Baumer
Passion for Sensors

Rotary encoders and 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 marked customer orientation, consistently high quality and vast innovation capability, Baumer develops specific solutions for many industries and applications worldwide.

Our standards – your benefits.

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

Baumer 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 considerable diversity of our production facilities and optimized business processes, which guarantee maximum flexibility and promptness in the implementation of customer requirements.

Learn more.
Detailed technical information, data sheets, tutorials and the Baumer product finder can be found at:
www.baumer.com

Content.

Flexible, robust and precise.

OptoPulse® EIL580-SC
with clamping flange and M23 connector

Incredibly versatile.

From cost-efficient standard products on to high-resolution variants with 320 000 ppr: In our portfolio you always will encounter the matching incremental encoder. Our passion for sensors lays the groundwork for innovative products available in different designs and variants – with robust magnetic or precise optical sensing, optional HTL, TTL or sine signals and with all standard mechanical interfaces.

The product portfolio comprises particularly compact designs of mere 24 mm in diameter on to large hollow shaft diameters up to 85 mm. Configurable encoders allow for maximum flexibility in a wide range of applications. In doing so, they contribute towards cutting down on costs in maintenance and inventory.

Service

OptoPulse® – quickly available with short lead times.
OptoPulse® sets new benchmarks also in terms of availability. We supply great many stock items within 24 hours - i.e. one working day. Optimized delivery processes allow for standard items up to the quantity of 10 to be supplied within 5 working days.

Industrial encoders incremental
Size up to ø40 mm

Precise optical sensing.
Up to 2048 pulses per revolution.
- Solid shaft, blind or through hollow shaft design
- Ideal where space is tight

Features	■ Size ø24 mm ■ Solid shaft with synchro flange	■ Size ø24 mm ■ Blind hollow shaft	■ Size ø30 mm ■ Solid shaft with synchro flange	■ Size ø40 mm ■ Blind hollow or through hollow shaft
Product family	ITD 01 B14	ITD 01 A4	BDK 16	BHK 16

Sensing method	Optical			
Size (housing)	ø24 mm		ø30 mm	ø40 mm
Voltage supply	5 VDC ±5 %, 8...30 VDC		5 VDC ±10 %, 10...30 VDC	
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
Output signals	A 90° B, R + inverted			
Shaft type				
- Solid shaft	ø4 mm	–	ø5 mm	–
- Blind hollow shaft	–	ø4 mm	–	ø12 mm
- Through hollow shaft	–	–	–	ø6 mm
Connection				
- Flange connector M9	–	–	Radial	
- Cable	Radial / axial	Radial	Radial / axial	Radial
Pulses per revolution	30...1024		10...2048	
Operating temperature	-20...+85 °C			
Protection	IP 54		IP 42, IP 65	
Operating speed	≤18 000 rpm	≤10 000 rpm	≤12 000 rpm (IP 42) ≤6000 rpm (IP 65)	≤12 000 rpm
Max. shaft load	≤5 N axial, ≤8 N radial	–	≤10 N axial, ≤10 N radial	–

Robust magnetic sensing.
Up to 1024 pulses per revolution.
■ Solid shaft or blind hollow shaft
■ Ideal where space is tight

Learn more:
www.baumer.com/incremental

EcoMag

Features	■ Size ø30 mm ■ Solid shaft with synchro flange	■ Size ø30 mm ■ Solid shaft with synchro flange ■ High protection IP 67	■ Size ø40 mm ■ Blind hollow shaft
Product family	BRIV 30	BRIV 30R	BRIH 40
Sensing method	Magnetic		
Size (housing)	ø30 mm	ø30 mm	ø40 mm
Voltage supply	5 VDC ±10 %, 20...28 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	■	■
Output signals	A 90° B, R + inverted		
Shaft type			
- Solid shaft	ø5 mm	ø6 mm, ø8 mm	–
- Blind hollow shaft	–	–	ø6 mm, ø12 mm
Connection			
- Flange connector M9	Radial	Radial / axial	Radial
- Cable	Radial / axial	Radial / axial	Radial
Pulses per revolution	2...1024		
Operating temperature	-20...+65 °C -20...+85 °C (5 VDC)	-40...+65 °C -40...+85 °C (5 VDC)	-20...+65 °C -20...+85 °C (5 VDC)
Protection	IP 65	IP 67	IP 65
Operating speed	≤6000 rpm		
Max. shaft load	≤10 N axial, ≤10 N radial	≤30 N axial, ≤50 N radial	–

EcoMag

EcoMag – robust incremental encoders with resilient magnetic sensing.

Industrial encoders incremental
Size ø58 mm

Precise optical sensing.
Up to 65 536 pulses per revolution.
- Solid shaft, blind or through hollow shaft design
- Robust all-metal housing

OptoPulse® – the global encoder standard

OptoPulse®

Features	■ Solid shaft with clamping flange	■ Solid shaft with synchro flange	■ Blind hollow shaft	■ Through hollow shaft
Product family	EIL580-SC	EIL580-SY	EIL580-B	EIL580-T

Sensing method	Optical			
Size (housing)	ø58 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				
- Solid shaft	ø10 mm	ø6 mm	–	–
- Blind hollow shaft	–	–	ø8...15 mm	–
- Through hollow shaft	–	–	–	ø8...15 mm
Connection				
- Flange connector M12, M23	Radial / axial			Radial
- Cable	Radial / axial / tangential			Radial / tangential
Pulses per revolution	100...5000 (programmable 1...65536)			
Operating temperature	-40...+85 °C (option: +100 °C)			
Protection	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	Programmable (EIL580P) Approval ATEX II 3 D, Zone 22 (ExEIL580, ExEIL580P), Square flange 2.5 Inch, EURO-flange B10 (REO-flange) SIL2/PLd certification (GI357) Up to 320 000 ppr (BDH/BDT HighRes)		Programmable (EIL580P) Isolated hollow shaft, hybrid bearings Stainless steel design (GE333) Up to 320 000 ppr (BHF/BHG HighRes) Operating temperature up to 120 °C (ITD21H00) SIL3/SIL2 certification (ITD22H00 SIL)	

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.

Robust magnetic sensing.
Up to 2048 pulses per revolution.
- Solid shaft, blind or through hollow shaft design
- Robust all-metal housing

Learn more:
www.baumer.com/incremental

EcoMag

Features	■ Solid shaft with clamping flange	■ Solid shaft with synchro flange	■ Blind hollow shaft	■ Through hollow shaft
Product family	BRIV 58K	BRIV 58S	BRIH 58S	BRID 58S

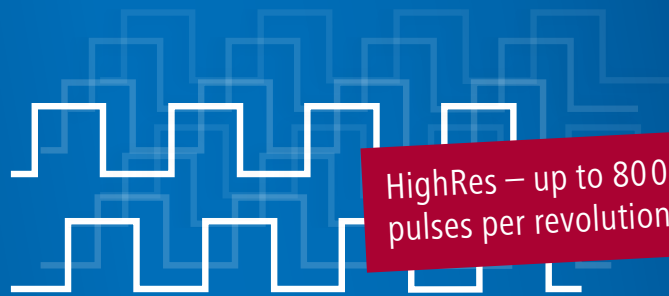|				
Sensing method	Magnetic			
Size (housing)	ø58 mm			
Voltage supply	5 VDC ±10 %, 10...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	■	■	■	■
Output signals	A 90° B, R + inverted			
Shaft type				
- Solid shaft	ø10 mm	ø6 mm	–	–
- Blind hollow shaft	–	–	ø12 mm	–
- Through hollow shaft	–	–	–	ø12 mm
Connection				
- Flange connector M12, M23	Radial			
- Cable	Radial			
Pulses per revolution	64...2048			
Operating temperature	-20...+85 °C			
Protection	IP 42, IP 65			
Operating speed	≤12 000 rpm (IP 42), ≤6000 rpm (IP 65)			
Max. shaft load	≤40 N axial, ≤60 N radial		–	–

ShaftLock

The *ShaftLock* locking collar prevents the large high-quality bearing pack from any misalignment by high axial shaft loads during operation or at installation. The *ShaftLock* technology ensures maximum precision and improved service life, keeps code disc and sensing unit safe from damage and avoids cost-intensive downtime.

Industrial encoders incremental
Large hollow shaft

Precise optical sensing.
Up to 80 000 pulses per revolution.
- Blind hollow or through hollow shaft
- Easy installation

HighRes – up to 80 000 pulses per revolution

Features	■ Through hollow shaft ■ Torque support ■ Up to 2048 ppr	■ Through hollow shaft ■ Up to 10 000 ppr	■ Through hollow shaft ■ Protection up to IP 67 ■ Up to 80 000 ppr ■ Isolated shaft
Product family	ITD 40	ITD 41	HS35F

Sensing method	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			
- Blind hollow shaft	–	–	–
- Through hollow shaft	ø17...27 mm	ø17...30 mm	ø0.375...1" (ø9.525...25.4 mm)
Connection			
- Flange connector M23	–	–	–
- Flange connector MIL	–	–	Radial
- Cable	Radial		
Pulses per revolution	200...2048	2000...10 000	1024...80 000
Operating temperature	-20...+70 °C, -20...+100 °C		-40...+100 °C (-40...+212 °F)
Protection	IP 65		IP 54, IP 65, IP 67
Operating speed	≤5000 rpm, ≤3000 rpm (>70 °C)		≤5000 rpm
Options	Torque support with electric isolation Stainless steel design		Programmable (HS35P) Sinus/Cosinus output signals (HS35S)

Precise optical sensing.
Up to 10 000 pulses per revolution.
- Through hollow shaft
- Easy installation

Learn more:
www.baumer.com/incremental

Features	■ Through hollow shaft up to ø50 mm ■ Very flat design ■ Clamping at B side ■ Stainless steel design	■ Through hollow shaft up to ø65 mm ■ Clamping at B side	■ Through hollow shaft up to ø85 mm ■ Bearingless
Product family	ITD 61	ITD 70	ITD 75

Sensing method	Optical		
Size (housing)	ø120 mm	ø150 mm	
Voltage supply	4.75…30 VDC	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	ø30…50 mm	ø38…65 mm	ø60…85 mm
Connection			
- Flange connector M23	–	Radial	–
- Cable	Radial		
Pulses per revolution	1024…10 000	1000…2500	
Operating temperature	-20…+85 °C	-20…+70 °C	
Protection	IP 54		
Operating speed	≤4000 rpm (+70 °C) ≤3000 rpm (+85 °C)	≤3000 rpm	
Options	Cable with connector	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	■ Through hollow shaft ■ Inch size ■ Protection up to IP 67	■ Through hollow shaft
Product family	ITD22H00	HS35S	ITD 42 A4 Y79

Sensing method	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)	ø20...27 mm
Connection			
- Flange connector MIL	–	Radial	–
- Cable	Tangential	Radial	Radial
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	IP 65	IP 65, IP 67	IP 65
Operating speed	≤6000 rpm	≤5000 rpm (IP 65) ≤3000 rpm (IP 67)	≤5000 rpm
Options	SIL3/SIL2 certicication (ITD22H00 SIL)	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.

Learn more:
www.baumer.com/incremental

Industrial encoders incremental
Inch size / square flange

Precise optical sensing.
Up to 80 000 pulses per revolution.
- Solid shaft, blind or through hollow shaft design
- Robust all-metal housing
- Protection up to IP 67

Features	■ Solid shaft with square flange ■ Inch size ■ Up to 6000 ppr	■ Solid shaft with square flange ■ Inch size ■ Up to 5000 ppr	■ Blind or through hollow shaft ■ Up to 5000 ppr ■	■ Through hollow shaft ■ Inch size ■ Up to 80 000 ppr ■ Isolated shaft
Product family	G25	EIL580-SQ	EIL580-B EIL580-T	HS35

Sensing method	Optical			
Size (housing)	2.5 x 2.5" (63.5 x 63.5 mm)	2.5 x 2.5" (63.5 x 63.5 mm)	2.28" (ø58 mm)	ø3.15" (ø80 mm)
Voltage supply	5 VDC ±10 % 4.75...30 VDC	5 VDC ±5 %, 8...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, B, R + inverted	A 90° B, R + inverted		A 90° B, R + inverted
Shaft type				
- Solid shaft	ø0.375" (ø9.52 mm)	ø10 mm	–	–
- Blind hollow shaft	–	–	ø0.315-0.591" (ø8...15 mm) –	–
- Through hollow shaft	–	–	– ø0.315-0.591" (ø8...15 mm)	ø0.375...1" (ø9.525...25.4 mm)
Connection				
- Flange connector MIL	7-/10-pins, radial	–	–	7-/10-pins, radial
- Flange connector M12, M23	–	Radial / axial	Radial / axial Radial	–
- Cable	Radial	Radial / axial / tangential	Radial / axial / tangential Radial / tangential	–
Pulses per revolution	5...6000	100...5000		1024...80 000
Sine periods per revolution	–	–	–	1024...5000
Operating temperature	-30...+100 °C (5 VDC) -30...+85 °C (24 VDC)	-40...+85 °C (optional +100 °C)		-40...+100 °C (-40...+212 °F)
Protection	IP 54 (without shaft seal) IP 67 (with shaft seal)	IP 65, IP 67		IP 54, IP 65, IP 67
Operating speed	≤10 000 rpm (IP 54) ≤6000 rpm (IP 67)	≤8000 rpm (IP 65) ≤6000 rpm (IP 67)		≤5000 rpm
Max. shaft load	≤80 lbs (350 N) axial/radial ≤100 lbs (450 N) axial or ≤150 lbs (670 N) radial	–	–	–
Options	–	Programmable (EIL580P)	Programmable (EIL580P) Isolated hollow shaft	Programmable (HS35P) SinCos output signals (HS35S)

Precise optical sensing.
Up to 6000 pulses per revolution.
- Solid shaft
- High-power signal output drivers
- Protection up to IP 67

Learn more:
www.baumer.com/incremental

Features	■ Solid shaft with EURO flange B10 ■ Up to 5000 ppr	■ Solid shaft with EURO flange B10 ■ Up to 2048 ppr ■ More powerful output drivers ■ Sense line	■ Solid shaft with EURO flange B10 ■ Up to 6000 ppr ■ More powerful output drivers ■ Sense line
Product family	EIL580-S1	ITD 40 B10	ITD 41 B10

Sensing method	Optical		
Size (housing)	ø58 mm	ø82 mm	
Voltage supply	5 VDC ±5 %, 8...30 VDC 4.75...30 VDC	5 VDC ±5 %, 8...30 VDC	
Output stage			
- TTL/RS422	■	–	–
- HTL/push-pull	■	■	■
Output signals	A 90° B, R + inverted	A 90° B, R + inverted	
Shaft type			
- Solid shaft	ø11 mm		
Connection			
- Flange connector M12	Radial	–	–
- Flange connector M23	Radial	–	–
- Cable	Radial		
Pulses per revolution	100...5000	200...2048	1000...6000
Operating temperature	-40...+85 °C (optional +100 °C)	-20...+70 °C (-20...+100 °C)	
Protection	IP 65, IP 67	IP 65	
Operating speed	≤12 000 rpm (IP 65) ≤6000 rpm (IP 67)	≤12 000 rpm	≤6000 rpm
Max. shaft load	≤40 N axial, ≤80 N radial	≤40 N axial, ≤60 N radial	
Options	–	Seawater resistant, cable with connector	

Compact high performance.

Absolute encoders in ø58 mm design:
EAL580 with clamping flange

All standard interfaces, either device-integrated or in modular bus cover.

With Baumer, you will always encounter the absolute encoder that is just right for your requirements – with conventional point-to-point interface or realtime Ethernet, with precise optical or robust magnetic sensing, from compact ø30 mm size on to large hollow shafts of ø50 mm. The products are optimized for maximum performance and hence ideal for demanding applications where they measurably contribute towards increased 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 allow for resolutions up to 18 bits per turn at an accuracy as high as ±0.01°. Magnetic encoders of the *MAGRES* series are particularly robust and always provide reliable operation even under heavy shocks and vibrations or where there is dew and condensation.

