnothing 16 \dots 80$ mm	$\varnothing 50 \dots 180$ mm	$\varnothing 70 \dots 340$ mm
Connection	Flange box M23, tangential		
Steps per revolution	$\leq 131072 / 17$ bits	$\leq 262144 / 17$ bits	$\leq 1 \dots 524288 / 17$ bits
Sine periods per revolution	1...8192	1...16384	1...32768
Operating temperature	-20...+85 °C		
Protection class	IP 66, IP 67, IP68 (wheel)		
Operating speed	≤ 8000 rpm	≤ 4000 rpm	≤ 2000 rpm

Bearingless encoders

For large shaft diameters

Magnetic belt encoder for HeavyDuty up to $\varnothing 3183$ mm.
up to 131 072 pulses/revolution.

- Square and SinCos signals, SSI interface
- Position and speed signals via SSI
- Any shaft diameter as standard
- Wear-free operation and wide axial backlash ± 5 mm



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HDmag flex



Features	<ul style="list-style-type: none"> ■ Incremental magnetic belt encoder ■ With adapter wheel ■ Pulses per rotation up to 131 072 ■ For shafts $\varnothing 90...300$ mm ■ Integrated FPGA signal processing 	<ul style="list-style-type: none"> ■ Incremental magnetic belt encoder ■ Pulses per rotation up to 131 072 ■ For shafts $\varnothing 300...3183$ mm ■ Integrated FPGA signal processing 	<ul style="list-style-type: none"> ■ Virtually absolute magnetic belt encoder ■ With adapter wheel ■ Singleturn resolution up to 24 bits ■ For shafts $\varnothing 90...300$ mm ■ Integrated FPGA signal processing 	<ul style="list-style-type: none"> ■ Virtually absolute magnetic belt encoder ■ Singleturn resolution up to 24 bits ■ For shafts $\varnothing 300...3183$ mm ■ Integrated FPGA signal processing
Product family	MIR 350F	MIR 3000F	MQR 350F	MQR 3000F
Sensing principle	Magnetic			
Dimensions (sensor head)	165 x 25 x 93 mm			
Voltage supply	4.75...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
- SinCos 1 Vpp	■	■	■	■
- SSI	–	–	Linedriver RS485	
Output signals	A 90° B, R + inverted		0...24 bits singleturn, 0...24 bits speed signal	
Shaft type				
- Magnetic belt	$\varnothing 90...300$ mm	$\varnothing 300...3183$ mm	$\varnothing 90...300$ mm	$\varnothing 300...3183$ mm
Mounting type material measure	Split adapter wheel	Screw connection on turn-buckle	Split adapter wheel	Screw connection on turn-buckle
Connection	Flange box M23, tangential			
Pulses per revolution	512...131 072		1024...4096	
Sine periods per revolution	512...16 384		1024...4096	
Operating temperature	-40...+85 °C			
Protection class sensor head	IP 67	IP 67	IP 67	IP 67
Operating speed	≤ 2000 rpm	≤ 1850 rpm	≤ 2000 rpm	≤ 1850 rpm
Options	–	–	Additional incremental signals	

HDmag flex

HDmag flex magnetic belt encoders operate on the proven *HDmag* technology. They feature a resistant, encapsulated sensing head to detect a high-precision yet extremely robust magnetic material measure. By virtue of its design, the sensing head will fit virtually any shaft diameter. The material measure is simply buckled on the shaft like a belt. *HDmag flex* magnetic belt encoders offer short-time availability, very easy installation, robustness and reliability, precise position and speed feedback and maximum radial and axial backlash.

Bearingless encoders

Absolute

Central magnet encoder size $\varnothing 36$ mm and $\varnothing 58$ mm.
Singleturn and multiturn version.

- Analog, SSI, fieldbus and realtime Ethernet interface
- Non-contact, wear-free operation
- Immune against dust, dirt, fibres and fluids
- Wide axial backlash for magnetic ring



MAGRES



Features	■ Size $\varnothing 36$ mm	■ Size $\varnothing 36$ mm ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)	■ Size $\varnothing 58$ mm	■ Size $\varnothing 58$ mm ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)
Product family	EAM360-K	EAM360R-K	EAM580-K	EAM580R-K
Sensing principle	Magnetic			
Interface				
- SSI / SSI + incremental	■ / ■	–	■ / ■	–
- Analog	–	■	–	■
- CANopen®	■	■	■	■
- SAE J1939	–	■	–	■
- Profinet	–	–	■	–
- EtherCAT	–	–	■	–
- EtherNet/IP	–	–	■	–
Function	Singleturn / Multiturn			
Size (housing)	$\varnothing 36$ mm		$\varnothing 58$ mm	
Voltage supply	4.5 ... 30 VDC (CANopen®, SAE J1939, SSI) 8 ... 30 VDC / 14 ... 30 VDC (analog - type-dependent) 10 ... 30 VDC (Ethernet)			
Shaft type				
- Drill hole magnetic ring	$\varnothing 6$ mm, $\varnothing 8$ mm, $\varnothing 12$ mm			
Connection				
- Flange box M12	Radial			
- Flange box M23	–	–	Radial	–
- Cable	Radial (0.14 mm ²)	Radial (0.5 mm ²)	Radial (0.14 mm ²)	Radial (0.5 mm ²)
Steps per revolution	≤65536/16 bits			
Number of revolutions	≤262 144/18 bits			
Operating temperature	-40...+85 °C			
Protection class	IP 67			
Operating speed	≤6000 rpm			
Options	Additional incremental signals (SSI, CANopen®)	Cable with DEUTSCH connector	Additional incremental signals (SSI, CANopen®)	Cable with DEUTSCH connector

Central magnet encoders of various designs. Singleturn variant.

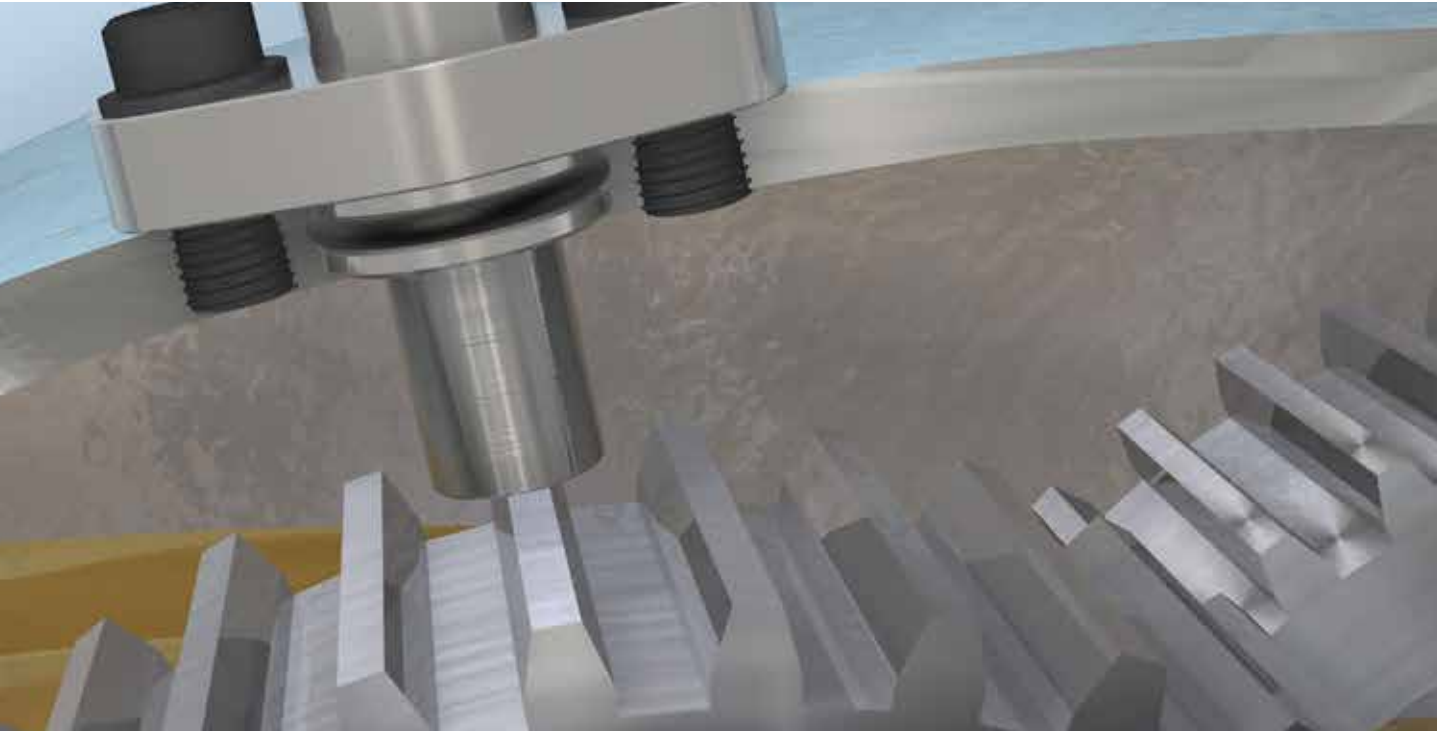
- Analog and CANopen® redundant interface
- Non-contact, wear-free operation
- Immune against dust, dirt, fibres and fluids
- Shallow installation depth down to 8 mm

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Features	<ul style="list-style-type: none"> ■ Integrated interface ■ Flat design ■ Singleturn ■ Redundant sensing possible 	<ul style="list-style-type: none"> ■ Cylindrical design with thread ■ Linearized analog output signals ■ Large working distance up to 5mm ■ Magnetic rotor can be ordered separately 	<ul style="list-style-type: none"> ■ Flat rectangular design ■ Linearized analog output signals ■ Large working distance up to 5 mm ■ Magnetic rotor can be ordered separately 			
Product family	EAM500 analog	EAM500 CANopen	MDRM 18I	MDRM 18U	MDFM 20I	MDFM 20U
Sensing principle	Magnetic					
Size (housing)	ø50 mm		M18 x 1		20 x 30 x 8 mm	
Angular range	30°...360°	0°...360°	270° (-135°...+135°)	360° (-180°...+180°)	270° (-135°...+135°)	360° (-180°...+180°)
Working distance	1...3 mm		0...2mm (can be ordered separately with magnetic rotor MxFN) 1...5mm (can be ordered separately with magnetic rotor MxFS)			
Interface	10...30 VDC (CANopen®) 8...30 VDC / 12...30 VDC (analog) 5 VDC ±5 % (analog)		Analog 4...20mA	Analog 0...4.3 VDC	Analog 4...20mA	Analog 0...4.3 VDC
Voltage supply	10...30 VDC 8...30 VDC / 12...30 VDC 5 VDC ±5 %		15...30 VDC	4.7...7.5 VDC	15...30 VDC	4.7...7.5 VDC
Shaft type						
- Mounting magnetic ring	Drill hole magnet rotor ø6 mm M7 screw		Drill hole magnet rotor ø6 mm Bonding of the magnet			
Connection	Cable 0.3 m, radial Cable connector M12, radial		Cable 2 m Connector M12		Cable 2 m Cable connector M8	
Resolution	≤4096/12 bits (analog)	≤16384/14 bits (CANopen®)	0.09°			
Response time	≤ 20 ms		<4 ms			
Absolute accuracy	±1.8°	±1.2°	±0.25% of the measurement range			
Operating temperature	-40...+85 °C					
Protection class	IP 67	IP 69K	IP 67			
Option	DEUTSCH or AMP connector Redundant version Corrosion protection CX (C5-M)		0...2mm magnet rotor: 11052887 MSFN AA01X06 0...2mm magnet: 11052885 MMFN AA01X06 1...5mm magnet rotor: 11016706 MSFS AA03X08 1...5mm magnet: 11052886 MMFS AA03X08			

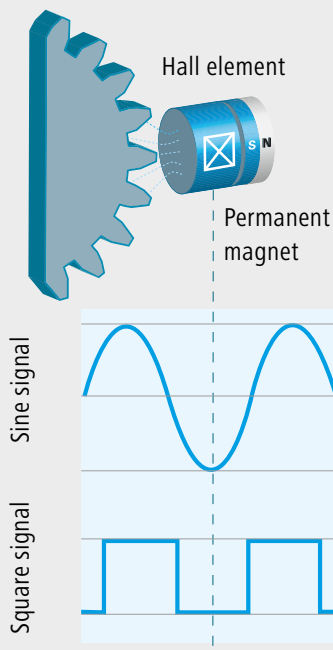
Bearingless encoders



Gearwheel sensors

Hall sensors are the choice to detect and monitor speed and position at fast rotating gears. Due to their high resolution and switching frequency of up to 15 kHz, gears can be reliably detected from module size 1 onward. Thanks to two phase-shifted signals, the direction of rotation can be determined in addition to the speed.

Hall sensors forgoing any moving parts minimize wear and considerably improve service life. Protected by all-metal housings, they are ideal for use in contaminated, humid or oily environments.



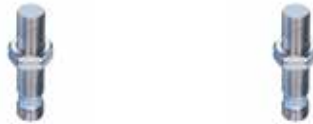
Sensor principle

Hall sensors operate on a current-carrying semiconductor which is biased by a permanent magnet installed behind. This magnetic field being penetrated by a ferromagnetic object would cause the semiconductor change voltage. Such change in voltage is recognized in the semiconductor. The resulting sine voltage is converted into a square signal by the internal electronics and amplified.

Gearwheel sensors up to 12mm. Incremental

- Sensing at gear wheels from module 1
- High switching frequency up to 15 kHz
- For contaminated, humid and oily environments
- Wide temperature range up to +120 °C

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Features	<ul style="list-style-type: none"> ■ Cylindrical design M12 ■ 1-channel push-pull output ■ High switching frequencies ■ Wide temperature range 	<ul style="list-style-type: none"> ■ Cylindrical design M12 ■ 2-channel push-pull output ■ Speed and direction of rotation ■ High protection class and pressure resistance ■ Wide temperature range up to +120 °C
Product family	MHRM 12 - 1 channel	MHRM 12 - 2 channels
Dimensions (sensor head)	M12 x 1 (cylindrical with thread)	
Housing lengths	50 mm, 60 mm	60 mm
Switching frequency	0...15 kHz	
Gearwheel size	From module 1	
Gearwheel width	>6 mm	
Working distance max.	0.7 mm (module 1) 2.4 mm (module 3)	
Output signal A	Push-pull	Push-pull
Output signal B	–	Push-pull
Connection	Cable, connector	Cable
Housing material	Brass nickel plated	Chrome-nickel steel
Working temperature	-40...+85 °C	-40...+120 °C
Protection class (active face)	IP 67	IP 68
Protection class (sensor)	IP 67	

Robust speed measurement

Hall sensors operate on non-contact sensing of ferromagnetic objects. Thanks to very high switching frequencies they are often used for tooth detection at fast rotating gears. In this way, a simple, space-saving and extremely robust speed measurement can be realized.

Unlimited variety.



Programmable industrial encoder
with handheld programmer



HMG10P programmable, absolute HeavyDuty
encoder with incremental signals and speed
monitor



Programmable encoders



Less variants - less warehousing costs

The Baumer portfolio of programmable encoders is unique and offers the right solution for every application. Sophisticated encoder designs optimized for quick availability reduce downtime to a minimum by ultimate robustness and longevity. Extremely versatile, they break new ground in terms of commissioning, service and maintenance.

Easy and intuitive programming solutions by Baumer enable staff of any experience level to start immediately. Convenient handling speeds up commissioning.

Depending on the product variant, the encoders enable intuitive configuration by handheld programmer, PC, tablet or smartphone - even if the encoder has already been installed. Convenient parameter download simplifies documentation. This supports the fast integration of the encoder into your application.

Whether as end customer, system integrator, maintenance technician or wholesaler - thanks to configuration flexibility few variants will suffice in your application. For you, this means a significant acceleration of your business processes as well as a significant reduction of variants and warehousing costs.

Programmable encoders

Size \varnothing 58 mm

Precise optical or magnetic sensing.
Up to 65536 pulses per revolution.

- Easy programming by PC software and handheld programming device
- Solid shaft, blind or through hollow shaft
- Adjustable level of the electrical interface (HTL or TTL)



Features	<ul style="list-style-type: none"> ■ Industrial encoders ■ Solid shaft with clamping flange 	<ul style="list-style-type: none"> ■ Industrial encoders ■ Solid shaft with synchro flange 	<ul style="list-style-type: none"> ■ Industrial encoders ■ Blind hollow shaft 	<ul style="list-style-type: none"> ■ Industrial encoders ■ Through hollow shaft
Product family	EIL580P-SC	EIL580P-SY	EIL580P-B	EIL580P-T
Programmable parameters	Pulses per revolution, output level HTL or TTL, zero pulse, signal sequence			
Configuration	PC software / hardware adapter, handheld programming device			
Sensing principle	Optical			
Size (housing)	\varnothing 58 mm			
Voltage supply	4.75...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
Output signals	A 90° B, R + inverted			
Shaft type				
- Solid shaft	\varnothing 10 mm	\varnothing 6 mm	–	–
- Blind hollow shaft	–	–	\varnothing 8...15 mm	–
- Through hollow shaft	–	–	–	\varnothing 8...15 mm
Connection				
- Flange box M23	Radial / axial			Radial
- Cable	Radial / axial / tangential			Radial / tangential
Pulses per revolution	1...65 536			
Operating temperature	-40...+100 °C			
Protection class	IP 65, IP 67			
Operating speed	\leq 12 000 rpm (IP 65) \leq 6000 rpm (IP 67)		\leq 8000 rpm (IP 65) \leq 6000 rpm (IP 67)	\leq 6000 rpm (IP 65) \leq 3000 rpm (IP 67)
Max. shaft load	\leq 40 N axial, \leq 80 N radial		–	–
Options	Approval ATEX II 3 D, zone 22 (ExEIL580P), Square flange 2.5 inch, isolated hollow shaft, fixed pulse number (EIL580)			

Programmable encoders

Size up to $\varnothing 115$ mm

Variety and flexibility. Individual configuration.

Programmability of:

- Pulses per revolution
- Zero pulse suppression
- Signal level HTL / TTL
- Speed switching limits and switching characteristics

HighRes – up to 131 072 pulses per revolution

www.baumer.com/programmable



Features	<ul style="list-style-type: none"> ■ Industrial encoders ■ Through hollow shaft ■ Inch dimensions ■ Isolated shaft 	<ul style="list-style-type: none"> ■ HeavyDuty encoders ■ Absolute and incremental signals / speed switches ■ Solid shaft with EURO flange B10 	<ul style="list-style-type: none"> ■ HeavyDuty encoders ■ Absolute and incremental signals / speed switches ■ Cone shaft or hollow shaft
Product family	HS35P	PMG 10P	HMG 10P
Programmable parameters	Pulses per revolution, Output level HTL or TTL, zero pulse	Pulses per revolution, switching speed, SSI settings of the absolute value	Pulses per revolution, switching speed, SSI settings of the absolute value
Configuration	PC software / hardware adapter, handheld programming device	WLAN adapter, monitoring function	WLAN adapter, monitoring function
Sensing principle	Optical	Magnetic	Magnetic
Size (housing)	$\varnothing 3.15"$ ($\varnothing 80$ mm)	$\varnothing 115$ mm	$\varnothing 105$ mm
Voltage supply	4.75...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	■	■
Output signals	A 90° B, R + inverted	A 90° B, R + inverted	A 90° B, R + inverted
Shaft type			
- Solid shaft	–	$\varnothing 11$ mm	–
- Cone shaft 1:10	–	–	$\varnothing 17$ mm
- Blind hollow shaft	–	–	$\varnothing 16...20$ mm
- Through hollow shaft	$\varnothing 0.375...1"$ ($\varnothing 9.525...25.4$ mm)	–	$\varnothing 16...20$ mm
Connection			
- Terminal box	–	Radial	Radial
- Flange box M23	–	Radial	Radial
- Flange box MIL	Radial, 7-/10-pin	–	–
- Cable	Radial	–	–
Pulses per revolution	1...8192	1...131072	1...131072
Operating temperature	-40...+100 °C (-40...+212 °F)	-40...+95 °C	-40...+95 °C
Protection class	IP 65, IP 67	IP 66, IP 67	IP 66, IP 67
Operating speed	≤ 5000 rpm	$\leq 12\,000$ rpm	$\leq 12\,000$ rpm
Max. shaft load	–	≤ 450 N axial, ≤ 650 N radial	
Options	Fixed resolution HTL/TTL up to 80 000 pulses/revolution, Sin/Cos up to 5000 sine periods/revolution	Integrated speed switch Absolute interfaces	Integrated speed switch Absolute interfaces

Solutions for all cases.



