Baumer Tachogenerators and Resolvers
Tachogenerators Baumer are an electric devices that measure the shaft rotation frequency and convert it into an electrical signal.

The German company produces several categories of such equipment. All series are products that can operate in heavy duty conditions.

The devices use Longlife technology, which consists of a silver track integrated in the commutator. This feature allows equipment almost completely to avoid wear. The technology significantly increases the life of the device and its reliability in harsh environments. Special seals are located in both sides of sensor’s body.

The company Baumer hubner produces the following types of tachogenerators:

- Solid shaft
- Bearingless
- Hollow shaft

To find out stock ability and delivery time to your region, please contact our manager.

info@eltra-trade.com
Content.

HeavyDuty encoders incremental 4
Size up to ø120 mm / solid shaft 6
Size up to ø105 mm / hollow shaft 8
Large hollow shaft 10
Sine/Cosine 12

HeavyDuty encoders absolute 14
Size up to ø115 mm 14
Large hollow shaft 15

HeavyDuty speed switches / monitors 16
Mechanical / electronic 16
Digital / stand-alone 17
Digital / encoder-integrated 18

HeavyDuty tachogenerators 22

HeavyDuty combinations 26

Bearingless encoders 30
Incremental 32
Absolute 36
For wide shaft diameter 39
Analog magnetic rotary sensors 40
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

Baumer Hübner

Hübner Berlin, now Baumer Hübner, is the Baumer Group competence center for HeavyDuty sensors particularly conceived for drive engineering. 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.
Heavy Duty 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

**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

**Output stage**
- TTL/RS422
- HTL/push-pull
- HTL-P (Power Linedriver)
- LWL (fiber-optic interface)

**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 56
- 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.
# HeavyDuty encoders incremental

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

<table>
<thead>
<tr>
<th>Features</th>
<th>POG 90</th>
<th>POG 10</th>
<th>POG 11</th>
<th>EEx OG 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Pulses per revolution up to 10000</td>
<td>■</td>
<td>■</td>
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<td>■</td>
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<tr>
<td>Solid shaft with EURO flange B10</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Pulses per revolution up to 5000</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Corrosion protection CX (C5-M)</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>HeavyDuty connection technology</td>
<td>■</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>

## Product family

- POG 90
- POG 10
- POG 11
- EEx OG 9

## Specifications

### 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 (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 IIC (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.**

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www.baumer.com 7

www.eltra-trade.com info@eltra-trade.com +421 552 601 099
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
- Blind hollow shaft

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
- ≤10000 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

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.

**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)
- 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

**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

**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

Features

- Through hollow shaft
- Corrosion protection CX (CS-M)
- Integrated lightning protection
- Axial torque plate

- Through hollow shaft up to ø38 mm
- Rotatable terminal box
- Operating speed up to 6000 rpm
- Pulses per revolution up to 5000

- Through hollow shaft
- Blind hollow shaft with keyway
- Corrosion protection CX (CS-M)
- Protection IP 67
- Pulses per revolution up to 8192

Product family

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

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.
**HeavyDuty encoders incremental**

**Large hollow shaft**

Through hollow shaft up to ø150 mm.

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

---

**Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>HOG 220</th>
<th>HOG 22</th>
<th>HOG 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through hollow shaft up to ø115 mm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Rotatable terminal box</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Robust light-metal housing</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Pulses per revolution up to 2048</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Pulses per revolution up to 4000</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Through hollow shaft up to ø150 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug-in electronics for quick exchange, no need to uninstall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With crane eye for easy handling</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Product family**

<table>
<thead>
<tr>
<th>Feature</th>
<th>HOG 220</th>
<th>HOG 22</th>
<th>HOG 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (housing)</td>
<td>ø227 mm</td>
<td>ø287 mm</td>
<td></td>
</tr>
<tr>
<td>Voltage supply</td>
<td>5 VDC ±5 %, 9...30 VDC</td>
<td>5 VDC ±5 %, 9...26 VDC</td>
<td></td>
</tr>
<tr>
<td>Output stage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- TTL/RS422</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>- HTL-P (Power Linedriver)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- LWL (fiber-optic)</td>
<td>With fiber-optic transducer (Outdoor-Box)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output signals</td>
<td>K1, K2, K0 + inverted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sensing method**

Optical

**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**

<table>
<thead>
<tr>
<th>1024, 2048</th>
<th>720...4000</th>
<th>1024...2048</th>
</tr>
</thead>
</table>

**Operating temperature**

-30...+85 °C

**Protection**

- IP 56
- IP 56
- 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**

<table>
<thead>
<tr>
<th>Redundant (HOG 220M)</th>
<th>Redundant (HOG 22M) Protection IP 56</th>
<th>Redundant (HOG 28M)</th>
</tr>
</thead>
</table>

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**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

