Baumer
Passion for Sensors

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.

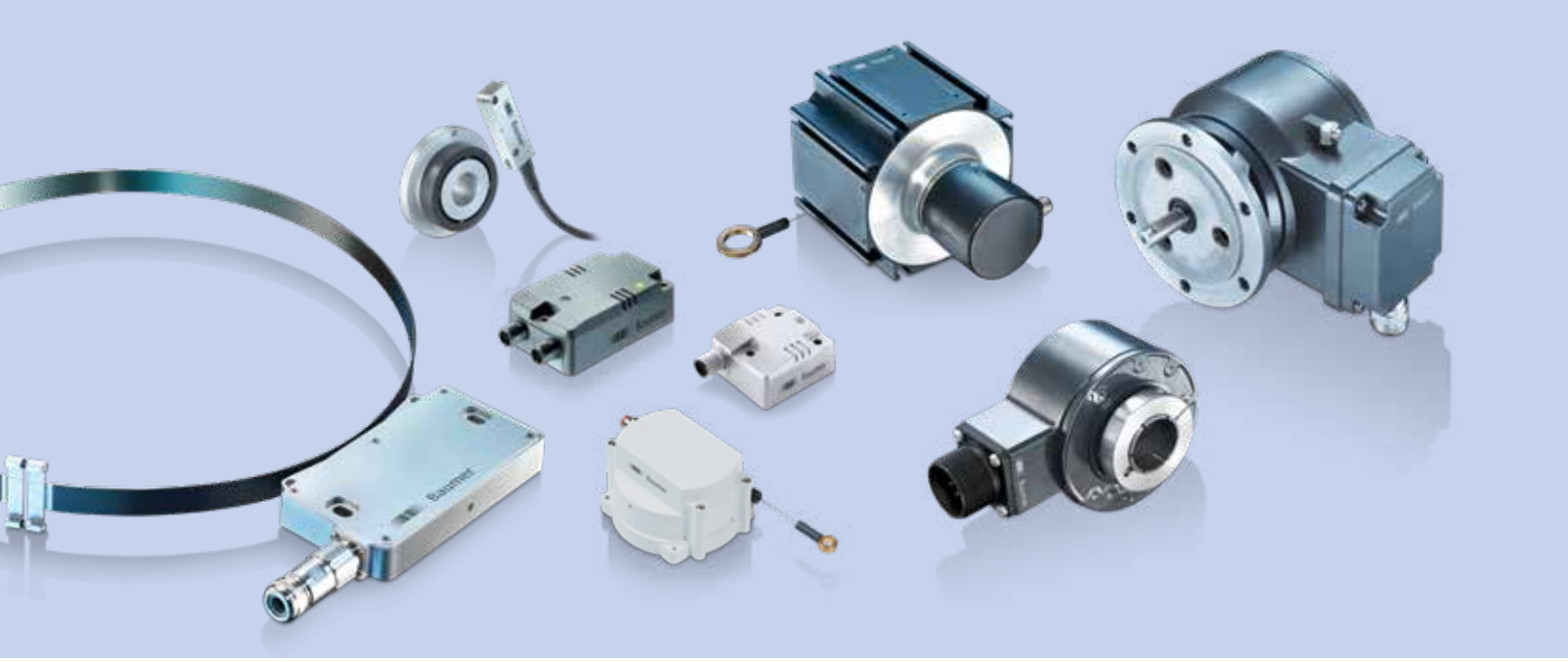
- Passion coupled with expertise – both have made us a sensor pioneer and technology leader
- Our range of services is hard to beat – we have the right product, developed by our own team, for every task
- Inspiring through innovation – a challenge Baumer employees take on every day
- Reliability, precision 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



Content.

Flexible, robust and precise.

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

Incredibly versatile.

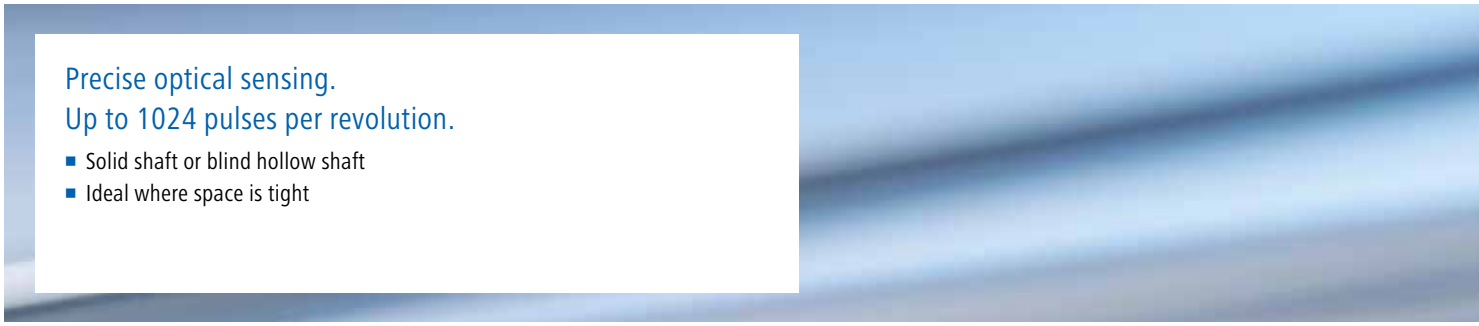
From cost-efficient standard products to high-resolution variants with 80 000 pulses per revolution: In our portfolio you always will encounter the matching incremental encoder. Our passion for sensor technology forms the basis for these innovative products, which we offer in various sizes and with robust 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 ø24 mm to large hollow shafts with ø85 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 ø24 mm



Precise optical sensing.
Up to 1024 pulses per revolution.

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

Features	■ Size ø24 mm ■ Solid shaft with synchro flange	■ Size ø24 mm ■ Blind hollow shaft
Product family	**ITD 01 B14**	**ITD 01 A 4 Y 1**

Sensing principle	Optical	
Size (housing)	ø24 mm	
Voltage supply	5 VDC ±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	ø4 mm	–
- Blind hollow shaft	–	ø4 mm
Connection		
- Cable	Radial / axial	Radial
Pulses per revolution	30...1024	
Operating temperature	-20...+85 °C	
Protection class	IP 54	
Operating speed	≤18 000 rpm	≤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	■ Blind hollow shaft ø10 ... 16 mm ■ Up to 2048 pulses per revolution	■ Through hollow shaft ø20 ... 27 mm ■ Up to 2048 pulses per revolution	■ Through hollow shaft ■ Protection class up to IP 67 ■ Up to 80 000 pulses per revolution ■ Isolated shaft	■ 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)	ø80 mm		ø3.15" (ø80 mm)	
Voltage supply	5 VDC ±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		ø20...27 mm	ø0.375...1" (ø9.525...25.4 mm)	
- Blind hollow shaft	ø10...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)	

Large hollow shaft

Precise optical sensing.
Up to 2500 pulses per revolution.

- Through hollow shaft
- Easy installation

www.baumer.com/incremental

Features	■ Through hollow shaft up to ø65 mm ■ Very flat size ■ B-side clamping ■ Stainless steel variant	■ Through hollow shaft up to ø65 mm ■ B-side clamping	■ Through hollow shaft up to ø85 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)	ø150 mm		
Voltage supply	5 VDC ±5 %, 8...30 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	■	■
Output signals	A 90° B, R + inverted		
Shaft type			
- Through hollow shaft	ø40 ... 65 mm		ø60...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