Industrial encoders absolute
Size up to ø36 mm

Robust, precise magnetic sensing.
- Solid shaft and blind hollow shaft
- Compact designs for tight spaces
- Shock resistant up to 500 g
- Angular accuracy up to ±0.15°

CANopen
SAE J1939
SSI

MAGRES

Features	■ Solid shaft with flat mounting flange ■ Redundante sensing	■ Solid shaft with synchro flange	■ Solid shaft with synchro flange ■ E1 compliant design ■ Corrosion protection CX (C5-M) ■ ISO 13849 compliant firmware	■ Blind hollow shaft
Product family	EAM280	EAM360-SW	EAM360R-SW	EAM360-B

Interface				
- SSI	–	■	–	■
- Analog	■	–	■	–
- CANopen® / redundant	■ / ■	■ / —	■ / —	■ / —
- CANopen® Lift	–	■	–	■
- SAE J1939	–	–	■	–

Function principle	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Sensing method	Magnetic						
Size (housing)	ø28.6 mm	ø36 mm					
Voltage supply	10...30 VDC (CANopen®) 12...30 VDC (Analog) 5 VDC ±5 % (Analog)	4.5...30 VDC (CANopen®, SAE J1939, SSI) 8...30 VDC / 14...30 VDC (Analog - type-specific)					
Shaft type							
- Solid shaft	ø6 mm	ø10 mm		ø10 mm		–	
- Blind hollow shaft	–	–		–		ø10...15 mm	
Connection							
- Flange connector M12	Radial	Radial		Radial		Radial	
- Cable	Radial	Radial (0.14 mm²)		Radial (0.5 mm²)		Radial (0.14 mm²)	
Steps per turn	4096/12 bits (Analog) 16384/14 bits (CANopen®)	≤65536/16 bits	≤65536/16 bits	≤65536/16 bits	≤65536/16 bits	≤65536/16 bits	≤65536/16 bits
Number of turns	–	≤262144/18 bits	–	≤262144/18 bits	–	≤262144/18 bits	–
Absolute accuracy	±1.8°	Up to ±0.15°					
Operating temperature	-40...+85 °C						
Protection	IP 65, IP 67	IP 65, IP 67		IP 67		IP 65, IP 67	
Operating speed	≤800 rpm	≤6000 rpm					
Max. shaft load	≤25 N axial, ≤25 N radial	≤40 N axial, ≤80 N radial					
Options	Cable with DEUTSCH connector	Additional incremental signals (SSI, CANopen®) Corrosion protection CX (C5-M)		Cable with DEUTSCH connector		Additional incremental signals (SSI, CANopen®) Corrosion protection CX (C5-M)	

Robust, precise magnetic sensing.
- Solid shaft and blind hollow shaft
- Compact designs for tight spaces
- Shock resistant up to 500 g
- Angular accuracy up to ±0.15°

Learn more:
www.baumer.com/absolute

MAGRES

Features	■ Blind hollow shaft
	■ E1 compliant design
	■ Corrosion protection CX (C5-M)
	■ ISO 13849 compliant firmware
Product family	EAM360R-B

Interface	
- SSI	
- Analog	■
- CANopen® / redundant	■ / –
- CANopen® Lift	–
- SAE J1939	■

Function principle	Multiturn	Singleturn
Sensing method	Magnetic	
Size (housing)	ø36 mm	
Voltage supply	4.5 ... 30 VDC (CANopen®, SAE J1939, SSI) 8 ... 30 VDC / 14 ... 30 VDC (Analog - type-specific)	

Shaft type		
- Blind hollow shaft	ø10...15 mm	
Connection		
- Flange connector M12	Radial	
- Cable	Radial (0.5 mm²)	
Steps per turn	≤65536/16 bits	≤65536/16 bits
Number of turns	≤262144/18 bits	–
Absolute accuracy	Up to ±0.15°	
Operating temperature	-40...+85 °C	
Protection	IP 67	
Operating speed	≤6000 rpm	
Max. shaft load	≤40 N axial, ≤80 N radial	
Options	Cable with DEUTSCH connector	

MAGRES – Robust precision

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

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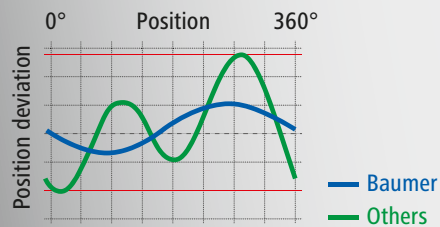
R-Series for extreme applications

Your benefits
- CX (C5-M) corrosion protection for high durability in outdoor use
- E1 compliant design for high electromagnetic compatibility when used in vehicles
- ISO 13849 compliant firmware for use in safety functions up to PLd
- 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

Robust, precise magnetic sensing.
- Solid shaft and blind hollow shaft
- Compact designs for tight spaces
- Shock resistant up to 500 g
- Angular accuracy up to ±0.15°

PROFI NET®
SSI
SAE J1939
CANopen

MAGRES

Features	■ Solid shaft with clamping or synchro flange	■ Solid shaft with clamping or synchro flange ■ E1 compliant design ■ Corrosion protection CX (C5-M) ■ ISO 13849 compliant firmware	■ Blind hollow shaft	■ Blind hollow shaft ■ E1 compliant design ■ Corrosion protection CX (C5-M) ■ ISO 13849 compliant firmware
Product family	EAM580-S	EAM580R-S	EAM580-B	EAM580R-B

Interface				
- SSI	■	–	■	–
- Analog	–	■	–	■
- CANopen® / redundant	■ / –	■ / ■	■ / –	■ / ■
- CANopen® Lift	■	–	■	–
- SAE J1939 / Profinet	– / ■	■ / –	– / ■	■ / –
- EtherCAT / EtherNet/IP	■ / ■	– / –	■ / ■	– / –

Function principle	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Sensing method	Magnetic							
Size (housing)	ø58 mm							
Voltage supply	4.5 … 30 VDC (CANopen®, SAE J1939, SSI), 8 … 30 VDC / 14 … 30 VDC (Analog - type-specific), 10 … 30 VDC (Ethernet)							
Shaft type								
- Solid shaft	ø6 mm, ø10 mm			–				
- Blind hollow shaft	–			ø10...15 mm				
Connection								
- Flange connector M12	Radial		Radial		Radial		Radial	
- Flange connector M23	Radial		–		Radial		–	
- Cable	Radial (0.14 mm²)		Radial (0.5 mm²)		Radial (0.14 mm²)		Radial (0.5 mm²)	
Steps per turn	≤65536/16 bits		≤65536/16 bits		≤65536/16 bits		≤65536/16 bits	
Number of turns	≤262144/18 bits	–	≤262144/18 bits	–	≤262144/18 bits	–	≤262144/18 bits	–
Absolute accuracy	Up to ±0.15°							
Operating temperature	-40...+85 °C							
Protection	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 (C5-M)		Cable with DEUTSCH connector		Additional incremental signals (SSI, CANopen®) Corrosion protection CX (C5-M)		Cable with DEUTSCH connector	

Robust magnetic sensing.
Integrated interface and modular bus covers.
- Solid shaft
- Operating temperature down to -40 °C
- Hermetically sealed, compliance up to IP 69K
- Stainless steel design

Learn more:
www.baumer.com/absolute

MAGRES hermetic

Features	■ Solid shaft with clamping flange ■ Multiturn ■ Hermetically sealed ■ Integrated interfaces	■ Solid shaft with clamping flange ■ Multiturn ■ Hermetically sealed ■ Modular bus cover
Product family	BMMV 58 - hermetic	BMMV 58 - hermetic

Interface		
- SSI	■	–
- CANopen®	■	■
- DeviceNet	–	■ 1)
- Profibus-DP	■	■
- SAE J1939 / Profinet	– / –	■ / ■
- EtherCAT / EtherNet/IP	– / –	■ / ■
- Powerlink	–	■ 1)

Function principle	Multiturn
Sensing method	Magnetic
Size (housing)	ø58 mm
Voltage supply	10...30 VDC
Shaft type	
- Solid shaft	ø10 mm
Connection	Flange connector M12
Steps per turn	≤4096/12 bits ≤8192/13 bits (Profibus) — ≤4096/12 bits
Number of turns	≤65536/16 bits (Profibus) ≤262 144/18 bits — ≤65536/16 bits ≤262 144/18 bits (CANopen®)
Absolute accuracy	±1°
Operating temperature	-40...+85 °C
Protection	IP 68, IP 69 K
Operating speed	≤6000 rpm
Max. shaft load	≤120 N axial, ≤280 N radial

1) on request

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

ETHERNET **POWERLINK**
PROFI BUS®
EtherCAT®
PROFI NET®
CANopen
EtherNet/IP®
SAE J1939
DeviceNet®

Features	Solid shaft with clamping or synchro flange		Blind hollow or through hollow shaft		Solid shaft with clamping or synchro flange		Blind hollow 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			
- EtherCAT	■	■	■	■	■	■	■	■
- EtherNet/IP	■	■	■	■	■	■	■	■
- Profinet	■	■	■	■	■	■	■	■

Function principle	Multiturn / Singleturn							
Sensing method	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 connector M12, M23, M27, D-SUB or cable (depending on product and variant)							
Steps per turn	≤262 144/18 bits				≤8192/13 bits			
Number of turns	≤8192/13 bits		≤8192/13 bits		≤65536/16 bits		≤65536/16 bits	
Absolute accuracy	±0.01°				±0,025°			
Protection	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				–			
Options	Preset / reset button							

HighRes – up to 18 bits
singleturn resolution

Learn more:
www.baumer.com/absolute

Features	■ Solid shaft with clamping flange		■ Solid shaft with synchro flange		■ Blind hollow shaft		■ Through hollow shaft	
Interface[1]	Product family - up to 18 bits singleturn resolution							
- SSI / SSI + incremental	GBM2W	GBA2W	GBM2W	GBA2W	GBM2S	GBA2S	GBM2H	GBA2H

Interface	Product family - up to 13 bits singleturn resolution							
- SSI / SSI + incremental	GM400	GA240	GM401	GA241	GXM2S	GXA2S	G0M2H	G0A2H
- Parallel	GXP1W	GA240	GXP1W	GA241	–	–	–	–
- CANopen®	GXP5W	GXU5W	GXP5W	GXU5W	GXP5S	–	G0P5H	–
- DeviceNet	GXP8W	–	GXP8W	–	–	–	–	–

Function principle	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Sensing method	Optical							
Size (housing)	ø58 mm							
Voltage supply	10...30 VDC							
Shaft type								
- Solid shaft	ø10 mm		ø6 mm		–		–	
- Blind hollow shaft	–		–		ø10...15 mm		–	
- Through hollow shaft	–		–		–		ø10...14 mm	
Connection	Flange connector M12, M23, D-SUB or cable (depending on product and variant)							
Steps per turn	≤262 144/18 bits resp. ≤8192/13 bits							
Number of turns	≤65536/16 bits	–	≤65536/16 bits	–	≤65536/16 bits	–	≤65536/16 bits	–
Absolute accuracy	±0.01° (singleturn 18 bits), ±0.025° (singleturn 13 bits)							
Protection	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

Industrial encoders absolute
Size ø58 mm

Precise optical sensing.
Modular bus cover.
- High resolution up to 18 bits per revolution
- High accuracy ±0.01°
- Operating temperature down to -40 °C
- Additional incremental signals

CANopen
DeviceNet
PROFI BUS®
ETHERNET
POWERLINK
SAE J1939

HighRes – up to 18 bits singleturn resolution

Features	■ Solid shaft with clamping flange		■ Solid shaft with synchro flange		■ Blind hollow shaft		■ Through hollow shaft	
	Product family - up to 18 bits singleturn resolution							
Interface	GBMMW	GBAMW	GBMMW	GBAMW	GBMMS	GBAMS	GBMMH	GBAMH
- CANopen®	■		■		■		■	
- DeviceNet	■		■		■		■	
- Profibus-DP	■		■		■		■	
- SAE J1939	■		■		■		–	
- Powerlink	■		■		■		–	
	Product family - up to 13 bits singleturn resolution							
Interface	GXMMW	GXAMW	GXMMW	GXAMW	GXMMS	GXAMS	G0MMH	G0AMH
- CANopen®	■		■		■		■	
- DeviceNet	■		■		■		■	
- Profibus-DP	■		■		■		■	
- SAE J1939	■		■		■		–	
- Powerlink	■		■		■		–	
Function principle	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Sensing method	Optical							
Size (housing)	ø58 mm							
Voltage supply	10...30 VDC							
Shaft type								
- Solid shaft	ø10 mm		ø6 mm		–		–	
- Blind hollow shaft	–		–		ø12...14 mm		–	
- Through hollow shaft	–		–		–		ø12...14 mm	
Connection	Flange connector M12 or cable (depending on product and variant)							
Steps per turn	≤262 144/18 bits resp. ≤8192/13 bits							
Number of turns	≤65536/16 bits	–	≤65536/16 bits	–	≤65536/16 bits	–	≤65536/16 bits	–
Absolute accuracy	±0.01° (singleturn 18 bits), ±0.025° (singleturn 13 bits)							
Protection	IP 54, IP 65						IP 54	
Operating temperature	≤6000 rpm							
Operating speed	-25...+85 °C							
Max. shaft load	≤20 N axial, ≤40 N radial				–		–	
Options	Incremental signals, Stainless steel design, Operating temperature -40...+85 °C, Rotary switch bus address / baud rate						Protection IP 69K Stainless steel design Operating temperature -40 °C	

Precise optical sensing.
SSI / fieldbus interface.

- Shallow installation depth
- Easy installation
- Wide rage of accessories

CANopen
SSI
DeviceNet
PROFIBUS®

Learn more:
www.baumer.com/absolute

Features	■ Through hollow shaft up to ø25.4 mm ■ Integrated interface SSI	■ Through hollow shaft up to ø50.8 mm ■ Integrated interface SSI	■ Through hollow shaft up to ø25.4 mm ■ Modular bus cover	■ Through hollow shaft up to ø50.8 mm ■ Modular bus cover
Product family	G1M2H	G2M2H	G1MMH	G2MMH

Interface				
- SSI	■	■	–	–
- CANopen®	–	–	■	■
- DeviceNet	–	–	■	■
- Profibus-DP	–	–	■	■

Function principle	Multiturn			
Sensing method	Optical			
Size (housing)	ø90 mm	ø116 mm	ø90 mm	ø116 mm
Voltage supply	10...30 VDC			
Shaft type				
- Through hollow shaft	ø25.4 mm	ø50.8 mm	ø25.4 mm	ø50.8 mm
Connection				
- Bus cover	–		M12 or cable gland (depending on product and variant)	
- Flange connector M23	Radial		–	
Steps per turn	≤8192/13 bits			
Number of turns	≤4096/12 bits		≤65 536/16 bits	
Absolute accuracy	±0.025°			
Operating temperature	-25...+85 °C			
Protection	IP 54			
Operating speed	≤3800 U/min	≤2000 U/min	≤3800 U/min	≤2000 U/min
Operating temperature	–		Steps per turn Number of turns Rotational direction Preset	
Options	Operating temperature -40...+85 °C Protection IP 65 Additional incremental signals (ATD 4S A4)		Operating temperature -40...+85 °C Protection IP 6	

Tough where it's rough.
Precise in operation.

Incremental encoder HOG 10 with
blind hollow shaft

HeavyDuty encoders, speed switches, tachogenerators 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 windpower stations – 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.

In drive applications where besides the speed information additional control signals are required, HeavyDuty product combinations of encoders, tachogenerators and speed switches will

provide you with the decisive impulse thanks to their integrated additional functions.