Encoders for ATEX areas EEx OG 9



Stainless steel encoder X 700 -
Profibus-DPVO



Rotary encoder for
offshore and marine
applications POG83



Rotary encoder with SIL certifica-
tion EIL576S-T



SIL, ATEX and offshore encoders.

Encoders and sensors for hazardous areas, highly corrosive environments or for applications with functional safety - we are your strong partner if you are facing special challenges.

The worldwide experience and many years of competence of our Baumer experts extends to many fields of application for encoders and sensors, for example electrical drive technology, mobile automation and offshore use on drilling rigs or in wind power plants.

Relevant certificates and type examinations from notified bodies as well as test certificates by renowned organisations such as UL, ATEX, IECEx and DNV stand as proof.



Certification

By consistently expanding our broad portfolio of encoders and sensors for functionally safe applications, as well as in the ATEX and IECEx certification of our explosion-proof encoders, we ensure that our devices always meet the most stringent international standards. International certification provides OEMs with particular benefits when it comes to exportation.

For special applications

Encoders for hazardous environments

Zone 1, 2 (gas) | Zone 22 (dust).

ATEX, IECEx

- Size $\varnothing 58...160$ mm
- Square and sine signals



Features	<ul style="list-style-type: none"> ■ Incremental rotary encoders ■ Solid shaft with EURO flange B10 ■ ATEX/IECEx certification ■ Sine/Cosine signal with <i>LowHarmonics</i> 		<ul style="list-style-type: none"> ■ Incremental rotary encoders ■ Through hollow shaft ■ ATEX/IECEx certification 		<ul style="list-style-type: none"> ■ Incremental rotary encoders ■ Solid shaft with clamping or synchro flange ■ Blind or through hollow shaft ■ ATEX certification 		<ul style="list-style-type: none"> ■ Incremental rotary encoders ■ Solid shaft with clamping or synchro flange ■ Blind or through hollow shaft ■ ATEX certification 	
Product family	EEx OG 9	EEx OG 9 S	EEx HOG 161	ExEIL580	ExEIL580P			
Sensing principle	Optical							
Size (housing)	$\varnothing 120$ mm	$\varnothing 120$ mm	$\varnothing 160$ mm	$\varnothing 58$ mm	$\varnothing 58$ mm			
Voltage supply	5 VDC $\pm 5\%$ 9...26 VDC 9...30 VDC	5 VDC $\pm 5\%$ 9...30 VDC	5 VDC $\pm 5\%$ 9...26 VDC 9...30 VDC	5 VDC $\pm 5\%$ 8...30 VDC 4.75...30 VDC	4.75...30 VDC			
Output stage								
- TTL/RS422	■	—	■	■	■			
- HTL/push-pull	■	—	■	■	■			
- SinCos 1 Vpp	—	■	—	—	—			
Output signals	K1, K2, K0 + inverted			A 90° B, R + inverted		A 90° B, R + inverted		
Shaft type								
- Solid shaft	$\varnothing 11$ mm	—	—	$\varnothing 6$ mm, $\varnothing 10$ mm	$\varnothing 6$ mm, $\varnothing 10$ mm			
- Blind hollow shaft	—	—	—	$\varnothing 8...15$ mm	$\varnothing 8...15$ mm			
- Through hollow shaft	—	—	$\varnothing 30...70$ mm	$\varnothing 8...15$ mm	$\varnothing 8...15$ mm			
Flange	EURO flange B10		—	Clamping/synchro flange		Clamping/synchro flange		
Connection								
- Terminal box	Radial		Radial	—		—		
- Flange box M12, M23	—		—	Radial / axial		Radial / axial		
- Cable	—		—	Radial / axial / tangential		Radial / axial / tangential		
Pulses per revolution	1...5000	—	250...2500	100...5000		1...65 536		
Sine periods per revolution	—	1024...2048	—	—		—		
Operating temperature	-50...+55°C -40...+55°C -25...+55°C	-20...+55°C	-20...+58°C (IP 56) -20...+66°C (IP 54)	-20...+60°C		-20...+60°C		
Protection class	IP 56		IP 54, IP 56	IP 65		IP 65		
Operating speed	≤ 5600 rpm		≤ 5600 rpm	$\leq 12\,000$ rpm (+20 °C) ≤ 8000 rpm (+60 °C)		$\leq 12\,000$ rpm (+20 °C) ≤ 8000 rpm (+60 °C)		
Max. shaft load	≤ 200 N axial, ≤ 350 N radial		≤ 450 N axial, ≤ 650 N radial	ExEIL580-S: ≤ 40 N axial, ≤ 80 N radial		ExEIL580P-S: ≤ 40 N axial, ≤ 80 N radial		
Explosion protection	Ex II 2G (ATEX/IECEx) for zone 1 (gas)		Ex II 2G (ATEX/IECEx) for zone 1 (gas)	Ex II 3D (ATEX) for zone 22 (dust)		Ex II 3D (ATEX) for zone 22 (dust)		
Options	Cable screw connection M16, M20, M25x1.5		Cable screw connection M16x1.5, M20x1.5	—		—		

For special applications

Encoders for hazardous environments

Zone 1, 2 (gas) | Zone 21, 22 (dust).

ATEX

- Size \varnothing 70 mm
- SSI, Profibus-DPVO



Features	<ul style="list-style-type: none"> ■ Absolute rotary encoders ■ Solid shaft with clamping flange ■ Stainless steel housing ■ ATEX certification 	<ul style="list-style-type: none"> ■ Absolute rotary encoders ■ Solid shaft with clamping flange ■ Stainless steel housing ■ ATEX certification ■ Bus cover
Product family	X 700 - SSI	X 700 - Profibus-DPVO
Interface		
- SSI	■	–
- Profibus-DPVO	–	■
Function	Multiturn	
Sensing principle	Optical	
Size (housing)	\varnothing 70 mm	
Voltage supply	10...30 VDC	
Shaft type		
- Solid shaft	\varnothing 10 mm	
Flange	Clamping flange	
Connection		
- Cable	Axial	–
- Cable screw connection	–	Radial
Steps per revolution	\leq 8192 / 13 bits	
Number of revolutions	\leq 4096 / 12 bits	\leq 65536 / 16 bits
Absolute accuracy	\pm 0.025°	
Operating temperature	20...+70 °C	
Protection class	IP 67	
Operating speed	\leq 6000 rpm	
Max. shaft load	\leq 60 N axial, \leq 50 N radial	
Explosion protection	Ex II 2D/2G (ATEX) for zone 1 (gas) and zone 21 (dust)	

For special applications

Redundant absolute encoders

Two sensing systems.
For high availability and safety.

- Size $\varnothing 28...58$ mm
- SSI, CANopen®, analog



Features	<ul style="list-style-type: none"> ■ Solid shaft with flat mounting flange ■ Singleturn ■ Redundant sensing and interface 	<ul style="list-style-type: none"> ■ Encoder kit - size $\varnothing 50$ mm ■ Singleturn ■ Corrosion protection CX ■ Redundant sensing and interface 	<ul style="list-style-type: none"> ■ Solid shaft or hollow shaft ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849) ■ Two-channel architecture
Product family	EAM280	EAM500	EAM580R

Interface

- Analog / redundant	■ / ■	■ / ■	-
- CANopen® / redundant	■ / ■	■ / ■	■ / ■
Function	Singleturn	Singleturn	Multiturn Singleturn
Sensing principle	Magnetic		
Size (housing)	$\varnothing 28.6$ mm	$\varnothing 50$ mm	$\varnothing 58$ mm
Voltage supply	10...30 VDC (CANopen®), 8...30 VDC / 12...30 VDC (analog) 5 VDC ± 5 % (analog)		10...30 VDC

Shaft type

- Solid shaft	$\varnothing 6$ mm	-	$\varnothing 6$ mm / $\varnothing 10$ mm
- Blind hollow shaft	-	-	$\varnothing 10...15$ mm
- Drill hole magnet rotor	-	$\varnothing 5...8$ mm	-

Connection	Cable 0.3 m with M12, 5-pin, male, cable	Cable	Flange box M12, cable
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Steps per revolution	4096/12 bits (analog) / 16 384/14 bits (CANopen®)		16384/14 bits 65 536/16 bits
Number of revolutions	-	-	$\leq 262144/18$ bits -
Absolute accuracy	Up to $\pm 1.0^\circ$	Up to $\pm 1.2^\circ$	Up to $\pm 0.15^\circ$
Operating temperature	-40...+85 °C	-40...+85 °C	-40...+85 °C
Protection class	IP 65 / IP 67	IP 67	IP 67
Operating speed	≤ 800 rpm	≤ 3000 rpm	≤ 6000 rpm
Max. shaft load	≤ 10 N axial, ≤ 10 N radial	-	≤ 40 N axial, ≤ 80 N radial
Options	Cable with industry standard connector (DEUTSCH, AMP,...) Redundant design (2-channel architecture)		

Functional safety with standard components

Functionally safe applications can be realized under certain conditions with standard components in the sense of the Machinery Directive. Our qualified and experienced experts would be happy to support you in the design of your safety-relevant application and its certification by the notified body.

For special applications SIL encoders incremental

With SIL2 and SIL3 certification.
For fast implementation of functionally safe plants.

- Safety rotary encoders
- Square and sine signals



Features	<ul style="list-style-type: none"> ■ Incremental rotary encoder ■ Solid shaft with clamping or synchro flange ■ SIL3 / PLe certification 	<ul style="list-style-type: none"> ■ Sine rotary encoder ■ Through hollow shaft ■ SIL2 / PLd certification ■ LowHarmonics signal quality 	<ul style="list-style-type: none"> ■ Sine rotary encoder ■ Cone shaft ■ Blind hollow shaft ■ SIL2 / PLd certification
Product family	EIL576S-S	EIL576S-T	HOGS 100S
Sensing principle	Optical		
Size (housing)	ø58 mm	ø58 mm	ø105 mm
Voltage supply	24 VDC +20/-50 %	5 VDC ±10 %	5 VDC ±10 %, 7...30 VDC
Output stage			
- TTL/RS422	■	–	–
- HTL/push-pull	■	–	–
- SinCos 1 Vpp	–	■	■
Output signals	A 90° B + inverted	A, B, R + inverted	K1, K2, K0 + inverted
Shaft type			
- Cone shaft 1:10	–	–	ø17 mm
- Solid shaft	ø6 mm / ø10 mm	–	–
- Blind hollow shaft	–	–	ø16 mm
- Through hollow shaft	–	ø10 mm, ø12 mm, ø14 mm	–
Connection	Flange box M12, M23	Cable	Terminal box
Pulses per revolution	1000...2500	–	–
Sine periods per revolution	–	1024, 2048	1024...5000
Operating temperature	-25...+85 °C	-30...+100 °C	-25...+85 °C
Protection class	IP 54 (without shaft seal) IP 65 (with shaft seal)	IP 65	IP 66
Operating speed	≤10 000 rpm	≤6000 rpm	≤10 000 rpm
Max. shaft load	≤20 N axial, ≤40 N radial	–	≤250 N axial, ≤400 N radial
Certification	SIL2 according to EN 61508	SIL2 or SIL3 with redundant use	SIL2 / PLd certification
Options	Suitable for SIL3 / PLe certified speed monitors GMM260S	Suitable for SIL3 / PLe certified speed monitors GMM240S / GMM246S Cable with connector	

Certified functional safety

The EC type examination certificate by a notified body certifies compliance with the increased requirements for the conformity assessment procedure stipulated in the Machinery Directive. These SIL2/PLd certified encoders make it easier for you to evaluate the safety of your application/system.

For special applications

SIL speed monitor

Safe speed monitors with SIL3/PLe certification

- Monitoring of ramps, underspeed, overspeed, standstill and rotational direction
- For combination with two non-safe encoders/sensors or with one safe encoder
- Easy integration into existing systems and designs



Features	<ul style="list-style-type: none"> ■ Safe speed monitor ■ For non-certified incremental encoders / proximity switches 	<ul style="list-style-type: none"> ■ Safe speed monitor - ■ For certified SinCos encoders 	<ul style="list-style-type: none"> ■ Safe speed monitor ■ For non-certified incremental encoders / proximity switches 	<ul style="list-style-type: none"> ■ Safe speed monitor - ■ For certified HTL / TTL encoders
Product family	GMM230S	GMM240S	GMM250S	GMM260S
FS - Certification	Up to SIL3 / PLe			
Voltage supply	18...30 VDC			
Encoder input	2 x HTL (2-channel) 2 x TTL (4-channel) 2 x Sin/Cos (4-channel) 2 x PNP	1 x Sin/Cos (4-channel) (FS) e.g. HOGS100S	2 x HTL (6-channel) 2 x TTL (6-channel)	1 x HTL (6-channel) (FS) 1 x TTL (6-channel) (FS)
Possible encoder	HOGS100, MIR 3000-F, MHRM 12	HOGS100S (FS) EIL576S-T (FS)	HOG10 M, POG10 G	EIL576S-S (FS)
Control input	0...4		8	
Relay output	1 (FS)		2 (synchronized) (FS)	
Output switching capacity	5...36 V (5 mA...5 A)		5... 250 VAC / VDC (5 mA...5 A)	
Control output	4 (FS)			
Analog output	4...20 mA (FS)			
Splitter output	1 TTL / SinCos (4-channel) (FS)		1 HTL / TTL (6-channel) (FS)	
Monitoring	Underspeed, overspeed, standstill and direction of rotation SS1, SS2, SOS, SLS, SDI, SSM, SLI, SBC, STO, SMS		Ramps, underspeed, overspeed, standstill and direction of rotation SS1, SS2, SOS, SLS, SDI, SSM, SLI, SBC, STO, SMS	
Switching speed range (ns)	≤500 kHz			
Parameterization	PC software & USB interface, optionally via display device			
Connection	Screw terminal or connector D-SUB			
Operating temperature	-20...+55 °C			
Protection class	IP 20			
Size (housing)	50 x 100 x 165 mm			
Mounting	DIN rail mounting, switchboard			
Options	Splitter output SinCos and RS422 GMI 230 display & control unit		GMI 200 display & control unit	

**SIL
PL**

Functional Safety

Proven combinations for safe speed monitoring

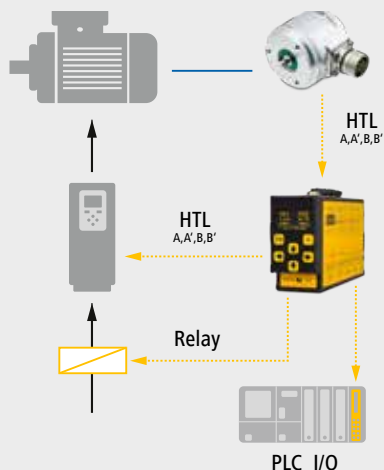
Use these combinations of encoder and speed monitor for simple and reliable monitoring of underspeed, overspeed, standstill and direction of rotation.

Your benefits:

- Increased safety of employees
- Lower costs and higher productivity by avoiding unnecessary shutdowns

Example for industrial applications

EIL576S-S & GMM260S

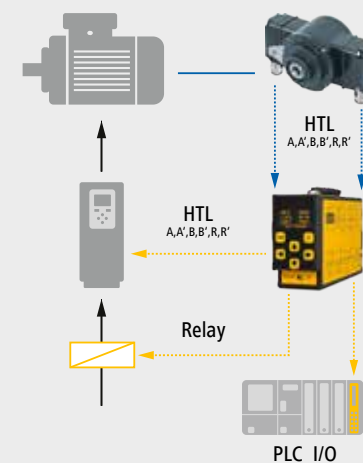


Your benefits:

- Simple machine acceptance due to SIL-certified encoder and speed monitor
- Minimal integration effort in existing designs (retrofitting)
- Flexible connection through several interfaces (IOs, relay output, signal outputs) directly from the speed monitor
- Suitable e.g. for crane systems, wind power plants, transport and conveyor systems, handling systems or for cutting, punching and pressing

Example for HeavyDuty applications

HOG10M & GMM250S



Your benefits:

- No compromises concerning robustness and reliability, thanks to proven, redundant HeavyDuty encoders
- Easy machine acceptance due to existing MTTf data and mounting evaluation
- The drive control does not have to be adjusted, as HTL/TTL signals are still fully available
- Minimal integration effort in existing designs (retrofitting)
- Flexible connection through several interfaces (IOs, relay output, signal outputs) directly from the speed monitor

For special applications

Offshore incremental encoder

Suitable for CX environments.

- Size $\varnothing 16...740$ mm
- Square and sine signals

HUBNER
BERLIN
A Baumer Brand



Features	<ul style="list-style-type: none"> ■ Cone shaft, solid shaft, blind hollow shaft ■ Stainless steel housing 		<ul style="list-style-type: none"> ■ Solid shaft with EUR flange B10 ■ Tested long-term sealing 		<ul style="list-style-type: none"> ■ Cone shaft or blind hollow shaft ■ High protection class IP 67 		<ul style="list-style-type: none"> ■ Through hollow shaft ■ Bearingless encoder ■ Up to 32 768 pulses per revolution 	
Product family	POG 10	HOG 10	POG 83		HOG 11		MHGE 100 - MHGE 800	
Sensing principle	Optical						Magnetic	
Size (housing)	$\varnothing 115$ mm	$\varnothing 105$ mm	$\varnothing 105$ mm		$\varnothing 105$ mm		100 x 40 x 65 mm	
Size (magnetic wheel)							$\varnothing 99.9...813$ mm	
Voltage supply	5 VDC $\pm 5\%$ 9...30 VDC		4.75...30 VDC (HTL/TTL)		5 VDC $\pm 5\%$ 9...30 VDC		Square: 4.75...30 VDC Sine: 5 VDC	
Output stage								
- TTL/RS422	■	■	■		■		■	
- HTL-P (Power Linedriver)	■	■	■(without Power Linedriver)		■		■	
- SinCos 1 Vpp	-	-	-		-		■	
Output signals	K1, K2, K0 + inverted		A+, A-, B+, B-, R+, R-		K1, K2, K0 + inverted		A+, B+, R+, A-, B-, R-	
Output frequency	≤ 120 kHz		≤ 300 kHz (TTL) ≤ 160 kHz (HTL)		≤ 120 kHz		≤ 300 kHz	
Shaft type								
- Solid shaft	$\varnothing 11$ mm	-	$\varnothing 11$ mm		-		-	
- Cone shaft 1:10	-	$\varnothing 17$ mm	-		$\varnothing 17$ mm		-	
- Blind hollow shaft	-	$\varnothing 12...20$ mm	-		$\varnothing 12...20$ mm		-	
- Through hollow shaft	-	-	-		-		$\varnothing 16...740$ mm	
Connection	Terminal box	Cable	Flange box M23		Terminal box		Flange box M23	
Pulses per revolution	300...5000		512 ... 4096		300...2500		64...32768	
Sine periods per revolution	-		-		-		64...512	
Operating temperature	-40...+100 °C		-40...+85 °C		-30...+100 °C		-40...+100 °C	
Protection class	IP 66		IP 66, IP 67, IP 69K		IP 67		IP 67 (sensor head)	
Operating speed	≤ 6000 rpm						≤ 8000 rpm	
Max. shaft load	≤ 300 N axial, ≤ 450 N radial	≤ 450 N axial, ≤ 600 N radial	≤ 250 N axial, ≤ 350 N radial		≤ 250 N axial, ≤ 400 N radial		-	
Corrosion protection	C4		CX		CX		-	
Options	-		DNV certificate		DNV certificate		DNV certificate	

For special applications Offshore encoder absolute

Suitable for CX environments.