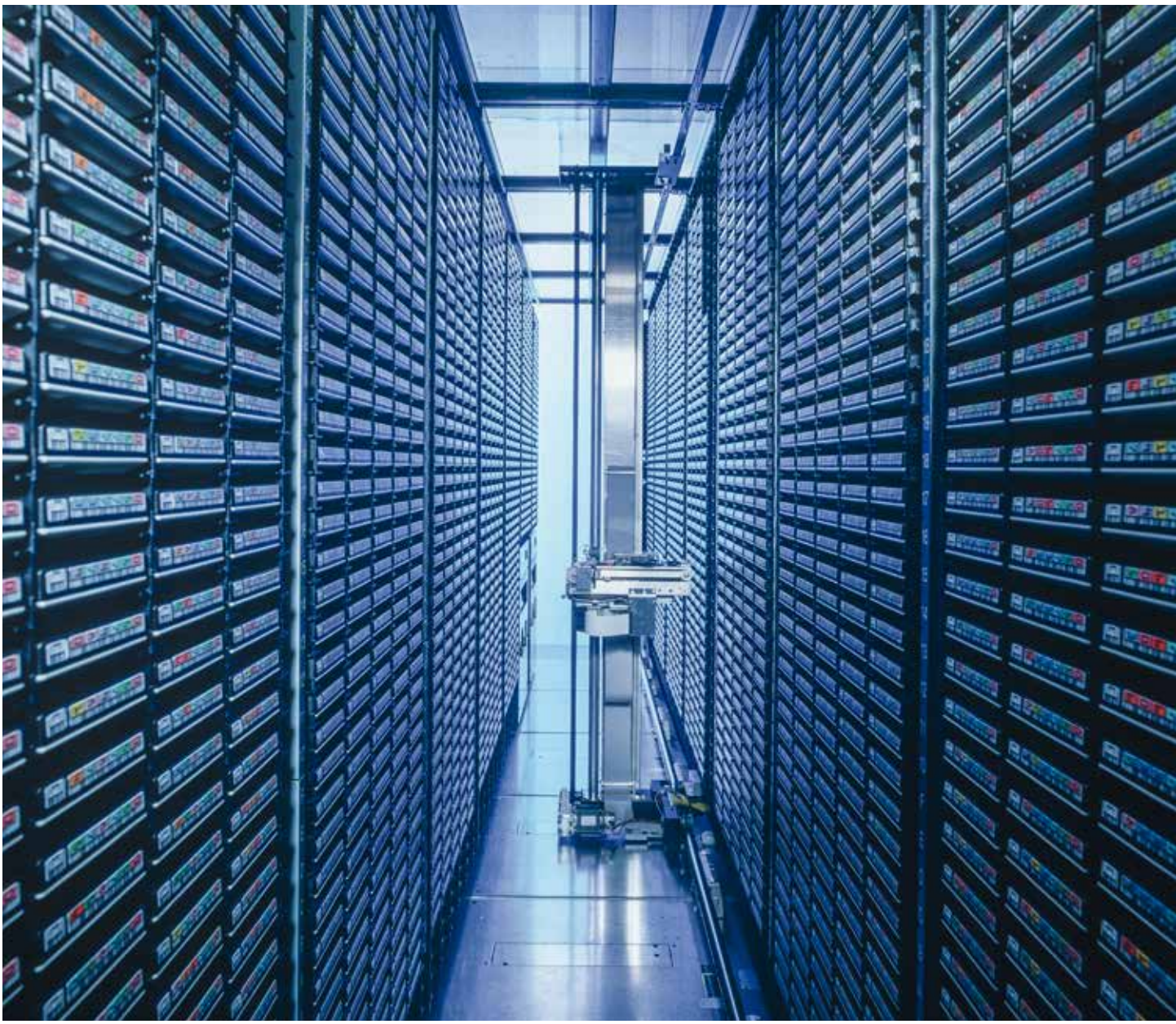
Features	■ Through hollow shaft ■ Tangential cable outlet ■ SIL2/SIL3 certification	■ Through hollow shaft ■ Inch dimensions ■ Protection class up to IP 67	■ Through hollow shaft
Product family	**EIL576S-T**	**HS35S**	**ITD 42 A 4**
Sensing principle	Optical / *LowHarmonics*		
Size (housing)	ø58 mm	ø3.15" (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 ø58 mm:
EAL580 with clamping flange

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 ø28 mm to industrial standard with ø58 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 ø36 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 ±0.15°

Features	■ Solid shaft with flat mounting flange ■ Redundant sensing and interface	■ Solid shaft ■ Blind hollow shaft ■ Radial or axial cable / connector connection ■ Angular accuracy up to ±0.15°	■ Solid shaft with synchro flange	■ 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)	ø28.6 mm	ø30 mm	ø36 mm	
Voltage supply	10...30 VDC (CANopen®) 8 ... 30 VDC / 12...30 VDC (analog) 5 VDC ±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				
- Solid shaft	ø6 mm	ø5 mm , ø6 mm, ø8 mm	ø10 mm	ø10 mm
- Blind hollow shaft	–	ø6 mm	–	–
Connection				
- Flange box M12	Cable 0.3 m with M12, 5-pin, male	Radial	Radial	Radial
- Cable	Radial (0.25 mm²)	Radial (0.09 mm²)	Radial (0.14 mm²)	Radial (0.5 mm²)
Steps per revolution	4096/12 bits (analog) 16384/14 bits (CANopen®)	≤16384/14 bits	≤65536/16 bits	
Number of revolutions	–	≤262144/18 bits | –	≤262144/18 bits | –	≤262144/18 bits | –
Absolute accuracy	Up to ±1.0°	Up to ±0.15°		
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

CANopen SAE J1939 SSI HTL / TTL

CANopen LIFT

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

MAGRES

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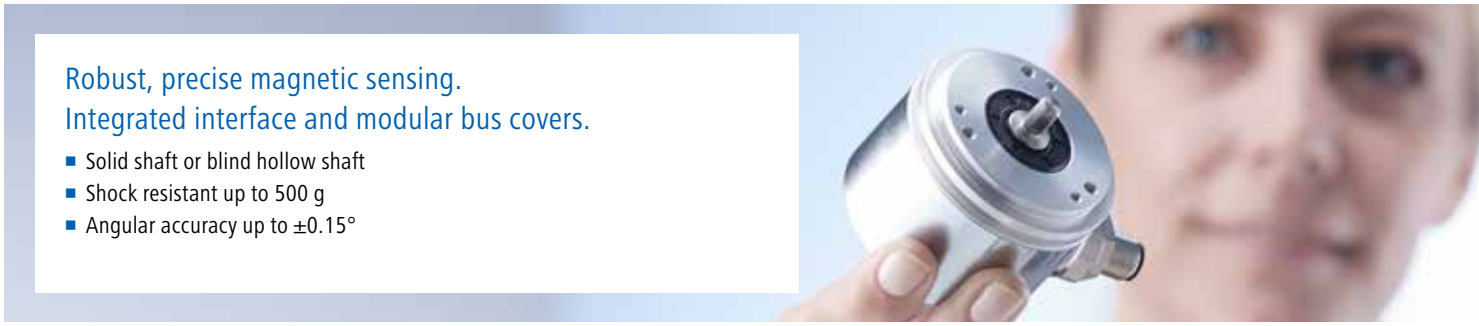
Features	■ Blind hollow shaft	■ Blind hollow shaft ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)
Product family	**EAM360-B**	**EAM360R-B**
Interface		
- SSI	■ / ■	–
- Analog	–	■
- CANopen® / redundant	■ / –	■ / –
- CANopen® lift	■	–
- SAE J1939	–	■
Function	Multiturn | Singleturn	Multiturn | Singleturn
Sensing principle	Magnetic	
Size (housing)	ø36 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	ø10...15 mm	
Connection		
- Flange box M12	Radial	
- Cable	Radial (0.14 mm²)	Radial (0.5 mm²)
Steps per revolution	≤65536/16 bits	
Number of revolutions	≤262144/18 bits | –	≤262144/18 bits | –
Absolute accuracy	Up to ±0.15°	
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 ±0.15°

MAGRES



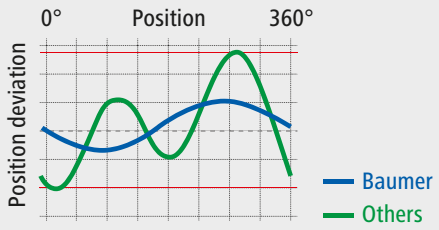

Features	■ Solid shaft with clamping or synchro flange	■ Solid shaft with clamping or synchro flange ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)	■ Blind hollow shaft	■ Blind hollow shaft ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 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 mm²)	Radial (0.5 mm²)	Radial (0.14 mm²)	Radial (0.5 mm²)
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 ±0.15°			
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

MAGRES

www.baumer.com/absolute

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 ±0.01°
- 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

EtherCAT EtherNet/IP SSI HTL / TTL PROFINET

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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**	**G0M2H**
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

HÜBNER 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 ø120 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	■ Solid shaft with EURO flange B10 ■ Housing uncoated	■ Solid shaft with EURO flange B10 ■ Corrosion protection C4	■ Solid shaft with EURO flange B10 ■ Shallow installation depth <70 mm	■ 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)	ø115 mm			
Voltage supply	5 VDC ±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	ø11 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	-30...+100 °C
Protection class	IP 56		IP 55	IP 56
Operating speed	≤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	■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 10800	■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 5000 ■ High protection class IP 66	■ Solid shaft with EURO flange B10 ■ Corrosion protection CX	■ 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)

B10® EURO FLANSCH

EURO flange B10

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

HeavyDuty encoders incremental
Size up to ø105 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

HTL TTL

Features	■ Cone shaft or blind hollow shaft ■ Rotatable terminal box ■ Isolated ball bearings	■ Cone shaft or blind hollow shaft ■ Rotatable terminal box ■ Corrosion protection C4 ■ Isolated ball bearings	■ 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)	ø99 mm	ø99 mm	ø97 mm
Voltage supply	5 VDC ±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	ø17 mm		
- Blind hollow shaft	ø12...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	≤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	■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 5000 ■ Hybrid bearings in standard products ■ Corrosion protection CX	■ Cone shaft or blind hollow shaft ■ Corrosion protection CX ■ Hybrid bearings in standard products ■ Protection class IP 67	■ 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 ø75 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	■ Through hollow shaft up to ø38 mm ■ Corrosion protection CX	■ 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)	ø158 mm	ø158 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		
- Through hollow shaft	ø20...38 mm	ø38...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.