Durable and reliable thanks to proven HeavyDuty technology.

- Solid aluminium or stainless steel housing
- Bearings at both shaft ends
- HeavyDuty connection technology
- Isolated against shaft currents
- Explosion protection against gases and dust
- Protected against sea and tropical climate

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 engingeering. We have been world-leading in this industry for more than 50 years, setting new benchmarks for reliable encoders, tachogenerators and speed switches in HeavyDuty technology. Our unrivalled resilient 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

**Synchro flange or
EURO flange B10.**
- Precision speed signals for drive engineering
- Robust electrical and mechanical designs
- Redundant sensing / twin encoders
- Second shaft end for centrifugal / speed switches
- Integrated function monitoring EMS

HÜBNER
BERLIN
A Baumer Brand

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 method	Optical			
Size (housing)	ø115 mm			
Voltage supply	5 VDC ±5 %, 9...26 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	–	–	–	–
- HTL-P (Power Linedriver)	■	■	■	■
- LWL (fiber-optic interface)	With fiber-optic transducer (Outdoor-Box)			
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Solid shaft	ø11 mm			
Flange	EURO flange B10			
Connection	Terminal box			
Pulses per revolution	512...2500	500...5000	1...1250	300...5000
Operating temperature	-40...+100 °C		-30...+100 °C	-30...+100 °C
Protection	IP 56		IP 55	IP 56
Operating speed	≤12 000 rpm			
Max. shaft load	≤250 N axial, ≤450 N radial			
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)			
Options	Corrosion protection C4	Function monitoring EMS Second shaft end Centrifugal switch (FSL)	–	Function monitoring EMS Second shaft end Speed switches (FSL, ESL) Twin encoder POG 9 G

Powerful 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. The high-current power drivers HTL-P are fully compatible to HTL/push-pull and allow for long-distance lines up to 350 m.

Unrivalled longevity and reliability thanks
to proven HeavyDuty technology.
- Solid aluminium or stainless steel housings
- Bearings at both shaft ends
- EX-protection for gas and dust
- HeavyDuty connection technology
- Insulation against shaft currents
- Protection against seawater and tropical conditions

Learn more:
www.baumer.com/HD-incremental

Features	■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 10000	■ Solid shaft with EURO flange B10 ■ Pulses per revolution up to 5000 ■ High protection IP 66	■ Solid shaft with EURO flange B10 ■ Corrosion protection CX (C5-M)	■ Solid shaft with EURO flange B10 ■ IECEx certification
Product family	POG 90	POG 10	POG 11	EEx OG 9

Sensing method	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 interface)	With fiber-optic transducer (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...10000	300...5000		25...5000
Operating temperature	-20...+85 °C	-40...+100 °C -50...+100 °C (option)		-40...+55 °C (<500 ppr) -50...+55 °C (<500-2500 ppr) -25...+55 °C (>3072 ppr)
Protection	IP 66	IP 66	IP 67	IP 56
Operating speed	≤12 000 rpm			
Max. shaft load	≤300 N axial, ≤450 N radial			≤200 N axial, ≤350 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)			Ex II 2G IIC (ATEX/IECEx)
Options	Second shaft end Centrifugal switch (FSL) Speed switch (ESL) Housing foot B3	Function monitoring EMS Redundant (POG 10M) Housing foot B3	Function monitoring EMS Redundant (POG 11M) Housing foot B3	–

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, through hollow or cone shaft.
- Precision signals in drive engineering
- Robust electrical and mechanical design
- Redundant sensing
- Integrated function monitoring EMS

Features	■ Blind hollow shaft ■ High shock and vibration resistance	■ Cone shaft or blind hollow shaft ■ Rotatable terminal box	■ Cone shaft or blind hollow shaft ■ Rotatable terminal box ■ Corrosion protection C4
Product family	HOG 71	HOG 86E	HOG 86

Sensing method	Optical		
Size (housing)	ø60 mm	ø99 mm	ø99 mm
Voltage supply	5 VDC ±5 %, 9...26 VDC		
Output stage			
- TTL/RS422	■	■	■
- HTL/push-pull	■	–	–
- HTL-P (Power Linedriver)	–	■	■
- LWL (fiber-optic interface)	With fiber-optic transducer (Outdoor-Box)		
Output signals	K1, K2, K0 + inverted		
Shaft type			
- Cone shaft 1:10	–	ø17 mm	
- Blind hollow shaft	ø8...12 mm	ø12...16 mm	
Connection	Terminals	Terminal box rotatable, flange connector M23	Terminal box rotatable, flange connector M23 or cable
Pulses per revolution	64...2048	512...2500	500...5000
Operating temperature	-20...+85 °C	-40...+100 °C	
Protection	IP 66		
Operating speed	≤10 000 rpm		
Max. shaft load	≤30 N axial, ≤40 N radial	≤350 N axial, ≤450 N radial	≤350 N axial, ≤450 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)		
Options	–	Corrosion protection C4	Function monitoring EMS Hybrid bearings Redundant (HOG 86M)

Redundant sensing

Devices with redundant, i.e. double sensing support demanding applications, e.g. where high availability and functional safety are required. 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.

With the HOG 86, HOG9 and HOG10 series from Hübner Berlin, you have a unique product portfolio at your disposal that combines more than 60 years of experience of the world market leader and the latest technologies to unrivalled robust and durable products.

Learn more:
www.baumer.com/HD-incremental

Features	■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 5000	■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 5000 ■ Hybrid bearings as standard ■ Corrosion protection CX (C5-M)	■ Cone shaft or blind hollow shaft ■ Corrosion protection CX (C5-M) ■ Hybrid bearings as standard ■ Protection class IP 67	■ Cone shaft or blind hollow shaft ■ Pulses per revolution up to 10 000 ■ Hybrid bearings as standard
Product family	HOG 9	HOG 10	HOG 11	HOG 100

Sensing method	Optical			
Size (housing)	ø97 mm	ø105 mm		
Voltage supply	5 VDC ±5 %, 9...30 VDC			5 VDC ±5 %, 9...26 VDC, 9...30 VDC
Output stage				
- TTL/RS422	■	■	■	■
- HTL/push-pull	–	–	–	–
- HTL-P (Power Linedriver)	■	■	■	■
- LWL (fiber-optic interface)	With fiber-optic transducer (Outdoor-Box)			
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Cone shaft 1:10	ø17 mm			
- Through hollow shaft	ø12...16 mm	ø12...20 mm		
Connection	Flange connector M23	Terminal box axial, radial		
Pulses per revolution	300...5000			1024...10 000
Operating temperature	-30...+100 °C	-40...+100 °C (-50...+100 °C option)		-30...+85 °C
Protection	IP 56	IP 66	IP 67	IP 66
Operating speed	≤10 000 rpm	≤12 000 rpm		
Max. shaft load	≤400 N axial, ≤500 N radial	≤450 N axial, ≤600 N radial		
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)			
Options	–	Function monitoring EMS Redundant (HOG 10M)	Function monitoring EMS Redundant (HOG 11M) DNV certificate	Centrifugal switch (FSL) Speed switch (ESL) Redundant (HOG 100M)

Enhanced Monitoring System EMS

Enhanced Monitoring System EMS in incremental encoders monitors all crucial encoder functionalities throughout the encoder's entire speed range. EMS will signal connection errors and speed up commissioning. During operation, EMS facilitates error tracking and prevents cost-intensive downtime.

HeavyDuty encoders incremental
Large hollow shaft

Through 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 as standard

HÜBNER BERLIN
A Baumer Brand

Features	• Through hollow shaft • Corrosion protection CX (C5-M) • Integrated lightning protection • Axial torque plate	• Through hollow shaft up to ø38 mm	• Through hollow shaft • Rotatable terminal box • Operating speed up to 6000 rpm • Pulses per revolution up to 5000	• Blind hollow shaft with keyway • Corrosion protection CX (C5-M) • Protection IP 67 • Pulses per revolution up to 8192
Product family	HOG 131	HOG 16	HOG 163	HOG 165

Sensing method	Optical			
Size (housing)	ø130 mm	ø158 mm	ø158 mm	ø165 mm
Voltage supply	5 VDC ±5 %, 9...30 VDC			
Output stage				
- TTL/RS422	■	■	■	■
- HTL-P (Power Linedriver)	■	■	■	■
- LWL (fiber-optic)	With fiber-optic transducer (Outdoor-Box)			
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Through hollow shaft	ø16...36 mm	ø20...38 mm	ø38...75 mm	–
- Blind hollow shaft	–	–	–	ø20...38 mm
Connection	Terminal box	Terminal box rotatable		
Pulses per revolution	2048...3072	250...2500	250...5000	1024...8192
Operating temperature	-40...+100 °C	-20...+85 °C	-30...+85 °C	-30...+100 °C
Protection	IP 56	IP 66	IP 56	IP 67
Operating speed	≤6000 rpm			
Max. shaft load	≤300 N axial, ≤500 N radial	≤450 N axial, ≤600 N radial	≤300 N axial, ≤500 N radial	≤500 N axial, ≤650 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)			
Options	Redundant (HOG 131M)	Redundant (HOG 16M)	Redundant (HOG 163M)	Redundant (HOG 165M) Through hollow shaft Long torque arm Surface protection in harsh environments

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. In parallel, hybrid bearings provide high-voltage proof isolation of the encoder shaft.

Through hollow shaft up to ø150 mm.

- Precise optical encoders for large drive shafts
- Outstanding high mechanical reserve capacity
- Isolated shaft

Learn more:
www.baumer.com/HD-incremental

Features	■ Through hollow shaft up to ø115 mm ■ Rotatable terminal box ■ Robust light-metal housing ■ Pulses per revolution up to 2048	■ Through hollow shaft up to ø115 mm ■ Rotatable terminal box ■ Robust light-metal housing ■ Pulses per revolution up to 4000	■ Through hollow shaft up to ø150 mm ■ Plug-in electronics for quick exchange, no need to uninstall ■ With crane eye for easy handling
Product family	HOG 220	HOG 22	HOG 28

Sensing method	Optical		
Size (housing)	ø227 mm		ø287 mm
Voltage supply	5 VDC ±5 %, 9...30 VDC		5 VDC ±5 %, 9...26 VDC
Output stage			
- TTL/RS422	■	■	■
- HTL-P (Power Linedriver)	■	■	■
- LWL (fiber-optic)	With fiber-optic transducer (Outdoor-Box)		
Output signals	K1, K2, K0 + inverted		
Shaft type			
- Through hollow shaft	ø80...115 mm		ø120...150 mm
Connection	Terminal box radial rotatable		Terminal box radial rotatable, mating connector M23
Pulses per revolution	1024, 2048	720...4000	1024...2048
Operating temperature	-30...+85 °C		
Protection	IP 56	IP 54	IP 56
Operating speed	≤3800 rpm		≤3600 rpm
Max. shaft load	≤450 N axial, ≤700 N radial		≤550 N axial, ≤800 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)		
Options	Redundant (HOG 220M) Isolated hollow shaft	Redundant (HOG 22M) Protection IP 56	Redundant (HOG 28M)
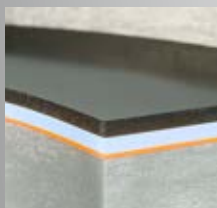
Outstanding corrosion protection

Thanks to optimized material selection and highly resistant coatings, Baumer encoders and sensors are ideally suited for corrosive environments, for example for permanent outdoor use at sea or in mobile automation. Their corrosion protection is determined by complex salt spray tests and usually corresponds to the highest corrosivity category C5-M (from 2018 CX) based on the EN ISO 12944 standard.

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	Blind hollow shaft up to ø14 mm High resistance against shocks and vibrations Patented expansion anchor for fan guard assembly
Product family	POGS 90	HOGS 71

Sensing method	Optical	
Size (housing)	ø115 mm	ø60 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	–	–
- Blind hollow shaft	–	ø12...14 mm
- Through hollow shaft	–	–
Flange	EURO flange B10	–
Connection	Terminal box, rotatable	Connecting terminals in the housing
Sine periods per revolution	720...5000	1024...5000
Operating temperature	-20...+85 °C	
Protection	IP 66	
Operating speed	≤10 000 rpm	
Max. shaft load	≤250 N axial, ≤350 N radial	≤30 N axial, ≤40 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)	
Options	Second shaft end	–

Blind hollow, through hollow or cone shaft.
- Precise optical sensing
- Extremely high signal quality

Learn more:
www.baumer.com/HD-incremental

Features	■ Cone shaft or blind hollow shaft up to ø20 mm	■ Through hollow shaft up to ø75 mm	■ Through hollow shaft up to ø70 mm ■ Axial torque plate ■ Clamping set
Product family	HOGS 100	HOGS 14	HOGS 151

Sensing method	Optical		
Size (housing)	ø105 mm	ø158 mm	ø168 mm
Voltage supply	5 VDC ±10 %, 9...30 VDC		
Output stage			
- SinCos 1 Vpp	■	■	■
Output signals	K1, K2, K0 + inverted		A+, B+, R+, A-, B-, R-
Shaft type			
- Cone shaft 1:10	ø17 mm	–	–
- Blind hollow shaft	ø12...20 mm	–	–
- Through hollow shaft	–	ø40...75 mm	ø60...70 mm
Connection	Terminal box, rotatable		Round connector, cable
Sine periods per revolution	1024...5000		
Operating temperature	-20...+85 °C		
Protection	IP 66	IP 55	IP 54
Operating speed	≤10 000 rpm	≤6300 rpm	
Max. shaft load	≤450 N axial, ≤600 N radial	≤150 N axial, ≤200 N radial	≤350 N axial, ≤500 N radial
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)		
Options	Second shaft end Centrifugal switch (FSL) Speed switch (ESL) Redundant (HOGS 100M)	–	–

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 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 scanning
- Energy self-sufficient *MicroGen* revolution counter
- Additional incremental signals with zero pulse
- Integrated speed switch optional

HÜBNER BERLIN A Baumer Brand

Programmable via Wifi adaptor

Features	■ Solid shaft with EURO flange B10 ■ Corrosion & seawater proof ■ Double-sided mounting	■ Solid shaft with EURO flange B10 ■ Corrosion & seawater proof ■ Double-sided mounting ■ Programmable	■ Cone shaft or hollow shaft ■ Corrosion & seawater proof ■ Double-sided mounting	■ Cone shaft or hollow shaft ■ Corrosion & seawater proof ■ Double-sided mounting ■ Programmable
Product family	PMG 10	PMG 10P	HMG 10	HMG 10P

Interface								
- SSI	■		■		■		■	
- CANopen® / DeviceNet	■ / ■		■ / ■		■ / ■		■ / ■	
- Profibus-DP / Profinet	■ / ■		■ / ■		■ / ■		■ / ■	
- EtherCAT / EtherNet/IP	■		■		■ / ■		■ / ■	
Function principle	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn	Multiturn	Singleturn
Programmable	–	–	■	■	–	–	■	■
Sensing method	Magnetic							
Size (housing)	ø115 mm				ø105 mm			
Voltage supply	9...30 VDC							
Shaft type								
- Solid shaft	ø11 mm				–			
- Cone shaft 1:10	–				ø17 mm			
- Hollow shaft	–				ø12...20 mm		ø12...20 mm	
Connection	Bus cover, terminal box, mating connector M12 or M23							
Steps per turn	≤1 048 576/20 bits							
Number of turns	≤1 048 576/ 20 bits	–	≤1 048 576/ 20 bits	–	≤1 048 576/ 20 bits	–	≤1 048 576/ 20 bits	–
Protection	IP 66, IP 67							
Operating temperature	-40...+85 °C (SSI: -40...+95 °C)							
Operating speed	≤12000 rpm							
Max. shaft load	≤450 N axial, ≤650 N radial							
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)							
Options	Additional incremental signals with zero pulse Integrated speed switch WLAN adapter for easy programming							