<table>
<thead>
<tr>
<th>Features</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td></td>
</tr>
<tr>
<td>Sine periods per revolution up to 5000</td>
<td></td>
</tr>
<tr>
<td>Blind hollow shaft up to Φ14 mm</td>
<td></td>
</tr>
<tr>
<td>High resistance against shocks and vibrations</td>
<td></td>
</tr>
<tr>
<td>Patented expansion anchor for fan guard assembly</td>
<td></td>
</tr>
</tbody>
</table>

### Product family

<table>
<thead>
<tr>
<th></th>
<th>POGS 90</th>
<th>HOGS 71</th>
</tr>
</thead>
</table>

### Sensing method
- Optical

### Size (housing)
- Φ115 mm
- Φ60 mm

### Voltage supply
- 5 VDC ±10 %, 9...30 VDC

### Output stage
- SinCos 1 Vpp

### Output signals
- K1, K2, K0 + inverted

### Shaft type
- Solid shaft
- Cone shaft 1:10
- Blind hollow shaft
- 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
- ≤10000 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
**HeavyDuty encoders incremental**

**Sine/Cosine**

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

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

---

**Features**

<table>
<thead>
<tr>
<th>Cone shaft or blind hollow shaft up to ø20 mm</th>
<th>Through hollow shaft up to ø75 mm</th>
<th>Through hollow shaft up to ø70 mm</th>
</tr>
</thead>
</table>

**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
- 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**

- ≤10000 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.

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www.eltra-trade.com  info@eltra-trade.com  +421 552 601 099
# 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

### Features

<table>
<thead>
<tr>
<th></th>
<th>Solid shaft with EURO flange B10</th>
<th>Solid shaft with EURO flange B10</th>
<th>Cone shaft or hollow shaft</th>
<th>Cone shaft or hollow shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corrosion &amp; seawater proof</td>
<td>Corrosion &amp; seawater proof</td>
<td>Corrosion &amp; seawater proof</td>
<td>Corrosion &amp; seawater proof</td>
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<tr>
<td></td>
<td>Double-sided mounting</td>
<td>Double-sided mounting</td>
<td>Double-sided mounting</td>
<td>Double-sided mounting</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Product family

<table>
<thead>
<tr>
<th></th>
<th>PMG 10</th>
<th>PMG 10P</th>
<th>HMG 10</th>
<th>HMG 10P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- SSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- CANopen® / DeviceNet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Profibus-DP / Profinet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- EtherCAT / EtherNet/IP</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Function principle

<table>
<thead>
<tr>
<th></th>
<th>Multiturn</th>
<th>Singleturn</th>
<th>Multiturn</th>
<th>Singleturn</th>
<th>Multiturn</th>
<th>Singleturn</th>
<th>Multiturn</th>
<th>Singleturn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Sensing method

Magnetic

### Size (housing)

<table>
<thead>
<tr>
<th></th>
<th>Ø115 mm</th>
<th>Ø105 mm</th>
</tr>
</thead>
</table>

### Voltage supply

9…30 VDC

### Shaft type

- Solid shaft Ø11 mm
- Cone shaft 1:10 Ø17 mm
- Hollow shaft Ø12…20 mm

### Connection

Bus cover, terminal box, mating connector M12 or M23

### Steps per turn

<table>
<thead>
<tr>
<th></th>
<th>≤1048576/20 bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of turns</td>
<td></td>
</tr>
<tr>
<td>≤1048576/20 bits</td>
<td>≤1048576/20 bits</td>
</tr>
</tbody>
</table>

### 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 IIC (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

Features
- Through hollow shaft
- Corrosion & seawater proof
- Isolated bearings
- Axial torque plate

Product family
HMG 161

Interface
- SSI
- CANopen® / DeviceNet
- 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

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

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

### Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>FS 90</th>
<th>ES 90</th>
<th>ES 93</th>
<th>ES 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical centrifugal switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature max. +130 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic speed switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed up to 6000 rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic speed switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 outputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Product family

<table>
<thead>
<tr>
<th>Product family</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS 90</td>
</tr>
<tr>
<td>ES 90</td>
</tr>
<tr>
<td>ES 93</td>
</tr>
<tr>
<td>ES 100</td>
</tr>
</tbody>
</table>

### Voltage supply

<table>
<thead>
<tr>
<th>Voltage supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
</tr>
</tbody>
</table>

### Switching outputs

<table>
<thead>
<tr>
<th>Switching outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 output, speed-controlled</td>
</tr>
</tbody>
</table>

### Output switching capacity

<table>
<thead>
<tr>
<th>Output switching capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤6 A / 230 VAC</td>
</tr>
<tr>
<td>≤1 A / 125 VDC</td>
</tr>
<tr>
<td>≤6 A / 250 VAC</td>
</tr>
<tr>
<td>≤1 A / 48 VDC</td>
</tr>
</tbody>
</table>

### Minimum switching current

<table>
<thead>
<tr>
<th>Minimum switching current</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mA</td>
</tr>
<tr>
<td>100 mA</td>
</tr>
<tr>
<td>40 mA</td>
</tr>
<tr>
<td>100 mA</td>
</tr>
</tbody>
</table>