Large hollow shaft

Magnetic ring encoder for HeavyDuty applications up to ø740 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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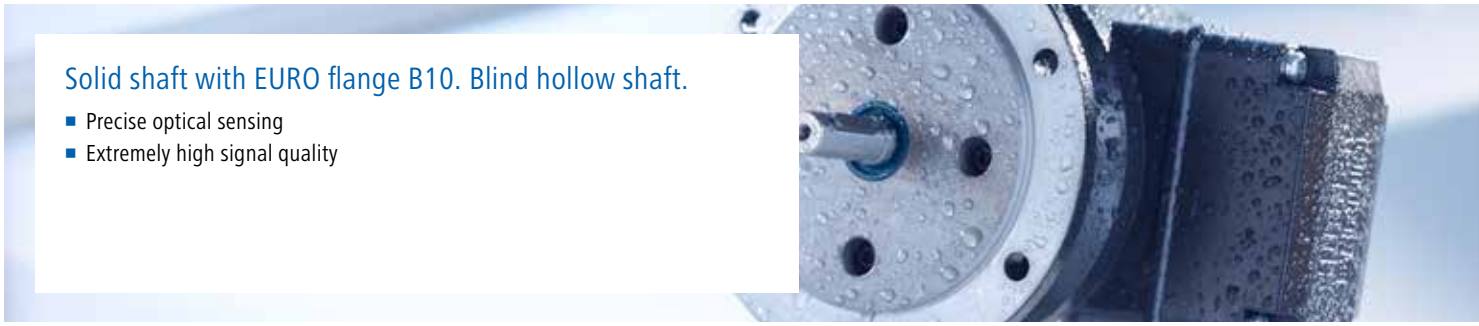
HDmag

Features	■ Through hollow shaft ø16...80 mm ■ Installation depth ≤40 mm ■ Stainless steel wheel	■ Through hollow shaft ø50...180 mm ■ Installation depth ≤40 mm ■ Stainless steel wheel	■ Through hollow shaft ø70...340 mm ■ Installation depth ≤40 mm ■ Stainless steel wheel	■ Through hollow shaft ø650...740 mm ■ Installation depth ≤40 mm
Product family	**MHGE 100**	**MHGE 200**	**MHGE 400**	**MHGE 800**
Sensing principle	Magnetic			
Magnetic wheel diameter	ø99.9 mm	ø201.7 mm	ø405.4 mm	ø813 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	ø16...80 mm	ø50...180 mm	ø70...340 mm	ø650...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...+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	■ Solid shaft with EURO flange B10 ■ Sine periods per revolution up to 5000	■ Cone shaft or blind hollow shaft up to ø20 mm
Product family	**POGS 90**	**HOGS 100**
Sensing principle	Optical	
Size (housing)	ø115 mm	ø105 mm
Voltage supply	5 VDC ±10 %, 9...30 VDC	
Output stage		
- SinCos 1 Vpp	■	■
Output signals	K1, K2, K0 + inverted	
Shaft type		
- Solid shaft	ø11 mm	–
- Cone shaft 1:10	–	ø17 mm
- Blind hollow shaft	–	ø12...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	≤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 ø115 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

absolute




Features	■ Solid shaft with EURO flange B10 ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends	■ Solid shaft with EURO flange B10 ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends ■ Programmable	■ Cone shaft or hollow shafts ■ Corrosion resistant and seawater resistant ■ Bearings at both shaft ends	■ 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							
Size (housing)	ø115 mm				ø105 mm			
Voltage supply	10...30 VDC (SSI 4.75...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			
Connection	Bus cover, terminal box, fuse box M12 or M23							
Steps per revolution	≤1 048 576/20 bits (additionally 1...131 072 pulses per revolution)							
Number of revolutions	≤1 048 576/ 20 bits	–	≤1 048 576/ 20 bits	–	≤1 048 576/ 20 bits	–	≤1 048 576/ 20 bits	–
Protection class	IP 66, IP 67							
Operating temperature	-40...+95 °C (fieldbus: -40...+85 °C)							
Operating speed	≤12000 rpm (fieldbus: ≤6000 rpm)							
Max. shaft load	≤450 N axial, ≤650 N radial							
Options	Additional incremental signals with zero pulse Integrated speed switch WLAN adapter for easy programming Sealing system for tropical environments							

1) Any combination with other interfaces

HeavyDuty encoders absolute
Size up to ø160 mm

EtherCAT · EtherNet/IP · DeviceNet · CANopen · PROFIBUS · PROFINET · SSI · HTL / TTL

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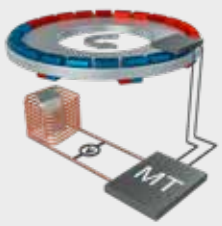
Features	■ Through hollow shaft ■ Corrosion resistant and seawater resistant ■ Axial torque plate
Product family	**HMG 161**
Interface	
- SSI	■
- Profinet / Profibus-DP	– / ■
- CANopen® / DeviceNet	■ / ■
Function	Multiturn | Singleturn
Programmable	–
Sensing principle	Optical
Size (housing)	ø160 mm
Voltage 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	■ Mechanical centrifugal switch ■ Operating temperature up to +130 °C	■ Electronic speed switch ■ Speed up to 6000 rpm	■ 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	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.

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

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Features	■ Hollow blind, through or cone ■ Programmable or fixed at the factory ■ Switch-off and switch-on speeds, switching delay	■ 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 / PLe

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

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

SIL2 PLd Functional Safety

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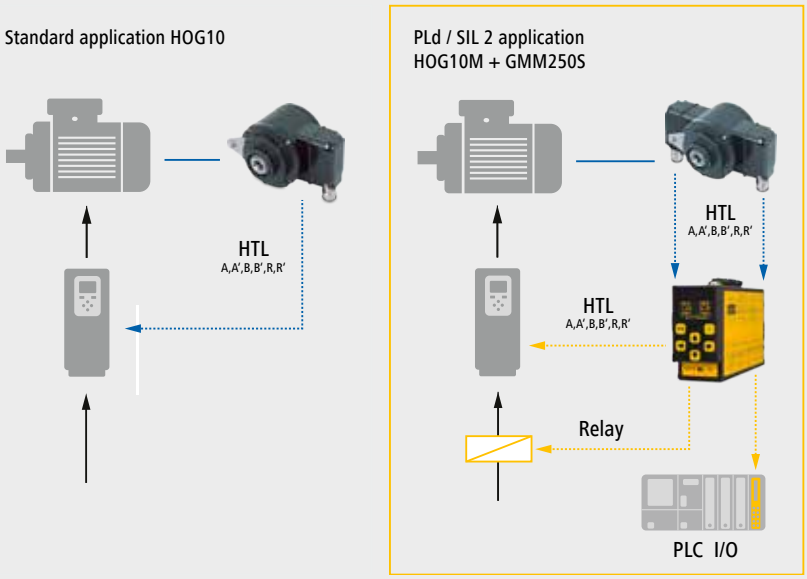

Example conversion of a standard application to functional safety (PLd / SIL2)

- No compromising on robustness and reliability, thanks to proven, redundant HeavyDuty encoders
- The drive control does not have to be changed over, since 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
- Suitable for e.g. mining, steel mills, port and crane technology, hoisting and lifting equipment, material handling and conveyor technology, large engines and large generators

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	■ Blind hollow shaft ■ 2 switching outputs	■ 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	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)	

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

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Features	■ 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	■ Solid shaft with EURO flange B10 ■ 1 switching output ■ 2 incremental outputs	■ Solid shaft with EURO flange B10 ■ 1 switching output ■ Programmable ■ 2 incremental outputs	■ Cone shaft or hollow shaft ■ 1 switching output ■ 2 incremental outputs	■ 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

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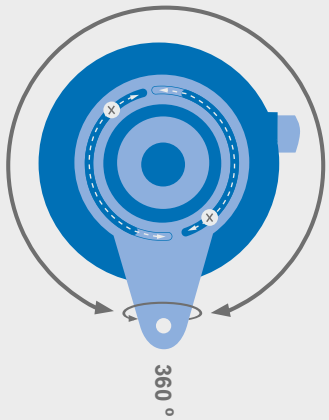
www.baumer.com/HD-speed

New torque plate



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

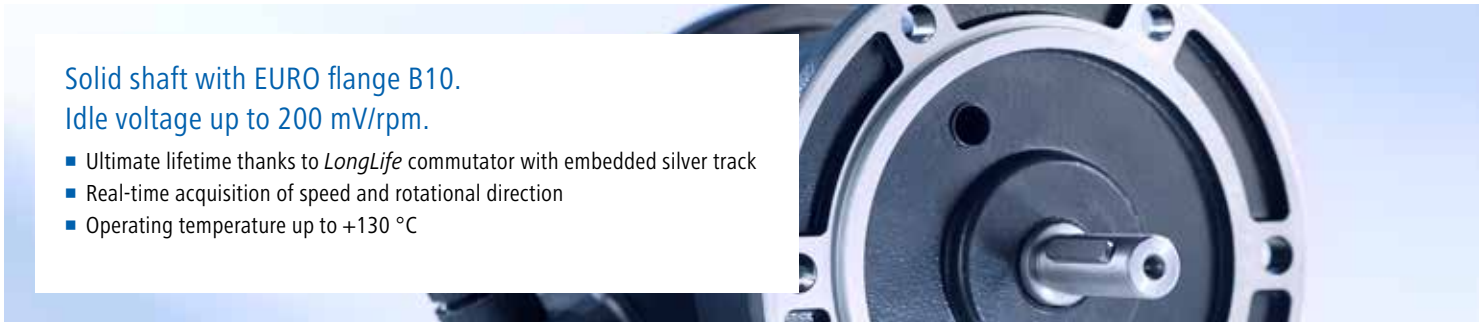
Intelligent HeavyDuty encoders

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 tacho generators
Tacho generators



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

LongLife

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/cm²	0.6 kg/cm²	0.25 kg/cm²	0.29 kg/cm²	1.1 kg/cm²	1.2 kg/cm²	17 kg/cm²	20 kg/cm²
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 tacho generators is based on a silver track embedded in the commutator. This reduces the wear of the commutator to almost zero. *LongLife* tacho generators combine very high signal quality for optimum dynamic control with outstanding robustness and unrivalled service life.