Through hollow shaft up to ø70 mm.
- Extremely robust design with bearings at both shaft ends
- Energy self-sufficient *MicroGen* revolution counter
- Additional incremental signals with zero pulse

EtherCAT® · *PROFIBUS*® · *PROFINET*® · SSI · CANopen · EtherNet/IP® · DeviceNet®

Learn more:
www.baumer.com/HD-absolute

Features	■ Through hollow shaft ■ Corrosion & seawater proof ■ Isolated bearings ■ Axial torque plate
Product family	HMG 161

| Interface	
- SSI	■
- CANopen® / DeviceNet	■ / ■
- Profibus-DP / Profinet	■ / –
- EtherCAT / EtherNet/IP	– / –
Function principle	Multiturn | Singleturn
Programmable	–
Sensing method	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 turn	≤8192/13 bits
Number of turns	≤65 536/ | – 16 bits
Protection	IP 66
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

Programming / monitoring

With the compact programming Wifi adapter, you can intuitively parameterise your HeavyDuty encoder 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 the principle's simplicity, the encoders are immune against magnetic fields, and combine wear-free operation over a large temperature range with leading edge robustness.
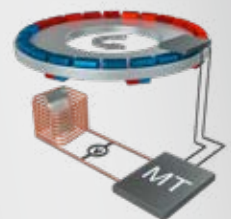
HeavyDuty speed switches / monitors
Mechanical / electronic

Mechanical centrifugal switches or
electronic speed switches.
- Mechanical centrifugal switches without auxiliary power supply
- Electronic speed switch, energy-autonomous tacho principle
- Up to three switching outputs
- Solid shaft
- EURO flange B10

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Features	■ Mechanical centrifugal switch ■ Operating temperature max. +130 °C	■ Electronic speed switch ■ Speed up to 6000 rpm	■ Electronic speed switch ■ 3 outputs	■ Electronic speed switch
Product family	**FS 90**	**ES 90**	**ES 93**	**ES 100**

Voltage supply	–	–	–	–
Switching outputs	1 output, speed-controlled	1 output, speed-controlled	3 outputs, speed-controlled	1 output, speed-controlled
Output switching capacity	≤6 A / 230 VAC ≤1 A / 125 VDC	≤6 A / 250 VAC ≤1 A / 48 VDC	–	≤6 A / 250 VAC ≤1 A / 48 VDC
Minimum switching current	50 mA	100 mA	40 mA	100 mA
Size (housing)	ø115 mm			
Shaft type				
- Solid shaft	ø11 mm			
Flange	EURO flange B10			
Connection	Terminal box			
Operating temperature	-30...+130 °C	-20...+85 °C		
Protection	IP 55			
Operating speed (n)	≤1.25 x ns	≤6000 rpm	≤5000 rpm	≤500 rpm
Switching speed range (ns)[1]	850...4900 rpm	650...6000 rpm	200...5000 rpm	110...500 rpm
Max. shaft load	≤150 N axial, ≤250 N radial			
Options	Product combination with encoder or tachogenerator			

1) Any selected switching speed as a permanent factory setting

Stand-alone product for
outdoor and switchboard.
- Configurable of HTL/TTL, PNP and SinCos signals
- Configurable switching thresholds
- Integrated speed display
- Standard component or safety component certified up to SIL3 / PLe

Learn more:
www.baumer.com/HD-speed

Features	▪ Configurable speed monitoring ▪ Outdoor housing ▪ With speed display	▪ Relay modul for DS 93 and encoder with DSL-R ▪ High switching performance ▪ DIN rail mount	▪ Safe speed monitors with SIL3/PLe certification ▪ For non-certified incremental encoders / proximity switches ▪ Inputs SinCos, TTL, HTL, PNP	▪ Safe speed monitors with SIL3/PLe certification ▪ For SIL-certified SinCos encoders ▪ Inputs SinCos
Product family	DS 93	DS 93 R	GMM230S, GMM236S	GMM240S, GMM246S

Voltage supply	15...26 VDC	–	18...30 VDC
Switching outputs	3 outputs, speed-controlled	3 potential-free relay contacts with changeover contact	1 relay-, 1 analog- and 4 control outputs HTL
Output switching capacity	High: 12 V, Low: 0 V ≤40 mA	≤6 A at 250 VAC or ≤1 A at 48 VC each output	Relay 5...36 V (5 mA...5 A) Analog 4...20 mA (≤270 Ω) HTL (≤30 mA each output)
Size (housing)	122 x 122 x 80 mm	50 x 75 x 55 mm	50 x 100 x 165 mm
Connection	Terminals with cable gland		Screw terminal and connector D-SUB
Operating temperature	-20...+70 °C	-20...+50 °C	-20...+55 °C
Protection	IP 65	IP 20	IP 20
Switching speed range (ns)	≤20 000 rpm	≤20 000 rpm	–
Options	Relay module with 3 potential-free relay contacts (DS 93R)	–	Splitter output SinCos and RS422 Programming unit

SAFETY

Mechanical centrifugal switches and electronic speed switches are ideally suited for the simple and fast implementation of safety functions when exceeding or falling below the speed of drives, machines and systems.
The following device types flexibly support the diverse requirements of safety architectures in OEM and retrofit applications:
- Speed switches
- Rotary encoder/speed switch combination
- Rotary encoder with integrated speed switch
- Stand-alone devices for encoder signal evaluation
In the design of your safety-relevant application and its certification by the notified body, our qualified and experienced experts would be glad to support you.

HeavyDuty speed switches / monitors
Digital / encoder-integrated

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

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Features	■ Blind hollow shaft ■ 2 switching outputs	■ Blind hollow shaft ■ 3 switching outputs	■ Through hollow shaft ■ 2 switching outputs	■ Through hollow shaft ■ 3 switching outputs
Product family	HOG 10+DSL.E	HOG 10+DSL.R	HOG 165+DSL.E	HOG 165+DSL.R

Sensing method	Optical			
Size (housing)	ø105 mm		ø165 mm	
Voltage supply	9...30 VDC	15...30 VDC	9...30 VDC	15...30 VDC
Output stage				
- TTL/RS422	■	■	■	■
- HTL-P (Power Linedriver)	■	■	■	■
Output signals	K1, K2, K0 + inverted			
Shaft type				
- Blind hollow shaft	ø16 mm		–	–
- Through hollow shaft	–	–	ø25 mm	
Connection	Terminal box			
Pulses per revolution	512...2500		512...4096	
Operating temperature	-30...+85 °C			
Protection	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		≤150 N axial, ≤200 N radial	
Switching outputs	2 relay outputs, each with its individual attack value, 1 relay output as control output	3 transistor outputs, each with its individual attack value	2 relay outputs, each with its individual attack value, 1 relay output as control output	3 transistor outputs, each with its individual attack value
Output switching capacity	≤0.25 A at 230 VAC/VDC at each output	High: 12 V, Low: 0 V ≤20 mA	≤0.25 A at 230 VAC/VDC at each output	High: 12 V, Low: 0 V ≤20 mA
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)			
Options	–	Relay module with 3 potential-free relay contacts (DS 93R)	–	Relay module with 3 potential-free relay contacts (DS 93R)

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

Configurable by
PC software

Learn more:
www.baumer.com/HD-speed

Features	■ Solid shaft with EURO flange B10 ■ 2 switching outputs	■ Solid shaft with EURO flange B10 ■ 3 switching outputs
Product family	POG 10+DSL.E	POG 10+DSL.R
Sensing method	Optical	
Size (housing)	ø120 mm	
Voltage supply	15...26 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	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, each with its individual attack value, 1 relay output as control output	3 transistor outputs, each with its individual attack value
Output switching capacity	≤0.25 A at 230 VAC/VDC at each output	High: 12 V, Low: 0 V ≤40 mA
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)	
Options	–	Relay module with 3 potential-free relay contacts (DS 93R)

HeavyDuty speed switches / monitors
Digital / encoder-integrated

Absolute encoders
with digital speed switch.

- Space-saving integration into encoder housing
- User-configurable on/off switching speeds
- Operating temperature -40...+95 °C
- Additional incremental signals with zero pulse
- Corrosion protection CX

EtherCAT® PROFIBUS®
CANopen PROFINET®
EtherNet/IP™ SSI
DeviceNet

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Features	■ Solid shaft with EURO flange B10 ■ 1 transistor output	■ Solid shaft with EURO flange B10 ■ 1 transistor output ■ Programmable	■ Cone shaft or blind hollow shaft ■ 1 transistor output	■ Cone shaft or blind hollow shaft ■ 1 transistor output ■ Programmable
Product family	PMG 10D	PMG 10PD	HMG 10D	HMG 10PD

Interface				
- SSI	■	■	■	■
- HTL/TTL	■	■	■	■
- CANopen® / DeviceNet	■ / ■	■ / ■	■ / ■	■ / ■
- Profibus-DP / Profinet	■ / ■	■ / ■	■ / ■	■ / ■
- EtherCAT / EtherNet/IP	■ / ■	■ / ■	■ / ■	■ / ■

Function principle	Singleturn / Multiturn			
Sensing method	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	–	–	ø12...20 mm	
- Through hollow shaft	–	–	ø12...20 mm	
Flange	EURO flange B10		–	–
Connection	Bus cover, terminal box, mating connector M12 or M23			
Steps per turn	≤1 048 576/20 bits			
Number of turns	≤1 048 576/20 bits			
Protection	IP 66, IP 67			
Operating temperature	-40...+85 °C (SSI: -40...+95 °C)			
Operating speed (n)	≤12000 rpm			
Switching speed range (ns)	2...12000 rpm			
Max. shaft load	≤450 N axial, ≤650 N radial		–	–
Switching outputs	1 transistor output, each with its attack value	1 transistor output speed controlled	1 transistor output, each with its attack value	1 transistor output speed controlled
Output switching capacity	≤100 mA with 30 VDC	≤100 mA with 30 VDC	≤100 mA with 30 VDC	≤100 mA with 30 VDC
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)			
Options	Additional incremental signals with zero pulse Relay output	Additional incremental signals with zero pulse Relay module with 3 potential-free relay contacts (DS 93R) WiFi adaptor for programming	Additional incremental signals with zero pulse Relay output	Additional incremental signals with zero pulse Relay module with 3 potential-free relay contacts (DS 93R) WiFi adaptor for programming

Flexible variety.
Individual configuration.

- Pulses per revolution
- Speed switching limits
- Switching characteristics / hysteresis
- SSI settings of absolute value

Programmable via Wifi adaptor

Learn more:
www.baumer.com/HD-speed

Intelligent HeavyDuty encoders

Intelligent HeavyDuty encoders with integrated speed switch provide positions as well as signals for speed detection and speed limitation in harsh environments.

Advantages
- Fast integration into your application
- Flexible parameterization and convenient monitoring of current signals
- Smartphone, tablet and PC directly connectable via WLAN programming adapter
- Integrated web server for access without software installation

HeavyDuty tachogenerators
Tachogenerators

Solid shaft with EURO flange B10.
Idle voltage up to 200 mV/rpm.

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

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Features	■ Solid shaft with EURO flange B10		■ Solid shaft with EURO flange B10, ø85 mm ■ Double tacho with redundant output (TDPZ)		■ Solid shaft with EURO flange B10 ■ Double tacho with redundant output (TDPZ)		■ Solid shaft with EURO flange B10 ■ Double tacho 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	No							
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 0.3 W	–	–
- Speed ≥2000 rpm	–	–	–	–	–	–	40 W	2 x 0.2 W
Rotor moment of inertia	0.4 kgcm²	0.6 kgcm²	0.25 kgcm²	0.29 kgcm²	1.1 kgcm²	1.2 kgcm²	0.4 kgcm²	0.2 kgcm²
Connection	Screw terminals		Terminal box					
Operating temperature	-30...+130 °C							
Protection	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 IP 56		–	

LongLife

LongLife technology in HeavyDuty tachogenerators is based on a commutator-embedded silver track which reduces wear virtually to zero. *LongLife* tachogenerators combine very high signal quality for optimum dynamic control with outstanding resilience and unrivalled longevity.

Analog tachogenerators by Baumer stand out by ultra-accurate conversion of tacho voltage throughout the entire speed range. *LongLife* transmission technology contributes a major share.

Learn more:
www.baumer.com/HD-tacho

HeavyDuty tachogenerators
Tachogenerators

Bearingless hollow shaft or cone shaft designs.
Idle voltage up to 60 mV per rpm.
- Ultimate longevity thanks to *LongLife* commutator with embedded silver track
- Operating temperature up to +130 °C
- Very high accuracy throughout the entire speed range

HÜBNER BERLIN
A Baumer Brand

Features	▪ Tachogenerator ▪ Bearingless ▪ Blind hollow shaft		▪ Tachogenerator ▪ Bearingless ▪ Blind hollow shaft		▪ Tachogenerator ▪ Bearingless ▪ Blind hollow shaft	▪ Tachogenerator ▪ Bearingless ▪ Blind hollow shaft	
Product family	GT 5		GT 7.08	GT 7.16	GT 9	GTB 9.06	GTB 9.16
Voltage supply	No						
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		ø7...14 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	16...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 kgcm²		0.4 kgcm²	0.55 kgcm²	0.95 kgcm²	0.95 kgcm²	
Connection	Plug-in terminals		Screw terminals		Plug-in terminals	Connector	
Operating temperature	-30...+130 °C						
Protection	IP 20		IP 55		IP 20	IP 68	
Operating speed	≤10 000 rpm		≤9000 rpm				
Options	–		Protection IP 44 with Protective cover		Protection IP 44 with Protective cover	–	

Learn more:
www.baumer.com/HD-tacho

Features	■ Tachogenerator ■ Bearingless ■ Blind hollow shaft	■ Tachogenerator ■ Blind hollow shaft	
Product family	GTR 9	KTD 3	KTD 4
Voltage supply/frequency	No		
Size (housing)	ø95 mm	ø100 mm	ø86 mm
Shaft type			
- Solid shaft	–	–	
- Blind hollow shaft	ø16 mm	ø14 mm	ø10...16 mm
Idle voltage	20...60 mV per rpm	20...60 mV per rpm	10...60 mV per rpm
Performance			
- Speed ≥5000 rpm	0.9 W	–	
Rotor moment of inertia	1.95 kgcm²	600-900 kgcm²	600 kgcm²
Connection	Connector	Screw terminals	Cable, radial
Operating temperature	-30...+130 °C	-25...+100 °C	-15...+100 °C
Protection	IP 56	IP 54	
Operating speed	≤9000 rpm	≤6000 rpm	
Options	–	–	Operating temperature -30 °C

HeavyDuty combinations
Incremental twin encoders

Two encoders on a common shaft.
Solid, blind hollow or cone shaft.
- ■ ■ Every encoder with optional redundant sensing
- ■ Integrated function monitoring EMS

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Features	■ Solid shaft with EURO flange B10 ■ Speed up to 12 000 rpm	■ Solid shaft with EURO flange B10 ■ Corrosion protection CX (C5-M)	■ Cone shaft or blind hollow shaft ■ Speed up to 10 000 rpm	■ Cone shaft or blind hollow shaft ■ Corrosion protection CX (C5-M)
Product family	POG 86 G POG 9 G	POG 10 G POG 11 G	HOG 9 G	HOG 10 G HOG 11 G

Sensing method	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 connector 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	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	Function monitoring EMS	Function monitoring EMS Redundant sensing and two terminal boxes per encoder	Function monitoring EMS	Function monitoring EMS Redundant sensing and two terminal boxes per encoder

Combinations *1 + 1 = 1*

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

HeavyDuty combinations
Tachogenerators

With mechanical centrifugal switch, electronic speed switch or incremental encoder.
- Energy-autonomous speed switch
- Electronic speed switch ESL with 1 or 3 switching outputs
- Mechanical centrifugal switch FSL with one switching output