- Size $\varnothing 58 \dots 115$ mm
- SSI, fieldbuses and real-time Ethernet

PROFINET[®]
BUS

PROFINET[®]
NET

SSI

EtherCAT

CANopen

DeviceNet

EtherNet/IP



Features	<ul style="list-style-type: none"> ■ Cone shaft, solid shaft, or hollow shaft ■ Bearings at both shaft ends ■ Stainless steel housing 	
Product family	PMG 10	HMG 10

Interface		
- SSI / SSI + incremental	■ / ■	■ / ■
- CANopen [®] / DeviceNet	■ / ■	■ / ■
- Profinet / Profibus-DP	■ / ■	■ / ■
- EtherCAT / EtherNet/IP	■ / ■	■ / ■

Function	Multiturn / Singleturn	
----------	------------------------	--

Sensing principle	Optical	
-------------------	---------	--

Size (housing)	$\varnothing 115$ mm	$\varnothing 105$ mm
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Voltage supply	9...30 VDC	
----------------	------------	--

Shaft type		
------------	--	--

- Solid shaft	$\varnothing 11$ mm	–
---------------	---------------------	---

- Cone shaft 1:10	–	$\varnothing 17$ mm
-------------------	---	---------------------

- Blind hollow shaft	–	$\varnothing 12 \dots 20$ mm
----------------------	---	------------------------------

- Through hollow shaft	–	$\varnothing 12 \dots 20$ mm
------------------------	---	------------------------------

Flange	EURO flange B10	–
--------	-----------------	---

Connection	Bus cover, terminal box, Fuse box M12 or M23	
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Steps per revolution	$\leq 1\,048\,576/20$ bits	
----------------------	----------------------------	--

Number of revolutions	$\leq 1\,048\,576/20$ bits	
-----------------------	----------------------------	--

Absolute accuracy	–	
-------------------	---	--

Protection class	IP 66, IP 67	
------------------	--------------	--

Operating temperature	$-40 \dots +100$ °C	
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Operating speed	≤ 12000 rpm	
-----------------	------------------	--

Max. shaft load	≤ 450 N axial, ≤ 650 N radial	
-----------------	---	--

Corrosion protection	CX	
----------------------	----	--

Options	Additional incremental signals	
---------	--------------------------------	--

Position and
vibration
under control
at all times.



Dynamic inclination sensor GIM700DR.

Inclination / acceleration sensors



Robust. Precise. Safe.

Baumer GIM inclination sensors are ideally suited for simple and precise angle measurement at all types of machine and system components, especially where the rotary axis is difficult to access.

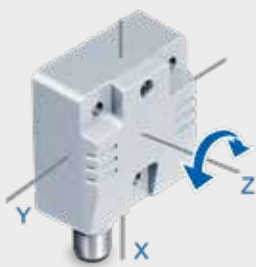
The robust Baumer R-Series “Designed for Mobile Automation” devices are specially designed for mobile applications in harsh outdoor environments. With E1-compliant design, best electromagnetic compatibility, protection class up to IP 69K as well as CX corrosion protection, they are ideally equipped for reliable continuous use in off-highway applications, construction machinery and mobile machines.

Baumer inclination and acceleration sensors utilize MEMS-sensor elements (Micro-Electro-Mechanical System). Compared to alternative technologies, MEMS sensor elements impress with their

small size and highest shock resistance and reliability. The MEMS sensor elements used by Baumer are specially qualified for tough industrial use. Their long-term availability is assured.

Baumer’s GAM acceleration sensors are vibration monitoring and shock detection solutions and are used to protect drives, machines and systems from failure. They provide real-time filtered structural vibration data to support condition monitoring and predictive maintenance.

The SIL2/Pld certified GAM900 series allows for functionally safe vibration monitoring in 3 directions. In addition to real-time filtered structural vibration data, they also transmit alarm and hazard warnings through their interface and relay outputs, and can be used for both safety and control.



Function principle of inclination sensors

Inclination sensors measure the inclination angle of an object relative to the Earth’s gravity without contact. By using advanced MEMS technology, inclination sensors are very precise and at the same time extremely robust, even in harsh environments. One-dimensional sensors measure the inclination of an axis in the range of 360°. Two-dimensional sensors simultaneously measure two axes up to a maximum of $\pm 90^\circ$ or $\pm 180^\circ$.

Inclination / acceleration sensors

Inclination sensors

Reliable detection of inclination angles.

- Ideal where the rotary shaft is not accessible
- Increased safety of mobile machinery
- Robust, encapsulated housing with high protection class
- For durable use in harsh environments



Features	<ul style="list-style-type: none"> ■ Measurement range 0...360° ■ Corrosion protection CX ■ Reverse polarity protection or high protection of the electrical output 	<ul style="list-style-type: none"> ■ Measurement range up to ±60° ■ Corrosion protection CX ■ Reverse polarity protection or high protection of the electrical output 	<ul style="list-style-type: none"> ■ Measurement range 0...360° ■ Corrosion protection CX ■ E1 compliant design 	<ul style="list-style-type: none"> ■ Measurement range up to ±60° ■ Corrosion protection CX ■ E1 compliant design
Product family	GIM140R - 1-dimensional	GIM140R - 2-dimensional	GIM140R - 1-dimensional	GIM140R - 2-dimensional

Interface

- Analog	■	■	—	—
- CANopen® / redundant	—	—	■ / ■	■ / ■
- SAE J1939	—	—	—	—

Sensing principle

MEMS

Size (housing)

48 x 14 x 45 mm

Voltage supply

8...30 VDC, 12...30 VDC

8...36 VDC

Connection

Cable 1x or 2x
Cable with M12 (connector)
Cable 2x with M12 (male/female)

Total resolution

0.2°

0.05°

0.1°

Accuracy

- Measurement range 0...360°	±0.4°	—	±0.2°	—
- Measurement range ±10°	—	±0.4°	—	±0.2°
- Measurement range ±30°, ±60°	—	±0.4°	—	±0.2°
- Measurement range ±90°	—	—	—	—

Operating temperature

-40...+85 °C

Protection class

IP 67 / IP 69K

Material

Aluminium

Options

Measurement range monitoring, cable with industry standard connector (DEUTSCH, AMP,...), setting of zero point, redundant design (2-channel architecture)

Measuring inclination in harsh environments

Acting as electronic spirit level, Baumer inclination sensors are ideal for conventional angle measurement, particularly where rotation shafts are difficult to access. Baumer inclination sensors significantly contribute towards improved safety, for example with cranes. The robust, IP 69K-rated salt water resistant metal housing makes the sensors ideal for industrial use in harsh environments.

Inclination / acceleration sensors

Inclination sensors

One or bidirectional detection. Compact size.

- Analog, CANopen® and SAE J1939
- MEMS technology without moving parts

CANopen **SAE J1939**

www.baumer.com/inclination



Features	<ul style="list-style-type: none"> ■ Measurement range 0...360° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849) 	<ul style="list-style-type: none"> ■ Measurement range up to ±90° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849) 	<ul style="list-style-type: none"> ■ Measurement range 0...360° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849) 	<ul style="list-style-type: none"> ■ Measurement range up to ±90° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849)
Product family	GIM500R - 1-dimensional	GIM500R - 2-dimensional	GIM500R - 1-dimensional	GIM500R - 2-dimensional
Interface				
- Analog	■	■	–	–
- CANopen® / redundant	–	–	■ / –	■ / –
- SAE J1939	–	–	■	■
Sensing principle	MEMS			
Size (housing)	48 x 52 x 24 mm			
Voltage supply	8...36 VDC			
Connection	Cable, flange box 1x or 2x M12			
Total resolution	0.025°			
Accuracy				
- Measurement range 0...360°	±0.1°	–	±0.1°	–
- Measurement range ±10°	–	±0.1°	–	±0.1°
- Measurement range ±30°, ±60°	–	±0.1°	–	±0.1°
- Measurement range ±90°	–	±0.1°	–	±0.1°
Operating temperature	-40...+85 °C			
Protection class	IP 66, IP 67, IP 68, IP 69K			
Material	Aluminium			
Options	Measurement range monitoring Cable with industry standard connector (DEUTSCH, AMP,...) Setting of zero point Low-pass filter parameterizable			

Can be used in safety functions up to PLd

GIM500 series inclination sensors are developed according to the requirements of ISO 13849, and can therefore be used in safety functions up to Performance Level PLd. An application note provides you with all the information you need for an efficient evaluation and safety assessment. Our expert sales team will be happy to assist you with any questions you may have about the product.

Inclination / acceleration sensors

Dynamic inclination sensors

Highest precision in dynamically moving applications.

- Precise position measurement with gyroscope-based motion compensation
- High signal quality and quick response time
- Robust, compact design for the harshest ambient conditions
- Uniaxial and biaxial inclination measurement

CANopen **SAE J1939**



Features	<ul style="list-style-type: none"> ■ Measurement range 0...360° ■ Precise, extremely robust inclination detection ■ Dynamically compensated with gyroscope and sensor fusion 	<ul style="list-style-type: none"> ■ Measurement range up to ±90° / ±180° ■ Precise, extremely robust inclination detection ■ Dynamically compensated with gyroscope and sensor fusion 	<ul style="list-style-type: none"> ■ Measurement range up to ±90° / ±180° ■ Precise, extremely robust inclination detection ■ Dynamically compensated with gyroscope and sensor fusion
Product family	GIM700DR - 1-dimensional	GIM700DR - 2-dimensional	GIM700DR - 3-dimensional

Interface

- Analog	-	-	-
- CANopen®	■	■	■
- SAE J1939	■	■	■
Sensing principle	MEMS		
Size (housing)	77 x 62 x 27 mm		
Voltage supply	8...36 VDC		
Connection	Flange box 2x M12		
Total resolution	0.01°		
Accuracy	±0.1° static, ±0.5° dynamic		
Measuring range	0...360°	±90°, ±180°	±90°, ±180°
Operating temperature	-40...+85 °C		
Protection class	IP 67, IP 68, IP 69K		
Material	Polyamide (glass fiber reinforced) / aluminium		
Options	Low-pass filter configurable Output of acceleration, rotation rate, Euler angle and quaternion		

Highest precision in dynamic applications

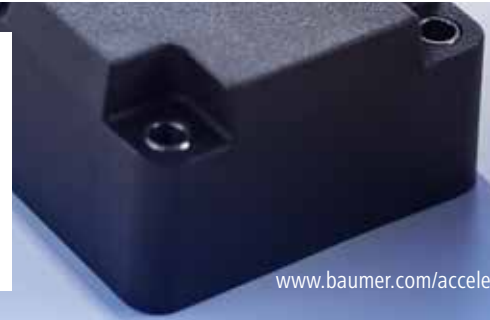
The reliable, precise, and fast measurement of the angle position in real time is the key to maximum dynamics, control, and safety. The GIM700DR allows position measurement with the highest dynamics and precision through unsurpassed signal quality, robustness, high resolution and minimum following error. In application, this results in increased efficiency, lower wear, and improved ease of use compared to conventional inclination sensors.

Inclination / acceleration sensors

Acceleration sensors

Vibration monitoring and shock detection solutions.

- Real-time filtered structural vibration data
- SIL2 / PLd certified limit value monitoring
- For the protection of drives, machines and systems
- For condition monitoring and preventive maintenance
- Suitable for safety and control



www.baumer.com/acceleration



Features	<ul style="list-style-type: none"> ■ Acceleration sensor / analog / CANopen® ■ 3-axis MEMS-based detection ■ Measurement range up to ±8 g 	<ul style="list-style-type: none"> ■ Vibration/shock detection on three axes ■ Limit value monitoring with two relay outputs 	<ul style="list-style-type: none"> ■ Safe vibration/shock detection on three axes ■ Redundant limit monitoring ■ SIL2-/PLd certification
Product family	GAM500	GAM900	GAM900.AS
Interface			
- Analog	■	■	■
- CANopen®	■	■	■
Relay output	–	2	2 (1 safe)
Sensing principle	MEMS		MEMS (2-channel architecture)
Size (housing)	48 x 52 x 24 mm	55 x 30 x 90 mm	
Voltage supply	8...36 VDC	10...30 VDC	
Connection	Cable, flange box 1x or 2x M12	Flange box 1x or 2x M12	
Frequency filter bands	6 (configurable)	6 (configurable)	12 (configurable)
Total resolution	16 bits CANopen 12 bits analog	<4 mg	<1 mg
Accuracy 3σ (with band-pass filtering)	=60 mg (range ±1000 mg) =15 mg (range ±250 mg)	=35 mg (range ±1000 mg) =10 mg (range ±250 mg)	=60 mg (range ±1000 mg) =15 mg (range ±250 mg)
Bandwidth	≤35 Hz	≤35 Hz	≤50 Hz
Measuring range	up to ±8 g	±2 g	±1.5 g, ±3 g, ±6 g
Operating temperature	-40...+85 °C		-40...+75 °C
Protection class	IP 66, IP 67, IP 68, IP 69K	IP 67	
Material	Aluminium	Glass-fiber reinforced plastic	Aluminium
Options	–	–	Up to 8 frequency filters per filter band (configurable)

Certified functional safety

The EC type examination of the GAM900.AS acceleration sensors by TÜV Rheinland certifies compliance with the increased requirements of the conformity assessment procedure stipulated in the Machinery Directive. Further encoders and sensors from Baumer suitable for safety applications or encoders and sensors that are SIL2-/PLd-certified complement our portfolio and facilitate the safety evaluation of the system.

Linear distance measurement made easy.



Cable transducer GCA5
for measurement lengths up to 7.8 m.

Distance measurement



Simple mounting - reliable measurement results.

Whether original equipment or retrofitting – Baumer cable transducers are ideal for simple and precise linear distance measurement. Though providing large measuring length, the cable transducers come in a compact design for reduced installation effort compared to conventional products. The integrated components are robust and designed for a long service life. Thus, the cable transducers are also suitable for reliable and low-maintenance use in harsh environments.

Your benefits:

- Compact design or modular system
- Measuring length up to 50 m
- Absolute or incremental interfaces
- Comprehensive mounting accessories for optimum installation

Redundant variants

To increase the availability and safety of your application, cable transducers with redundant sensing and signal output of the measuring wire position can be used. Our qualified and experienced experts would be happy to support you in the design of your safety-relevant application and its certification by the notified body.



Three-chamber design

Baumer cable transducers feature a three-chamber design to endure harsh environments. The electronics being completely isolated from the cable mechanism means optimum protection against ingress of moisture or other harmful ambient impacts.

Distance measurement

Cable transducers

Robust for outdoor use. Measuring length up to 20 m.

- Integrated absolute position feedback
- Two-channel architecture with independent, redundant signals
- Analog and CANopen®
- Compact housing
- Integrated inclination sensor



Features	<ul style="list-style-type: none"> ■ Measuring length up to 4.7 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Space-saving design 	<ul style="list-style-type: none"> ■ Measuring length up to 7.8 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Three-chamber design 	<ul style="list-style-type: none"> ■ Measuring length up to 12 m ■ Absolute potentiometer sensing ■ Dirt skimmer ■ Three-chamber design 	<ul style="list-style-type: none"> ■ Measuring length up to 20 m ■ Absolute potentiometer sensing ■ Dirt skimmer ■ Robust design 	
Product family	GCA3	GCA5	GCA8	GCA12	GCA20
Function	Absolute				
Interface					
- Analog / redundant	■ / ■	■ / ■	■ / ■	■ / ■	
- CANopen® / redundant	■ / ■	■ / ■	■ / ■	■ / ■	
Sensing principle	Non-contact magnetic		Potentiometric		
Size	88 x 88 x 60.5 mm	88 x 88 x 65 - 70 mm	88 x 88 x 80.5 mm	126 x 126 x 98 mm	222 x 271 x 124 mm
Voltage supply	8...30 VDC, 12...30 VDC (analog), 10...30 VDC (CANopen®)				
Measuring length max.	4.7 m	7.8 m	8 m	12 m	20 m
Accuracy	±0.4 % or 9.2...18.8 mm	up to 0.6 % or 36...46.8 mm	0.3 % or 18...24 mm	0.3 % or 30...36 mm	1 % or 120...160...200 mm
Linearity (interface-dependent)	±0.3 %	±0.6 %	±0.3 %		±1 %
Connection					
- Flange box M12	Radial				
- Cable	Radial				
Resolution	up to 14 bits				
Operating temperature	-40...+85 °C				
Protection class	IP 67	IP 67	IP 65	IP 65	
Materials	Housing: plastic Cable: sheathed stainless steel		Housing: plastic/aluminium Cable: sheathed stainless steel		Housing: aluminium Cable: sheathed stainless steel
Options	Integrated redundant inclination sensor Two-channel architecture	Integrated redundant inclination sensor Two-channel architecture	Integrated redundant inclination sensor		Integrated redundant inclination sensor Two-channel architecture

Integrated inclination sensor

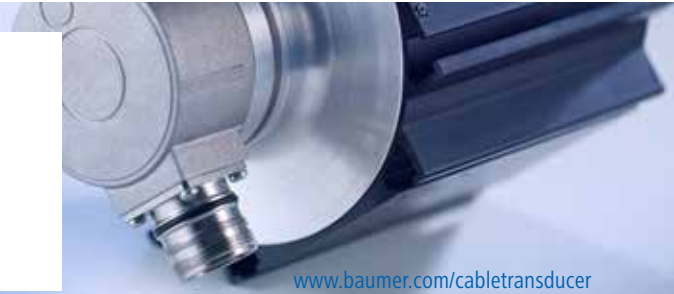
Your benefits

- Measure length and angle simultaneously with a compact sensor
- Convenient length and inclination readout via CANopen®
- Ideal for boom position measurement by saving installation space and cabling effort

Distance measurement Cable transducers

Modular system. Measuring length up to 50 m.

- High combination flexibility of cable-transducer and basic encoder
- All standard interfaces
- High operational safety and long service life
- Precision metal housing
- Highest linearity



www.baumer.com/cabletransducer



Features	<ul style="list-style-type: none"> ■ Measuring length 2.4 m ■ Absolute rotary encoders ■ Cable-pull housing: plastic 	<ul style="list-style-type: none"> ■ Measuring length 3 m ■ Absolute rotary encoders ■ Cable-pull housing: aluminium 	<ul style="list-style-type: none"> ■ Measuring length 5...15 m ■ Absolute rotary encoders ■ Cable-pull housing: aluminium 	<ul style="list-style-type: none"> ■ Measuring length 30...50 m ■ Absolute rotary encoders ■ Cable-pull housing: aluminium
Product family	GCA2	GCA4	GCA15	GCA50
Function	Absolute			
Interface				
- SSI	■	■	■	■
- CANopen®	■	■	■	■
- SAE J1939	■	■	■	■
- Profinet / Profibus-DP	■ / ■	■ / ■	■ / ■	■ / ■
- EtherCAT / EtherNet/IP	■ / ■	■ / ■	■ / ■	■ / ■
Sensing principle	Optical			
Size (cable-pull)	60 x 60 mm	96 x 96 x 56 mm	115 x 115 x 82.5 - 180.5 mm	200 x 200 x 268 - 333.5 mm
Voltage supply	10...30 VDC			
Measuring length max.	2.4 m	3 m	5...15 m	30...50 m
Linearity	±0.01 %	±0.02 % (3...7.5 m), ±0.01 % (10...50 m)		
Connection				
- Flange box M12, M23	Radial, axial			
- Cable	Radial, axial			
- Bus cover	Radial			
Operating temperature	-20...+85 °C (optional: -40...+85 °C)			
Protection class	IP 50 (cable-pull), IP 65 (encoder)			
Materials	Cable-pull housing: plastic Rotary encoder: aluminium Cable: sheathed stainless steel	Cable-pull housing: aluminium Rotary encoder: aluminium Cable: sheathed stainless steel		

Distance measurement

Linear magnetic encoders

Non-contact length measurements. Economical and precise.

- Non-contact, wearfree magnetic sensing technology
- Resistant to dirt and vibrations
- Extended life span thanks to robustness and durability in extreme conditions
- for maximum machine and system uptime



Features	<ul style="list-style-type: none"> ■ Linear measuring system ■ Output signals A 90° B with index pulse ■ Output stages push-pull or RS422
Product family	MIL10
Design (sensor head)	Square
Dimensions (sensor head)	10 x 15 x 45.5 mm
Working distance	0.1...0.6 mm
Interpolation	20x, 50x, 100x
Movement speed	<ul style="list-style-type: none"> <5 m/s (resolution 5 µm) <10 m/s (resolution 10 µm) <25 m/s (resolution 25 µm)
Output stage	HTL/Push-pull TTL/RS422
Output signals	A 90° B, R + inverted
Resolution	<ul style="list-style-type: none"> 5 µm (4-fold evaluation) 10 µm (4-fold evaluation) 25 µm (4-fold evaluation)
System accuracy	±(0.02 mm +0.04 mm x magnetic tape length)
Connection	<ul style="list-style-type: none"> Cable 2 m Cable 0.3 m with connector M12
Voltage supply	10...30 VDC, 5 VDC ±5 %
Operating temperature	-40...+85 °C
Protection class	IP 66, IP 67

Magnetic belts

Baumer offers a wide selection of magnetic material measures. Lengths from a few millimeters up to 25 m are available. With a pole pitch of 2 mm and accuracy class of $\pm 40 \mu\text{m}$, high accuracy can be guaranteed. Other pole pitches and accuracy classes available on request.