HeavyDuty tacho generators
Tacho generators

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

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www.baumer.com/HD-tacho

Features	■ In industrial NEMA 12 housing ■ For direct replacement of "PY" or "BC" style tachometers ■ CSA / C / US approved	■ 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/cm²	
Connection	Terminal box with 1/2" – 14 NPT connection thread	
Operating temperature	-30...+130 °C (-22…266 °F)	
Protection class	IP 55	
Operating speed	≤10 000 rpm	
Max. shaft load	≤60 N axial, ≤80 N radial	

Even though analog tacho generators have long since been replaced by digital rotary encoders in modern control concepts, LongLife tacho generators 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

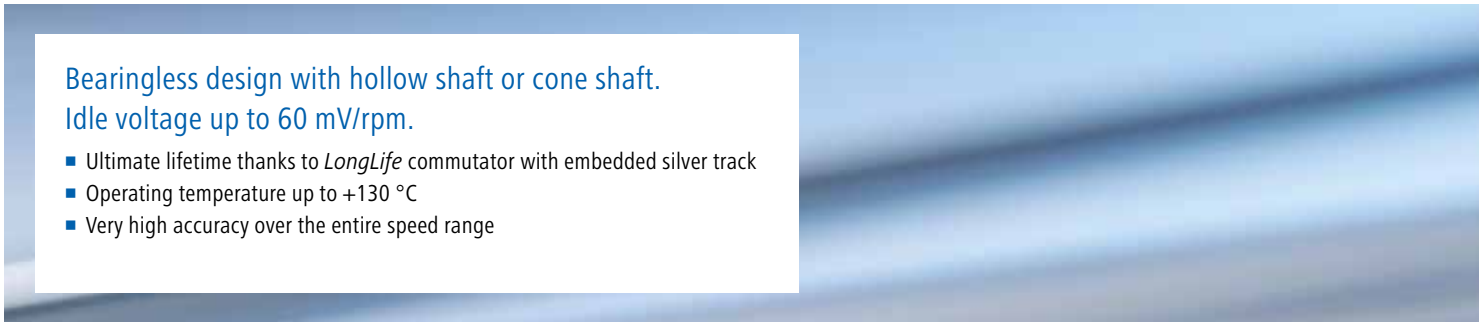
Cost effective
- Signal transmission with two-core cable, requiring no electrical auxiliary energy and power supply
- Cost-effective complete package of tacho generators, cable and evaluation electronics

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: tacho + rotary encoder, tacho + speed switch
- Matching spare parts in OEM quality, even for obsolete models, other makes and special designs

HeavyDuty tacho generators
Tacho generators



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

LongLife

Features	■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft	■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft		■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft	■ 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/cm²	0.4 kg/cm²	0.55 kg/cm²	0.95 kg/cm²	0.95 kg/cm²	1.95 kg/cm²
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	–	

Tacho generators

Features	■ Tacho generator ■ Bearingless variant ■ Blind hollow shaft	■ 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/cm²	600 g/cm²
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.

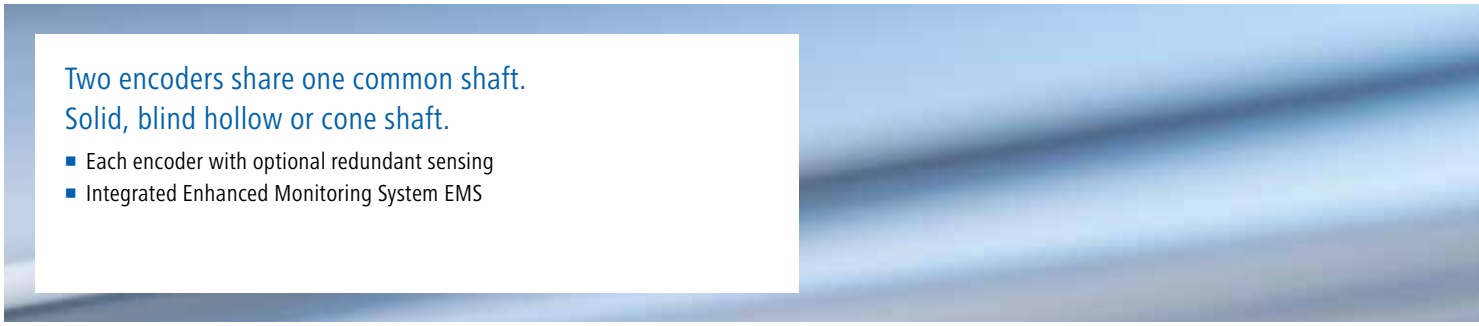
That's what Baumer stands for, also when it comes to tacho generators.

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 generatos in use revised in our factory. We are committed to improve our customers' competitivenes 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	■ Solid shaft with EURO flange B10 ■ Maximum speed up to 12 000 rpm	■ Solid shaft with EURO flange B10 ■ Corrosion protection CX	■ Cone shaft or blind hollow shaft ■ Maximum speed up to 10 000 rpm ■ Isolated ball bearings	■ 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 IIIC (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, tacho generators 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

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Features	■ Tacho generator with mechanical centrifugal switch ■ Solid shaft with EURO flange B10	■ Tacho generator with mechanical centrifugal switch ■ Solid shaft with EURO flange B10		■ Tacho generator with electronic speed switch ■ Solid shaft with EURO flange B10		■ 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)		5 VDC ±5 % 8...30 VDC
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	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		IP 56
Operating speed (n)	≤1.25 x ns	≤1.25 x ns		≤6000 rpm		≤10 000 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 / tacho principle
- Electronic speed switch ESL with 1 or 3 switching outputs
- Mechanical centrifugal switch FSL with one switching output

Features	■ Solid shaft with EURO flange B10 ■ Pulses per revolution 500...5000	■ Solid shaft with EURO flange B10 ■ Pulses per revolution 300...5000		■ Solid shaft with EURO flange B10		■ 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	1 output	1 or 3 outputs
Output circuit	Opener/Closer	Opener/ Closer	Transistor Outputs	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

Incremental encoders with speed switch

Mechanical centrifugal switch or electronic speed switch.

- 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

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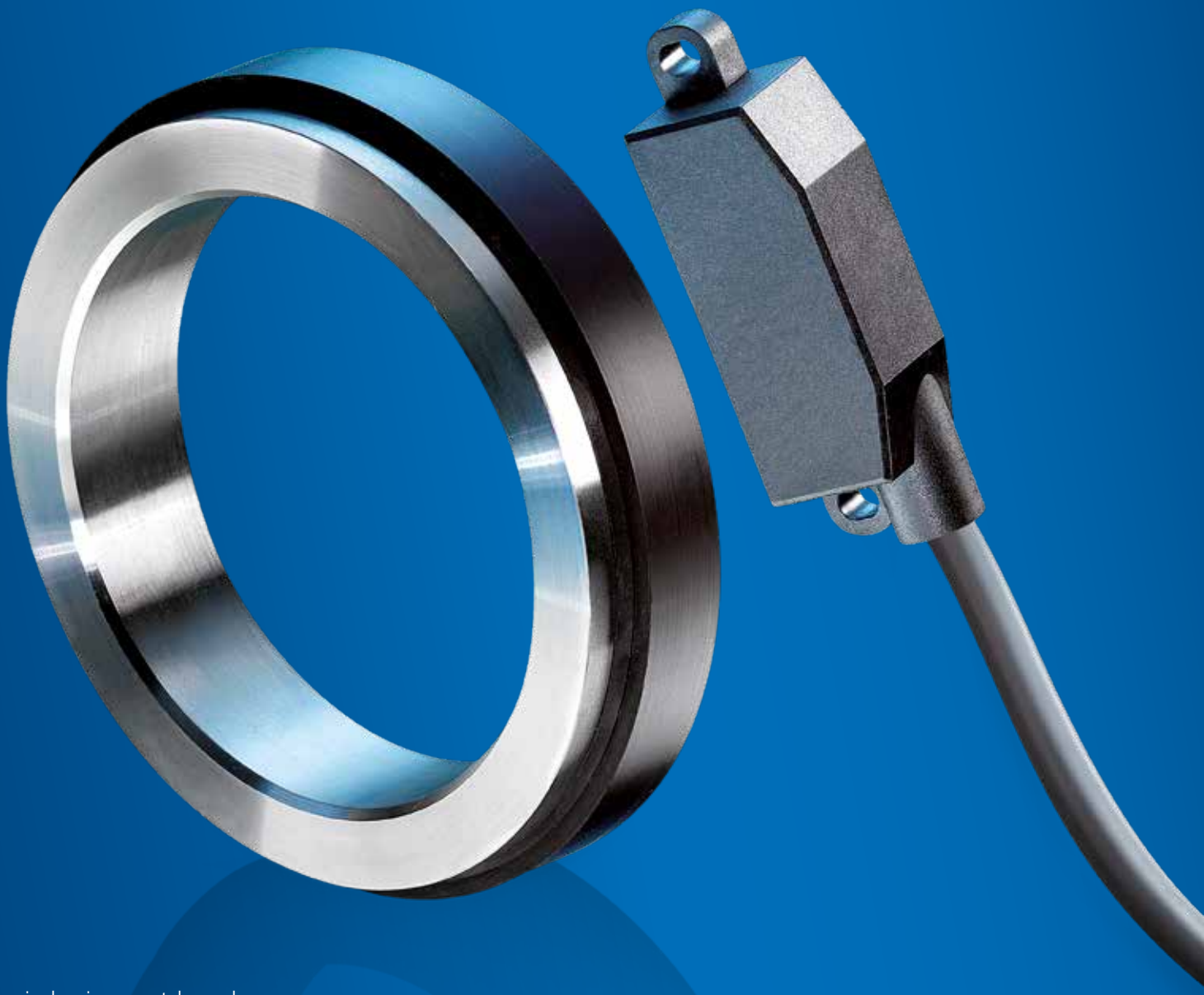
Features	■ Cone shaft or blind hollow shaft	■ Cone shaft or blind hollow shaft ■ Sealed separately against solid impurities		■ Cone shaft or blind hollow shaft ■ Corrosion protection CX ■ For use in salty, oil-wet environments	
Product family	**HOG 86+FSL**	**HOG 10+FSL**	**HOG 10+ESL**	**HOG 11+FSL**	**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		IP 67	
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

Bearingless encoders

Non-contact, wear-free and compact.