Learn more:
www.baumer.com/HD-combi

Features	■ Tacho generator with integrated mechanical centrifugal switch ■ Solid shaft with EURO flange B10	■ Tacho generator with integrated mechanical centrifugal switch ■ Solid shaft with EURO flange B10	■ Tacho generator with electronic speed switch ■ Solid shaft with EURO flange B10	■ Tacho generator with 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 method	Optical			
Size (housing)	ø85 mm	ø115 mm		
With centrifugal switch	■	■	–	–
With speed switch	–	–	■	–
Voltage supply	No	No	12 VDC ±10 % (only TDP 0.2 +ESL 93)	5 VDC ±5 % 8...30 VDC
Idle voltage	10...60 mV per rpm	10...150 mV per rpm | 0...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	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...4900 rpm	850...4900 rpm	200...600 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	Normally open / Normally closed	Normally open / Normally closed	Transistor outputs: High: 12 V, Low: 0 V ≤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-autonomous speed switch
- Electronic speed switch ESL with one or three switching outputs
- Mechanical centrifugal switch FSL with one switching output

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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 ■ Special sealing against ingress of solids		■ Solid shaft with EURO flange B10 ■ Corrosion protection CX (C5-M) ■ For use in salty, oily-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 method	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	-25...+85 °C	-40...+100 °C	-25...+85 °C
Protection	IP 56		IP 56		IP 66		IP 67	
Operating speed	≤6000 rpm							
Switching speed range (ns)[1]	850...4900 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	Norm. open/ Norm. closed		Norm. open/ Norm. closed	Transistor outputs	Norm. open/ Norm. closed	Transistor outputs	Norm. open/ Norm. closed	Transistor outputs
Options	Function monitoring EMS				Function monitoring EMS Redundant sensing			

1) Any selected switching speed as a permanent factory setting

Mechanical centrifugal switch
or electronic speed switch.
- Energy-autonomous speed switch
- Electronic speed switch ESL with one or three switching outputs
- Mechanical centrifugal switch FSL with one switching output

Learn more:
www.baumer.com/HD-combi

Features	■ Cone shaft or blind hollow shaft	■ Cone shaft or blind hollow shaft ■ Special sealing against ingress of solids		■ Cone shaft or blind hollow shaft ■ Corrosion protection CX (C5-M) ■ For use in salty, oily-wet environments	
Product family	HOG 86+FSL	HOG 10+FSL	HOG 10+ESL	HOG 11+FSL	HOG 11+ESL

Sensing method	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	IP 56	IP 66		IP 67	
Operating speed	≤6000 rpm				
Switching speed range (ns)[1]	850...4900 rpm	850...4900 rpm (FSL) 200...6000 rpm (ESL)		850...4900 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	Norm. open/ Norm. closed	Norm. open/ Norm. closed	Transistor outputs	Norm. open/ Norm. closed	Transistor outputs
Options	Function monitoring EMS Redundant sensing				

Durable and space-saving.

Bearingless absolute encoder:
MHAD 50

Non-contact, wear-free and compact.

Bearingless encoders by Baumer operate on the non-contact method, most utlilize magnetic sensing and virtually all are free from wear. No dust, dirt or condensation will impair their reliable operation. They even withstand harmful fibres dominating any envirment in the textile industry. Our bearingless encoders are particularly resistant to shocks and vibrations with a virtually unlimited service life.

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

Fit into the smallest gap

Their extremely shallow installation depth, some designs merely 10 mm, make bearingless encoders with ring magnet and sensor an ideal solution where installation space is very limited – whether on shafts with 6 or 600 mm diameter. The narrow ring magnet and the lean sensor head even allow for attachment to the A-end of the shaft, for example between gearing and the machine part to be driven.

Bearingless encoders
Incremental

Hollow shaft up to ø150 mm.
Up to 8192 pulses per revolution.
- Square wave and SinCos signals
- Wear-free operation
- Small mounting depth for easy integration
- Immunity against dust, dirt, fibres and fluids

Features	■ Through hollow shaft up to ø43.5 mm ■ Up to 1024 ppr	■ Through hollow shaft up to ø43.5 mm ■ Up to 4096 ppr ■ Metal die cast housing	■ Through hollow shaft up to ø45 mm ■ Up to 50 ppr	■ Through hollow shaft up to ø28 mm ■ Up to 2048 ppr	
Product family	MDFK 08	MIR 10	ITD 67	ITD49H	ITD49H Sine

Sensing method	Magnetic				
Magnetic wheel diameter	ø30.5...56 mm	ø30.5...56 mm	ø72 mm	ø40 mm	
Mount magnetic wheel	Radial screw connection			Hot shrinking, stick, radial screw connection	
Dimensions (sensing head)	15 x 8.5 x 45.5 mm	10 x 15 x 45.5 mm	20 x 11 x 75 mm	12 x 16 x 48 mm	
Voltage supply	8...30 VDC 5 VDC ±5 %	10...30 VDC 5 VDC ±5 %	8...26 VDC	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 + inverted	A 90° B, R + inverted	A, B	A 90° B, R / A 90° B, R + inv.	
Output frequency	≤250 kHz	≤350 kHz	≤160 kHz	≤300 kHz (TTL) ≤160 kHz (HTL)	≤180 kHz
Shaft type					
- Through hollow shaft	ø6...43.5 mm	ø6...43.5 mm	ø10...45 mm	ø9...28 mm	
Connection					
- Cable	Radial				
Pulses per revolution	256...1024	320...4096	20, 50	64...2048	–
Sine periods per revolution	–	–	–	–	64
Operating temperature	-25...+85 °C	-40...+85 °C	-20...+85 °C	-40...+100 °C	
Protection	IP 67	IP 66, IP 67	IP 67	IP 67	
Operating speed	≤20 000 rpm	≤20 000 rpm	≤10 000 rpm	≤30 000 rpm	
Options	Cable with pre-assembled connector Serveral mounting options Magnetic shields Redundant sensing of a magnetic wheel with two sensing 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.

Learn more:
www.baumer.com/bearingless

Features	■ Through hollow shaft up to ø65 mm ■ Up to 4095 ppr		■ Through hollow shaft up to ø150 mm ■ Up to 8192 ppr	
Product family	ITD69H	ITD69H Sine	ITD89H	ITD89H Sine

Sensing method	Magnetic			
Magnetic wheel diameter	ø81 mm		ø162 mm	
Mount magnetic wheel	Hot shrinking, stick, radial screw connection			
Dimensions (sensing 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...150 mm	
Connection				
- Cable	Radial			
Pulses per revolution	128...4096	–	256...8192	–
Sine periods per revolution	–	128	–	246
Operating temperature	-40...+100 °C			
Protection	IP 67			
Operating speed	≤15 000 rpm		≤7500 rpm	
Options	Cable with pre-assembled connector Serveral mounting options Magnetic shields Redundant sensing of a magnetic wheel with two sensing heads			

Redundant sensing

To increase the availability and safety of your application, redundant sensing of one magnetic pole wheel with two sensing heads can be applied.
In the design of your safety-relevant application and its certification by the notified body, our qualified and experienced experts would be glad to support you.

Bearingless encoders
Incremental

HDmag

Features	■ Through hollow shaft ø16...80 mm ■ Installation depth ≤30 mm ■ Stainless steel wheel	■ Through hollow shaft ø50...180 mm ■ Installation depth ≤30 mm ■ Stainless steel wheel	■ Through hollow shaft ø70...340 mm ■ Installation depth ≤30 mm ■ Stainless steel wheel	■ Through hollow shaft ø650...740 mm ■ Installation depth ≤30 mm
Product family	MHGE 100	MHGE 200	MHGE 400	MHGE 800

Sensing method	Magnetic			
Magnetic wheel diameter	ø99.9 mm	ø201.7 mm	ø405.4 mm	ø813 mm
Dimensions (sensing head)	100 x 40 x 65 mm			
Voltage supply	Rectangular: 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 connector M23	Radial			
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	IP 66, IP 67			
Operating speed	≤8000 rpm	≤4000 rpm	≤2000 rpm	≤1000 rpm
Options	DNV certificate			DNV certificate Stainless steel wheel

HDmag

Bearingless *HDmag* encoders are based on the high-resolution scanning of a precision magnetic wheel combined with digital real-time signal processing. *HDmag* encoders are available as incremental and absolute variants, provide outstanding high resolution and fit virtually any shaft diameter.

Hollow shaft up to ø340 mm.
Up to 524 288 pulses per revolution.
- Square wave and SinCos signals
- Wear-free operation
- Wide axial tolerance ±3 mm
- Pole wheel fixation by screwing, gluing or shrinking
- Superb signal quality thanks to FPGA signal processing

Learn more:
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 method	Magnetic		
Magnetic wheel diameter	ø99.9 mm	ø201.7 mm	ø405.4 mm
Dimensions (sensing head)	120 x 30 x 90 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 connector M23	Radial		
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	IP 66, IP 67		
Operating speed	≤8000 rpm	≤4000 rpm	≤2000 rpm

Bearingless encoders
Absolute

Compact kit design ø36 mm and ø58 mm.
Singleturn and multiturn variants.
- Analog, SSI, fieldbus and realtime Ethernet interface
- Touchless, wear-free operation
- Immune against dust, dirt, fibres and fluids
- Wide axial tolerance for magnet rotor
- Robust R-series for demanding applications

MAGRES

Features	■ Encoder kit – size ø36 mm	■ Encoder kit – size ø36 mm ■ E1 compliant design ■ Corrosion protection CX (C5-M) ■ ISO 13849 compliant firmware	■ Encoder kit – size ø58 mm	■ Encoder kit – size ø58 mm ■ E1 compliant design ■ Corrosion protection CX (C5-M) ■ ISO 13849 compliant firmware
Product family	EAM360 Kit	EAM360R Kit	EAM580 Kit	EAM580R Kit

Interface				
- SSI	■	–	■	–
- Analog	–	■	–	■
- CANopen®	■	■	■	■
- SAE J1939	–	■	–	■
- Profinet	–	–	■	–
- EtherCAT	–	–	■	–
- EtherNet/IP	–	–	■	–

Function principle	Singleturn / Multiturn			
Sensing method	Magnetic			
Size (housing)	ø36 mm		ø58 mm	
Voltage supply	4.5 … 30 VDC (CANopen, SAE J1939, SSI) 8 … 30 VDC / 14 … 30 VDC (Analog - type-specific) 10 … 30 VDC (Ethernet)			
Shaft type				
- Ring magnet bore	ø6 mm, ø8 mm, ø12 mm			
Connection				
- Flange connector M12	Radial			
- Flange connector M23	–	–	Radial	–
- Cable	Radial (0.14 mm²)	Radial (0.5 mm²)	Radial (0.14 mm²)	Radial (0.5 mm²)
Steps per turn	≤65536/16 bits			
Number of turns	≤262 144/18 bits			
Operating temperature	-40...+85 °C			
Protection	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

Compact kit design ø50 mm and ø55 mm.
Singleturn variants.

- Analog, SSI and CANopen redundant interface
- Touchless, wear-free operation
- Immune against dust, dirt, fibres and fluids
- Small mounting depth down to 10 mm

Learn more:
www.baumer.com/bearingless

MAGRES

New   New

Features	■ Encoder kit – size ø50 mm ■ Integrated interfaces ■ Singleturn	■ Encoder kit – size ø55 mm ■ Integrated interfaces ■ Singleturn
Product family	EAM500	BMSK 55

Interface		
- SSI	–	■
- Analog	■	–
- CANopen® / redundant	■ / ■	– / –
Function principle	Singleturn	
Sensing method	Magnetic	
Size (housing)	ø50 mm	ø55 mm
Voltage supply	10...30 VDC (CANopen®) 12...30 VDC (Analog) 5 VDC ±5 % (Analog)	10...30 VDC (on request) 5 VDC ±10 %
Shaft type		
- Bore of magnet rotor	ø5...8 mm	
Connection		
- Cable	Radial	
Steps per turn	≤4096/12 bits (Analog) ≤16384/14 bits (CANopen®)	≤4096/12 bits
Absolute accuracy	±1.8°	±1°
Operating temperature	-40...+85 °C	-20...+85 °C
Protection	IP 67	
Operating speed	≤800 rpm	≤6000 rpm

Bearingless encoders
Absolute

**Hollow shaft up to ø340 mm.
Singleturn variants.**

- SSI and CANopen® interface
- Additional square wave and SinCos signals
- Wide axial tolerance ±3 mm
- Touchless, wear-free operation
- Immune against dust, dirt, fibres and fluids

HDmag

Features	■ Wear-free encoder ■ Through hollow shaft ø30 mm	■ Wear-free encoder ■ Through hollow shaft ø16...80 mm ■ Stainless steel wheel	■ Wear-free encoder ■ Through hollow shaft ø50...180 mm ■ Stainless steel wheel	■ Wear-free encoder ■ Through hollow shaft ø70...340 mm ■ Stainless steel wheel
Product family	MHAD 50	MHAP 100	MHAP 200	MHAP 400

Interface				
- SSI	■	■	■	■
- CANopen®	■	–	–	–
Function principle	Singleturn			
Sensing method	Magnetic			
Magnetic wheel diameter	ø50 mm	ø101.3 mm	ø203.1 mm	ø406.8 mm
Dimensions (sensing head)	55 x 36 x 20 mm	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	ø30 mm	ø16...80 mm	ø50...180 mm	ø70...340 mm
Connection				
- Flange connector M12	Radial	–	–	–
- Flange connector M23	–	Radial		
- Cable	Radial	–	–	–
Total resolution	≤65 536 / 16 bits	≤131 072 / 17 bits		
Absolute accuracy	±0.3° (-40...+85 °C) ±0.25° (+20 °C)	–	–	–
Pulses per revolution	1024...8192	1...131 072	1...262 144	1...524 288
Sine periods per revolution	–	1...8192	1...16 384	1...32 768
Operating temperature	-40...+85 °C	-20...+85 °C		
Protection	IP 67	IP 66, IP 67		
Operating speed	≤6000 rpm	≤8000 rpm	≤4000 rpm	≤2000 rpm

Hollow shaft ø3183 mm.
Up to 131 072 pulses per revolution.
- Square wave, SinCos and SSI interface
- Position and speed signals via SSI
- Any shaft diameter as standard
- Wear-free
- Wide axial tolerance ±5 mm
- Radial air gap up to 3 mmm

HÜBNER BERLIN
A Baumer Brand

Learn more:
www.baumer.com/bearingless

HDmag flex

Features	■ Magnetic belt encoder with adapter wheel ■ Incremental ■ Pulses per revolution up to 131 072 ■ For shaft ø90...300 mm	■ Magnetic belt encoder ■ Incremental ■ Pulses per revolution up to 131 072 ■ For shaft ø300...3183 mm	■ Magnetic belt encoder with adapter wheel ■ Quasi-absolute ■ Resolution up to 24 bits singleturn ■ For shaft ø90...300 mm	■ Magnetic belt encoder ■ Quasi-absolute ■ Resolution up to 24 bits singleturn ■ For shaft ø300...3183 mm
Product family	MIR 350F	MIR 3000F	MQR 350F	MQR 3000F

Sensing method	Magnetic			
Dimensions (sensing 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
Connection	Flange connector M23			
Pulses per revolution	512...131 072		1024...4096	
Sine periods per revolution	512...16 384		1024...4096	
Operating temperature	-40...+85 °C			
Protection sensing head	IP 67	IP 66, IP 67	IP 67	IP 66, 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. The sensor head will fit any shaft diameter thanks to both sensing elements being permanently aligned in the factory. The magnetic scale is buckled on the shaft like a belt. *HDmag flex* magnetic belt encoders are characterized by short lead times, easy installation with wide axial and radial tolerances, outstanding robustness and reliability for precise position and speed feedback with ultimate resolution.