The magnetic belts are self-adhesive or suitable for self-fastening and can optionally be supplied with a stainless steel protection tape.

Distance measurement Measuring wheel encoders

The efficient and reliable solution to measure length.

- Programmable incremental encoders used in combination with measuring wheels
- Extremely convenient acquisition of position and speed with maximum flexibility
- Perfect for ink jet and laser printing applications thanks to precise optical sensing



Features	<ul style="list-style-type: none"> ■ Measuring wheel encoder consisting of rotary encoder, measuring arm and measuring wheel ■ Contact pressure continuously adjustable 	<ul style="list-style-type: none"> ■ Solid shaft with clamping or synchro flange ■ Incremental encoder combined with measuring wheel and programming device
Product family	MA20	EIL580P-SC EIL580P-SY
Programmable parameters	16 predefined resolutions	Pulses per revolution, output level HTL or TTL, zero pulse, signal sequence
Configuration	HEX switches	PC software / hardware adapter, handheld programming device
Sensing principle	Optical	
Size (housing)	ø40 mm (encoder)	ø58 mm
Voltage supply	4.75...30 VDC	
Output stage		
- TTL/RS422	–	■
- HTL/push-pull	■	■
Output signals	A 90° B	A 90° B, R + inverted
Shaft type		
- Solid shaft	ø6 mm	ø10 mm ø6 mm
Flange	–	Clamping flange Synchro flange
Connection		
- Flange box M12	Radial	Radial / axial
- Flange box M23	–	Radial / axial
- Cable	Radial	Radial / axial / tangential
Pulses per revolution	100...25 000	1...65 536
Operating temperature	-20...+85 °C	-40...+100 °C
Protection class	IP 64	IP 65, IP 67
Operating speed	≤3000 rpm	≤12 000 rpm (IP 65) ≤6000 rpm (IP 67)
Options	Measuring wheels with different rubber hardness	Approval ATEX II 3 D, zone 22 (ExEIL580P) Measuring wheels MR2, MR5, MR7

Easy programming

Easy programming of EIL580P and Ex EIL580P by handheld programmer

- User-configurable resolution and signal levels
- Intuitive operation
- 4 user-assignable keys
- Standard AA battery supply



Measuring wheels

Baumer offers a wide selection of measuring wheels of the MR2, MR5 and MR7 series to ensure the best match with the material properties of the measured object: Aluminium, TPE, PUR and NBR with diameters from 20 to 50 cm. For best results thanks to smooth run in operation and optimum grip of the measuring wheel on the contact surface.

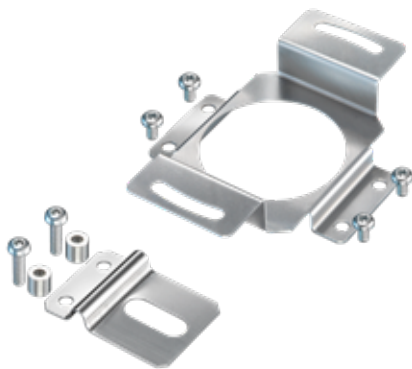


Accessories

Mounting accessories and programming.

Several mechanical and electric interface concepts as well as increasingly demanding applications call for appropriate accessories.

With Baumer you will always encounter the matching mounting accessories like torque supports, spring washers, connectors and cables.



Mounting accessories for hollow shaft encoders

Accessories for hollow shaft mount

- Stator couplings for ultra-precise mount with maximum installation flexibility
- Safe and easy anti-torsion spring washers and pins
- Torque supports for industry and HeavyDuty variants

Mounting accessories for solid shaft encoders

Accessories for solid shaft mount

- Shaft couplings to link drive shaft and encoder shaft
- Mounting clamp to secure encoder flange
- Mounting adaptor and mounting angle for quick and safe encoder mounting
- Flange adaptor to convert a clamping flange into a synchro flange, for example

Programming and diagnostic tools

For commissioning and parameterization of encoders

- Signal processing for signal interpolation, conversion, regeneration and as switching relay, HTL, TTL, SinCos and LWL
- Programming accessories with GSD/EDS/XML files as well as manuals, USB adapters and PC software
- Testing device for incremental encoders for continuous monitoring of encoder data
- PC software for display and evaluation

Connectors, cables, measuring wheels and counters.

Deployed in conjunction with incremental encoders, measuring wheels perform the task of length measurement or speed monitoring. For further information please refer to: www.baumer.com

www.baumer.com/accessories



Large variety of connectors and cables

Suitable for all encoders and angle sensors

- Fuse box M12, M23, MIL and other standards
- Connectors pre-assembled or self-assembled
- Various cables, unassembled

Small and large measuring wheels

Measuring wheels – the optimum grip on any surface

- Wheel material and surface profile depending on the application
- Circumference 20 or 50 cm
- For shaft diameters from 4 to 12 mm

Counters and displays

Acquisition, display and control of process data and measured values

- Counters / position displays / process displays
- Preset counters / multifunction devices
- Time / hour counters

Accessories

Signal processing

Digital converters.

- Level conversion and potential separation
- For extended signal transmission length
- TTL, HTL and SinCos



Features	<ul style="list-style-type: none"> ■ Signal splitter 1 input / 3 outputs ■ Conversion HTL to TTL / TTL to HTL ■ Signal regeneration ■ Potential separation with several receivers ■ 1 input unit / 3 output units 	<ul style="list-style-type: none"> ■ TTL to TTL conversion ■ HTL to TTL conversion ■ Signal regeneration 	<ul style="list-style-type: none"> ■ HTL to HTL conversion ■ TTL to HTL conversion ■ Signal regeneration 		
Product family	HEAG 150	HEAG 151	HEAG 152	HEAG 153	HEAG 154
Size	Housing for DIN rail 150 x 75 x 55 mm	Housing for DIN rail 50 x 75 x 55 mm			
Voltage supply	5 VDC ±5 %, 9...26 VDC	5 VDC ±5 %		9...26 VDC	
Inputs					
- Number	1	1	1	1	1
- TTL/RS422	■	■	–	■	–
- HTL/push-pull	■	–	■	–	■
Outputs					
- Number	3	1	1	1	1
- TTL/RS422	■	■	■	–	–
- HTL/push-pull	■	–	–	■	■
Input signals	K1, K2, K0 + inverted				
Output signals	K1, K2, K0 + inverted				
Output circuit	Optocoupler				
Connection	Screw terminals				
Operating current	≤300 mA	≤75 mA		≤100 mA	
Input frequency	120 kHz, 200 kHz	200 kHz	120 kHz	200 kHz	120 kHz
Operating temperature	-20...+50 °C				
Protection class	IP 20				



Precision interpolators and signal converters.

- Enhanced resolution and signal interpolation
- Up to two signal outputs
- TTL, HTL and SinCos
- Optional: Two sine inputs for compensating radial runout of the connected encoder

www.baumer.com/signal-processing



Features	<ul style="list-style-type: none"> ■ Precision interpolator ■ Splitter for signal conversion SinCos to TTL/HTL ■ Additional signal interpolation 	<ul style="list-style-type: none"> ■ Precision sine multiplier ■ Converter SinCos to multiple SinCos 	<ul style="list-style-type: none"> ■ Precision interpolator ■ Precision splitter ■ Converter SinCos to multiple SinCos ■ Additional HTL or TTL signal interpolation
Product family	HEAG 158	HEAG 159	HEAG 160
Size	Surface-mounted housing 122 x 122 x 80 mm		
Voltage supply	10...30 VDC	5 VDC ±5%, 10...30 VDC	
Inputs			
- Number	1	1	1
- TTL/RS422	–	–	–
- HTL/push-pull	–	–	–
- SinCos 1 Vpp	■	■	■
Outputs			
- Number	2	1	2
- TTL/RS422	■	–	■
- HTL/push-pull	■	–	■
- SinCos 1 Vpp	–	■	■
- Error output	■	■	■
Input signals (optional)	A+, A-, B+, B-, R+, R-		
Output signals	A+, A-, B+, B-, R+, R-		
Connection	Fuse box M23, connector 3-pin		
Operating current	≤150 mA (15 VDC)	≤500 mA (5 VDC), ≤300 mA (10...30 VDC)	
Input frequency	400 kHz		
Operating temperature	0...+50 °C		
Protection class	IP 65		
Options	Integrated pre-amplifier Two sine inputs for runout compensation of the connected encoder Error output External power supply		

Accessories

Signal processing

Optical signal transmission.

Serial communication via up to 2 optical fibers.

- Immune to interference in environments with high EMC loads.
- Transmission range up to 1500 m
- High-precision, redundant transmission of TTL/HTL encoder signals
- Automated channel switching in real-time in the event of fiber-optic cable



Features	<ul style="list-style-type: none"> ■ Transmitter for fiber optic signals (LWL) ■ Switchboard device for DIN rail mounting ■ Conversion HTL/TTL to LWL ■ 4+2 channels ■ Transmission length ≤ 1500 m 	<ul style="list-style-type: none"> ■ Transmitter for fiber optic signals (LWL) ■ Field device with outdoor box ■ Conversion HTL/TTL to LWL ■ 4+2 channels ■ Transmission length ≤ 1500 m 	<ul style="list-style-type: none"> ■ Receiver for fiber optic signals (LWL) ■ Switchboard device for DIN rail mounting ■ LWL to HTL/TTL conversion ■ 2+4 channels ■ 3 status outputs
Product family	LWL-SHR	LWL-SBR	LWL-EHR
Size	100 x 75 x 53 mm	122 x 81 x 220 mm	100 x 75 x 53 mm
Voltage supply	9...30 VDC		
Inputs			
- Number	4	4	2
- TTL/RS422	■	■	—
- HTL/push-pull	■	■	—
- Error	■	■	—
- LWL	—	—	■
Outputs			
- Number	2	2	4
- TTL/RS422	—	—	■
- HTL/push-pull	—	—	■
- LWL	■	■	—
Input signals	K1, K2, K0 + inverted, Err +/-	K1, K2, K0 + inverted, Err +/-	LWL 1, 2
Output signals	LWL 1, 2	LWL 1, 2	K1, K2, K0 + inverted, Err +/-
Connection			
- Screw terminal	■	■	■
- Cable screw connection	—	M16, M20, M32x1.5	—
- Fibre-optic cable	2x ST connector	2x ST connector	2x ST connector
Operating current	≤ 300 mA		
Operating temperature	-20...+70 °C		
Protection class	IP 20	IP 66, IP 67	IP 20
Signal monitoring	Error detection and status signals Redundant transmission via two fiber-optic cables Automated channel switching in the event of fiber-optic cable failure		

Optical signal transmission. Parallel communication using up to 4 fiber-optic cables.

- Immune to interference in environments with high EMC loads.
- Transmission range up to 1500 m
- High precision transmission of TTL/HTL encoder signals



www.baumer.com/signal-processing



Features	<ul style="list-style-type: none"> ■ Conversion TTL to LWL ■ For environments with strong EMC exposure 	<ul style="list-style-type: none"> ■ Conversion HTL to LWL ■ For environments with strong EMC exposure 	<ul style="list-style-type: none"> ■ Conversion LWL to TTL ■ For environments with strong EMC exposure 	<ul style="list-style-type: none"> ■ Conversion LWL to HTL ■ For environments with strong EMC exposure
Product family	HEAG 171	HEAG 172	HEAG 173	HEAG 174
Size	Surface-mounted housing 122 x 122 x 80 mm		Housing for DIN rail 50 x 75 x 55 mm	
Voltage supply	5 VDC ±5 %, 9...26 VDC	9...26 VDC	5 VDC ±5 %	10...30 VDC
Inputs				
- Number	4	4	3	3
- TTL/RS422	■	—	—	—
- HTL/push-pull	—	■	—	—
- LWL	—	—	■	■
Outputs				
- Number	4	4	3	3
- TTL/RS422	—	—	■	—
- HTL/push-pull	—	—	—	■
- LWL	■	■	—	—
Input signals	K1, K2, K3, K4 + inverted		LWL 1, 2, 3	
Output signals	LWL 1, 2, 3, 4		K1, K2, K3 + inverted	
Connection				
- Screw terminal	■	■	■	■
- Cable screw connection M16	■	■	—	—
- Cable screw connection M20	■	■	—	—
Max. load current	200 mA		60 mA	
Operating temperature	-20...+70 °C		-20...+50 °C	
Protection class	IP 65		IP 20	

Efficiency for long distances

To provide interference-immune efficient long-distance transmission of encoder signals and information, the Baumer solution converts incremental square signals (8-channel maximum) and status signals in real-time into a serial digital data stream. This digital data stream is transmitted optically by light pulses via one or two parallel fibre-optic cables, protected by a CRC checksum against bit errors and loss of individual data packets.

For maximum availability, redundant transmission via two fiber-optic cables is recommended. If one of the two fibre-optic cables should fail, the receiver will continue to generate high-quality output signals with the information from the remaining optical channel.

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Represented by:

Industrial encoders incremental

Size up to ø58 mm

Size (ø)	Precise optical	Solid shaft	Blind hollow shaft	Through hollow shaft	TTL/RS422	HTL/push-pull	Pulses per revolution	≤5000	>5000	Programmable	Product family	Page
24 mm	■	■			■	■					ITD 01 B14	6
24 mm	■		■		■	■					ITD 01 A 4 Y1	6
58 mm	■	■			■	■					EIL580-SC	7
58 mm	■	■			■	■					EIL580P-SC	7
58 mm	■	■			■	■					EIL580-SY	7
58 mm	■	■			■	■					EIL580P-SY	7
58 mm	■		■		■	■					EIL580-B	7
58 mm	■		■		■	■					EIL580P-B	7
58 mm	■			■	■	■					EIL580-T	7
58 mm	■			■	■	■					EIL580P-T	7



Large hollow shaft

Size (ø max.)	Through hollow shaft	TTL/RS422	HTL/push-pull	Pulses per revolution	≤5000	>5000	Programmable	Product family	Page
27 mm	■	■	■					ITD 40 A 4	8
30 mm	■	■	■					ITD 40 A 4 Y79	8
25,4 mm	■	■	■					HS35F	8
25,4 mm	■	■	■	■				HS35P	8
50 mm	■	■	■					ITD 70 A 4 Y 7	9
65 mm	■	■	■					ITD 70 A 4 Y 9	9
85 mm	■	■	■					ITD 75 A 4	9



Sine/Cosine

Size (ø)	Through hollow shaft	Sine periods per revolution	≤2048	>2048	SIL	Product family	Page
58 mm	■		■			EIL576S-T	10
80 mm	■		■			HS35S	10
80 mm	■			■		ITD 42 A4	10



Industrial encoders absolute

Size up to $\varnothing 36$ mm

Size (\varnothing)	Solid shaft	Blind hollow shaft	Singleturn	Multiturn	SSI	Analog	CANopen*	CANopen* redundant	SAE J1939	Corrosion protection CX (C5-M)	Product family	Page
28 mm	■		■			■	■	■			EAM280	14
30 mm	■	■	■	■		■					EAM300	14
36 mm	■		■	■		■		■			EAM360-SW	14
36 mm	■		■	■		■			■	■	EAM360R-SW	14
36 mm		■	■	■		■		■			EAM360-B	15
36 mm		■	■	■		■			■	■	EAM360R-B	15



Size $\varnothing 58$ mm - robust magnetic sensing

Size (\varnothing)	Solid shaft	Blind hollow shaft	Singleturn	Multiturn	Integrated interface	Modular bus cover	SSI	Analog	CANopen@	CANopen* redundant	Profinet	SAE J1939	EtherCAT / EtherNet/IP	Profibus	Corrosion protection CX (C5-M)	Product family	Page
58 mm	■		■	■			■		■	■		■	■			EAM580-S	16
58 mm	■		■	■			■		■	■		■		■		EAM580R-S	16
58 mm		■	■	■			■		■	■		■	■			EAM580-B	16
58 mm		■	■	■			■		■	■		■		■		EAM580R-B	16



Industrial encoders absolute

Size \varnothing 58 mm - precise optical sensing

Size (\varnothing)	Solid shaft	Blind hollow shaft	Through hollow shaft	Multiturn	Singleturn	Resolution up to 18 bits/rev.	SSI / SSI + incremental	CANopen	EtherCAT	EtherNet/IP	Profinet	Product family	Page
58 mm	■			■				■	■	■		EAL580-SC	18
58 mm	■			■				■	■	■		EAL580-SV	18
58 mm		■		■				■	■	■		EAL580-B	18
58 mm			■	■				■	■	■		EAL580-T	18
58 mm	■			■								GM400	19
58 mm	■			■								GM401	19
58 mm	■				■							GA240	19
58 mm	■				■							GA241	19
58 mm		■		■								GXM2S	19
58 mm			■	■								GOM2H	19



EAL580-SC



EAL580-SV



EAL580-B



EAL580-T



GM400
GA240



GM401
GA241



GXM2S



GOM2H

HeavyDuty encoders incremental

Size up to $\varnothing 120$ mm / solid shaft

Size (\varnothing)	Shaft (\varnothing max.)	TTL/RS422	HTL /push-pull	HTL-P/Power Linedriver	LWL (Outdoor-Box)	EURO flange B10	Terminal box	Redundant sensing	EMS	Ex II 3G/3D (ATEX)	Ex II 2G (ATEX/IECEX)	Product family	Page
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	POG 86E	22
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	POG 86	22
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	OG 9	22
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	POG 9	22
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	POG 90	23
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	POG 10	23
115 mm	11 mm	■	■	■	■	■	■	■	■	■	■	POG 11	23
120 mm	11 mm	■	■	■	■	■	■	■	■	■	■	EEx OG 9	23



Size up to $\varnothing 105$ mm / hollow shaft

Size (\varnothing)	Hollow shaft(\varnothing max.)	TTL/RS422	HTL /push-pull	HTL-P/Power Linedriver	LWL (Outdoor-Box)	Terminal box	Redundant sensing	EMS	Ex II 3G/3D (ATEX)	Product family	Page
99 mm	16 mm	■	■	■	■	■	■	■	■	HOG 86E	24
99 mm	16 mm	■	■	■	■	■	■	■	■	HOG 86	24
97 mm	16 mm	■	■	■	■	■	■	■	■	HOG 9	24
105 mm	20 mm	■	■	■	■	■	■	■	■	HOG 10	25
105 mm	20 mm	■	■	■	■	■	■	■	■	HOG 11	25
105 mm	20 mm	■	■	■	■	■	■	■	■	HOG 100	25



Large hollow shaft

Size (\varnothing)	Hollow shaft (\varnothing max.)	TTL/RS422	HTL /push-pull	HTL-P/Power Linedriver	LWL (Outdoor-Box)	Terminal box	Redundant sensing	Ex II 3G/3D (ATEX)	Product family	Page
158 mm	38 mm	■	■	■	■	■	■	■	HOG 16	26
158 mm	75 mm	■	■	■	■	■	■	■	HOG 163	26



Sine/Cosine

Size (\varnothing)	Shaft (\varnothing max.)	Solid shaft	Hollow shaft	EURO flange B10	Terminal box	Ex II 3G/3D (ATEX)	Product family	Page
115 mm	11 mm	■	■	■	■	■	POGS 90	28
105 mm	20 mm	■	■	■	■	■	HOGS 100	28



HeavyDuty encoders absolute

Size up to ø115 mm

Size (ø)	SSI	CANopen®	DeviceNet	Profibus-DP	EtherCAT	EtherNet/IP	Profinet	EURO-Flange B10	Terminal box	Ex II 3G/3D (ATEX)	Programmable	Speed switches	Product family	Page
115 mm	■	■	■	■	■	■	■	■	■	■	■	■	PMG 10	30
115 mm	■	■	■	■	■	■	■	■	■	■	■	■	PMG 10P	30
105 mm	■	■	■	■	■	■	■	■	■	■	■	■	HMG 10	30
105 mm	■	■	■	■	■	■	■	■	■	■	■	■	HMG 10P	30