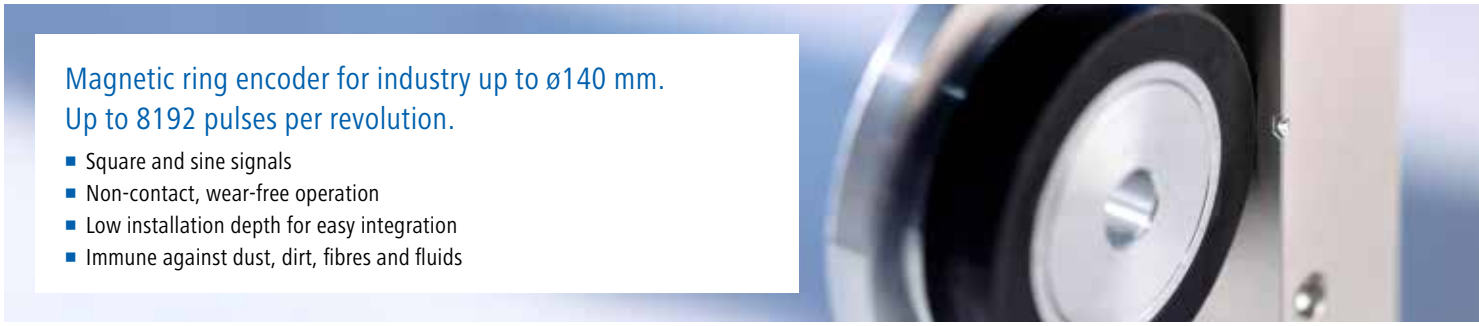
Bearingless encoders by Baumer operate on the non-contact principle and mainly utlilize magnetic sensing and virtually all are free from wear. No dust, dirt or condensation will impair reliable operation. They even withstand harmful fibres dominating the environments of the textile industry. Our bearingless 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 ø140 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	■ Through hollow shaft up to ø43.5 mm ■ Pulses per revolution up to 1024 ■ IO-Link	■ Through hollow shaft up to ø43.5 mm ■ Pulses per revolution up to 4096 ■ Zinc die-cast sensor housing	■ Through hollow shaft up to ø28 mm ■ Pulses per revolution up to 2048	
Product family	**EB200E**	**MIR10**	**ITD49H**	**ITD49H sine**
Sensing principle	Magnetic			
Magnetic wheel diameter	ø30.5...56 mm	ø30.5...56 mm	ø40 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 ±5 %	5 VDC ±5 % 8...26 VDC	5 VDC ±10 %
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) ≤160 kHz (HTL)	≤180 kHz
Shaft type				
- Through hollow shaft	ø6...43.5 mm	ø6...43.5 mm	ø8...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	≤6 000 rpm	≤20 000 rpm	≤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 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.

www.baumer.com/bearingless

Features	■ Through hollow shaft up to ø65 mm ■ Pulses per revolution up to 4096		■ Through hollow shaft up to ø150 mm ■ Pulses per revolution up to 8192	
Product family	**ITD69H**	**ITD69H sine**	**ITD89H**	**ITD89H sine**
Sensing principle	Magnetic			
Magnetic wheel diameter	ø81.3 mm		ø162 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) ≤160 kHz (HTL)	≤180 kHz	≤300 kHz (TTL) ≤160 kHz (HTL)	≤180 kHz
Shaft type				
- Through hollow shaft	ø40...65 mm		ø70...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	≤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 ø740 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

HDmag




Features	■ Through hollow shaft ø16...80 mm ■ Installation depth ≤40 mm ■ Stainless steel wheel	■ Through hollow shaft ø50...180 mm ■ Installation depth ≤40 mm ■ Stainless steel wheel	■ Through hollow shaft ø70...340 mm ■ Installation depth ≤40 mm ■ Stainless steel wheel	■ Through hollow shaft ø650...740 mm ■ Installation depth ≤40 mm
Product family	**MHGE 100**	**MHGE 200**	**MHGE 400**	**MHGE 800**
Sensing principle	Magnetic			
Magnetic wheel diameter	ø99.9 mm	ø201.7 mm	ø405.4 mm	ø813 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	ø16...80 mm	ø50...180 mm	ø70...340 mm	ø650...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...+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.

Magnetic ring encoder for HeavyDuty applications
up to ø340 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

HÜBNER BERLIN
A Baumer Brand

www.baumer.com/bearingless



Features	■ Through hollow shaft ø16...80 mm ■ Installation depth ≤35 mm ■ Stainless steel wheel	■ Through hollow shaft ø50...180 mm ■ Installation depth ≤35 mm ■ Stainless steel wheel	■ Through hollow shaft ø70...340 mm ■ Installation depth ≤35 mm ■ Stainless steel wheel
Product family	MHGP 100	MHGP 200	MHGP 400
Sensing principle	Magnetic		
Magnetic wheel diameter	ø99.9 mm	ø201.7 mm	ø405.4 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	ø16...80 mm	ø50...180 mm	ø70...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...+85 °C		
Protection class	IP 66, IP 67		
Operating speed	≤8000 rpm	≤4000 rpm	≤2000 rpm

HÜBNER 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.

Bearingless encoders
Absolute

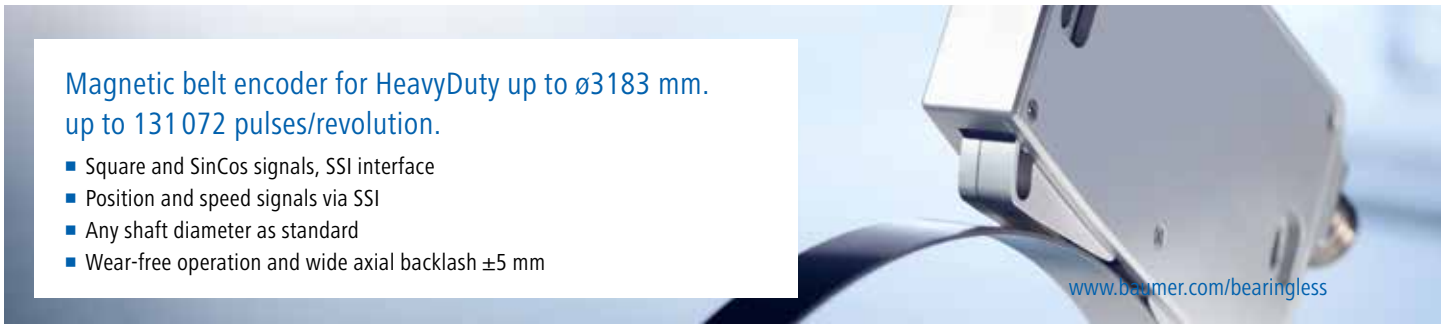
Magnetic ring encoder for HeavyDuty up to ø340 mm. Singleturn variant.

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

HDmag

Features	■ Wear-free rotary encoder ■ Through hollow shaft ø16...80 mm ■ Stainless steel wheel ■ Integrated FPGA signal processing	■ Wear-free rotary encoder ■ Through hollow shaft ø50...180 mm ■ Stainless steel wheel ■ Integrated FPGA signal processing	■ Wear-free rotary encoder ■ Through hollow shaft ø70...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	ø101.3 mm	ø203.1 mm	ø406.8 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	ø16...80 mm	ø50...180 mm	ø70...340 mm
Connection	Flange box M23, tangential		
Steps per revolution	≤131072 /17 bits	≤262 144 /17 bits	≤1...524 288 /17 bits
Sine periods per revolution	1...8192	1...16 384	1...32 768
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



HDmag flex




Features	■ Incremental magnetic belt encoder ■ With adapter wheel ■ Pulses per rotation up to 131 072 ■ For shafts ø90...300 mm ■ Integrated FPGA signal processing	■ Incremental magnetic belt encoder ■ Pulses per rotation up to 131 072 ■ For shafts ø300...3183 mm ■ Integrated FPGA signal processing	■ Virtually absolute magnetic belt encoder ■ With adapter wheel ■ Singleturn resolution up to 24 bits ■ For shafts ø90...300 mm ■ Integrated FPGA signal processing	■ Virtually absolute magnetic belt encoder ■ Singleturn resolution up to 24 bits ■ For shafts ø300...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	ø90...300 mm	ø300...3183 mm	ø90...300 mm	ø300...3183 mm
Mounting type material measure	Split adapter wheel	Screw connection on turnbuckle	Split adapter wheel	Screw connection on turnbuckle
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 ø36 mm and ø58 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 ø36 mm	■ Size ø36 mm ■ E1 compliant design ■ Corrosion protection CX ■ Applicable up to PLd (ISO 13849)	■ Size ø58 mm	■ Size ø58 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)	ø36 mm		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				
- Drill hole magnetic ring	ø6 mm, ø8 mm, ø12 mm			
Connection				
- Flange box M12	Radial			
- Flange box M23	–	–	Radial	–
- Cable	Radial (0.14 mm²)	Radial (0.5 mm²)	Radial (0.14 mm²)	Radial (0.5 mm²)
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.