Bearingless encoders
Analog magnetic rotary encoders

Cylindrical design.
Angular range 120...360°.
- Linearized analog output signals
- Resolution up to 0.09°
- With magnet rotor
- Absolute sensing

Features	■ Linear angular range 120° ■ Output signal 4...20 mA	■ Linear angular range 270° ■ Output signal 4...20 mA		■ Linear angular range 160° ■ Output signal 0.5...4.5 VDC / 1...9 VDC	■ Linear angular range 360° ■ Output signal 0...4.3 VDC / 0...5 VDC	
Product family	MDRM 18	MDRM 18	MDRM 18	MDRM 18	MDRM 18	MDRM 18

Sensor housing	Cyclindrical threaded					
Angular range	120° linear	270° linear		160° linear	360° linear	
Resolution	0.09	0.09°	1.41°	0.09°	0.09°	1.41°
Sensing distance max.	5 mm (with magnet rotor MSFS)	5 mm (with magnet rotor MSFS)	4 mm (with magnet rotor MSFS)	5 mm (with magnet rotor MSFS)	5 mm (with magnet rotor MSFS)	4 mm (with magnet rotor MSFS)
Output circuit	Current output			Voltage output		
Output signal	4...20 mA			0.5...4.5 VDC 1...9 VDC	0...4.3 VDC	0...5 VDC
Response time	<2 ms					
Dimensions (sensing head)	18 mm					
Connection	Cable 2 m Mating connector M12	Cable 2 m Connector M12		Cable 2 m Mating connector M8	Cable 2 m Connector M12	
Voltage supply	15...30 VDC			5 VDC 12...28 VDC	4.7...7.5 VDC	4.75...5.25 VDC
Operating temperature	-40...+85 °C					
Protection	IP 67					

Functional principle

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

Rectangular design.
Angular range 270...360°.
- Linearized analog output signals
- Resolution up to 0.09°
- With magnet rotor
- Absolute sensing

Features	■ Linear angular range 270° ■ Output signal 4...20 mA ■ Resolution 0.09°	■ Linear angular range 270° ■ Output signal 4...20 mA ■ Resolution 1.41°	■ Linear angular range 360° ■ Output signal 0...4.3 VDC ■ Resolution 0.09°	■ Linear angular range 360° ■ Output signal 0...5 VDC ■ Resolution 1.41°
Product family	MDFM 20	MDFM 20	MDFM 20	MDFM 20

Sensor housing	Rectangular			
Angular range	270° linear		360° linear	
Resolution	0.09°	1.41°	0.09°	1.41°
Sensing distance max.	5 mm (with magnet rotor MSFS)	4 mm (with magnet rotor MSFS)	5 mm (with magnet rotor MSFS)	4 mm (with magnet rotor MSFS)
Output circuit	Current output		Voltage output	
Output signal	4...20 mA		0...4.3 VDC	0...5 VDC
Response time	<4 ms			
Dimensions (sensing head)	20 x 30 x 8 mm			
Connection	Cable 2 m Mating connector M8			
Voltage supply	15...30 VDC		4.7...7.5 VDC	4.75...5.25 VDC
Operating temperature	-40...+85 °C			
Protection	IP 67			

Unlimited
possibilities.

Incremental encoder EIL580P
with Handheld programming tool

Less variants – lower storage 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.

According to the product variant, the encoders can be intuitively configured using the handheld programming tool, a PC, tablet or smartphone - even if the encoder is already installed in the system. Convenient parameter download simplifies documentation and encoder integration.

Whether as end customer, system integrator, maintenance technician or wholesaler - thanks to configuration flexibility few variants will suffice in your application. This will not only speed up your processes but in parallel significantly cut down on inventory costs.

Programmable encoders
Size ø58 mm

Precise optical or magnetic sensing.
Up to 131 072 pulses per revolution.
- Easy programming by software and handheld tool
- Configure encoder ppr value, zero pulse and HTL/TTL output
- Adjust speed switch limit values and characteristics

Features	■ Solid shaft with clamping flange up to ø10 mm or synchro flange up to ø6 mm	■ Solid shaft with clamping flange up to ø10 mm or synchro flange up to ø6 mm	■ Blind or through hollow shaft up to ø15 mm	■ Blind or through hollow shaft up to ø15 mm
Product family	EIL580P-SC	EIL580P-SY	EIL580P-B	EIL580P-T

Configurable parameters	Pulses per revolution, output stage HTL or TTL, zero pulse, signal sequence			
Configuration	PC software / hardware adapter, handheld programming tool			
Sensing method	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 connector M23	Radial / axial			Radial
- Cable	Radial / axial / tangential			Radial / tangential
Pulses per revolution	1...65536			
Operating temperature	-40...+100 °C			
Protection	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	Certification ATEX II 3 D, Zone 22 (ExEIL580, ExEIL580P), Square flange 2.5 Inch, EURO-flange B10 (REO-flange), isolated hollow shaft, fix pulse number (EIL580)			

Flexible variety.
Individual configuration.
- Pulses per revolution
- Zero pulse blanking
- Signal level HTL / TTL
- Speed switching limits and switching characteristics

HighRes – up to 131 072
pulses per revolution

Learn more:
www.baumer.com/programmable

Features	■ Through hollow shaft ■ Inch dimenions ■ Isolated shaft	■ HeavyDuty encoder ■ Absolute and incremental signals / speed switch ■ Solid shaft with EURO flange B10	■ HeavyDuty rotary encoder ■ Absolute and incremental signals / speed switch ■ Cone shaft or hollow shaft
Product family	HS35P	PMG 10P	HMG 10P
Configurable parameters	Pulses per revolution, output stage HTL or TTL, zero pulse	Pulses per revolution, switching speed, SSI settings of absolute output	Pulses per revolution, switching speed, SSI settings of absolute output
Configuration	PC software / hardware adapter, handheld programming tool	WLAN adapter, monitoring function	WLAN adapter, monitoring function
Sensing method	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 mm			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 connector M23	–	Radial	Radial
- Flange connector MIL	Radial	–	–
- 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		IP 66, IP 67	IP 66, IP 67
Operating speed	≤5000 rpm	≤12000 rpm	≤12000 rpm
Max. shaft load	–	≤450 N axial, ≤650 N radial	–
Options	Fix resolution HTL/TTL up to 80 000 ppr, SinCos up to 5000 periods per revolution	Additional incremental signals with zero pulse Integrated speed switch Absolute interfaces	Additional incremental signals with zero pulse Integrated speed switch Absolute interfaces

Bare your teeth.

Hall sensor MHRM18
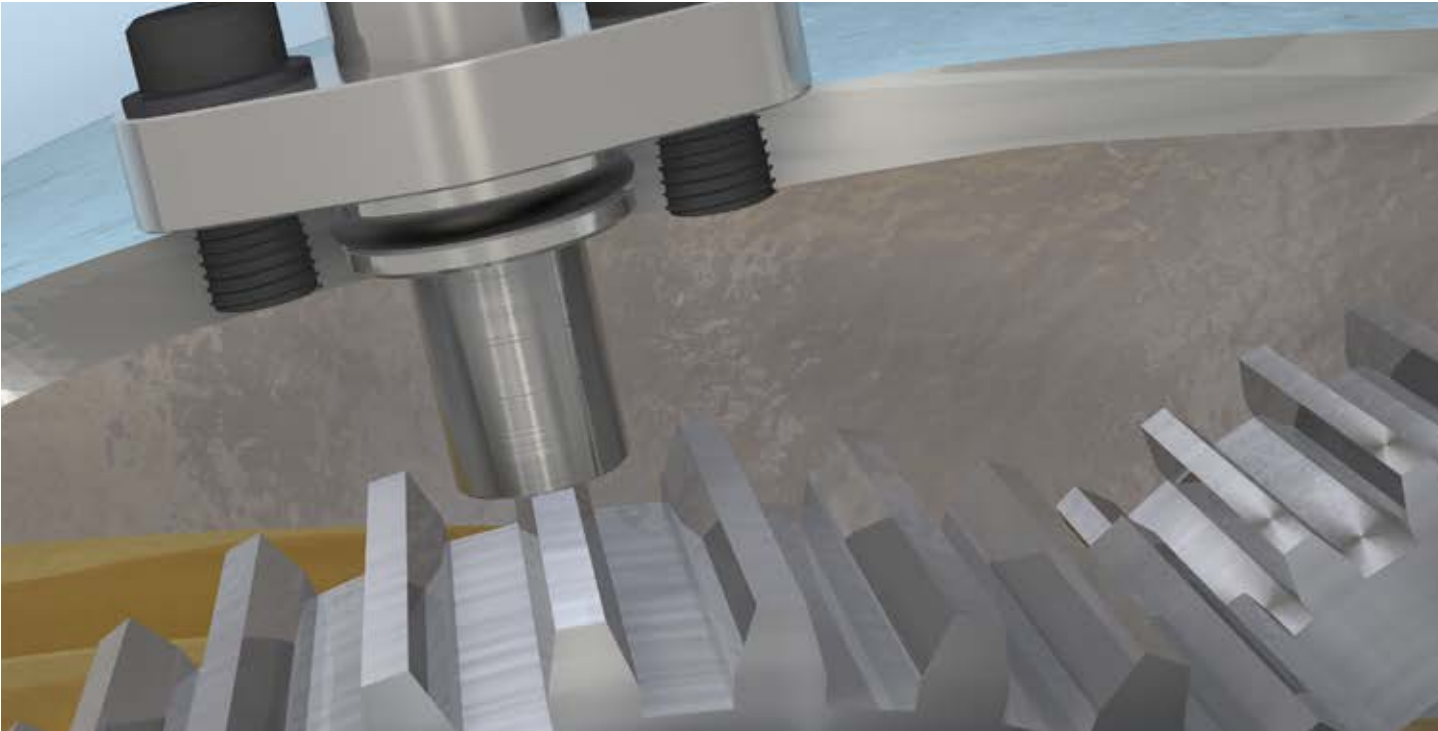
Non-contact and wear-free detection

Thanks to their high switching frequency of up to 20 kHz, hall sensors are preferred for the measurement and monitoring of speeds, velocities and positions of fast-rotating gears. Thanks to their high resolution, gear teeth can be reliably detected even from module size 1. Thanks to two phase shifted signals, the direction of rotation can be determined in addition to the speed.

Since hall sensors do not require any moving mechanical elements, wear is minimized and the service life is considerably extended. In a full metal housing, they are ideally suited for use in dirty, humid or oily environments.

Hall / speed sensors

Size up to 18 mm.
Incremental.

- Scanning of gear wheels from module 1
- High switching frequency up to 20 kHz
- For dirty, humid and oily environments

Features	■ Cylindrical design M12 ■ 1-channel push-pull output ■ High switching frequency ■ Large temperature range	■ Cylindrical design M12 ■ 2-channel push-pull output ■ Detection of speed and rotational direction ■ High protection class and pressure resistance ■ Wide temperature range up to +120 °C	■ Cylindrical design M12 ■ 1-channel PNP output ■ High degree of protection and pressure resistance ■ Wide temperature range up to +120 °C	■ Cylindrical design M18 ■ 1-channel PNP output ■ Wide temperature range up to +120 °C
Product family	MHRM 12 - 1 channel	MHRM 12 - 2 channels	IHRM 12 - 1 channel	MHRM 18 - 1 channel

Size	12 mm			18 mm
Housing length	50 mm, 60 mm	60 mm		
Switching frequency	0...15 kHz		1...20 kHz	
Gear size	>Modul 1			
Gear width	>6 mm			
Output signal A	Push-pull	Push-pull	PNP	PNP
Output signal B	–	Push-pull	–	–
Connection	Cable, connector	Cable	Cable, mating connector M12	Cable
Housing material	Brass nickel plated	Chrome-nickel steel		
Operating temperature	-40...+85 °C	-40...+120 °C	-40...+120 °C (-25...+75 °C)	-40...+120 °C
Protection (sensing face)	IP 67	IP 68		
Protection (sensor)	IP 67	IP 67		

Robust speed measurement

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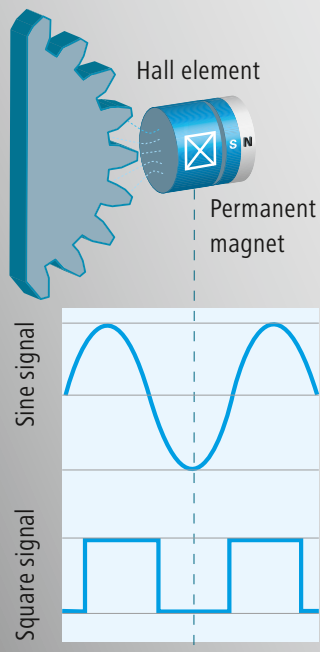
Functional principle

Hall sensors operate on a current-carrying semiconductor which is biased by a permanent magnet installed behind. This magnetic field being penetrated by a ferromagnetic object causes the semiconductor to change voltage, which is transformed by the integrated electronics into an amplified square signal.

Hall element

Permanent magnet

Sine signal

Square signal

Solutions for every scenario.

Absolute encoder / ATEX
X 700 with bus cover

SIL, Ex, stainless steel 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 turbines.

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

Certification

Ever-extending IECEx certification of our explosion-protected HeavyDuty incremental encoders ensures compliance to most demanding international safety directives. Hence, the encoders are approved for use throughout all 30 countries supporting the IECEx standard. International certification provides particular benefit to OEMs when exporting their machines and systems.

Encoders for hazardous environments

Zone 1, 2 | Zone 21, 22 | Class I Division 1, Class 2 Division 1.
ATEX, IECEx, IEC (UL).
- Size 58...160 mm
- Square wave and sine signals
- SSI, CANopen®, Profibus-DP

Features	■ Incremental encoder ■ Solid shaft with EURO flange B10 ■ ATEX-/IECEx certification ■ SinCos signal with *LowHarmonics*		■ Incremental encoder ■ Through hollow shaft ■ ATEX-/IECEx certification	■ Incremental encoder ■ Solid shaft with clamping or synchro flange ■ Blind or through hollow shaft ■ ATEX certification	■ Incremental encoder ■ Solid shaft with clamping or synchro flange ■ Blind or through hollow shaft ■ ATEX certification ■ Programmable
Product family	EEx OG 9	EEx OG 9 S	EEx HOG 161	ExEIL580	ExEIL580P

Sensing method	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	5 VDC ±5 % 8...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			–	–
- Flange connector M12, M23	–			Radial / axial	Radial / axial
- Cable	–		–	Radial / axial / tangential	Radial / axial / tangential
Pulses per revolution	1...5000	–	250...2500	100...5000	100...5000
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)	-40...+85 °C	-40...+85 °C
Protection	IP 56		IP 54, IP 56	IP 65, IP 67	IP 65, IP 67
Operating speed	≤5600 rpm		≤5600 rpm	≤12 000 rpm (IP 65) ≤6000 rpm (IP 67)	≤12 000 rpm (IP 65) ≤6000 rpm (IP 67)
Max. shaft load	≤200 N axial, ≤350 N radial		≤450 N axial, ≤650 N radial	≤40 N axial, ≤80 N radial	≤40 N axial, ≤80 N radial
Explosion protection	Ex II 2G (ATEX/IECEx)		Ex II 2G (ATEX/IECEx)	Ex II 3D (ATEX)	Ex II 3D (ATEX)
Options	Cable gland M16, M20, M25x1.5		Cable gland M20x1.5	–	–

Zone 1, 2 | Zone 21, 22 | Class I Division 1, Class 2 Division 1.
ATEX, IECEx, IEC (UL).