### Size (housing)

<table>
<thead>
<tr>
<th>Size (housing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø115 mm</td>
</tr>
</tbody>
</table>

### Shaft type

- Solid shaft ø11 mm

### Flange

<table>
<thead>
<tr>
<th>Flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>EURO flange B10</td>
</tr>
</tbody>
</table>

### Connection

<table>
<thead>
<tr>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal box</td>
</tr>
</tbody>
</table>

### Operating temperature

<table>
<thead>
<tr>
<th>Operating temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30...+130 °C</td>
</tr>
<tr>
<td>-20...+85 °C</td>
</tr>
</tbody>
</table>

### Protection

<table>
<thead>
<tr>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 55</td>
</tr>
</tbody>
</table>

### Operating speed (n)

<table>
<thead>
<tr>
<th>Operating speed (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1.25 x ns</td>
</tr>
<tr>
<td>≤6000 rpm</td>
</tr>
<tr>
<td>≤5000 rpm</td>
</tr>
<tr>
<td>≤500 rpm</td>
</tr>
</tbody>
</table>

### Switching speed range (ns)\(^1\)

<table>
<thead>
<tr>
<th>Switching speed range (ns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>850...4900 rpm</td>
</tr>
<tr>
<td>650...6000 rpm</td>
</tr>
<tr>
<td>200...5000 rpm</td>
</tr>
<tr>
<td>110...500 rpm</td>
</tr>
</tbody>
</table>

### Max. shaft load

<table>
<thead>
<tr>
<th>Max. shaft load</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤150 N axial, ≤250 N radial</td>
</tr>
</tbody>
</table>

### Options

<table>
<thead>
<tr>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product combination with encoder or tachogenerator</td>
</tr>
</tbody>
</table>

\(^1\) Any selected switching speed as a permanent factory setting
HeavyDuty speed switches / monitors
Digital / Stand-alone

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

Features

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

Product family

<table>
<thead>
<tr>
<th>Product family</th>
<th>Voltage supply</th>
<th>Switching outputs</th>
<th>Output switching capacity</th>
<th>Size (housing)</th>
<th>Connection</th>
<th>Operating temperature</th>
<th>Protection</th>
<th>Switching speed range (ns)</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 93</td>
<td>15...26 VDC</td>
<td>3 outputs, speed-controlled</td>
<td>High: 12 V, Low: 0 V ≤40 mA</td>
<td>122 x 122 x 80 mm</td>
<td>Terminals with cable gland</td>
<td>-20...+70 °C</td>
<td>IP 65</td>
<td>≤20 000 rpm</td>
<td>Relay module with 3 potential-free relay contacts (DS 93R)</td>
</tr>
<tr>
<td>DS 93 R</td>
<td>18...30 VDC</td>
<td>3 potential-free relay contacts with changeover contact</td>
<td>≤6 A at 250 VAC or ≤1 A at 48 V each output</td>
<td>50 x 75 x 55 mm</td>
<td>Screw terminal and connector D-SUB</td>
<td>-20...+50 °C</td>
<td>IP 20</td>
<td>≤20 000 rpm</td>
<td>–</td>
</tr>
<tr>
<td>GMM230S, GMM236S</td>
<td></td>
<td>1 relay-, 1 analog- and 4 control outputs HTL</td>
<td>Relay 5...36 V (5 mA...5 A) Analog 4...20 mA (≤270 Ω) HTL (≤30 mA each output)</td>
<td>50 x 100 x 165 mm</td>
<td></td>
<td></td>
<td>IP 20</td>
<td>–</td>
<td>Splitter output SinCos and RS422 Programming unit</td>
</tr>
<tr>
<td>GMM240S, GMM246S</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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.
### Heavy Duty 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

### Features

<table>
<thead>
<tr>
<th></th>
<th>Blind hollow shaft</th>
<th>Blind hollow shaft</th>
<th>Through hollow shaft</th>
<th>Through hollow shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 switching outputs</td>
<td>3 switching outputs</td>
<td>2 switching outputs</td>
<td>3 switching outputs</td>
<td></td>
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</tbody>
</table>