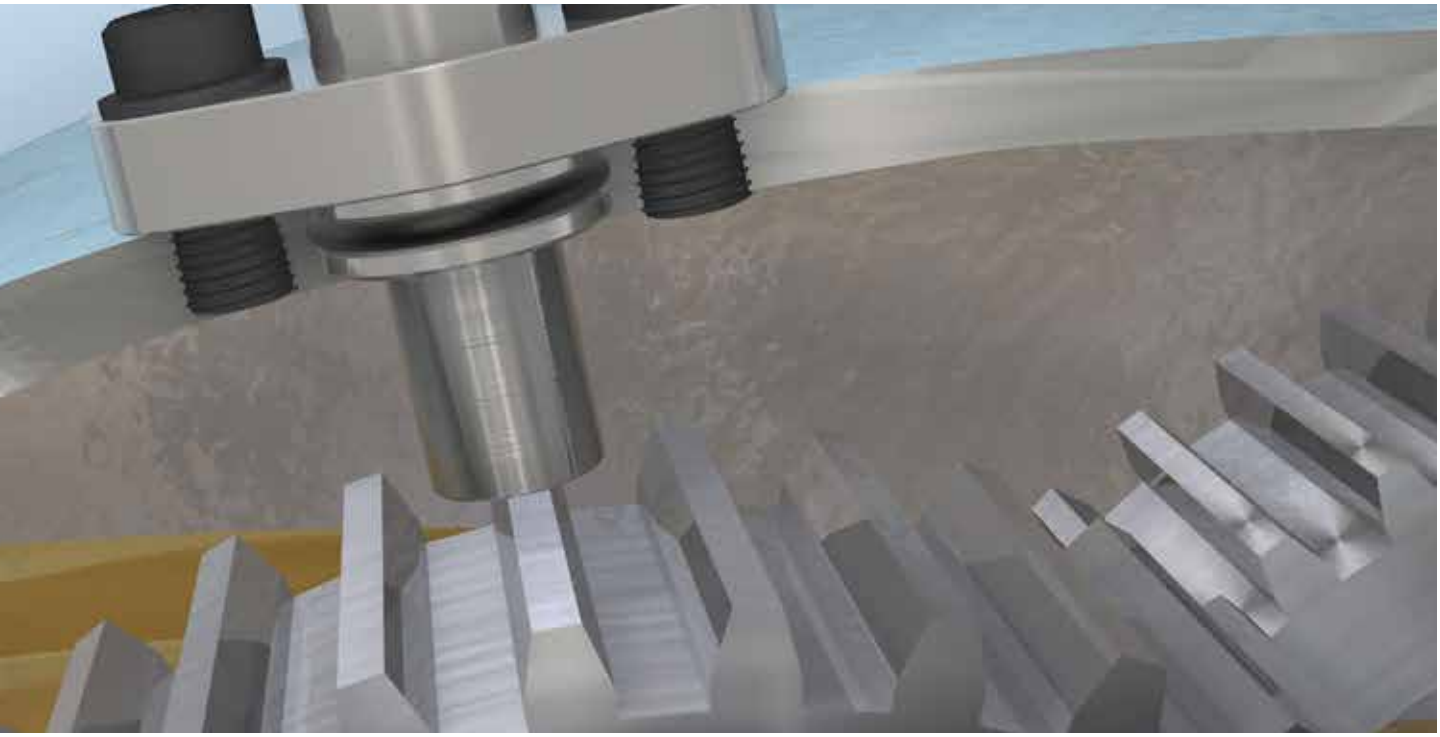
- Analog and CANopen® redundant interface
- Non-contact, wear-free operation
- Immune against dust, dirt, fibres and fluids
- Shallow installation depth down to 8 mm

www.baumer.com/bearingless



Features	■ Integrated interface ■ Flat design ■ Singleturn ■ Redundant sensing possible		■ Cylindrical design with thread ■ Linearized analog output signals ■ Large working distance up to 5mm ■ Magnetic rotor can be ordered separately		■ 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			

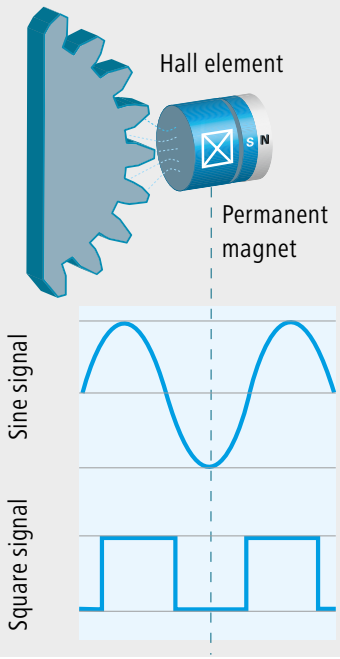
Bearingless encoders



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

www.baumer.com/bearingless

Features	■ Cylindrical design M12 ■ 1-channel push-pull output ■ High switching frequencies ■ Wide temperature range	■ 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

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 ø58 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	■ Industrial encoders ■ Solid shaft with clamping flange	■ Industrial encoders ■ Solid shaft with synchro flange	■ Industrial encoders ■ Blind hollow shaft	■ 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)	ø58 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	ø10 mm	ø6 mm	–	–
- Blind hollow shaft	–	–	ø8...15 mm	–
- Through hollow shaft	–	–	–	ø8...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	≤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 (ExEIL580P), Square flange 2.5 inch, isolated hollow shaft, fixed pulse number (EIL580)			

Programmable encoders
Size up to ø115 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	■ Industrial encoders ■ Through hollow shaft ■ Inch dimensions ■ Isolated shaft	■ HeavyDuty encoders ■ Absolute and incremental signals / speed switches ■ Solid shaft with EURO flange B10	■ 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)	ø3.15" (ø80 mm)	ø115 mm	ø105 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	–	ø11 mm	–
- Cone shaft 1:10	–	–	ø17 mm
- Blind hollow shaft	–	–	ø16...20 mm
- Through hollow shaft	ø0.375...1" (ø9.525...25.4 mm)	–	ø16...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	≤12 000 rpm	≤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-DPV0

Rotary encoder for offshore and marine applications POG83

Rotary encoder with SIL certification 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.

SIL PL Functional Safety

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




Features	■ Incremental rotary encoders ■ Solid shaft with EURO flange B10 ■ ATEX/IECEx certification ■ Sine/Cosine signal with *LowHarmonics*		■ Incremental rotary encoders ■ Through hollow shaft ■ ATEX/IECEx certification	■ Incremental rotary encoders ■ Solid shaft with clamping or synchro flange ■ Blind or through hollow shaft ■ ATEX certification	■ 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)	ø120 mm	ø120 mm	ø160 mm	ø58 mm	ø58 mm
Voltage supply	5 VDC ±5 % 9...26 VDC 9...30 VDC	5 VDC ±5 % 9...30 VDC	5 VDC ±5 % 9...26 VDC 9...30 VDC	5 VDC ±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	ø11 mm		–	ø6 mm, ø10 mm	ø6 mm, ø10 mm
- Blind hollow shaft	–		–	ø8...15 mm	ø8...15 mm
- Through hollow shaft	–		ø30...70 mm	ø8...15 mm	ø8...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	≤12 000 rpm (+20 °C) ≤8000 rpm (+60 °C)	≤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	–	–

Encoders for hazardous environments

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

- Size ø70 mm
- SSI, Profibus-DPV0

Features	■ Absolute rotary encoders ■ Solid shaft with clamping flange ■ Stainless steel housing ■ ATEX certification	■ Absolute rotary encoders ■ Solid shaft with clamping flange ■ Stainless steel housing ■ ATEX certification ■ Bus cover
Product family	**X 700 - SSI**	**X 700 - Profibus-DPV0**
Interface		
- SSI	■	–
- Profibus-DPVO	–	■
Function	Multiturn	
Sensing principle	Optical	
Size (housing)	ø70 mm	
Voltage supply	10...30 VDC	
Shaft type		
- Solid shaft	ø10 mm	
Flange	Clamping flange	
Connection		
- Cable	Axial	–
- Cable screw connection	–	Radial
Steps per revolution	≤8192 / 13 bits	
Number of revolutions	≤4096 / 12 bits	≤65536 / 16 bits
Absolute accuracy	±0.025°	
Operating temperature	20...+70 °C	
Protection class	IP 67	
Operating speed	≤6000 rpm	
Max. shaft load	≤60 N axial, ≤50 N radial	
Explosion protection	Ex II 2D/2G (ATEX) for zone 1 (gas) and zone 21 (dust)	

For special applications
Redundant absolute encoders



Features	■ Solid shaft with flat mounting flange ■ Singleturn ■ Redundant sensing and interface	■ Encoder kit - size ø50 mm ■ Singleturn ■ Corrosion protection CX ■ Redundant sensing and interface	■ 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)	ø28.6 mm	ø50 mm	ø58 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	ø6 mm	–	ø6 mm / ø10 mm
- Blind hollow shaft	–	–	ø10...15 mm
- Drill hole magnet rotor	–	ø5...8 mm	–
Connection	Cable 0.3 m with M12, 5-pin, male, cable	Cable	Flange box M12, cable
Steps per revolution	4096/12 bits (analog) / 16 384/14 bits (CANopen®)		16384/14 bits | 65 536/16 bits
Number of revolutions	–	–	≤262144/18 bits | –
Absolute accuracy	Up to ±1.0°	Up to ±1.2°	Up to ±0.15°
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.