- Size 58...160 mm
- Square wave and sine signals
- SSI, CANopen®, Profibus-DP

Features	- Incremental encoder - Solid shaft with clamping flange - Stainless steel housing - ATEX certification	- Absolute encoder - Solid shaft with clamping flange - Stainless steel housing - ATEX certification	- Absolute encoder - Solid shaft with clamping flange - Stainless steel housing - ATEX certification - Modular bus cover
Product family	X 700 - incremental	X 700 - SSI	X 700 - CANopen® X 700 - Profibus-DP

Interface				
- SSI	–	■		–
- CANopen® / Profibus-DP	–	–		■ / ■
Function principle	Incremental	Multiturn	Singleturn	Multiturn	Singleturn
Sensing method	Optical			
Size (housing)	ø70 mm			
Output stages				
- TTL/RS422	■	–		–
- HTL/push-pull	■	–		–
- SinCos 1 Vpp	–	–		–
Output signals	A 90° B, R + inverted	–		–
Voltage supply	4.75...30 VDC	10...30 VDC		
Shaft type				
- Solid shaft	ø10 mm			
Flange	Clamping flange			
Connection				
- Cable gland	Axial	Axial		Bus cover, radial
Pulses per revolution	5...5000	–		–
Steps per turn	–	≤8192/13 bits	≤16384/14 bits	≤8192/13 bits	≤16384/14 bits
Number of turns	–	≤4096/12 bits	–	≤4096/12 bits	–
Absolute accuracy	–	±0.025°		
Operating temperature	-25...+70 °C	-25...+60 °C		
Protection	IP 67			
Operating speed	≤6000 rpm			
Max. shaft load	≤60 N axial, ≤50 N radial			
Explosion protection	Ex II 2D/2G (ATEX)			

For special applications
Redundant absolute encoders

Two sensing systems.
For maximum availability and safety.
- Size 28...58 mm
- SSI, CANopen®, analog

Features	■ Solid shaft with flat mounting flange ■ Redundant sensing	■ Encoder kit – size ø50 mm ■ Integrated interface ■ Singleturn ■ Redundant sensing	■ Solid shaft or hollow shaft ■ E1 compliant design ■ Corrosion protection CX (C5-M) ■ ISO 13849 compliant firmware ■ Two-channel architecture
Product family	EAM280	EAM500	EAM580R

Interface			
- Analog redundant	■	■	–
- CANopen® redundant	■	■	■
Function prinzip	Singleturn	Singleturn	Multiturn | Singleturn
Sensing method	Magnetic		
Size (housing)	ø28.6 mm	ø50 mm	ø58 mm
Voltage supply	10...30 VDC (CANopen®), 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
- Ring magnet bore	–	ø5...8 mm	–
Connection	Flange connector M12, cable	Cable	Flange connector M12, cable
Total resolution	≤12 bits (Analog) / ≤14 bits (CANopen®)		≤32 bits | ≤16 bits
Steps per turn	4096/12 bits (Analog) / 16 384/14 bits (CANopen®)		16384/14 bits | 65 536/16 bits
Number of turns	–	–	≤262144/18 bits | –
Absolute accuracy	±1.8°	±1.8°	Up to ±0.15°
Operating temperature	-40...+85 °C	-40...+85 °C	-40...+85 °C
Protection	IP 65	IP 67	IP 67
Operating speed	≤800 rpm	≤800 rpm	≤6000 rpm
Max. shaft load	≤25 N axial, ≤25 N radial	–	≤40 N axial, ≤80 N radial

Functional safety with standard components

An efficient and economic implementation of functional safety applications with standard components in the sense of the Machinery Directive is possible under certain pre-conditions. In the design of your safety-relevant application and its certification by the notified body, our qualified and experienced experts would be glad to support you.

With SIL2 and SIL3 certificate.
For quick implementation of your system concepts.
- Safe rotary encoders
- Square wave and SinCos signals

Features	■ Incremental encoders ■ Solid shaft with clamping or synchro flange ■ SIL2 certification	■ Sine encoders ■ Through hollow shaft ■ SIL2/SIL3 certification	■ Sine encoders ■ Cone shaft ■ Blind hollow shaft ■ PLd/SIL2 certification
Product family	GI357	ITD22H00 SIL	HOGS 100S

Sensing method	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	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...14 mm	–
Flange	Clamping or synchro flange	–	–
Connection			
- Terminal box	–	–	Radial
- Flange connector M12, M23	Radial, axial	–	–
- Cable	–	Tangential	–
Pulses per revolution	5...5000	–	–
Sine periods per revolution	–	1024, 2048	1024...5000
Operating temperature	-25...+85 °C	-30...+100 °C	-25...+85 °C
Protection	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 DIN EN 61508	SIL2 or SIL3 compliant in redundant use	PLd/SIL2 certification
Other	–	For use with SIL3 / PLe-certified motion monitors GMM240S / GMM246S	

For special applications
Stainless steel encoders / incremental

Housing V2A or V4A.
Up to 10 000 pulses per revolution.
- Size 58...89 mm
- Square wave and SinCos signals

Features	■ Through hollow shaft ■ Up to 6000 ppr	■ Solid shaft with clamping flange ■ Up to 6000 ppr	■ Blind hollow shaft ■ Up to 6000 ppr	■ Blind hollow shaft ■ Up to 10 000 ppr ■ Sine periods per revolution 1024...2048	
Product family	GE333	GE355	GF355	ITD21 A4 Y65	ITD 41 A4 Y141	ITD 42 A4 Y141

Sensing method	Optical				
Size (housing)	ø58 mm			ø89 mm	
Voltage supply	5 VDC ±10 %, 4.75...30 VDC, 10...30 VDC			5 VDC ±5 %, 8...30 VDC	
Output stage					
- TTL/RS422	■	■		■	■	–
- HTL/push-pull	■	■		■	■	–
- SinCos 1 Vpp	–	–		–	–	■
Output signals	A 90° B, R + inverted				A, B, R + inv.	A, B, R
Shaft type					
- Solid shaft	–	ø10 mm		–	–	–
- Blind hollow shaft	–	–		–	ø20...27 mm	–
- Through hollow shaft	ø12 mm	–		ø10...14 mm	–	ø20...27 mm
Connection					
- Cable	Radial	Radial / axial		Radial	Radial	
Pulses per revolution	5...6000	5...6000		200...6000	200...10 000	–
Sine periods per revolution	–	–		–	–	1024...2048
Operating temperature	-25...+100 °C (5 VDC) -25...+85 °C (24 VDC)	-25...+85 °C		-20...+85 °C	-20...+70 °C	-20...+85 °C
Protection	IP 65	IP 67		IP 66	IP 67	
Operating speed	≤6000 rpm	≤10 000 rpm		≤3000 rpm	≤2500 rpm	
Max. shaft load	–	≤20 N axial, ≤40 N radial			–	
Material	Stainless steel: 1.4305	Stainless steel: 1.4305	Stainless steel: 1.4404	Stainless steel: 1.4305	Stainless steel: 1.4305	Stainless steel 1.4305
Options	–	–		Cable with connector	Cable with connector	

Housing V2A or V4A.
- Size 58 mm
- SSI, fieldbus, realtime Ethernet

EtherCAT   EtherNet/IP   PROFIBUS®

CANopen   DeviceNet   PROFINET®

ETHERNET POWERLINK   SSI   SAE J1939

MAGRES hermetic

Features	Solid shaft with clamping flange / Integrated interfaces	Solid shaft with clamping or synchro flange / Through hollow shaft / Flexible bus cover	Solid shaft with clamping flange / Hermetically sealed / Integrated interfaces	Solid shaft with clamping flange / Hermetically sealed / Flexible bus cover
Product family	GE244	GE404	GEMMW	GEMMH	BMMV 58 - hermetic	BMMV 58 - hermetic

Interface						
- SSI	■		–		■	–
- CANopen®	–		■		■	■
- DeviceNet	–		■		–	■ 1)
- Profibus-DP	–		■		■	■
- SAE J1939	–		■ 1)		–	■
- EtherCAT	–		■ 1)		–	■ 1)
- EtherNet/IP	–		■ 1)		–	■
- Powerlink	–		■ 1)		–	■ 1)
- Profinet	–		■ 1)		–	■

Function principle	Singleturn	Multiturn	Multiturn	Multiturn	Multiturn
Sensing method	Optical			Magnetic	
Size (housing)	ø58 mm				
Voltage supply	10...30 VDC				
Shaft type					
- Solid shaft	ø10 mm		ø6, ø10 mm	–	ø10 mm	
- Through hollow shaft	–		–	ø12...14 mm	–	–
Connection	M23 radial		Bus cover cable gland		Bus cover M12	
Total resolution	14 bits	26 bits	29 bits		≤29 bits	≤30 bits
Steps per turn	≤16384/14 bits	≤4096/12 bits	≤8192/13 bits		≤8192/13 bits	≤4096/12 bits
Number of turns	–	≤16384/14 bits	≤65 536/16 bits		≤65 536/16 bits	≤262 144/18 bits
Absolute accuracy	±0.025°			±1°	
Operating temperature	-25...+85 °C			-40...+85 °C	
Protection	IP 67			IP 68, IP 69 K	
Operating speed	≤6000 rpm				
Max. shaft load	≤20 N axial ≤40 N radial		≤20 N axial ≤40 N radial	–	≤120 N axial (combined), ≤280 N radial (combined) ≤270 N axial (single load)	
Material	Stainless steel: 1.4305 / 1.4404		Stainless steel: 1.4305			

1) on request

For special applications
Offshore incremental encoders

For use in CX environments.
- Size ø100...800 mm
- Square wave and SinCos signals

Features	■ Cone shaft or blind hollow shaft ■ High protection IP 67	■ Through hollow shaft	■ Through hollow shaft ■ Bearingless encoders ■ Up to 32 768 ppr	■ Through hollow shaft ■ Bearingless encoders ■ Up to 32 768 ppr
Product family	HOG 11	HOG 131	MHGE 100	MHGE 800
Sensing method	Optical	Optical	Magnetic	Magnetic
Size (housing) Size (magnetic wheel)	ø105 mm	ø130 mm	100 x 40 x 65 mm ø99.9...813 mm	100 x 40 x 65 mm ø99.9...813 mm
Voltage supply	5 VDC ±5 % 9...30 VDC	5 VDC ±5 %, 9...26 VDC 9...30 VDC	Rectangular: 4.75...30 VDC Sine: 5 VDC	Rectangular: 4.75...30 VDC Sine: 5 VDC
Output stage				
- TTL/RS422	■	■	■	■
- HTL-P (Power Linedriver)	■	■	■	■
- SinCos 1 Vpp	−	−	■	■
Output signals	K1, K2, K0 + inverted	K1, K2, K0 + inverted	A+, B+, R+ , A-, B-, R-	A+, B+, R+ , A-, B-, R-
Output frequency	≤120 kHz	≤120 kHz	≤300 kHz	≤300 kHz
- Cone shaft 1:10	ø17 mm	−	−	−
- Blind hollow shaft	ø12...20 mm	−	−	−
- Through hollow shaft	−	ø16...36 mm	ø16...80 mm	ø650...740 mm
Connection				
- Flange connector M23	−	−	Radial	Radial
- Terminal box	Radial	Radial	−	−
Pulses per revolution	300...2500	2048...3072	64...4096	512..32 768
Sine periods per revolution	−	−	64	512
Operating temperature	-30...+85 °C	-40...+100 °C	-40...+100 °C	-40...+100 °C
Protection	IP 67	IP 56	IP 67 (sensor head)	IP 67 (sensor head)
Operating speed	≤6000 rpm	≤6000 rpm	≤8000 rpm	≤1000 rpm
Max. shaft load	≤250 N axial, ≤400 N radial	≤300 N axial, ≤500 N radial	−	−
Explosion protection	Ex II 3G IIC / 3D IIIC (ATEX)	Ex II 3G IIC / 3D IIIC (ATEX)	−	−
Corrosion protection	Corrosion and seawater resistant			
Options	DNV certificate	−	DNV certificate	DNV certificate Stainless steel wheel

For use in CX environments.
- Size ø58...122 mm
- SSI, fieldbus, real-time Ethernet

EtherCAT®   PROFIBUS®
CANopen
EtherNet/IP™   PROFINET®
DeviceNet   SSI

New

Features	■ Solid shaft with clamping or synchro flange	■ Through hollow shaft	■ Solid shaft with clamping or synchro flange	■ Cone, solid, blind or through hollow shaft ■ Double-sided mounting ■ Stainless steel	
Product family	GM400-C[1)	GM401-C[1)	G0M2H-C[1)	G0A2H-C[1)	GXMMW-C[1)	PMG 10	HMG 10

Interface					
- SSI / SSI with incremental	■ / ■	■ / ■	■ / ■	■ / ■	■ / ■
- CANopen®	–	–	■	■	■
- DeviceNet	–	–	■	■	■
- Profibus-DP	–	–	■	■	■
- EtherCAT	–	–	■	■	■
- Profinet	–	–	■	■	■

Function principle	Multiturn	Multiturn	Singleturn	Multiturn	Multiturn / Singleturn
Sensing method	Optical				
Size (housing)	ø58 mm	ø58 mm		ø58 mm	ø115 mm	ø105 mm
Voltage supply	10...30 VDC	10...30 VDC		10...30 VDC	9...30 VDC
Shaft type					
- Solid shaft	ø10 mm	ø6 mm	–		ø6 mm, ø10 mm	ø11 mm	–
- Cone shaft 1:10	–	–		–	–	ø17 mm
- Blind hollow shaft	–	–		–	–	ø12...20 mm
- Through hollow shaft	–	ø12...14 mm		–	–	ø12...20 mm
Flange	Clamping flange	Synchro flange	–		Clamping flange, synchro flange	EURO flange B10	–
Connection	Flange connector M23 cable	Flange connector M23 cable		Bus cover with M12 or cable gland	Bus cover, terminal box, connector M12 or M23
Total resolution	≤30 bits	≤26 bits	≤14 bits	≤29 bits	≤40 bits
Steps per turn	≤16384/14 bits	≤16384/14 bits	≤16384/14 bits	≤8192/13 bits	≤1 048 576/20 bits
Number of turns	≤65536/16 bits	≤4096/12 bits	–	≤65 536/16 bits	≤1 048 576/20 bits
Absolute accuracy	±0.025°	±0.025°		±0.025°	–
Protection	IP 54, IP 65	IP 54 (IP 65 option)		IP 54, IP 65	IP 66, IP 67
Operating temperature	-25...+85 °C	-25...+85 °C		-25...+85 °C	-40...+100 °C
Operating speed	≤6000 rpm	≤6000 rpm		≤6000 rpm	≤12 000 rpm
Max. shaft load	≤20 N axial, ≤40 N radial	–		≤20 N axial, ≤40 N radial	≤450 N axial, ≤650 N radial
Corrosion protection	CX (C5-M)			Corrosion and seawater resistant	
Options	Additional incremental signals				

1) on request

Tilt and vibration safely under control.

Inclination sensor GIM500R.

Inclination / acceleration sensors

Precise and robust.

The Baumer GIM inclination sensors are ideal for easy and precise angle measurement at all types of machinery and system components, especially where the rotary axis is difficult to access. Robust industrial design with IP 69 protection, corrosion resistance CX (C5-M), supreme EMC capabilties and E1 compli-ant electronics ensure ultimate durability in harsh environments, particularly in mobile automation.

Baumer inclination and acceleration sensors utilize MEMS technology (micro electro mechanical system) and stand out by compact designs, high cost efficiency and ultimate durability under adverse conditions. The MEMS sensor elements deployed by Baumer are particularly designed for use in harsh industrial environments to ensure maximum system uptime.

The Baumer GAM900 acceleration sensor is a two-in-one pro-duct. It delivers precise acceleration information to a higher-level system via CANopen® or analog interface. In parallel, the sensor monitors shocks and vibrations, and reports any limit exceeded via the relay output.

The product variant GAM900S provides limit monitoring in compliance to funcitonal safety integrity requirements up to SIL2/PLd. The EC type examination enables fast implementation of demanding safety requirements and speeds up conformi-ty assessment procedures in accordance with the Machinery Directive.