### Product family

<table>
<thead>
<tr>
<th></th>
<th>HOG 10+DSL.E</th>
<th>HOG 10+DSL.R</th>
<th>HOG 165+DSL.E</th>
<th>HOG 165+DSL.R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing method</td>
<td>Optical</td>
<td>Optical</td>
<td>Optical</td>
<td>Optical</td>
</tr>
<tr>
<td>Size (housing)</td>
<td>Ø105 mm</td>
<td>Ø165 mm</td>
<td>Ø105 mm</td>
<td>Ø165 mm</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>9...30 VDC</td>
<td>15...30 VDC</td>
<td>9...30 VDC</td>
<td>15...30 VDC</td>
</tr>
<tr>
<td>Output stage</td>
<td>- TTL/RS422</td>
<td>- TTL/RS422</td>
<td>- TTL/RS422</td>
<td>- HTL-P</td>
</tr>
<tr>
<td></td>
<td>- HTL-P</td>
<td>- HTL-P</td>
<td>- HTL-P</td>
<td>- HTL-P</td>
</tr>
<tr>
<td>Output signals</td>
<td>K1, K2, K0 + inverted</td>
<td>K1, K2, K0 + inverted</td>
<td>K1, K2, K0 + inverted</td>
<td>K1, K2, K0 + inverted</td>
</tr>
<tr>
<td>Shaft type</td>
<td>- Blind hollow shaft</td>
<td>- Through hollow shaft</td>
<td>- Blind hollow shaft</td>
<td>- Through hollow shaft</td>
</tr>
<tr>
<td></td>
<td>Ø16 mm</td>
<td>Ø16 mm</td>
<td>Ø16 mm</td>
<td>Ø25 mm</td>
</tr>
<tr>
<td>Connection</td>
<td>Terminal box</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pulses per revolution</td>
<td>512...2500</td>
<td>512...4096</td>
<td>512...4096</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30...+85 °C</td>
<td>-30...+85 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>IP 66</td>
<td>IP 67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating speed (n)</td>
<td>≤6000 rpm</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching speed (ns)</td>
<td>3...6000 rpm</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. shaft load</td>
<td>≤250 N axial, ≤450 N radial</td>
<td>≤150 N axial, ≤200 N radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching outputs</td>
<td>2 relay outputs, each with its individual attack value, 1 relay output as control output</td>
<td>3 transistor outputs, each with its individual attack value</td>
<td>2 relay outputs, each with its individual attack value, 1 relay output as control output</td>
<td>3 transistor outputs, each with its individual attack value</td>
</tr>
<tr>
<td>Output switching capacity</td>
<td>≤0.25 A at 230 VAC/VDC at each output</td>
<td>High: 12 V, Low: 0 V ≤20 mA</td>
<td>≤0.25 A at 230 VAC/VDC at each output</td>
<td>High: 12 V, Low: 0 V ≤20 mA</td>
</tr>
<tr>
<td>Explosion protection</td>
<td>Ex II 3G IIC / 3D IIIC (ATEX)</td>
<td>-</td>
<td>Relay module with 3 potential-free relay contacts (DS 93R)</td>
<td>-</td>
</tr>
<tr>
<td>Options</td>
<td>-</td>
<td>Relay module with 3 potential-free relay contacts (DS 93R)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
### HeavyDuty speed switches / monitors

Digital / encoder-integrated

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

---

**Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>POG 10+DSL.E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td>✓</td>
</tr>
<tr>
<td>2 switching outputs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature</th>
<th>POG 10+DSL.R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td>✓</td>
</tr>
<tr>
<td>3 switching outputs</td>
<td></td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Feature</th>
<th>POG 10+DSL.E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 relay outputs, each with its individual attack value, 1 relay output as control output</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature</th>
<th>POG 10+DSL.R</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 transistor outputs, each with its individual attack value</td>
<td></td>
</tr>
</tbody>
</table>

**Output switching capacity**

- ≤0.25 A at 230 VAC/VDC at each output

**Explosion protection**

- Ex II 3G IIC / 3D IIIC (ATEX)

**Options**

- Relay module with 3 potential-free relay contacts (DS 93R)

---

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

<table>
<thead>
<tr>
<th>Features</th>
<th>PMG 10D</th>
<th>PMG 10PD</th>
<th>HMG 10D</th>
<th>HMG 10PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Cone shaft or blind hollow shaft</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Cone shaft or blind hollow shaft</td>
<td>●</td>
<td>●</td>
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</table>

## Interface

<table>
<thead>
<tr>
<th></th>
<th>PMG 10D</th>
<th>PMG 10PD</th>
<th>HMG 10D</th>
<th>HMG 10PD</th>
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<tbody>
<tr>
<td>SSI</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>HTL/TTL</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>CANopen® / DeviceNet</td>
<td>● / ●</td>
<td>● / ●</td>
<td>● / ●</td>
<td>● / ●</td>
</tr>
<tr>
<td>Profinet-DP / Profinet</td>
<td>● / ●</td>
<td>● / ●</td>
<td>● / ●</td>
<td>● / ●</td>
</tr>
<tr>
<td>EtherCAT / EtherNet/IP</td>
<td>● / ●</td>
<td>● / ●</td>
<td>● / ●</td>
<td>● / ●</td>
</tr>
</tbody>
</table>

## 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
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.

### Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft</td>
<td>EURO flange B10</td>
</tr>
<tr>
<td>Idle voltage</td>
<td>Up to 200 mV/rpm</td>
</tr>
<tr>
<td>Ultimate lifetime thanks to LongLife</td>
<td>Commutator with embedded silver track</td>
</tr>
<tr>
<td>Real-time acquisition of speed and rotational direction</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Up to +130 °C</td>
</tr>
</tbody>
</table>