SIL encoders incremental

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

- Safety rotary encoders
- Square and sine signals

Features	■ Incremental rotary encoder ■ Solid shaft with clamping or synchro flange ■ SIL3 / PLe certification	■ Sine rotary encoder ■ Through hollow shaft ■ SIL2 / PLd certification ■ LowHarmonics signal quality	■ 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

SIL3 PLe Functional Safety




Features	■ Safe speed monitor ■ For non-certified incremental encoders / proximity switches	■ Safe speed monitor - ■ For certified SinCos encoders	■ Safe speed monitor ■ For non-certified incremental encoders / proximity switches	■ 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	

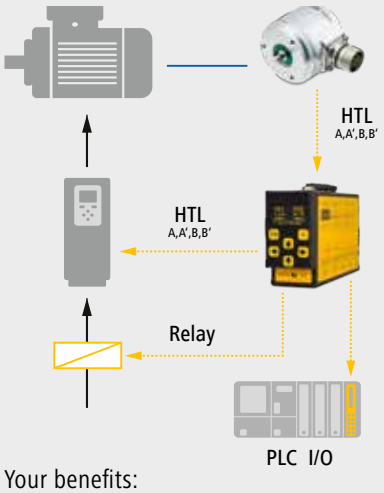
Proven combinations for safe speed monitoring

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

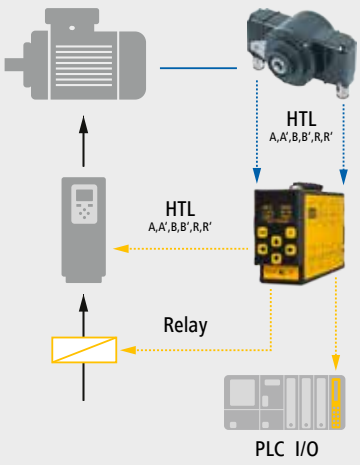
EIL576S-S & GMM260S



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

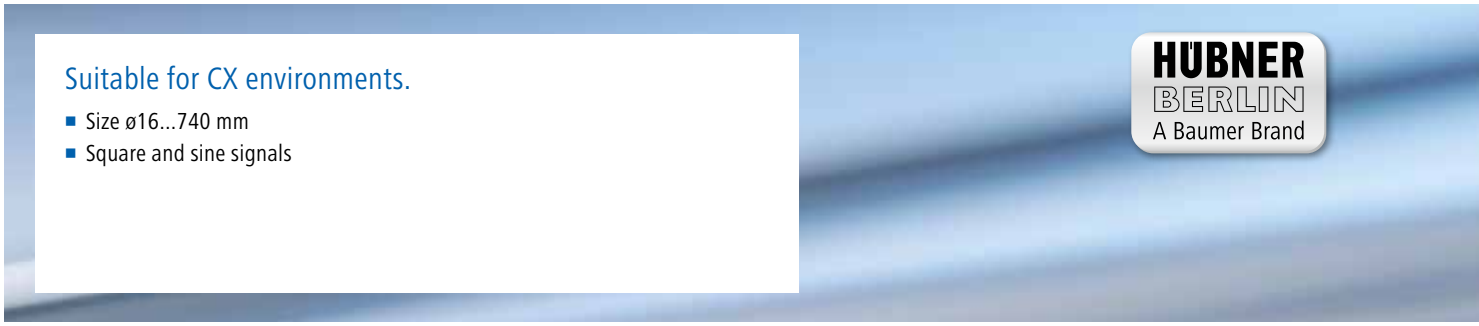
Example for HeavyDuty applications

HOG10M & GMM250S



Your benefits:
- No compromises concerning robustness and reliability, thanks to proven, redundant HeavyDuty encoders
- Easy machine acceptance due to existing MTTFd 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






Features	■ Cone shaft, solid shaft, blind hollow shaft ■ Stainless steel housing		■ Solid shaft with EUR flange B10 ■ Tested long-term sealing	■ Cone shaft or blind hollow shaft ■ High protection class IP 67	■ 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) Size (magnetic wheel)	ø115 mm	ø105 mm	ø105 mm	ø105 mm	100 x 40 x 65 mm ø99.9...813 mm
Voltage supply	5 VDC ±5 % 9...30 VDC		4.75...30 VDC (HTL/TTL)	5 VDC ±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	ø11 mm	–	ø11 mm	–	–
- Cone shaft 1:10	–	ø17 mm	–	ø17 mm	–
- Blind hollow shaft	–	ø12...20 mm	–	ø12...20 mm	–
- Through hollow shaft	–	–	–	–	ø16...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

Offshore encoder absolute

Suitable for CX environments.

- Size ø58...115 mm
- SSI, fieldbuses and real-time Ethernet

Features	■ 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)	ø115 mm	ø105 mm
Voltage supply	9...30 VDC	
Shaft type		
- Solid shaft	ø11 mm	–
- Cone shaft 1:10	–	ø17 mm
- Blind hollow shaft	–	ø12...20 mm
- Through hollow shaft	–	ø12...20 mm
Flange	EURO flange B10	–
Connection	Bus cover, terminal box, Fuse box M12 or M23	
Steps per revolution	≤1 048 576/20 bits	
Number of revolutions	≤1 048 576/20 bits	
Absolute accuracy	–	
Protection class	IP 66, IP 67	
Operating temperature	-40...+100 °C	
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.

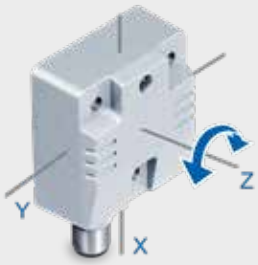
Baumer GIM inclination sensors are ideally suited for simple and precise angle measurement at all types of machine and system components, especially where the rotary axis is difficult to access.

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/PId 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.

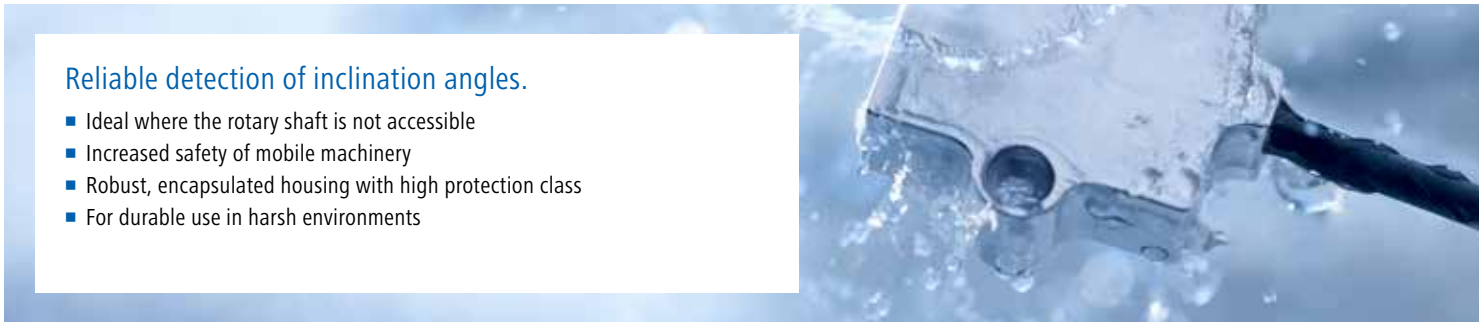


Function principle of inclination sensors

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 ±90° or ±180°.

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

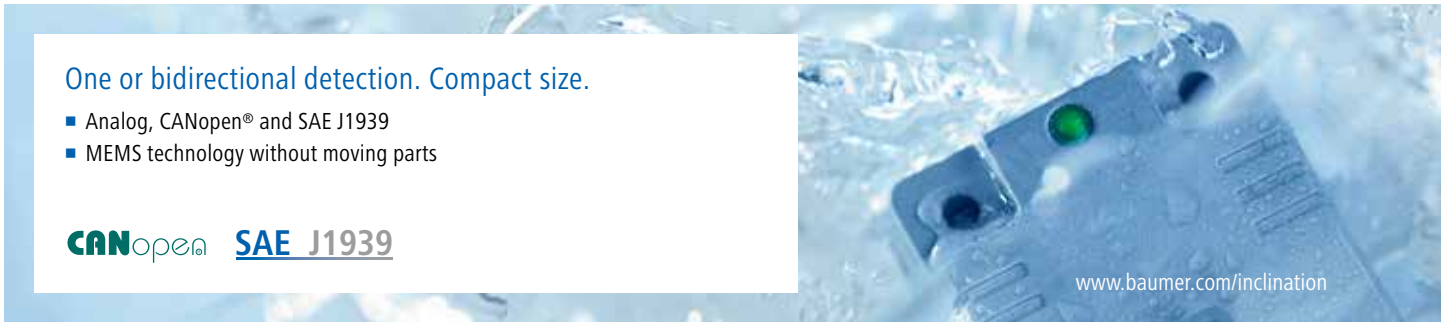



Features	■ Measurement range 0...360° ■ Corrosion protection CX ■ Reverse polarity protection or high protection of the electrical output	■ Measurement range up to ±60° ■ Corrosion protection CX ■ Reverse polarity protection or high protection of the electrical output	■ Measurement range 0...360° ■ Corrosion protection CX ■ E1 compliant design	■ 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 sensors






Features	■ Measurement range 0...360° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849)	■ Measurement range up to ±90° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849)	■ Measurement range 0...360° ■ Corrosion protection CX ■ E1 compliant design ■ Applicable up to PLd (ISO 13849)	■ 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	■ Measurement range 0...360° ■ Precise, extremely robust inclination detection ■ Dynamically compensated with gyroscope and sensor fusion	■ Measurement range up to ±90° / ±180° ■ Precise, extremely robust inclination detection ■ Dynamically compensated with gyroscope and sensor fusion	■ 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		

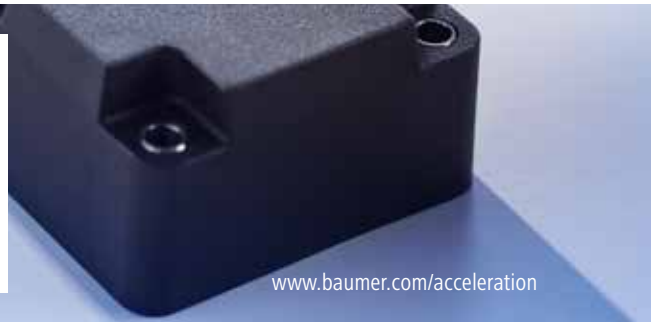
Highest precision in dynamic applications

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.