PMG 10
PMG 10P



HMG 10
HMG 10P

Size up to ø160 mm

Size (ø)	SSI	CANopen®	DeviceNet	Profibus-DP	Terminal box	Ex II 3G/3D (ATEX)	Product family	Page
160 mm	■	■	■	■	■	■	HMG 161	31



HMG 161

HeavyDuty speed monitoring switches

Mechanical / electronic

Size (ø)	Mechanical	Electronic	Solid shaft	Switching outputs	EURO-Flange B10	Terminal box	Product family	Page
115 mm	■	■	1	■	■	■	FS 90	32
115 mm	■	■	1	■	■	■	ES 90	32
115 mm	■	■	3	■	■	■	ES 93	32



FS 90



ES 90
ES 93

Digital / Stand-alone

Size	Digital/programmable	Switching outputs	Top mount housing	Product family	Page
100 mm	■	4	■	GMM2xxS	70



GMM2xxS

Digital / encoder-integrated / incremental & absolute

Size (ø)	Digital/progr.	Solid shaft	Hollow shaft	TTL/RS422	HTL/push-pull	Switching outputs	EURO-Flange B10	Terminal box	M23	Ex II 3G/3D (ATEX)	Transistor output	Optical	Magnetic	Product family	Page
105 mm	■	■	■	■	2	■	■	■	■	■	■	■	■	HOG 10 + DSL.E	36
165 mm	■	■	■	■	2	■	■	■	■	■	■	■	■	HOG 165 + DSL.E	36
120 mm	■	■	■	■	2	■	■	■	■	■	■	■	■	POG 10 + DSL.E	37
115 mm	■	■	■	■	■	■	■	■	■	■	■	■	■	PMG 10D UO	38
105 mm	■	■	■	■	■	■	■	■	■	■	■	■	■	HMG 10D UO	38
115 mm	■	■	■	■	■	■	■	■	■	■	■	■	■	PMG 10PD	38
105 mm	■	■	■	■	■	■	■	■	■	■	■	■	■	HMG 10PD	38



HOG 10 + DSL.E



HOG 165 + DSL.E



POG 10 + DSL.E



PMG 10D UO
PMG 10DP



HMG 10D UO
HMG 10DP

HeavyDuty tachogenerators

Size (ø max.)	Solid shaft	EURO-flange B10	Terminal box	LongLife embedded	Product family	Page
115 mm	■	■	■	■	GTF 7.08	40
115 mm	■	■	■	■	GTF 7.16	40
85 mm	■	■	■	■	TDP 0,09	40
85 mm	■	■	■	■	TDPZ 0,09	40
115 mm	■	■	■	■	TDP 0,2	40
115 mm	■	■	■	■	TDPZ 0,2	40
175 mm	■	■	■	■	TDP 13	40
175 mm	■	■	■	■	TDPZ 13	40



Size (ø max.)	Hollow shaft	Bearingless variant	LongLife embedded	Product family	Page
52 mm	■	■	■	GT 5	42
85 mm	■	■	■	GT 7.08	40
85 mm	■	■	■	GT 7.16	40
89 mm	■	■	■	GT 9	42
95 mm	■	■	■	GTB 9.06	42
95 mm	■	■	■	GTB 9.16	42
95 mm	■	■	■	GTR 9	43
86 mm	■	■	■	KTD 4	43



HeavyDuty combinations

Incremental twin encoder

Size (ø)	Solid shaft	Hollow shaft	TTL/RS422	HTL/push-pull	EURO flange B10	Terminal box	Redundant sensing	EMS	Ex II 3G/3D (ATEX)	Corrosion protection CX (C5-M)	Product family	Page
115 mm	■	■	■	■	■	■	■	■	■	■	POG 9 G	22
115 mm	■	■	■	■	■	■	■	■	■	■	POG 10 G	44
115 mm	■	■	■	■	■	■	■	■	■	■	POG 11 G	44
97 mm	■	■	■	■	■	■	■	■	■	■	HOG 9 G	44
105 mm	■	■	■	■	■	■	■	■	■	■	HOG 10 G	44
105 mm	■	■	■	■	■	■	■	■	■	■	HOG 11 G	44



HeavyDuty combinations

Tacho generator

Size (ø)	Centrifugal switch (FSL)	Speed switch (ESL)	Incremental encoder	Solid shaft	EURO-Flange B10	Terminal box	Product family	Page
85 mm	■		■	■	■		TDP 0,09 + FSL	45
115 mm	■		■	■	■		TDP 0,2 + FSL	45
115 mm	■		■	■	■		TDPZ 0,2 + FSL	45
115 mm		■	■	■	■		TDP 0,2 + ESL	45
115 mm		■	■	■	■		TDPZ 0,2 + ESL	45
115 mm			■	■	■	■	TDP 0,2 + OG9	45



Incremental encoders with speed switch

Size (ø)	Incremental	Mechanical (FSL)	Electronic (ESL)	Solid shaft	Blind hollow shaft	TTL/RS422	HTL/push-pull	Product family	Page
115 mm	■	■		■	■	■		POG 9 + FSL	46
115 mm	■		■	■	■	■		POG 9 + ESL	46
115 mm	■	■		■	■	■		POG 10 + FSL	46
115 mm	■		■	■	■	■		POG 10 + ESL	46
115 mm	■	■		■	■	■		POG 11 + FSL	46
115 mm	■		■	■	■	■		POG 11 + ESL	46
105 mm	■	■		■	■	■		HOG 10 + FSL	47
105 mm	■		■	■	■	■		HOG 10 + ESL	47
105 mm	■	■		■	■	■		HOG 11 + FSL	47
105 mm	■		■	■	■	■		HOG 11 + ESL	47



Bearingless encoders

Incremental

Size (ø max.)	TTL/RS422	HTL/push-pull	SinCos 1 Vpp	DNV certification	Product family	Page
47,8 mm	■				EB200E	50
47,8 mm	■	■			MIR 10	50
28 mm	■	■			ITD49H	50
28 mm			■		ITD49H Sine	50
65 mm	■	■			ITD69H	51
65 mm			■		ITD69H Sine	51
140 mm	■	■			ITD89H	51
140 mm			■		ITD89H Sine	51
80 mm	■	■	■	■	MHGE 100	27
180 mm	■	■	■	■	MHGE 200	27
340 mm	■	■	■	■	MHGE 400	27
740 mm	■	■	■	■	MHGE 800	27
80 mm	■	■	■		MHGP 100	53
180 mm	■	■	■		MHGP 200	53
340 mm	■	■	■		MHGP 400	53



Bearingless encoders

Absolute

	Hollow shaft (ø max.)	Absolute singleturn	Absolute multiturn	SSI	Analogue	CANopen*	SAE J1939	EtherCAT / EtherNet/IP	Powerlink / Profinet	TTL/RS422	HTL/ push-pull	SinCos 1 Vpp	Corrosion protection CX (C5-M)	Product family	Page
12 mm	■	■	■	■	■									EAM360 Kit	56
12 mm	■	■		■	■	■								EAM360R Kit	56
12 mm	■	■	■		■		■	■						EAM580 Kit	56
12 mm	■	■		■	■	■								EAM580R Kit	56
8 mm	■			■	■									EAM500R Kit	57
80 mm	■		■					■	■	■				MHAP 100	54
180 mm	■		■					■	■	■				MHAP 200	54
340 mm	■		■					■	■	■				MHAP 400	54



For large shaft diameters

	Hollow shaft (ø max.)	Incremental	Quasi-absolute	TTL/RS422	HTL/ push-pull	HTL-Pr Power Linedriver	SinCos 1 Vpp	Product family	Page
340 mm	■		■	■	■		■	MIR 350F	55
3183 mm	■		■	■	■		■	MIR 3000F	55
340 mm		■	■	■			■	MQR 350F	55
3183 mm		■	■		■		■	MQR 3000F	55



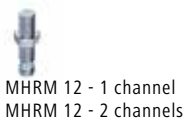
Analog magnetic rotary encoders

	Cylindrical design	Cubical design	Angular range 360°	Angular range 270°	Current output	Voltage output	Product family	Page
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	■		■	■			MDFM 20I	57
	■	■					MDFM 20U	57



Hall and speed sensors

	Design M12	Design M18	Switching frequency 0 to 15 kHz	Switching frequency 0 to 20 kHz	Push-pull output	PNP output	Product family	Page
■		■		■			MHRM 12 - 1 channel	59
■		■		■			MHRM 12 - 2 channels	59



Programmable encoders

	Size (ø)	Solid shaft	Blind hollow shaft	Through hollow shaft	Pulses per revolution	Output signal level	Zero pulse	TTL/RS422	HTL/ push-pull	Outputs	Speed switches	HeavyDuty applications	Programmable Handheld, PC	WLAN adapter / browser	Product family	Page
58 mm	■	■	■	■	■	■	■	■	1		■			EIL580P	62	
80 mm		■	■	■	■	■	■	■	1		■			HS35P	8	
105 mm	■			■	■	■	■	■	2	■	■			PMG 10P U0	30	
115 mm		■	■	■	■	■	■	■	2	■	■			HMG 10P	30	



For special applications

Encoders for hazardous environments

Size (ø)	Ex II 2G (ATEX/IECEx)	Ex II 2D/2G (ATEX)	Ex II 3D (ATEX)	Incremental	Absolute	Solid shaft	Hollow shaft	Programmable	TTL/RS422	HTL/push-pull	SinCos 1 Vpp	SSI	Profibus-DP	HeavyDuty applications	Product family	Page
115 mm	■			■	■				■	■			■		EEx OG 9	23
115 mm	■			■	■						■		■		EEx OG 9 S	66
160 mm	■			■		■			■	■			■		EEx HOG 161	66
58 mm		■		■		■	■		■	■			■		ExEIL580	66
58 mm		■		■		■	■		■	■			■		ExEIL580P	66
70 mm			■		■	■						■			X 700 - SSI	67
70 mm			■		■	■						■			X 700 - Profibus-DP	67



EEx OG 9
EEx OG 9 S

EEx HOG 161

ExEIL580
ExEIL580P



X 700 - SSI

X 700 - Profibus-DPV0

Redundant absolute encoders

Size (ø)	Solid shaft	Hollow shaft	Bearingless encoders	Analog redundant	CANopen™ redundant	Corrosion protection CX (C5-M)	Product family	Page
28,6 mm	■		■	■			EAM280	14
50 mm		■	■	■	■		EAM500R Kit	68
58 mm	■	■		■	■		EAM580R	68



EAM280

EAM500R Kit

EAM580R

SIL encoders incremental

Size	SIL3	SIL2	Solid shaft	Hollow shaft	TTL/RS422	HTL/push-pull	SinCos 1 Vpp	Product family	Page
ø58 mm		■	■		■	■		EIL576S-S	69
ø58 mm	■	■		■			■	EIL576S-T	69
ø105 mm		■		■	■	■		HOGS 100S	28
100 mm	■	■		■	■			GMM2xxS	70



EIL576S-S

EIL576S-T

HOGS 100S

GMM2xxS

For special applications

Offshore encoders

Size (ø)	Inkremental	Absolut Singleturn	Absolut Multiturn	Solid shaft	Hollow shaft	TTL/RS422	HTL-PPower Linedriver	SimCos 1 Vpp	SSI / SSI + incremental	CANopen*	DeviceNet	EtherCAT / EtherNet/IP	Profinet	Profibus-DP	Speed switches	Product family	Page
115 mm	■		■		■	■										POG 10	23
115 mm	■		■		■	■								■		POG 11	23
115 mm	■		■		■											POG 83	72
105 mm	■			■	■	■										HOG 10	25
105 mm	■			■	■	■								■		HOG 11	25
100 mm	■			■	■	■	■									MHGE 100	72
813 mm	■			■	■	■	■									MHGE 800	72
105 mm	■	■	■		■	■	■	■	■	■	■	■	■	■	■	HMG 10	30
115 mm	■	■	■		■	■	■	■	■	■	■	■	■	■	■	PMG 10	30



HOG 10



HOG 11



MHGE 100



MHGE 800



HMG 10

Inclination sensors

Size	Measuring range 1-dim. / 0...360°	Measuring range 2-dim. / up to ±90°	Analog	CANopen*	SAE J1939	Corrosion protection CX (C5-M)	ISO 13849 compliant firmware	Dynamic inclination sensors	Product family	Page
45 mm	■	■	■	■					GIM140R	76
48 mm	■	■	■	■					GIM500R	77
62 mm	■	■		■			■		GIM700DR	78



GIM140R



GIM500R



GIM700DR

Acceleration sensors

Size	Redundant	SIL2/PLd Certification	Analog	CANopen*	Product family	Page
48 mm		■	■		GAM500	79
55 mm			■	■	GAM900	79
55 mm	■	■	■	■	GAM900AS	79



GAM500



GAM900



GAM900AS

Distance measurement

Cable transducers

Size	Measuring length max.	Absolute	SSI	Analog / redundant	CANopen* / redundant	DeviceNet	Profibus-DP / EtherNet/IP	EtherCAT / EtherNet/IP	Powerlink / Profinet	Product family	Page
88 mm	4,7 m	■		■	■					GCA3	82
88 mm	7,8 m	■		■	■					GCA5	82
126 mm	8 m	■		■	■					GCA8	82
126 mm	12 m	■		■	■					GCA12	82
222 mm	20 m	■		■	■					GCA20	82
60 mm	2,4 m	■	■		■	■	■	■	■	GCA2	83
96 mm	3 m	■	■		■	■	■	■	■	GCA4	83
115 mm	15 m	■	■		■	■	■	■	■	GCA15	83
200 mm	50 m	■	■		■	■	■	■	■	GCA50	83



GCA3



GCA5



GCA8
GCA12



GCA20



GCA2



GCA4



GCA15



GCA50

Linear magnetic encoders / encoders with measuring wheels

Product family	Page	Product family	Page	Product family	Page
MIL10	84	MA20	85	EIL580P	62



Eyeing
your
quality.

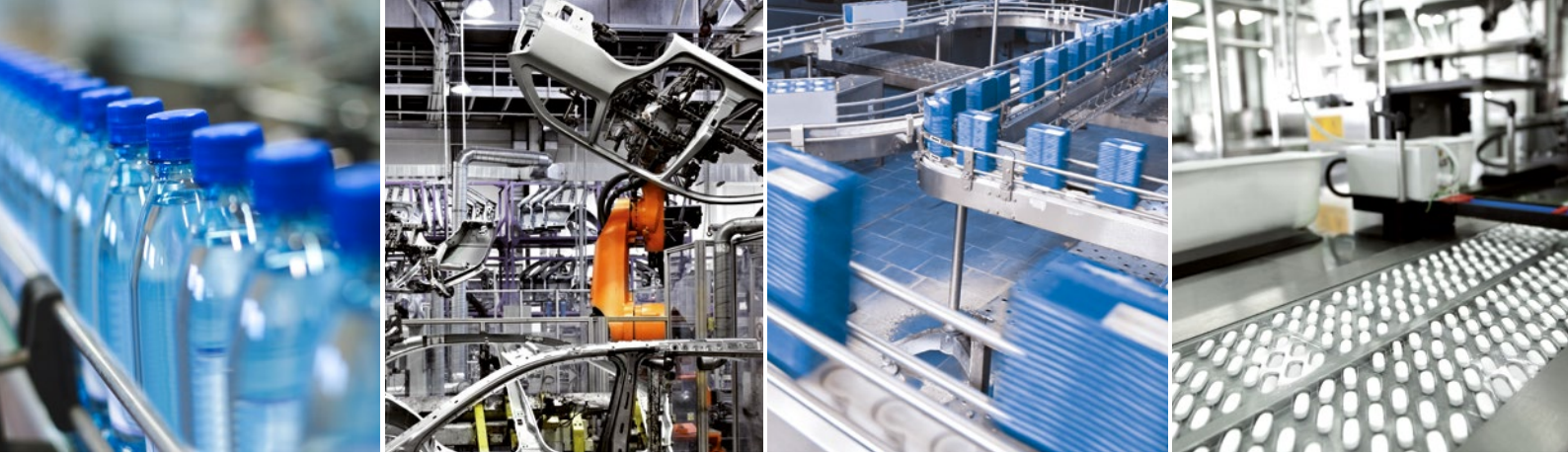
Simply focused on the essentials.

Baumer is a global leader in sensor solutions for factory and process automation. More than 2,700 employees in 39 subsidiaries in 19 countries are at your service across the globe.

Baumer ranks with its powerful vision sensors among the world's most successful suppliers in this product category. Our customers profit from a structured product portfolio with high functionality and innovative features.

Everything we do is governed by our mission to continuously improve our products and shape technological developments. At the same time we focus on high performance, outstanding quality and simple operation – giving you more time for solving your application needs.

Where standard products come to their limits, we develop market-oriented, customized components in close cooperation with our customers. The result: Your decisive competitive edge.



The right vision sensor for your application.

Are you looking for a sensor where maximum functional and operational flexibility go together with easy process integration? *VeriSens*[®] vision sensors offer all these benefits – and still many more.

What exactly is a *VeriSens*[®] vision sensor?

VeriSens[®] is a complete image processing system in the shape of a sensor. An image sensor, illumination (or illumination connection), optics (also interchangeable lenses), hardware / software, as well as Ethernet and digital interfaces, e.g. for PLC connection, are integrated in a compact, industry-suited housing. After typical one-time configuration on PC, a vision sensor is ready to perform a specific task like a conventional sensor.

VeriSens[®] vision sensors solve inspection tasks and can perform up to 32 feature checks simultaneously:

- Presence and completeness checks
- Determination or inspection of object position and orientation
- Reading and verifying human-readable imprints (OCR / OCV)
- Reading and checking matrix codes and barcodes including GS1 codes

How does a *VeriSens*[®] vision sensor work?

VeriSens[®] acquires images, evaluates them and communicates the results to the system control or to individual components in your system. Initial configuration on PC allows you entry of image acquisition parameters, selecting tools for feature checks and setup of the required interfaces.

Where does *VeriSens*[®] make the most sense?

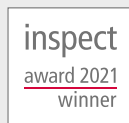
VeriSens[®] vision sensors tap their full potential of efficiency wherever various features must be checked in parallel or part locations vary, tasks which usually are only mastered by sophisticated sensor technology. This also includes applications where a visual inspection is advisable and/or contactless checks are required.

An intelligent sensor like *VeriSens*[®] is also the optimum component for checking (even different) batches in the line or communicating collected data.

VeriSens[®] vision sensors operate extremely efficient – depending on the scope of feature checking, more than 8,000 inspections per minute can be performed.

VeriSens[®] vision sensors at a glance

- Wide variety of feature checks with one single sensor
- Easy configuration within a few minutes
- Compact, industry-suited metal housing with protection class IP 67 or IP 69K
- Intuitive and unified configuration software
- Versatile connection options via digital I/O and Industrial Ethernet



VeriSens® – tried and tested in many industries.

We have earned a reputation supplying the automotive, food and beverage as well as packaging industry where we have acquired many years of expertise. We are also close to the medical and pharmaceutical sector by supplying sensor technology to perform inspection tasks and to provide vital findings.

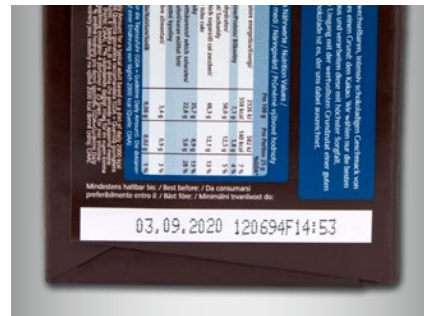
Every industry has its particular needs. We would like to give you a brief overview of how and where our detection and inspection technology is applied.