### Product family

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTF 7.08</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>GTF 7.16</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>TDP 0.09</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>TDPZ 0.09</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>TDP 0.2</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>TDPZ 0.2</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>TDP 13</td>
<td>Tachogenerator</td>
</tr>
<tr>
<td>TDPZ 13</td>
<td>Tachogenerator</td>
</tr>
</tbody>
</table>

### Specifications

| 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 |
| Rotor moment of inertia | 0.4 kg cm² | 0.6 kg cm² | 0.25 kg cm² | 0.29 kg cm² | 1.1 kg cm² | 1.2 kg cm² | 0.4 kg cm² | 0.2 kg cm² |
| Connection | Screw terminals | Terminal box |
| Protection | IP 56 | IP 55 |
| Operating speed | ≤9000 rpm | ≤10 000 rpm | ≤10 000 rpm | ≤60 000 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

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second shaft end protection</td>
<td></td>
</tr>
<tr>
<td>Sea/tropical climate protection</td>
<td></td>
</tr>
<tr>
<td>Protection IP 56</td>
<td></td>
</tr>
</tbody>
</table>

**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

---

**Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>GT 5</th>
<th>GT 7.08</th>
<th>GT 7.16</th>
<th>GT 9</th>
<th>GTB 9.06</th>
<th>GTB 9.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachogenerator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bearingless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blind hollow shaft</td>
<td></td>
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</tbody>
</table>

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**Product family**

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<th>Product family</th>
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<th>GT 7.16</th>
<th>GT 9</th>
<th>GTB 9.06</th>
<th>GTB 9.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size (housing)</td>
<td>ø52 mm</td>
<td>ø85 mm</td>
<td>ø89 mm</td>
<td>ø95 mm</td>
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</table>

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**Shaft type**

<table>
<thead>
<tr>
<th>Shaft type</th>
<th>GT 5</th>
<th>GT 7.08</th>
<th>GT 7.16</th>
<th>GT 9</th>
<th>GTB 9.06</th>
<th>GTB 9.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone shaft: 1:10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blind hollow shaft</td>
<td>ø8...12 mm</td>
<td>ø12...16 mm</td>
<td>ø7...14 mm</td>
<td>ø12...16 mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Idle voltage**

<table>
<thead>
<tr>
<th>Idle voltage</th>
<th>GT 5</th>
<th>GT 7.08</th>
<th>GT 7.16</th>
<th>GT 9</th>
<th>GTB 9.06</th>
<th>GTB 9.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>7...10 mV per rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10...60 mV per rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10...20 mV per rpm</td>
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</tbody>
</table>

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**Performance**

<table>
<thead>
<tr>
<th>Performance</th>
<th>GT 5</th>
<th>GT 7.08</th>
<th>GT 7.16</th>
<th>GT 9</th>
<th>GTB 9.06</th>
<th>GTB 9.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed ≥5000 rpm</td>
<td>0.075 W</td>
<td>0.3 W</td>
<td>0.6 W</td>
<td>0.3 W</td>
<td>0.3 W</td>
<td>0.3 W</td>
</tr>
<tr>
<td>Rotor moment of inertia</td>
<td>0.05 kgcm²</td>
<td>0.4 kgcm²</td>
<td>0.55 kgcm²</td>
<td>0.95 kgcm²</td>
<td>0.95 kgcm²</td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>Plug-in terminals</td>
<td>Screw terminals</td>
<td>Plug-in terminals</td>
<td>Connector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>≤-30...+130 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>IP 20</td>
<td>IP 55</td>
<td>IP 20</td>
<td>IP 68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating speed</td>
<td>≤10000 rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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**Options**

<table>
<thead>
<tr>
<th>Options</th>
<th>GT 5</th>
<th>GT 7.08</th>
<th>GT 7.16</th>
<th>GT 9</th>
<th>GTB 9.06</th>
<th>GTB 9.16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective cover</td>
<td></td>
<td></td>
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</table>
## Heavy Duty Tachogenerators

### Tachogenerators

Learn more: [www.baumer.com/HD-tacho](http://www.baumer.com/HD-tacho)

<table>
<thead>
<tr>
<th>Features</th>
<th>Tachogenerator</th>
<th>Bearingless</th>
<th>Blind hollow shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply/frequency</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size (housing)</td>
<td>Ø95 mm</td>
<td>Ø100 mm</td>
<td>Ø86 mm</td>
</tr>
<tr>
<td>Shaft type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Solid shaft</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>- Blind hollow shaft</td>
<td>Ø16 mm</td>
<td>Ø14 mm</td>
<td>Ø10...16 mm</td>
</tr>
<tr>
<td>Idle voltage</td>
<td>20...60 mV per rpm</td>
<td>20...60 mV per rpm</td>
<td>10...60 mV per rpm</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Speed ≥5000 rpm</td>
<td>0.9 W</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Rotor moment of inertia</td>
<td>1.95 kg cm²</td>
<td>600-900 kg cm²</td>
<td>600 kg cm²</td>
</tr>
<tr>
<td>Connection</td>
<td>Connector</td>
<td>Screw terminals</td>
<td>Cable, radial</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-30...+130 °C</td>
<td>-25...+100 °C</td>
<td>-15...+100 °C</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 56</td>
<td>IP 54</td>
<td></td>
</tr>
<tr>
<td>Operating speed</td>
<td>≤9000 rpm</td>
<td>≤6000 rpm</td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td>–</td>
<td>–</td>
<td>Operating temperature ≤-30 °C</td>
</tr>
</tbody>
</table>
## 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