Redundant sensing

To increase the availability and safety of your application, two redundant inclination sensors can be used to scan a component under certain conditions. 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.

Inclination / acceleration sensors
Inclination sensors

One and two-dimensional sensing.
Compact design.
- Analog, CANopen® and SAE J1939
- Robust metal or plastic housing
- MEMS technology

Learn more:
www.baumer.com/inclination

Features	■ Sensing range: 0...360° (1-dimensional) ■ Corrosion protection CX (C5-M) ■ E1 compliant design	■ Sensing range: Up to ±60° (2-dimensional) ■ Corrosion protection CX (C5-M) ■ E1 compliant design	■ Sensing range: 0...360° (1-dimensional) ■ Corrosion protection CX (C5-M) ■ E1 compliant design ■ ISO 13849 compliant firmware	■ Sensing range: Up to ±90° (2-dimensional) ■ Corrosion protection CX (C5-M) ■ E1 compliant design ■ ISO 13849 compliant firmware
Product family	GIM140R - 1-dimensional	GIM140R - 2-dimensional	GIM500R - 1-dimensional	GIM500R - 2-dimensional

Interface				
- Analog	■	■	■	■
- CANopen®	■	■	■	■
- SAE J1939	–	–	■	■
Sensing method	MEMS			
Size (housing)	48 x 14 x 45 mm		48 x 24 x 52 mm	
Voltage supply	8...30 VDC, 12...30 VDC		8...36 VDC	
Connection	Cable		Cable, flange connector M12	
Total resolution	0.2°		0.025°	
Accuracy				
- Sensing range 0...360°	±0.4°	–	±0.1°	–
- Sensing range ±10°	–	±0.4°	–	±0.1°
- Sensing range ±30°, ±60°	–	±0.4°	–	±0.1°
- Sensing range ±90°	–	–	–	±0.1°
Operating temperature	-40...+85 °C			
Protection	IP 67 / IP 69K		IP 69K	
Options	Out-of-range diagnostic Cable with DEUTSCH connector			

Measuring inclination even in harsh environments

Inclination sensors detect the angle of inclination towards the horizontal line at machines and equipment. Acting as electronic water scale, they are ideal for measuring inclination angles, particularly where rotation shafts are difficult to access. Baumer inclination sensors significantly contribute towards improved safety, for example at cranes. The robust and saltwater-proof, IP 69K-rated aluminium die cast housing makes them ideal for industrial use in a rough ambiance.

Vibration and shock detection.
3-dimensional.

- Diversitary redundant sensing
- Offshore capable
- Analog and CANopen®
- Configurable filter settings

Learn more:
www.baumer.com/acceleration

Features	■ Up to two relay outputs for limit monitoring ■ 3-dimensional sensing	■ Safe limit monitoring by relay output ■ Redundant 3-dimensional sensing ■ SIL2/PLd certification
Product family	GAM900	GAM900S

Interface		
- Analog	■	■
- CANopen®	■	■
Sensing method	MEMS	2 x MEMS
Size (housing)	55 x 30 x 90 mm	
Voltage supply	10...30 VDC	
Connection	Flange connector 1x or 2x M12	
Frequency bands	6 (configurable)	4 (configurable)
Total resolution	<4 mg	
Accuracy 3σ (with band pass filtering)	=35 mg (range ±1000 mg) =10 mg (range ±250 mg)	=60 mg (range ±1000 mg) =15 mg (range ±250 mg)
Measuring range	±2 g	
Operating temperature	-40...+85 °C	
Protection	IP 67	
Material	Aluminium or glass-fiber reinforced plastic	
Options	Filter up to 150 Hz	

Functional safety with certificate

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

Linear measurement made easy.

Cable transducer GCA5
for measuring length up to 7.8 m.

Easy attachment – reliable results.

Whether original equipment or retrofitting – Baumer cable tranducers 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 to ensure reliable and low-maintenance operation in harsh environments.

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

Redundant variants

Cable transducers with redundant sensing and signal output of the position value will increase application availability and safety.
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.

Three-chamber design

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

Distance measurement
Cable transducers

Robust design for outdoor use.
Measuring length up to 20 m.
- Absolute position sensing integrated
- Redundant sensing and interface
- Analog and CANopen®
- Compact housing

New | New | New

Features	■ Measuring length up to 4.7 m ■ Non-contact magnetic sensing ■ Dirt skimmer ■ Three-chamber 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 ■ Three-chamber design
Product family	GCA3	GCA5	GCA8 | GCA12	GCA20

Function principle	Absolute			
Interface				
- Analog / redundant	■ / ■	■ / ■	■ / ■	■ / ■
- CANopen® / redundant	■ / ■	■ / ■	■ / ■	■ / ■
Sensing method	Non-contact magnetic		Potentiometric	
Size	88 x 88 x 60.5 mm	88 x 88 x 65 mm	88 x 88 x 80.5 mm | 126 x 126 x 98 mm	222 x 271 x 124 mm
Voltage supply	8...30 VDC, 12...30 VDC (Analog), 10...30 VDC (CANopen®)			
Measuring length max.	4.7 m	7.8 m	8 m | 12 m	20 m
Linearity	±0.5 %	±0.5 %	±0.3 %	±1 %
Connection				
- Flange connector M12	Radial			
- Cable	Radial			
Resolution	Up to 14 bits			
Operating temperature	-40...+85 °C			
Protection	IP 67	IP 67	IP 65	IP 65
Materials	Housing: Plastic Cable: Stainless steel with coating		Housing: Plastic/aluminium Cable: Stainless steel with coating	Housing: Aluminium Cable: Stainless steel with coating
Options	Integrated redundant inclination sensor	Integrated redundant inclination sensor Two-channel architecture ISO 13849 compliant firmware	Integrated redundant inclination sensor	Integrated redundant inclination sensor

Integrated inclination sensor

Your added value:
- A single compact sensor to measure length and angle simultaneously
- Convenient length and inclination readout via CANopen®
- Ideal for boom position measurement
- Saving installation space and cabling effort

Modular system.
Measuring length up to 50 m.
- Flexible product combinations of cable-pull and standard rotary encoder
- All standard absolute and incremental interfaces
- Maximum reliability and longevity
- Precision metal housing
- Highest linearity

Learn more:
www.baumer.com/cabletransducer

Features	■ Measuring length 2.1 m ■ Absolute or incremental encoder		■ Measuring length 3 m ■ Absolute or incremental encoder		■ Measuring length 5...15 m ■ Absolute or incremental encoder		■ Measuring length 30...50 m ■ Absolute or incremental encoder	
Product family	GCI2	GCA2	GCI4	GCA4	GCI15	GCA15	GCI50	GCA50
Function principle	Incremental	Absolute	Incremental	Absolute	Incremental	Absolute	Incremental	Absolute
Interface								
- SSI / BiSS-C	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■
- CANopen® / DeviceNet	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■
- Profibus-DP / Profinet	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■
- EtherCAT / EtherNet/IP	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■
- Powerlink / SAE J1939	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■	– / –	■ / ■
Output stage								
- TTL/RS422	■	–	■	–	■	–	■	–
- HTL/push-pull	■	–	■	–	■	–	■	–
Size	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	5 VDC 4.75...30 VDC	10...30 VDC	5 VDC 4.75...30 VDC	10...30 VDC	5 VDC 4.75...30 VDC	10...30 VDC	5 VDC 4.75...30 VDC	10...30 VDC
Measuring length	2.1 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 connector M12, M23	Radial, axial							
- Cable	Radial, axial							
- Bus cover	Radial							
Operating temperature	-20...+85 °C							
Protection (encoder)	IP 65							
Materials	Cable-pull housing: plastic Encoder housing: aluminium Wire: sheathed stainless steel		Cable-pull housing: aluminium Encoder housing: aluminium Wire: sheathed stainless steel					
Options	Operating temperature -40...+85 °C							

Distance measurement
Linear magnetic encoders

Size 10 mm.
Unlimited measuring range.
- Square wave output signals
- Max. resolution 0.02 mm
- With magnetic belt

Features	■ Linear measuring system ■ Output signals A 90° B with index pulse ■ Output circuit push-pull or RS422
Product family	MIL10

Size (sensing head)	Rectangular
Dimensions (sensing head)	10 x 15 x 45.5 mm
Sensing distance	0.1...0.6 mm
Interpolation	Factor 20, 50, 100
Movement speed	<5 m/s (resolution 5 µm) <10 m/s (resolution 10 µm) <25 m/s (resolution 25 µm)
Output circuit	HTL/Push-pull TTL/RS422
Output signal	A 90° B
Total resolution	5 µm (factor 4 evaluation) 10 µm (factor 4 evaluation) 25 µm (factor 4 evaluation)
System accuracy	±(0.02 mm +0.04 mm x magnetic belt length)
Connection	Cable 2 m Cable 0.3 m with connector M12
Voltage supply	10...30 VDC, 5 VDC ±5 %
Operating temperature	-40...+85 °C
Protection	IP 66, IP 67

Measuring wheel encoder for length measurement.

- Voltage supply 4.75...30 VDC
- Protection IP 64

Learn more:
www.baumer.com/wheel

Features	■ Encoder assembly including tether arm and measuring wheel ■ User-adjustable contact pressure	■ Solid shaft with clamping flange or synchro flange ■ Incremental encoder with measuring wheel and programming tool	
Product family	MA20	EIL580P-SC	EIL580P-SY
Configurable parameters	16 pre-defined resolutions	Pulses per revolution, output stage HTL or TTL, zero pulse, signal sequence	
Configuration	HEX switch	Programming software, Programming tool	
Sensing method	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 connector M12	Radial	Radial / axial	
- Flange connector 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	IP 64	IP 65, IP 67	
Operating speed	≤3000 rpm	≤12 000 rpm (IP 65) ≤6000 rpm (IP 67)	
Options	Measuring wheels available with different rubber linings	Approval ATEX II 3 D, zone 22 (ExEIL580, ExEIL580P)	

Convenient programming

Easy programming of EIL580P and Ex EIL580P by handheld tool

- 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 to ensure the best match with the material properties of the measuring object: Aluminium, TPE, PUR and NBR with diameters from 20 to 50 cm. For best results and optimum grip.

Accessories
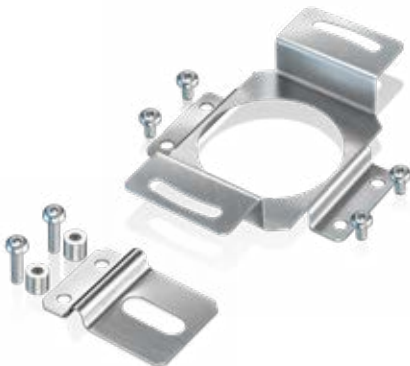
Mounting accessories for hollow shaft encoders

Matching 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

Matching accessories for
solid shaft mount

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

Programming and diagnostic tools

For encoder commissioning
and configuration

- Signal processing for interpolation, conversion, regenerating and as a switching relay, HTL, TTL, SinCos and fiber-optic
- Programming tools with GSD-/EDS-/XML files as well as instruction manuals, USB adatpor and PC software
- Testing equipment for incremental encoders for consistent monitoring of encoder data
- PC software for display and evaluation

Rotary encoders and angle sensors

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.

Deployed in conjunction with incremental encoders, measuring wheels perform the task of length measurement or speed monitoring. Learn more at: www.baumer.com

Learn more:
www.baumer.com/accessories

Varied connectors and cables

Matching all encoders
and angular sensors

- Mating connector M12, M23, MIL and other standards
- Mating connector pre-assembled or for self-assembly
- Different cables, non-assembled

Small and large measuring wheels

Measuring wheels – for any surface the optimum grip

- 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

HÜBNER BERLIN
A Baumer Brand

Features	■ Conversion HTL to TTL / TTL to HTL ■ Signal regeneration ■ Potential separation with several receivers ■ 1 input unit / 3 output units	■ Conversion TTL to HTL ■ Conversion HTL to TTL ■ Signal regeneration		■ Conversion TTL to HTL ■ Conversion HTL to TTL ■ Signal regeneration	
Product family	**HEAG 150**	**HEAG 151**	**HEAG 152**	**HEAG 153**	**HEAG 154**

Size	DIN rail housing 150 x 75 x 55 mm	DIN rail housing 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	K1, K2, K0 + inverted			
Output signals	K1, K2, K0 + inverted	K1, K2, K0 + inverted			
Output circuit	Optocoupler				
Connection	Screw terminals				
Consumption	≤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	IP 20				

Precision interpolators and signal converters.
- Enhanced resolution and signal interpolation
- Up to three signal outputs
- TTL, HTL and SinCos

Learn more:
www.baumer.com/signal-processing

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 mount housing 122 x 122 x 80 mm		
Voltage supply	10...30 VDC	5 VDC ±5%, 10...30 VDC	
Inputs			
- Number	2	2	2
- TTL/RS422	–	–	–
- HTL/push-pull	–	–	–
- SinCos 1 Vpp	■	■	■
Outputs			
- Number	3	2	4
- TTL/RS422	■	–	■
- HTL/push-pull	■	–	■
- SinCos 1 Vpp	–	■	■
- Error output	■	–	■
Input signals	A+, A-, B+, B-, R+, R-		
Output signals	A+, A-, B+, B-, R+, R-		
Connection	Mating 3-pin connector M23		
Consumption	≤150 mA (15 VDC)	≤500 mA (5 VDC), ≤300 mA (10...30 VDC)	
Input frequency	400 kHz		
Operating temperature	0...+50 °C		
Protection	IP 65		
Options	A+, A-, B+, B-, R+, R-, Error		

Accessories
Signal processing

Features	■ Transmitter for fiber optic signals (FO) ■ Switch cabinet device for DIN rail mounting ■ Conversion HTL/TTL to FO ■ 4+2 channels ■ Transmission length ≤1500 m	■ Transmitter for fiber optic signals (FO) ■ Field device with outdoor box ■ Conversion HTL/TTL to FO ■ 4+2 channels ■ Transmission length ≤1500 m	■ Receiver for fiber optic signals (FO) ■ Switch cabinet device for DIN rail mounting ■ Conversion FO to HTL/TTL ■ 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 gland	–	M16, M20, M32x1.5	–
- Fiber-optic	2x ST connector	2x ST connector	2x ST connector
Consumption	≤300 mA		
Operating temperature	-20...+70 °C	-40...+85 °C	-20...+70 °C
Protection	IP 20	IP 66, IP 67	IP 20
Signal monitoring	Error detection and status signals Redundant transmission via two optical fibers Automatic channel switching in case of failure of a fiber optic line		

Optical signal transmission.
Parallel communication via up to 4 optical fibres.
- Immunity to interference in environments with high EMC loads.
- Transmission range up to 1500 m
- High precision transmission of TTL/HTL encoder signals

Learn more:
www.baumer.com/signal-processing

Features	■ Signal conversion TTL to LWL ■ For EMC-critical environments	■ Signal conversion HTL to LWL ■ For EMC-critical environments	■ Signal conversion LWL to TTL ■ For EMC-critical environments	■ Signal conversion LWL to HTL ■ For EMC-critical environments
Product family	HEAG 171	HEAG 172	HEAG 173	HEAG 174
Size	Surface mount housing 122 x 122 x 80 mm		DIN rail housing 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 terminals	–	–	■	■
- Cable gland M16	■	■	–	–
- Cable gland M20	■	■	–	–
Max. load current	200 mA		60 mA	
Operating temperature	-20…+70 °C		-20…+50 °C	
Protection	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 optical fibers, protected by a CRC checksum against bit errors and loss of individual data packets.

For maximum system availability, we recommend redundant transmission via two optical fibers in parallel. If one optical fiber should fail, the receiver will further generate high-quality signals from the information of the remaining optical channel.

Index

Worldwide presence and supreme competence in consulting, 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.

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

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

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

Worldwide presence.

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