Food and beverage industry

- Checking best-before dates
- Presence and position of straws on primary packaging
- Position of safety closures
- and many more

Example:
Inspection of best-before dates



OK



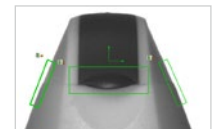
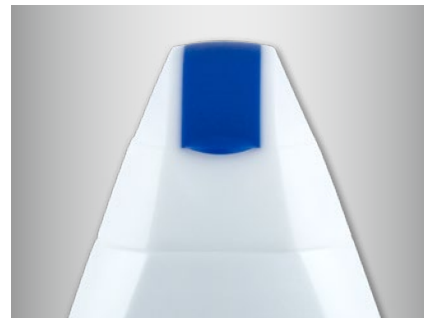
NOK



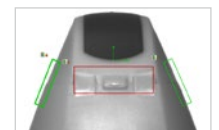
Packaging industry

- Cap monitoring
- Foil wrapping seams
- Label inspection (logo, text, code, product content, etc.)
- and many more

Example:
Inspection of forward cap alignment



OK



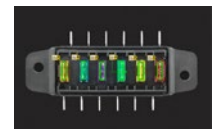
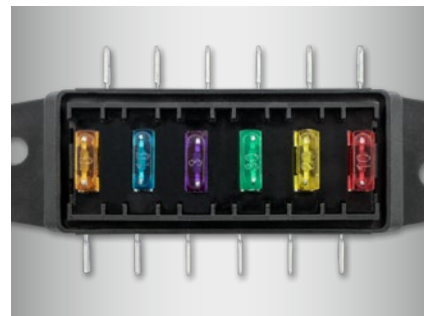
NOK



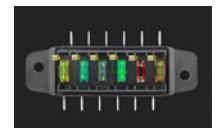
Automotive industry/electronics

- Assembly and surface mounting monitoring
- Presence and alignment check of pins
- Detection of overmolding, injection molding errors, scratches, etc.
- and many more

Example:
Inspection of fuse type (color) position



OK



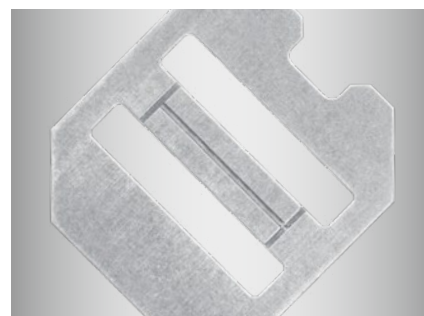
NOK



Assembly/handling

- Position detection for pick-and-place
- Presence check and position monitoring of components
- Position of protective caps or plugs
- and many more

Example: Position detection of blanked parts for pick-and-place



OK



NOK

Inspired by nature.

Flexibility

We recognize objects in their entirety and this way can easily determine their position.

Object recognition

We can identify objects even in weak light – namely, by their contour.

Clearly focused

We can focus on specific details.



Robust

Our sensitive eye lens is protected by the flexible eyelid.

Communicative

Our eyes are linked to the high-speed network of our nervous system.

A clever mind on top

The eye requires intelligence.

Light conditions

Using artificial illuminations we can see even in weak light.

Our technology as evolution.

Flexibility

No matter how something is positioned on the conveyor belt – the integrated 360° *FEXLoc*® part recognition always keeps *VeriSens*® feature checks on track.

Clearly focused
VeriSens® offers free choice of lenses to ensure optimum object focusing.

Object recognition
VeriSens® features a contour-based mode of operation – in real time calculated by the patented Baumer *FEX*® image processor.



Robust
Every *VeriSens*® provides at least IP 67 protection. Industry-suited metal housing and modular tube system protect the entire vision sensor, even including the interchangeable lens.

Clever technology combined
VeriSens® is a perfectly harmonized system to see, decide, communicate – and even to learn new things.

Communicative
VeriSens® provides results over Ethernet, Industrial Ethernet or digital I/Os and even controls Universal Robots (UR).

Light conditions

VeriSens® features integrated machine vision illumination. Besides powering external illumination, the models of the XC series are the only vision sensors with fully integrated flash controller to multiply brightness.

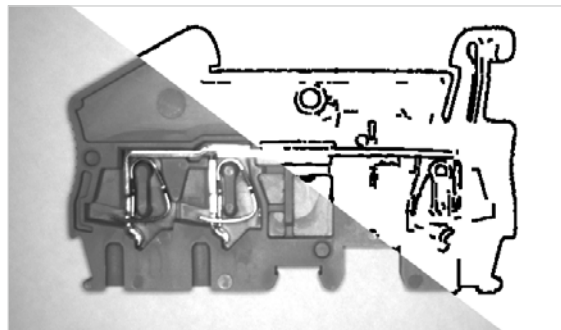
***VeriSens*® – even faster and more objective than nature.**

Do you want to benefit from the flexibility and versatility of image-based product verification as well? As a compact image processing system in the shape of a sensor, *VeriSens*® is an ideal component which comes with all the necessary hardware and software and is also intuitively configurable using a PC.

What makes *VeriSens*[®] so special for our customers?

■ Patented Baumer *FEX*[®] image processor – inspired by nature

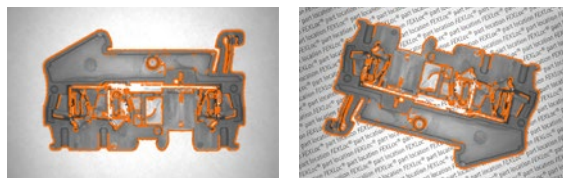
Any process deviations, such as varying light intensity, demanding object surfaces or ambient background influence quality in image processing. *VeriSens*[®] acts like human beings who can still recognize trees and houses clearly by their contours even in dismal weather: The patented *FEX*[®] image processor calculates contours in real time where others discern only shades of gray. Contour-based image processing works reliably and quickly – even in less stable ambient light conditions.



Visualization of the detected object by conventional image processing (bottom) and contour-based technology using Baumer *FEX*[®] image processor (top)

■ *FEXLoc*[®] part location – to simplify the machine design

The location of parts during feeding does not matter to *VeriSens*[®]. Reliable 360° part recognition enables virtual object alignment to check the correct positions. This means that mechanical part alignment is no longer necessary. All XF, XC, and CS series models are equipped with integrated *FEXLoc*[®] part location.

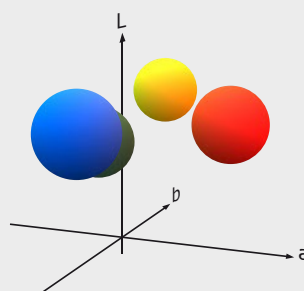


Virtual object alignment using *FEXLoc*[®]
left: object contours
right: object turned in front of severe background structures



See the right colors even faster – with *ColorFEX*[®] in 3D

ColorFEX[®] is the unique, intelligent 3D color assistant for quick and intuitive setup of colors and their differentiation. Object colors and their shades are automatically identified and visualized in 3D. This allows for very easy and self-explaining setup of reliable color inspections.



TUTORIAL

Easy to use.



■ **SmartGrid** – the intelligent calibration target

SmartGrid (patent-pending) provides four benefits: Supporting automated teach-in for image distortion correction in real time, it allows for precise object and dimensional checks even when *VeriSens*® is installed in inclined position. When converting to world coordinates, *VeriSens*® is receiving scaling specifications via *SmartGrid* (optionally with Z calibration). *SmartGrid* is the basis for automated coordinate alignment by *VeriSens*® when attached to Universal Robots (UR) to determine object positions.

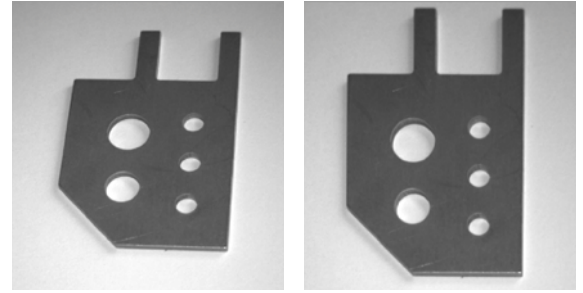


Image distortion correction (right: corrected)

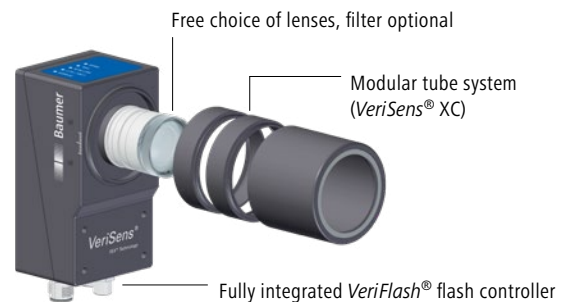
■ **Universal Robots (UR) control** – easier than ever before

VeriSens® controls Universal Robots (UR) after just a few minutes of setup. Automated coordinate alignment via *SmartGrid* replaces the conventional manual “hand-eye” procedure. *VeriSens*® *URCap* is the user-friendly UR “app” and allows for easy vision sensor installation and integration into the program flow. UR programming utilizes only two additional nodes (commands) for image processing and thus remains as easy as ever: from tracking several objects including free space checks to identifying free storage space on to quality inspections and object identification – there are virtually no limits for applications.

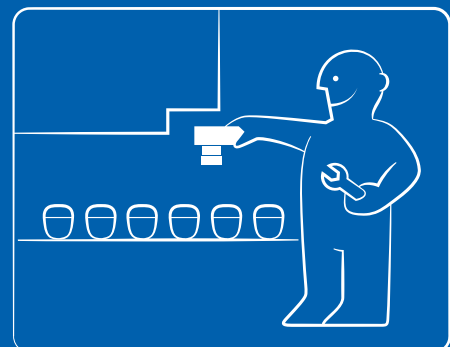


■ **Industry-suited design with IP 67 resp. IP 69K protection**

VeriSens® vision sensors come in robust aluminium respectively stainless steel housing that is up to harsh industrial environments. The patented modular tube system for the models with C-mount interface provides optimum protection for interchangeable lenses. Variable intermediate rings allow fast and economical adaptation to longer lenses – retrospectively as well.



Easy
to configure.



Unified configuration software and integrated web interface.

Thanks to *VeriSens® Application Suite*, the cross-series unified configuration software available in 9 languages, your vision sensor is configured in just four easy-to-understand steps. Even for beginners the first job configuration will take only a few minutes, saving valuable time on the project.

Software includes simulators for every device – any conventional digital camera or smartphone as image source will do.

The simulators allow you to test feature checks offline prior to product purchase. An installation is not required – no need for administrator privileges.

A configurable human-machine interface is already integrated within the device for customers who want to configure *VeriSens®* also during the production process.

The *VeriSens® Application Suite* needs only a few clicks to set web interface options (functionalities, user groups, design) and therefore will be operational in just a few minutes. Security is provided by the encrypted HTTPS connection (device dependent). The *MultiViewer* feature enables selection of up to 16 *VeriSens®* vision sensors for view a standard web browser – therefore you will always be able to keep an eye on the entire production line.



Download and test free of charge
VeriSens® Application Suite
www.baumer.com/vs-sw



VeriSens® software at a glance

VeriSens® Application Suite for configuration and offline simulation

- Intuitive to use, even for non-expert users
- 4 steps to solve your inspection task
- Optionally with pop-up context help



TUTORIAL

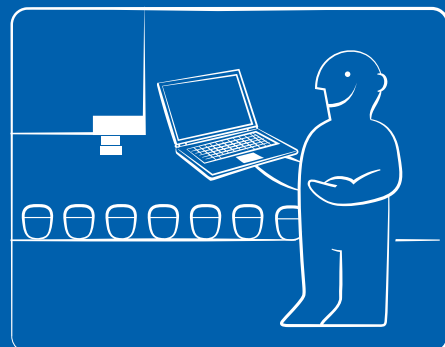
VeriSens® web interface for visualization and monitoring in operation

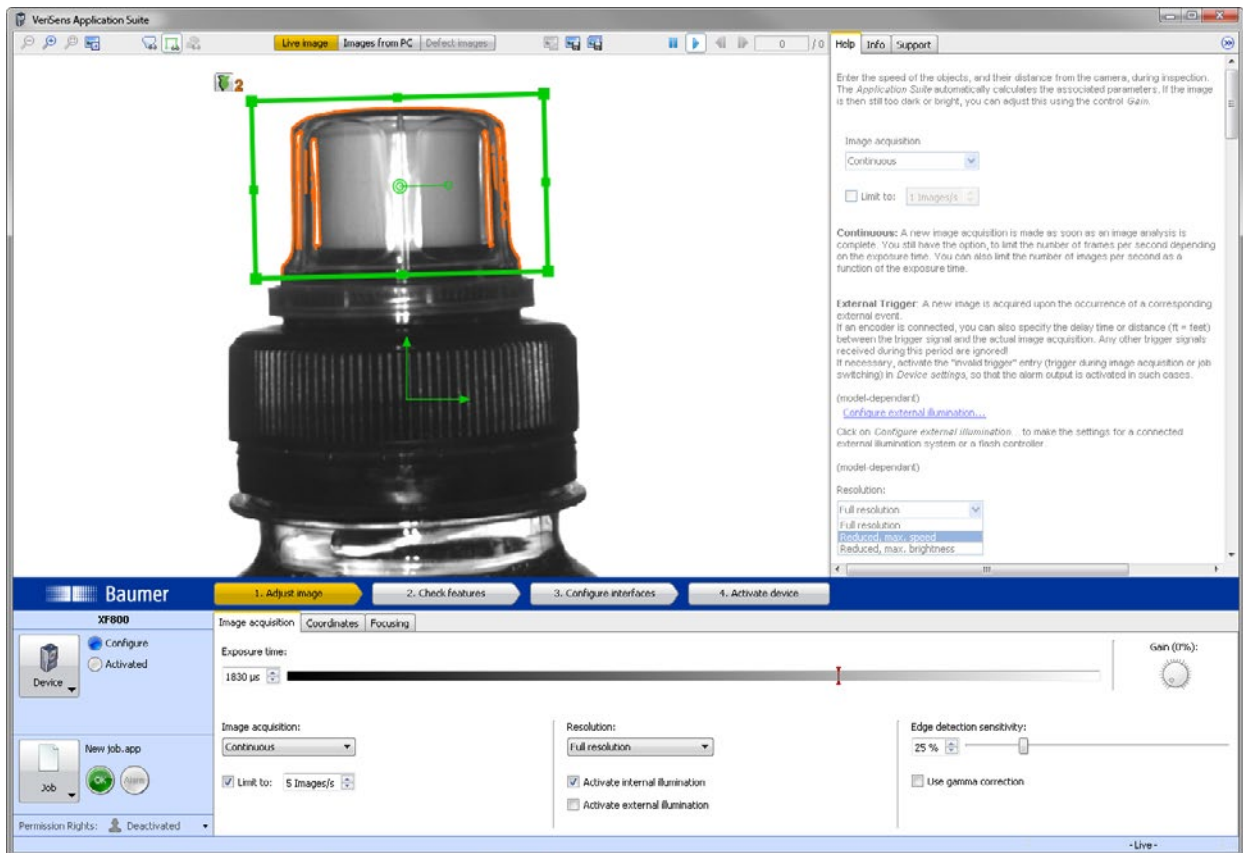
- Visualization using the existing web browser, no plug-ins required
- Functionalities and design configured within few minutes
- Optimized for touch screen operation, optional user levels



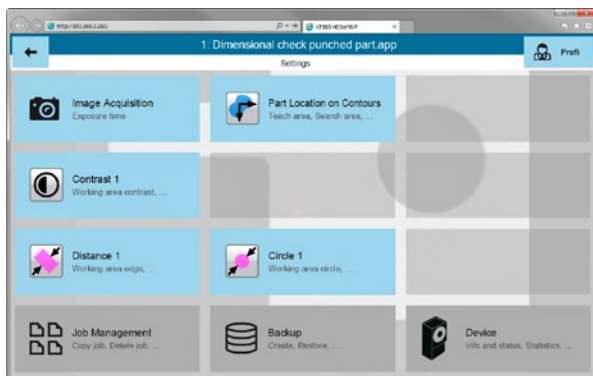
TUTORIAL

Absolutely powerful.

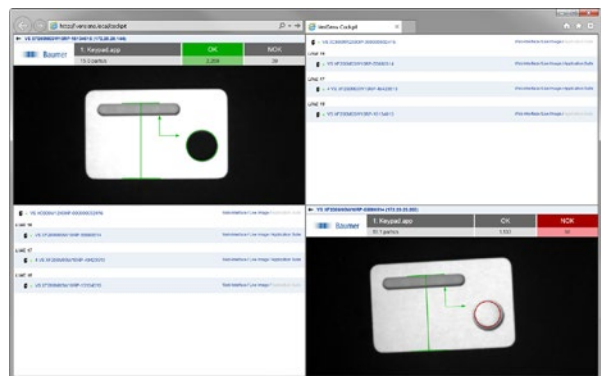




VeriSens® Application Suite

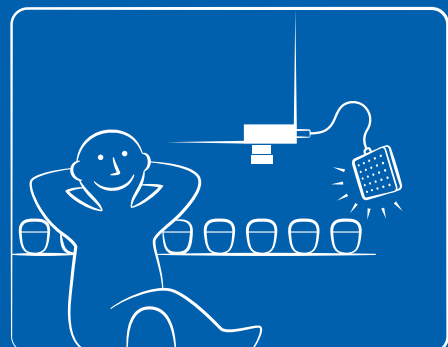


VeriSens® web interface



VeriSens® MultiViewer

Absolutely ingenious.





XF series: All aboard!

XF stands for “eXtended Functionality” – the series includes everything required to immediately enter the world of image processing. The versatile scope of functionalities ensures maximum flexibility of up to 22 feature checks and makes sure the right image tool is always available. A single sensor will suffice for simultaneously checking object properties and positions as well as reading text (OCR/OCV) and 1D/2D codes. All XF series models feature robust 360° part location by *FEXLoc*® for reliable part recognition.

The XF models integrate LED illumination in white or infrared. Infrared with integrated daylight filter provides several application benefits such as highlighting particular object features and minimizing ambient light effects. Furthermore, nobody working nearby will be bothered by flashing *VeriSens*® illumination.

XF series

- Image evaluation: monochrome or color
- Includes all *VeriSens*® feature checks (up to 22)
- Integrated optics: 8 | 10 | 12 | 16 mm
- Integrated illumination, white or infrared
- Housing: aluminum (IP 67) or stainless steel (IP 69K)

- **Models XF700 /XF800 /XF900**
Latest hardware generation to boost productivity, with enhanced identification algorithms (XF800 /XF900), integrated real-time distortion correction and Industrial Ethernet (PROFINET and EtherNet/IP™)
- **Models XF700C /XF800C (color)**
Latest hardware generation with *ColorFEX*® color assistant for convenient and reliable color setup and integrated Industrial Ethernet (PROFINET and EtherNet/IP™)
- **Models XF800 /XF900**
Identification functions additionally: 1D / 2D code identification, reading of plain text (OCR) without requiring previous font training, print quality evaluation (OCV)
- **Models XF900**
The robot expert that integrates into the program flow of Universal Robots (UR) with the help of *VeriSens*® *URCap* – for image-based object tracking and robot-supported quality control, optional Z calibration for coordinate scaling in space





XC series: Maximum flexibility.

XC is an abbreviation of “eXtended Functionality with C-mount” – the series for maximum functionality and versatility. Advanced users benefit from up to 22 feature checks and the freedom to choose lens and illumination.

External illumination is supplied by the integrated *VeriFlash*® flash controller powering at the required pulse up to 48V and 4A. *ColorFEX*®, the intelligent and multiple award-winning 3D color assistant, enables intuitive and quick color setup in 3D. The patented and modular *VeriSens*® XC Tube System is the optimum protection for interchangeable lenses and can be configured to match the individual size of the lens.

■ Models XC700 / XC800 / XC900

Latest hardware generation to boost productivity, with enhanced identification algorithms (XC800 / XC900), integrated real-time distortion correction and Industrial Ethernet (PROFINET and EtherNet/IP™), XC800 / XC900 with additional identification functions: 1D / 2D code identification, reading of plain text (OCR) without requiring previous font training, printing quality evaluation (OCV), XC900: The robot expert that integrates into the program sequence of Universal Robots (UR) with the help of *VeriSens*® *URCap* – for image-based object tracking and robot-supported quality control, optional Z calibration for coordinate scaling in space

■ Models XC700C / XC800C (color)

Latest hardware generation with *ColorFEX*® 3D color assistant for convenient and reliable color setup, XC800C with additional identification functions

XC series

- Image evaluation: monochrome or color
- Includes all *VeriSens*® feature checks (up to 22)
- C-mount and free choice of lenses
- *VeriFlash*® flash controller
- Industry-suited aluminum housing (IP 67)





CS/ID series: The experts.

The VeriSens® sensor functionalities of the CS and ID series focus on core application tasks making them the ideal entry-level product for image-based object inspection.