### Features

<table>
<thead>
<tr>
<th>Features</th>
<th>POG 86 G</th>
<th>POG 9 G</th>
<th>POG 10 G</th>
<th>POG 11 G</th>
<th>HOG 9 G</th>
<th>HOG 10 G</th>
<th>HOG 11 G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td>Solid shaft with EURO flange B10</td>
<td>Cone shaft or blind hollow shaft</td>
<td>Cone shaft or blind hollow shaft</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed up to 12 000 rpm</td>
<td>Speed up to 12 000 rpm</td>
<td>Speed up to 10 000 rpm</td>
<td>Speed up to 10 000 rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid, blind hollow or cone shaft</td>
<td>Solid, blind hollow or cone shaft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every encoder with optional redundant sensing</td>
<td>Every encoder with optional redundant sensing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated function monitoring EMS</td>
<td>Integrated function monitoring EMS</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### Product family

- **Features**
  - Solid shaft with EURO flange B10
  - Speed up to 12 000 rpm
  - Solid shaft with EURO flange B10
  - Speed up to 12 000 rpm
  - Cone shaft or blind hollow shaft
  - Speed up to 10 000 rpm
  - Cone shaft or blind hollow shaft
  - Speed up to 10 000 rpm

### Sensing method

- Optical

### Size (housing)

- 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
- Solid shaft Ø11 mm
- Cone shaft -
- Cone shaft -
- Blind hollow shaft Ø17 mm
- Blind hollow shaft Ø17 mm
- Blind hollow shaft Ø16 mm
- Blind hollow shaft Ø16...20 mm

### Flange

- EURO flange B10
- EURO flange B10
- Terminal box
- Terminal box
- Flange connector M23
- Terminal box

### Connection

- Terminal box
- Flange connector M23
- Terminal box
- Flange connector M23

### 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
- ≤10 000 rpm
- ≤300 N axial, ≤350 N radial
- ≤300 N axial, ≤450 N radial
- ≤400 N axial, ≤500 N radial
- ≤450 N axial, ≤500 N radial

### 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
- Redundant sensing and two terminal boxes per encoder
- 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.
### 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
- TDP Z 0,2+FSL
- TDP Z 0,2+ESL
- TDP Z 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 %
- 5 VDC ±5 %
- 8...30 VDC (only TDP 0.2 + ESL 93)

### 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
- ≤10000 rpm

### Switching speed range (ns)
- 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

#### Features

<table>
<thead>
<tr>
<th>Features</th>
<th>POG 86+FSL</th>
<th>POG 9+FSL</th>
<th>POG 9+ESL</th>
<th>POG 10+FSL</th>
<th>POG 10+ESL</th>
<th>POG 11+FSL</th>
<th>POG 11+ESL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid shaft with EURO flange B10</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pulses per revolution 500...5000</td>
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<tr>
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<td></td>
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<tr>
<td>Pulses per revolution 300...5000</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Special sealing against ingress of solids</td>
<td></td>
<td></td>
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#### Product family

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<tr>
<th>Product family</th>
<th>POG 86+FSL</th>
<th>POG 9+FSL</th>
<th>POG 9+ESL</th>
<th>POG 10+FSL</th>
<th>POG 10+ESL</th>
<th>POG 11+FSL</th>
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<tr>
<td>- TTL/RS422</td>
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<td>- HTL-P (Power Linedriver)</td>
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<td>IP 56</td>
<td>IP 66</td>
<td>IP 67</td>
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<td>1 or 3 outputs</td>
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<td>1 or 3 outputs</td>
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<td>1 or 3 outputs</td>
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<td>Norm. open/ Norm. closed</td>
<td>Transistor outputs</td>
<td>Norm. open/ Norm. closed</td>
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<td>Options</td>
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1) Any selected switching speed as a permanent factory setting
# Heavy Duty 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

---

## Features

<table>
<thead>
<tr>
<th>Features</th>
</tr>
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<tbody>
<tr>
<td>- Cone shaft or blind hollow shaft</td>
</tr>
<tr>
<td>- Cone shaft or blind hollow shaft Special sealing against ingress of solids</td>
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<td>- Cone shaft or blind hollow shaft Corrosion protection CX (C5-M)</td>
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## Product family

<table>
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<th>HOG 86+FSL</th>
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<td>- Blind hollow shaft</td>
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<td>IP 66</td>
<td>IP 67</td>
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<td>850...4900 rpm (FSL)</td>
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<td>Options</td>
<td>Function monitoring EMS</td>
<td>Redundant sensing</td>
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</table>

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**Learn more:**

www.baumer.com/HD-combi

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**Contact:**

www.eltra-trade.com info@eltra-trade.com +421 552 601 099
Durable and space-saving.