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



SIL2 PLd Functional Safety

Features	■ Acceleration sensor / analog / CANopen® ■ 3-axis MEMS-based detection ■ Measurement range up to ±8 g	■ Vibration/shock detection on three axes ■ Limit value monitoring with two relay outputs	■ 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 measure-ment made easy.

Cable transducer GCA5
for measurement lengths up to 7.8 m.

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	■ Measuring length up to 4.7 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Space-saving design	■ Measuring length up to 7.8 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Three-chamber design	■ Measuring length up to 12 m ■ Absolute potentiometer sensing ■ Dirt skimmer ■ Three-chamber design	■ 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

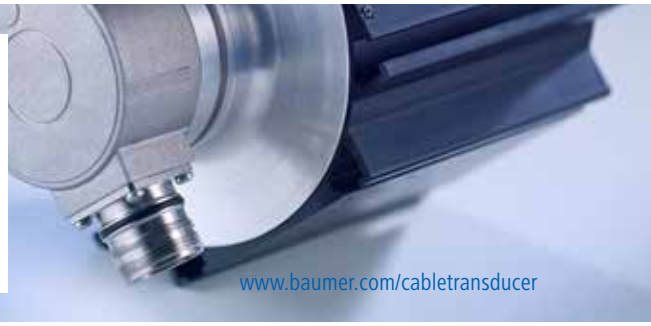
Your benefits

- 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.

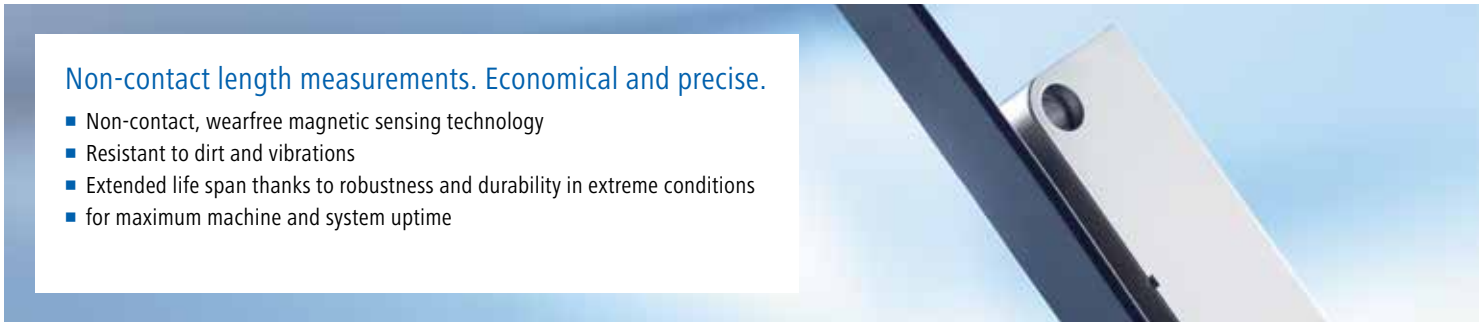
- High combination flexibility of cable-transducer and basic encoder
- All standard interfaces
- High operational safety and long service life
- Precision metal housing
- Highest linearity



www.baumer.com/cabletransducer

Features	■ Measuring length 2.4 m ■ Absolute rotary encoders ■ Cable-pull housing: plastic	■ Measuring length 3 m ■ Absolute rotary encoders ■ Cable-pull housing: aluminium	■ Measuring length 5...15 m ■ Absolute rotary encoders ■ Cable-pull housing: aluminium	■ 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	■ 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	<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	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	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 ±40 µm, 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.

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	■ Measuring wheel encoder consisting of rotary encoder, measuring arm and measuring wheel ■ Contact pressure continuously adjustable	■ 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

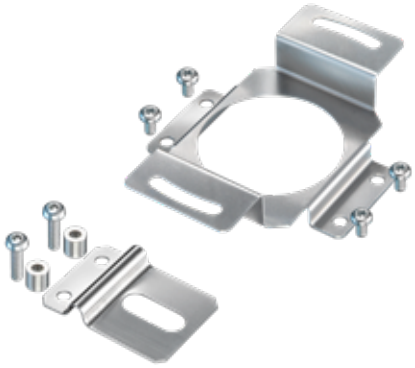
Measuring wheels

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

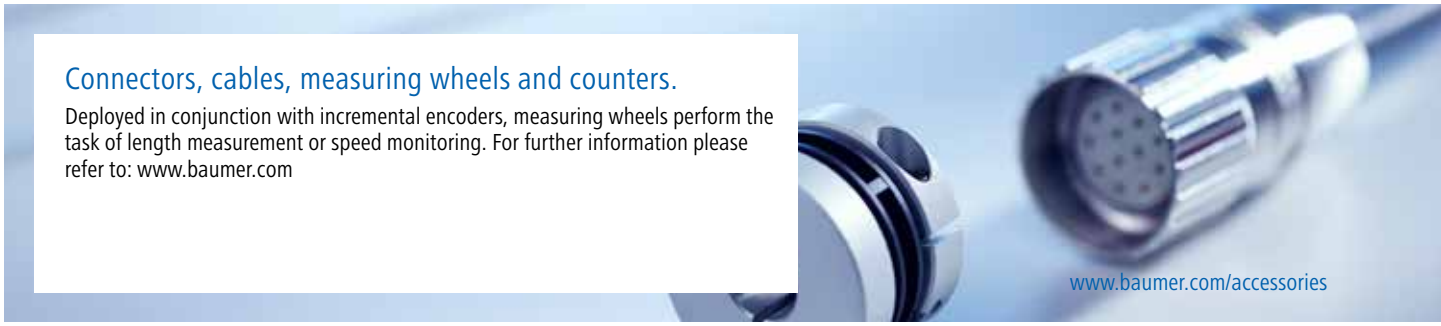
- Shaft couplings to link drive shaft and encoder shaft
- Mounting clamp to secure encoder flange
- Mounting adaptor and mounting angle for quick and safe encoder mounting
- Flange adaptor to convert a clamping flange into a synchro flange, for example

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

Accessories



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

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	■ 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	■ TTL to TTL conversion ■ HTL to TTL conversion ■ Signal regeneration		■ 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

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Features	■ Precision interpolator ■ Splitter for signal conversion SinCos to TTL/HTL ■ Additional signal interpolation	■ Precision sine multiplier ■ Converter SinCos to multiple SinCos	■ 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	■ Transmitter for fiber optic signals (LWL) ■ Switchboard device for DIN rail mounting ■ Conversion HTL/TTL to LWL ■ 4+2 channels ■ Transmission length ≤1500 m	■ Transmitter for fiber optic signals (LWL) ■ Field device with outdoor box ■ Conversion HTL/TTL to LWL ■ 4+2 channels ■ Transmission length ≤1500 m	■ 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

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Features	■ Conversion TTL to LWL ■ For environments with strong EMC exposure	■ Conversion HTL to LWL ■ For environments with strong EMC exposure	■ Conversion LWL to TTL ■ For environments with strong EMC exposure	■ 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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Worldwide presence and competent support in consultation, sales and service.

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.

Baumer's worldwide sales companies ensure short delivery times and a high level of readiness for delivery.
The ordering processes of many Baumer customers are straight embedded in our electronic supply system to ensure just-in-time logistics.

A worldwide network, supported by state-of-the-art communication technologies, allows us to transmit information quickly and transparently to all Baumer locations to all decision-makers.

To Baumer, being close to customers means being available for your concerns at any time and at any place.

Present around the globe.

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Cameroon
Morocco
Réunion
South Africa

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Canada
Columbia
Mexico
USA
Venezuela

Asia
Bahrain
China
India
Indonesia
Israel
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Qatar
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Malaysia
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Philippines
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South Korea
Taiwan
Thailand
UAE

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Belgium
Bulgaria
Denmark
Germany
Finland
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For more information about our global subsidiaries visit:
www.baumer.com/worldwide

Baumer
Passion for Sensors

Switzerland
Baumer Electric AG
P. O. Box
Hummelstrasse 17
CH-8501 Frauenfeld
Phone +41 (0)52 728 1122
Fax +41 (0)52 728 1144
sales.ch@baumer.com

Germany / Austria
Baumer GmbH
Pfingstweide 28
DE-61169 Friedberg
Phone +49 (0)6031 60 07 0
Fax +49 (0)6031 60 07 60 70
sales.de@baumer.com

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