The CS series (“Check & Sort”) provides every tool required for checking and sorting applications:

- **Model CS100**

Either with white or infrared illumination – particularly easy-to-use vision sensors designed for product inspection with immediate results output via digital I/Os

The ID series (“IDentification”) features both reliable text readers and code readers:

- **Model ID510 (text and code reader)**

Latest hardware generation to double productivity, integrated Industrial Ethernet (PROFINET and EtherNet/IP™), enhanced identification algorithms, in addition: reading of plain text (OCR) without requiring previous font training, print quality evaluation (OCV)

- **Model ID100 (code reader)**

Reads barcodes and matrix codes (1D/2D codes including GS1) with quality evaluation

CS/ID series














- Image evaluation: monochrome
- Selected VeriSens® feature checks (up to 6)
- Integrated optics, 10 mm, 12 mm or 16 mm
- Integrated illumination, white or infrared
- Housing: aluminum (IP 67)



VeriSens[®] vision sensors product overview

Additional devices (including IP 69K):
www.baumer.com/verisens

Type key (e.g.): VS XF 800 M 03 W 12 I P		Series (XF/XC/CS/ID)	Model with protection class	Resolution [µm]	LED illumination	Interface	Output (PNP/NPN)
XF	800	M	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)

Article No.	Type name	Series	Model with protection class	Resolution [µm]	LED illumination	Interface	Output (PNP/NPN)
	11700462 VS XF700M03W08IP	XF	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)
	11173091 VS XF700M03W12IP						
	11173090 VS XF700M03W16IP						
	11700463 VS XF700M03I08IP						
	11173089 VS XF700M03I12IP						
	11173088 VS XF700M03I16IP						
	11210957 VS XF800M03W08IP						
	11162177 VS XF800M03W12IP						
	11162175 VS XF800M03W16IP						
	11700461 VS XF800M03I08IP						
	11173087 VS XF800M03I12IP						
	11173086 VS XF800M03I16IP						
	11700457 VS XF900M03W08IP						
	11700458 VS XF900M03W12IP						
	11700460 VS XF900M03I08IP						
	11700459 VS XF900M03I12IP						
	11197478 VS XF700C03W12IP	XF	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)
	11197479 VS XF700C03W16IP						
	11210959 VS XF800C03W08IP						
	11199868 VS XF800C03W12IP						
	11199869 VS XF800C03W16IP						
	11173085 VS XC700M03X00IP	XC	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)
	11173084 VS XC700M12X00IP						
	11173083 VS XC700M20X00IP						
	11166806 VS XC800M03X00IP						
	11166807 VS XC800M12X00IP						
	11166808 VS XC800M20X00IP						
	11700454 VS XC900M03X00IP						
	11700456 VS XC900M12X00IP						
	11700455 VS XC900M20X00IP						
	11181282 VS XC700C03X00IP	XC	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)
	11181283 VS XC700C12X00IP						
	11166809 VS XC800C03X00IP						
	11180704 VS XC800C12X00IP						
	11048500 VS CS100M03W10EP	CS	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)
	11076261 VS CS100M03W16EP						
	11089900 VS CS100M03I10EP						
	11093026 VS CS100M03I16EP						
	11048489 VS ID100M03W10RP	ID	IP 67 (100/200/510/700/800/900) IP 69K (105/205)	752/640 × 480 (VGA, 1/3" / 1/4") 1280 × 960 (1.2 MP, 1/3") 1600 × 1200 (2 MP, 1/1.8")	White (integrated) Infrared (integrated) VeriFlash [®] flash controller	8 mm (integrated) 10 mm (integrated) 12 mm (integrated) 16 mm (integrated) C-mount interface	Ethernet (TCP/UDP), Industrial Ethernet ¹⁾ Ethernet (TCP/UDP) Ethernet (TCP/UDP), RS485 Output (PNP/NPN)
	11076263 VS ID100M03W16RP						
	11173082 VS ID510M03W12IP						
	11173081 VS ID510M03I12IP						

¹⁾ PROFINET/Ethernet/IP™

²⁾ for configuration only

Vision Guided Robotics easier than ever before – *VeriSens*[®] for Universal Robots (UR) control.

Robots with “eyes” offer enormous versatility in the application. Pick and place flexibility, gripper clearance checks, overlap inspection, quality control, object identification and more – image processing paves the way.



Why is *VeriSens*[®] so unique for use with Universal Robots?

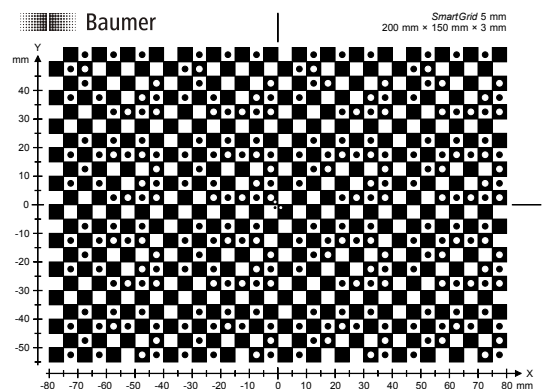
- **Really easy:** It takes only two commands in UR programming to access the many great benefits of image processing, such as object tracking. Thanks to their excellent usability, vision sensors and robots significantly cut down on operator training time.
- **No longer manual but automated:** Automated coordinate alignment via *SmartGrid* eliminates the conventional required elaborate manual “hand-eye” procedure.
- **Matching all:** Object tracking, quality control, identification, installed at robot or overhead – the universal concept will support you in virtually any application and allows for fast adaptations.



SmartGrid

Innovative *SmartGrid* is the centerpiece for fast setup in few minutes:

- Teach-in for correction of image distortion in real time
- Conversion to world coordinates and orientation within the coordinate system
- Z-calibration for 3D scaling of coordinates
- Automated coordinate alignment between *VeriSens*[®] and Universal Robot



Application versatility

- Control object pick and place
- Quality control
- Object identification







A question of light.

A decisive criterion for inspection stability in the application is the accentuation of differences in application-relevant features. Therefore illumination should be selected with utmost care in order to obtain optimum results. Basically, there is incident light, dark field and back light.

Colored illumination may cause strong contrast. Due to the topic's complexity, the following provides only a rough outline. The Baumer team will gladly be of help should you need more detailed support.

Illumination position

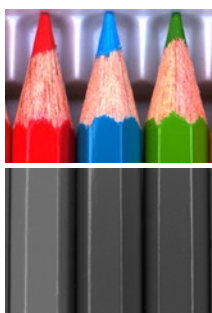
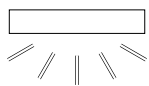
Illumination type	Ideal for	Object
Incident light Homogenous illumination of rough and matte objects	Presence and position checks, imprint inspection (OCR/OCV), e. g. best-before date	
Dome light Shadow-free illumination, suppression of surface irregularities and reflections	Inspection of severely glossy or mirroring objects, e. g. yogurt lids (seals)	
Dark field light Highlighting any unevenness, contours, edges and defects	Surface inspection, e. g. scratches or engravings	
Back light Inspected object illumination from below or behind delivers high-contrast shadow images	Contour-based inspection, e. g. accuracy of punched parts and mounting holes, measuring operations, presence checks of transparent packaging	

Colored illumination

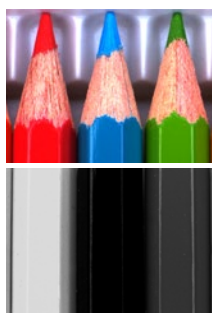
Colored illumination may intensify or suppress defined colors also in monochrome imaging. The contrast created this way helps recognizing relevant features which is decisive for an application-specific and optimally matching solution.

For example, blue light cast on a multi-color surface will be reflected by the blue content only. The more blue content is in object, the more light is reflected and the brighter will appear the object. In an analog way, red content illuminated in blue appears extremely dark.

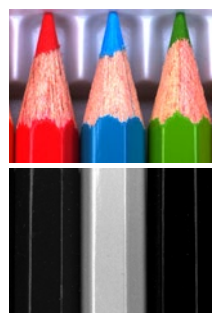
Illumination: White



Red



Blue



Green



Technical data

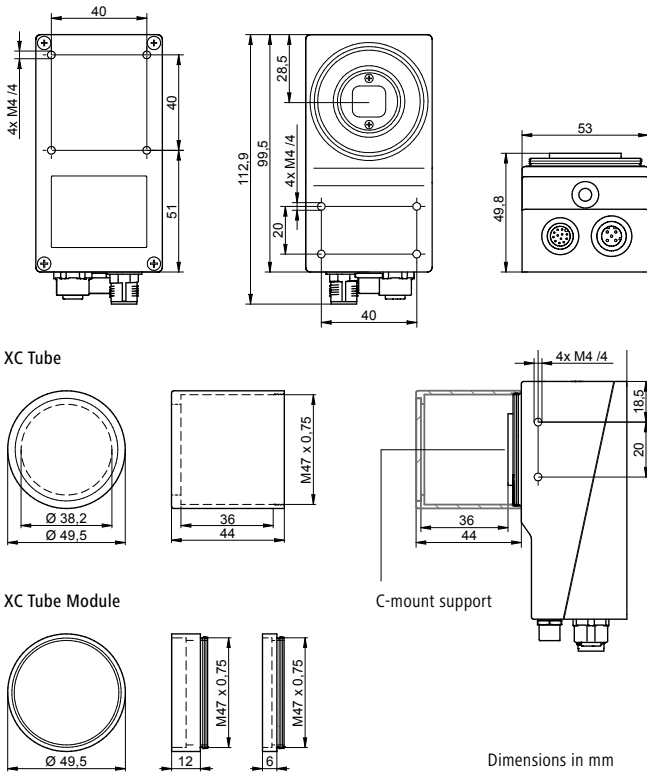
General data	XC700 / XC800 / XC900			XF700 / XF800 / XF900 CS100 ID100 / ID510		
Resolution	640 × 480 px	1280 × 960 px	1600 × 1200 px	752 × 480 px		
Sensor	1/4" CCD (monochrome, color)	1/3" CCD (monochrome, color)	1/1.8" CCD (monochrome)	1/3" CMOS (monochrome, color)		
LED illumination	Fully integrated VeriFlash® flash controller for external illumination			White (LED class: Risk group 1 low risk, EN 62471:2008) Infrared (860 nm) (LED class: free group risk-free, EN 62471:2008)		
Lens	Interchangeable lens (C-mount)			f = 10 mm	f = 8 / 12 mm	f = 16 mm
Min. object distance	Depending on interchangeable lens			50 mm	50 mm	70 mm 100 mm ¹⁾
Max. object distance	Depending on interchangeable lens			∞	450 mm	300 mm
Speed	Max. inspections / s		Max. inspections / s	Max. inspections / s		
High-resolution mode	118 (monochrome) 116 (color)	32 (monochrome) 31 (color)	21 (monochrome)	50 (monochrome) 50 (color)		
High-speed mode* (* limited resolution)	144 (monochrome)	54 (monochrome)	35 (monochrome)	100 (monochrome, XF series only)		
Defect image memory	32	8	4	32		
Number of jobs	Up to 255 on the device (can be exchanged via process interface)					
Features per job	32					
Electrical data	XC700 / XC800 / XC900			XF700 / XF800 / XF900 CS100 ID100 / ID510		
Power supply	=== 24 V ± 25 % / Class 2 per NEC / Protection class III 18 ... 30 V ²⁾					
Power consumption	Max. 42 W (with IO and illumination)			Max. 18 W (with IO) Typical 5 W (I _{max} = 1 A at 24 V) ²⁾		
Inputs	8 ... 30 V					
Outputs	PNP I _{peak} = 100 mA and I _{eff} = 50 mA					
Digital input	Trigger, Job selection, External teach-in, Encoders (CH-A, CH-B) 500 kHz			¹⁾ XF / XC700/800/900, ID510 only		
Digital output	Pass/Fail 1-5 ³⁾ , Flash Sync, Alarm, Camera Ready, Output Enable			²⁾ CS100/ID100 only		
Communication	Ethernet (10BASE-T / 100BASE-TX)			³⁾ VSxxxxxxxxxRP: 1-3		
Initial setup	PROFINET (CC-A) ¹⁾ / Ethernet/IP ¹⁾ , TCP / UDP (Ethernet) ⁴⁾ , RS485 ⁵⁾			⁴⁾ except CS100		
Process interface				⁵⁾ VSxxxxxxxxxRP only		
Integr. flash controller	XC700 / XC800 / XC900			XF700 / XF800 / XF900 CS100 ID100 / ID510		
Voltage (permanent)	=== 12 V DC or === 24 V DC			-		
Voltage (pulsed)	┌ 24 V DC or ┌ 48 V DC			-		
Current (permanent)	I _{max} = 800 mA at === 24 V DC (+/- 10 %, at least +/- 100 mA, at 25 °C)			-		
Current (pulsed)	I _{max} = 4 A at ┌ 48 V DC (+10/-20 %, at least +/- 100 mA, at 25 °C)			-		
Flash time	Max. 1 ms (Duty Cycle max. 1:10)			-		
Operating conditions	XC700 / XC800 / XC900			XF700 / XF800 / XF900 CS100 ID100 / ID510		
Operating temperature	+5 ... +55 °C @ measurement point			+5 ... +60 °C +5 ... +50 °C ²⁾ @ measur. point		
Storage temperature	-20 ... +70 °C					
Humidity	0 ... 90 % (non-condensing)					
Protection class	IP 67 (XC series: with tube)			IP 67		
Vibration load	IEC 60068-2-6, IEC 60068-2-64					
Mech. shock resistance	EN 60068-2-27					
Mechanical data	XC700 / XC800 / XC900			XF700 / XF800 / XF900 CS100 ID100 / ID510		
Width × Height × Depth	53 mm × 99.5 mm × 49.8 mm (without lens / tube)			53 mm × 99.5 mm × 38 mm		
Material	Housing: aluminum Cover glass tube: PMMA			Housing: aluminum Cover glass: PMMA ⁶⁾		
Weight (approx.)	300 g (without lens / tube)			250 g		
Code types / OCR	XC800 / XC900			XF800 / XF900 ID510 ID100		
Barcode ⁷⁾	2/5 Industrial, 2/5 Interleaved, Codabar, Code 39, Code 93, Code 128, PharmaCode EAN 8, EAN 13, UPC-A, UPC-E: Base code + variants Add-On 2, Add-On 5 GS1 DataBar (RSS): Limited, Expanded, Expanded Stacked GS1 DataBar (RSS-14): Omnidir, Truncated, Stacked, Stacked Omnidir GS1 128					
Matrix code ⁷⁾	DataMatrix (ECC 200), GS1-DataMatrix, QR, PDF417					
Font ⁸⁾	Many font styles (recommended: sans serif, proportional), Dot Matrix, Characters: A-Z a-z 0-9 + - . : / ()					

⁶⁾ for XF700/XF800/XF900, CS100, ID510 with infrared illumination: daylight filter 780 nm integrated

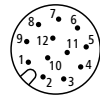
⁷⁾ incl. quality rating of all barcodes according to ISO/IEC 15416 as well as all matrix codes according to ISO/IEC 15415 or AIM DPM-1-2006

⁸⁾ XC800/XC900, XF800/XF900, ID510 only

Dimension drawing (XC series)

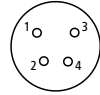


Electrical connection ¹⁾ M12 / 12-pin, A-coded



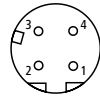
1: Power (+18-30 V DC)	7: OUT3
2: Ground	8: IN3
3: IN1 (Trigger)	9: OUT4 RS485+ ²⁾
4: OUT1	10: IN4
5: IN2	11: IN5
6: OUT2	12: OUT5 RS485- ²⁾

Electrical connection illumination ^{1,3)} M8 / 4-pin ⁴⁾



1: +24 V or +48 V Flash
2: +12 V or +24 V Flash
3: Ground
4: Flash Sync ⁵⁾ PNP 100 mA

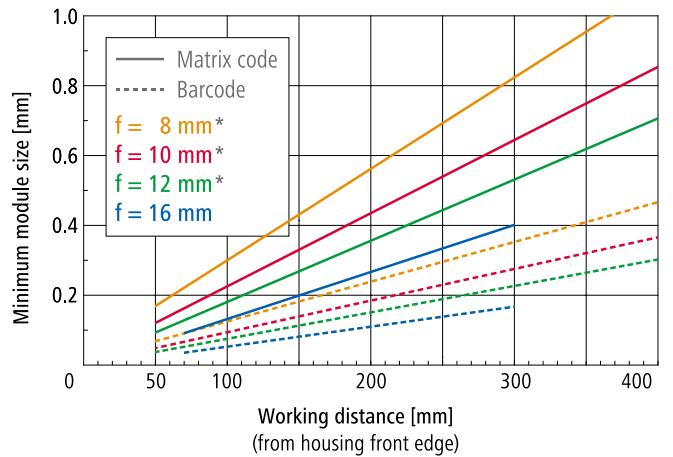
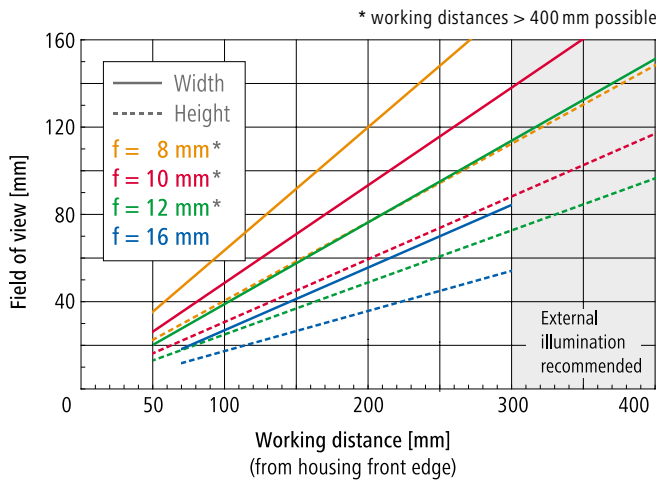
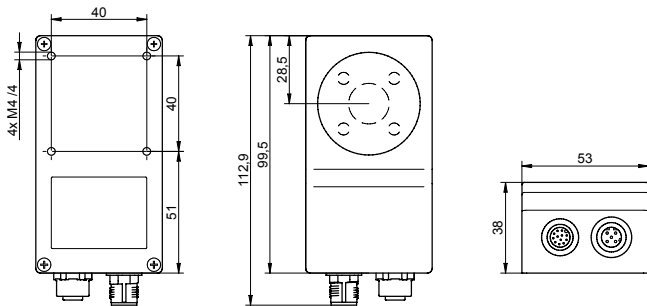
Ethernet connection ¹⁾ M12 / 4-pin



1: TD+
2: RD+
3: TD-
4: RD-

- ¹⁾ on device
- ²⁾ RS485: VSxxxxxxxxRP only
- ³⁾ XC series only
- ⁴⁾ voltage outputs configurable by software
- ⁵⁾ voltage according to power supply

Dimension drawing (XF/CS/ID series)



Device dependent:




System design


Lab setup accessories (optional)

11048083	Connecting cables <i>VeriSens</i> [®] , adapter M12 / DC socket
11079750	Power supply 24 V / 1 A, international, DC plug
11051407	Laboratory stand, hinged bracket, mounting material







Mounting accessories (optional)

11177010	 <i>VeriSens</i> [®] mounting adapter
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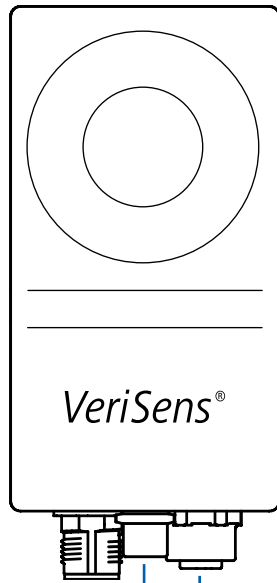
Polarization filter (optional)

11161075	ZVF-Filter Pol. <i>VeriSens</i> [®] ID / CS / XF (VSxxxxxxxWxxxx only)	
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Connecting cables⁴⁾ shielded, to free cable end

11201118	2 m	
11195097	5 m	
11195098	10 m	
11201128	2 m	
11195094	5 m	
11195095	10 m	

⁴⁾ suitable for robotics, UL approved



Lens accessories (optional)