Bearless absolute encoder: MHAD 50
Non-contact, wear-free and compact.

Bearingless encoders by Baumer operate on the non-contact method, most utilize 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 environment 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>MDFK 08</th>
<th>MIR 10</th>
<th>ITD 67</th>
<th>ITD49H</th>
<th>ITD49H Sine</th>
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<tbody>
<tr>
<td>Through hollow shaft up to ø43.5 mm</td>
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<tr>
<td>Up to 1024 ppr</td>
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<tr>
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<td>Metal die cast housing</td>
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<tr>
<td>Up to 50 ppr</td>
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<tr>
<td>Through hollow shaft up to ø28 mm</td>
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<td>☑</td>
<td>☑</td>
<td>☑</td>
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<tr>
<td>Up to 2048 ppr</td>
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### Product family

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<thead>
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<th>Product Family</th>
<th>MDFK 08</th>
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<th>ITD 67</th>
<th>ITD49H</th>
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<td>Magnetic</td>
<td>Magnetic</td>
<td>Magnetic</td>
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<tr>
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<td>ø30.5...56 mm</td>
<td>ø72 mm</td>
<td>ø40 mm</td>
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<td>Radial screw connection</td>
<td>Radial screw connection</td>
<td>Hot shrinking, stick, radial screw connection</td>
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<tr>
<td><strong>Dimensions (sensing head)</strong></td>
<td>15 x 8.5 x 45.5 mm</td>
<td>10 x 15 x 45.5 mm</td>
<td>20 x 11 x 75 mm</td>
<td>12 x 16 x 48 mm</td>
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<td>10...30 VDC 5 VDC ±5 %</td>
<td>8...26 VDC 5 VDC ±5 %</td>
<td>8...26 VDC 5 VDC ±10 %</td>
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<tr>
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<td>- TTL/RS422</td>
<td>- HTL/push-pull</td>
<td>- HTL/push-pull</td>
<td>- SinCos 1 Vpp</td>
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<td>☑</td>
<td>☑</td>
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<td>≤160 kHz</td>
<td>≤300 kHz (TTL)</td>
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<td>ø6...43.5 mm</td>
<td>ø10...45 mm</td>
<td>ø9...28 mm</td>
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<td><strong>Pulses per revolution</strong></td>
<td>256...1024</td>
<td>320...4096</td>
<td>20, 50</td>
<td>64...2048</td>
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<td><strong>Sine periods per revolution</strong></td>
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<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
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<tr>
<td><strong>Operating temperature</strong></td>
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<td>-20...+85 °C</td>
<td>-40...+100 °C</td>
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<td>IP 66, IP 67</td>
<td>IP 67</td>
<td>IP 67</td>
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<td><strong>Operating speed</strong></td>
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<td><strong>Options</strong></td>
<td>Cable with pre-assembled connector</td>
<td>Serveral mounting options</td>
<td>Magnetic shields</td>
<td>Redundant sensing of a magnetic wheel with two sensing heads</td>
<td></td>
</tr>
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</table>
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.

Bearingless encoders
Incremental

<table>
<thead>
<tr>
<th>Features</th>
<th>Through hollow shaft up to ø65 mm</th>
<th>Up to 4095 ppr</th>
<th>Through hollow shaft up to ø150 mm</th>
<th>Up to 8192 ppr</th>
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<tr>
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<td>- SinCos 1 Vpp</td>
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</table>

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**

**Hollow shaft up to Ø740 mm.**
**Up to 32 768 pulses per revolution.**
- Square wave and SinCos signals
- Wear-free operation
- Wide axial tolerance ±3 mm
- Pole wheel fixation by screwing, gluing or shrinking

---

**HDmag**

Bearlingless **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.

---

<table>
<thead>
<tr>
<th>Features</th>
<th>Through hollow shaft ø16...80 mm</th>
<th>Through hollow shaft ø50...180 mm</th>
<th>Through hollow shaft ø70...340 mm</th>
<th>Through hollow shaft ø650...740 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Installation depth ≤30 mm</td>
<td>Installation depth ≤30 mm</td>
<td>Installation depth ≤30 mm</td>
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<tr>
<td></td>
<td>Stainless steel wheel</td>
<td>Stainless steel wheel</td>
<td>Stainless steel wheel</td>
<td>Stainless steel wheel</td>
</tr>
<tr>
<td>Product family</td>
<td>MHGE 100</td>
<td>MHGE 200</td>
<td>MHGE 400</td>
<td>MHGE 800</td>
</tr>
</tbody>
</table>

**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
- Through hollow shaft ø50...180 mm
- Through hollow shaft ø70...340 mm
- Through hollow shaft ø650...740 mm

**Connection**
- Flange connector M23

**Pulses per revolution**
- 64...4096
- 128...192
- 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
- Stainless steel wheel
Bearingless encoders