11088325	XC Tube, M47, length 44 mm (scope of delivery <i>VeriSens</i> [®] XC)
11115649	XC Tube Module, M47, 6 mm
11089149	XC Tube Module, M47, 12 mm
11010529	Close-up ring set 6-part, 0.5 / 1 / 5 / 10 / 20 / 40 mm
11092000	Pentax [®] polarization filter, linear: filter thread 27 mm ¹⁾
11175428	filter thread 30.5 mm ²⁾
11167713	filter thread 40.5 mm ³⁾
11006551	Pentax [®] color filter ¹⁾ (red), filter thread 27 mm
11097573	IR cut filter, C-mount, height 2.5 mm, screw-in tool
11097576	Daylight filter, C-mount, height 2.5 mm, screw-in tool


Compatible to lenses:

- ¹⁾ Article No. 11150226 / 11150228 / 11003417
- ²⁾ Article No. 11008992 / 11150229 / 11150230 / 11003041
11175031 / 11175034 / 11175035 / 11175036
- ³⁾ Article No. 11150223 / 11002877




Ethernet cables shielded, to RJ-45 plug

2 m	11700903
5 m	11700905
10 m	11700904
2 m	11701260
5 m	11701261
10 m	11701262

Monitor (All-in-one PC, optional)







11122988	ZVP-ALL_IN_ONE_PC.DE (10.4", 1024 × 768 px, Stylus)	
11093293	ZVP-ALL_IN_ONE_PC.EN (10.4", 1024 × 768 px, Stylus)	

Illumination cables

11088882	1.5 m	Extension cable shielded, male conn. straight M8, to female conn. straight M8 ⁵⁾	
11136134	0.3 m	Extension cable shielded, male conn. straight M8, to female conn. straight M8 ⁵⁾	
10163693	2 m	Adapter cable, free cable end, to female connector straight M8 ⁵⁾	
11175008	0.15 m	Adapter cable, ZVI-LUMIMAX [®] T1 at <i>VeriSens</i> [®] XF / XC / CS / ID series	

⁵⁾ *VeriSens*[®] XC series only

Set of mounting brackets

11092203	VB Fix Kit FLDR-i90B, small (57 mm)	for LED ring light FLDR-i90B to <i>VeriSens</i> [®] XC series	
11092204	VB Fix Kit FLDR-i90B, large (93 mm)		
11136136	VB Fix Kit RONDO-LX, small (57 mm)	for LED ring light ZVI-RONDOLX to <i>VeriSens</i> [®] XC series	
11136139	VB Fix Kit RONDO-LX, large (93 mm)		
11076264	ZVI-VB Fix Kit Industrial Light	for illumination (e.g. Spot 5W)	
11175009	ZVI-VB Fix Kit Adapter Spot5W	to <i>VeriSens</i> [®] XF / XC / CS / ID	

Interchangeable lenses (C-mount, VeriSens® XC series only)



Article No.	Type name	Focal distance [mm]	Aperture speed range	Minimum distance [m]	Maximum lens length ¹⁾ [mm]	Filter thread [mm]	XC Tube Module ²⁾ (Art. Nr. 11089149)
11037579	ZVL-FL-HC0416X-VG ³⁾	4.2	F1.6 - C	0.20	44	–	1 piece
11008992	ZVL-FL-HC0614-2M	6	F1.4 - 16.2	0.10	38	30.5	1 piece
11150223	ZVL-FL-CC0814A-2M	8	F1.4 - 16.2	0.10	37	40.5	1 piece
11002877	ZVL-FL-CC0815B-VG ³⁾	8.5	F1.5 - C	0.20	40	40.5	1 piece
11150226	ZVL-FL-CC1214A-2M	12	F1.4 - 16.2	0.10	46	27.0	1 piece
11150228	ZVL-FL-CC1614A-2M	16	F1.4 - 16.2	0.10	33	27.0	–
11150229	ZVL-FL-CC2514A-2M	25	F1.4 - 16.2	0.10	38	30.5	1 piece
11003417	ZVL-FL-CC3516-2M	35	F1.6 - 16	0.40	36	27.0	–
11150230	ZVL-FL-CC5024A-2M	50	F2.8 - 22.2	0.30	47	30.5	1 piece
11003041	ZVL-FL-CC7528-2M	75	F2.8 - 32	0.70	60	30.5	3 pcs

¹⁾ measured from C-mount support (see XC series scale drawing)

²⁾ necessary with lens length > 36 mm

³⁾ only compatible to VeriSens® with 0.3 MP resolution (VS XCxxxx03xxxxx)

External illumination modules ⁴⁾

Article No.	Type name	Product description	Cable [cm]	Illuminated area [mm]	Outer dimensions [mm]	Height [mm]
Cable with M8/4-pin connector ^{4,5)}						
11085869	FLDR-i90B-W	LED ring light, white	30	∅ 87	∅ 93,5	24.6
11154321	FLDR-i90B-SR24	LED ring light, red 626 nm	30	∅ 87	∅ 93,5	24.6
11090900	FLDR-i90B-IR24	LED ring light, IR 875 nm	30	∅ 87	∅ 93,5	24.6
11086539	FLDL-i150x15-W	LED bar light, white, diffuse	100	148 × 15	158 × 17.5	20
11086540	FFPR-i100-W	LED dark field light, white, diffuse	30	∅ 94,6	∅ 100	40
11086541	FLDM-i100-W	LED dome light, white	30	∅ 80	∅ 130	61
11086536	FLDL-TP-Si36-W	LED back light, white, diffuse	100	36 × 36	47 × 47	15
11086538	FLDL-TP-Si85x77-W	LED back light, white, diffuse	100	85 × 77	95 × 95	15
11086537	FLDL-TP-Si200x100-W	LED back light, white, diffuse	100	200 × 100	228 × 116	23.5
11095910	FLFL-Si60-IR24	LED back light, IR 850 nm, diffuse	100	60 × 60	94 × 94	10
With M8/4-pin connector ^{4,7)}						
11130179	ZVI-RONDOLX_24VDC_weiss_120°	LED ring light, white, 120°	–	∅ 67	∅ 101	24
11130176	ZVI-RONDOLX_24VDC_IR850nm_50°	LED ring light, IR 850 nm, 50°	–	∅ 67	∅ 101	24
11130150	ZVI-RONDOLX_24VDC_IR850nm_120°	LED ring light, IR 850 nm, 120°	–	∅ 67	∅ 101	24
11130185	ZVI-TOPLINED1_24VDC_weiss_120°	LED bar light, white, 120°	–	78 × 25	78 × 25	23
11130186	ZVI-TOPLINED1_24VDC_SHweiss_120°	LED bar light, SH white, 120°	–	78 × 25	78 × 25	23
11130187	ZVI-TOPLINED1_24VDC_rot617nm_30°	LED bar light, red 617 nm, 30°	–	78 × 25	78 × 25	23
11135012	ZVI-TOPLIGHT80_24VDC_rot617nm_30°	LED incident light, red 617 nm, 30°	–	87 × 87	87 × 87	20
11130183	ZVI-ARCUSM_24VDC_weiss_120°	LED dark field light, white, diffuse	–	∅ 68	∅ 120	9.5
11130181	ZVI-HILIGHT80_24VDC_weiss	LED back light, white, diffuse	–	78 × 78	87 × 87	20
11130182	ZVI-HILIGHT120_24VDC_weiss	LED back light, white, diffuse	–	118 × 118	127 × 127	20

⁴⁾ VeriSens® XC series only

⁵⁾ connector directly on the device

⁶⁾ supplier: Falcon Illumination MV GmbH & Co. KG


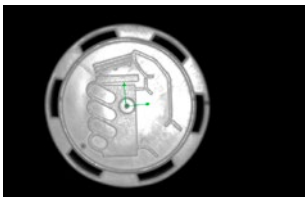
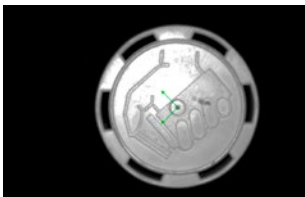

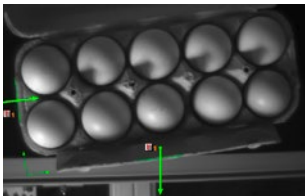
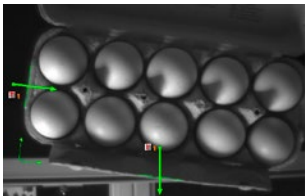

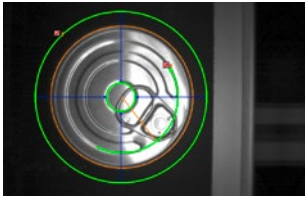
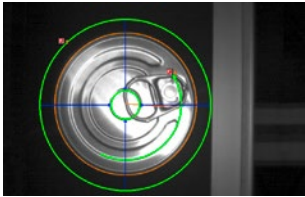

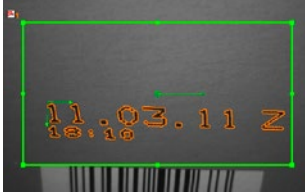
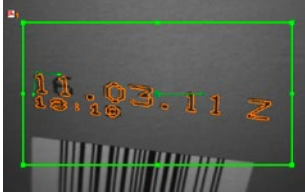

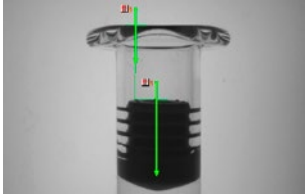
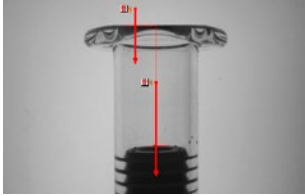

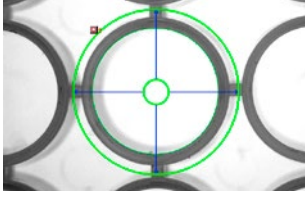
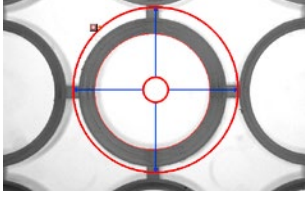

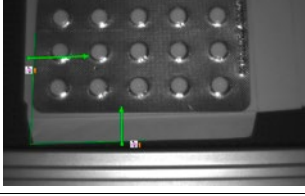
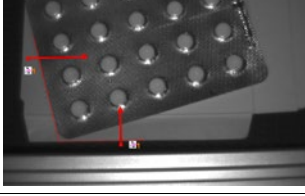
⁷⁾ supplier: Büchner Lichtsysteme GmbH

Illumination accessories (optional)

11167410	Polarization filter for FLDR-i90B	11167411	Support polarization filter for für FLDR-i90B	11167413	Diffusor A1421 for FLDR-i90B-DP
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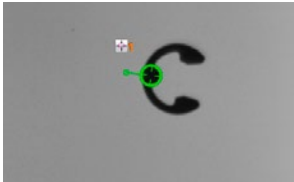



VeriSens® feature checks: overview.

VeriSens® vision sensors provide 23 different feature checks. The device-specific feature set is fully included with the purchase. Up to 32 checks can be performed all at once – with a single image acquisition – for comprehensive and efficient quality control.


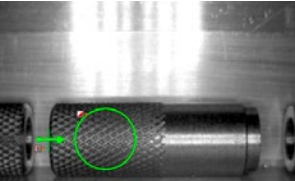
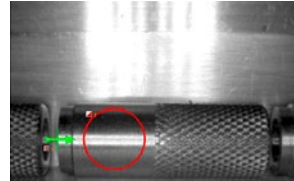




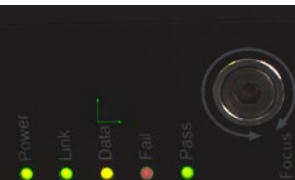
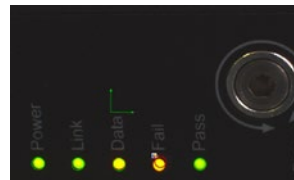

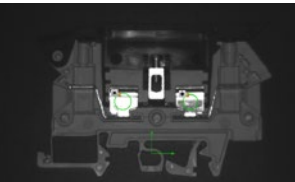
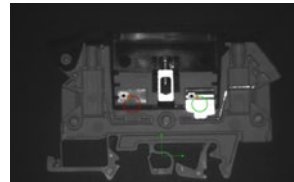

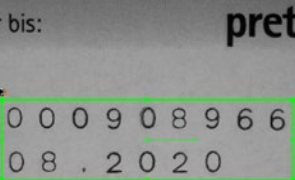
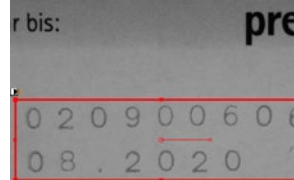
			Models					
			XF700 / XC700 ¹⁾	XF800 / XC800 ¹⁾	XF900 / XC900	CS100	ID510	ID100
Part location								
	<p>Part location on contours (FEXLoc®)</p> <p>Determines the location and rotational position of a part based on its contours. All subsequent feature checks are aligned according to the determined position.</p>			360°	360°	360°	360°	
	<p>Part location on edges (FEXLoc®)</p> <p>Determines the location and rotational position of a part from a single edge or two edges at right angles to each other. All subsequent feature checks are aligned according to the determined position.</p>			■	■	■		
	<p>Part location on circle (FEXLoc®)</p> <p>Determines the location and rotational position of circular parts. All subsequent feature checks are aligned according to the determined position.</p>			■	■	■		
	<p>Part location on text line</p> <p>Determines the location and rotational position of text within a working area. The text may change during this task. All subsequent feature checks are aligned according to the determined position.</p>			■	■	■	■	
Geometry								
	<p>Distance</p> <p>Determines the distance between two edges.</p>			■	■	■	■	
	<p>Circle</p> <p>Determines the diameter, location and roundness in comparison to a reference circle.</p>			■	■	■	■	
	<p>Angle</p> <p>Determines the angle between two edges.</p>			■	■	■		

Models
XF700 / XC700 [®]
XF800 / XC800 [®]
XF900 / XC900
CS100
ID510
ID100



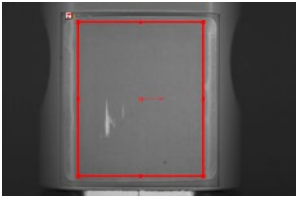

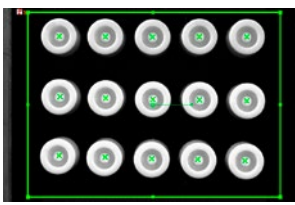
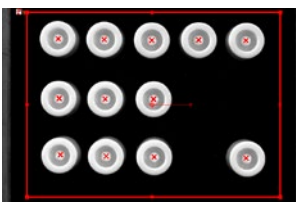

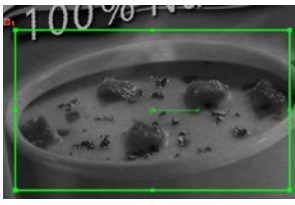
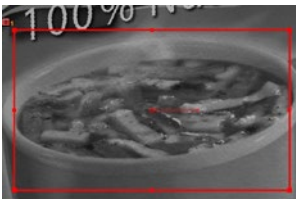

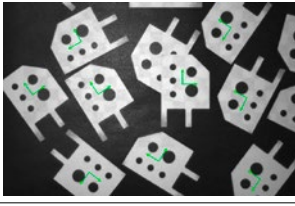
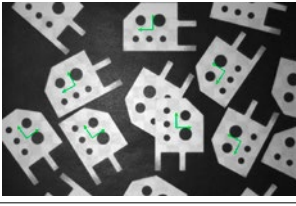



Geometry

	<p>Count edges Determines the number of edges along a tracing ray.</p>			■	■	■		
	<p>Point position Determines the coordinates of one point.</p>			■	■	■		
	<p>Edge characteristics Compares the distances of edges along a tracing ray.</p>			■	■	■		

Feature comparison

	<p>Count contour points Determines the number of contour points within a working area.</p>			■	■	■	■	
	<p>Contour comparison Compares the contour of a taught-in part with the contour of the current part.</p>			■	■	■	■	■
	<p>Color identification Identifies color within the operating range and its deviation from the reference color.</p>			■	■			
	<p>Brightness Determines the average brightness in a working area.</p>			■	■	■	■	
	<p>Contrast Calculates the contrast in a working area.</p>			■	■	■		

Feature comparison

 <p>Area size Identifies light or dark respectively color-defined areas in the image. Determines the total area or the largest continuous area.</p>			■	■	■				
 <p>Count areas Counts the visible continuous light or dark respectively color-defined areas in the image.</p>			■	■	■				
 <p>Pattern comparison Compares the working area with a taught-in pattern.</p>			■	■	■				
 <p>Find object positions Finds several objects based on a taught one.</p>			■	M	■	M			
 <p>Color positioning Verifies presence of defined colors within defined image sections.</p>			■	■					

Identification

 <p>Barcode Reads barcodes. Determines quality according to ISO/IEC 15416, result is output via process interface, can be compared to a set value.</p>			■	■					
 <p>Matrix code Reads matrix codes (ECC200, GS1, QR, PDF417) at any angle of rotation. Determines quality according to ISO/IEC 15415 or AIM DPM-1-2006, result is output via process interface, can be compared to a set value.</p>			■	■				■	■
 <p>Text Reads numbers and characters. Characters read are output via process interface, can be compared to a set value.</p>			■	■				■	

¹⁾ Feature checks available: "M" corresponds to "monochrome sensors only"

Additional features to solve your application.

Image acquisition

Optics XF / CS / ID series:	8 mm 10 mm 12 mm 16 mm
Optics XC series:	C-mount
Illumination XF / CS / ID series:	White Infrared
Illumination XC series:	VeriFlash® (integrated flash controller) <small>(infrared: integrated daylight filter 780 nm)</small>
Configurable web interface:	HTTP HTTPS <small>(live image, job switching, retrieving defect images, MultiViewer (700/800/900))</small>
Save images via:	FTP SFTP
Configuration via Ethernet	

Functions

Process linkage:	Digital I/Os
Process interface for:	Data output Universal Robots (URCap)
	Universal Robots+ Certified (UR+)
	Ethernet (TCP/IP, UDP) Industrial Ethernet (PROFINET, EtherNet/IP™) RS485
	Baumer FEX® image processor
	ColorFEX® intelligent 3D color assistant (device dependent)
	User administration / Password protection
	Coordinate conversion Automated coordinate alignment via SmartGrid
	Distortion correction (monochrome only) Z calibration

Process integration

Flexible result conjunction
Result conjunction with integrated digital inputs
Test functionality
High-speed mode (monochrome only)
Gamma correction (monochrome only)

¹⁾ non-configurable, Industrial Ethernet not supported

■ Wide range of interfaces

Up to 5 digital inputs and outputs, process interface (device dependent) for result output and/or device control or encoder interface for path-based triggering and ejection – VeriSens® is prepared for almost any integration method. Prefabricated function blocks are available for the Siemens SIMATIC® S7.

■ Integrated FTP / SFTP client

To store live and defect images for tracking or later analysis and / or visualization as easily as possible, all VeriSens® vision sensors support FTP servers.

■ Remote access

The Ethernet interface integrated in all models allows remote access (including gateway and NAT support) via the VeriSens® Application Suite to enable worldwide product access.

Models	XF700 / XF800	XC700 / XC800	XF900	XC900	CS100	ID510	ID100
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■	■	■	■	■	■	■

5 / 5	5 / 5	5 / 5	5 / 5	5 / 5	5 / 5	5 / 3
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■ Integrated test functionality

VeriSens® vision sensors offer an integrated test function which enables you to have images collected during a test run sorted according to good and reject parts in order to evaluate the reliability of the inspection task you created. The test function includes further useful features – ranging from statistical data processing including histogram representation to data export (CSV format).

■ User management

VeriSens® vision sensors feature an integrated user management with password protection, for example, to prevent modification of device settings by machine operators.

■ Backup & Restore function

All VeriSens® vision sensors support service and commissioning through a backup & restore function for the device software settings and inspection tasks stored in the device, to enable easy backup or transmission of this data to other devices.

Worldwide presence.



Africa

Algeria
Cameroon
Côte d'Ivoire
Egypt
Morocco
Reunion
South Africa

America

Brazil
Canada
Colombia
Mexico
United States
Venezuela

Asia

Bahrain
China
India
Indonesia
Israel
Japan
Kuwait
Malaysia
Oman
Philippines
Qatar
Saudi Arabia
Singapore
South Korea
Taiwan
Thailand
UAE

Europe

Austria
Belgium
Bulgaria
Croatia
Czech Republic
Denmark
Finland
France
Germany
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Norway
Poland
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Romania
Russia
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom

Oceania

Australia
New Zealand



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