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

<table>
<thead>
<tr>
<th>Features</th>
<th>Through hollow shaft ø16...80 mm</th>
<th>Through hollow shaft ø50...180 mm</th>
<th>Through hollow shaft ø70...340 mm</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Installation depth ≤35 mm</td>
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<tr>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
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<th>MHGP 100</th>
<th>MHGP 200</th>
<th>MHGP 400</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Sensing method</th>
<th>Magnetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic wheel diameter</td>
<td>ø99.9 mm</td>
</tr>
<tr>
<td>Dimensions (sensing head)</td>
<td>120 x 30 x 90 mm</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>4.5...30 VDC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output stage</th>
<th>- TTL/RS422</th>
<th>- HTL/push-pull</th>
<th>- SinCos 1 Vpp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output signals</td>
<td>A 90° B, R + inverted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output frequency</td>
<td>≤2 MHz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shaft type</th>
<th>- Through hollow shaft ø16...80 mm</th>
<th>ø50...180 mm</th>
<th>ø70...340 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection</td>
<td>- Flange connector M23 Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulses per revolution</td>
<td>64...131 072</td>
<td>128...262 144</td>
<td>256...524 288</td>
</tr>
<tr>
<td>Sine periods per revolution</td>
<td>8192</td>
<td>16384</td>
<td>32768</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20...+85 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>IP 66, IP 67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating speed</td>
<td>≤8000 rpm</td>
<td>≤4000 rpm</td>
<td>≤2000 rpm</td>
</tr>
</tbody>
</table>

Learn more:
www.baumer.com/bearingless
Bearingless encoders
Absolute

Compact kit design ø36 mm and ø58 mm. Singleturn and multturn 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

<table>
<thead>
<tr>
<th>Features</th>
<th>Encoder kit – size ø36 mm</th>
<th>Encoder kit – size ø36 mm</th>
<th>Encoder kit – size ø58 mm</th>
<th>Encoder kit – size ø58 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Encoder kit – size ø36 mm</td>
<td>E1 compliant design</td>
<td>Corrosion protection CX</td>
<td>E1 compliant design</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(C5-M)</td>
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<tr>
<td></td>
<td></td>
<td>ISO 13849 compliant</td>
<td>firmware</td>
<td>ISO 13849 compliant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>firmware</td>
<td></td>
<td>firmware</td>
</tr>
</tbody>
</table>

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
- 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

Options
- Additional incremental signals (SSI, CANopen®)
- Additional incremental signals (SSI, CANopen®)
- Cable with DEUTSCH connector
- Cable with DEUTSCH connector
Bearingless encoders

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

**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

Learn more:
www.baumer.com/bearingless
## 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

### Features

<table>
<thead>
<tr>
<th>Features</th>
<th>MHAD 50</th>
<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear-free encoder Through hollow shaft ø30 mm</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Wear-free encoder Through hollow shaft ø16...80 mm Stainless steel wheel</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Wear-free encoder Through hollow shaft ø50...180 mm Stainless steel wheel</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Wear-free encoder Through hollow shaft ø70...340 mm Stainless steel wheel</td>
<td>☑</td>
<td>☑</td>
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### Product family

<table>
<thead>
<tr>
<th>Product family</th>
<th>MHAD 50</th>
<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
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</thead>
<tbody>
<tr>
<td>Interface</td>
<td>SSI</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
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<tr>
<td>- CANopen®</td>
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<tr>
<td>Function principle</td>
<td>Singleturn</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sensing method</td>
<td>Magnetic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetic wheel diameter</td>
<td>ø50 mm</td>
<td>ø101.3 mm</td>
<td>ø203.1 mm</td>
<td>ø406.8 mm</td>
</tr>
<tr>
<td>Dimensions (sensing head)</td>
<td>55 x 36 x 20 mm</td>
<td>120 x 30 x 90 mm</td>
<td>120 x 30 x 78 mm</td>
<td>120 x 30 x 78 mm</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>4.5...30 VDC</td>
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</table>

### Output stage

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<thead>
<tr>
<th>Output stage</th>
<th>MHAD 50</th>
<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
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</thead>
<tbody>
<tr>
<td>- TTL/RS422</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>- HTL/push-pull</td>
<td></td>
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<tr>
<td>- SinCos 1 Vpp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output signals</td>
<td>A 90° B + inverted</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Shaft type

<table>
<thead>
<tr>
<th>Shaft type</th>
<th>MHAD 50</th>
<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through hollow shaft ø30 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ø16...80 mm</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ø50...180 mm</td>
<td></td>
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<tr>
<td>ø70...340 mm</td>
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</table>

### Connection

<table>
<thead>
<tr>
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<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Flange connector M12 Radial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Flange connector M23 Radial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cable Radial</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Total resolution

<table>
<thead>
<tr>
<th>Total resolution</th>
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<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤65536 / 16 bits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤131072 / 17 bits</td>
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<td></td>
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### Absolute accuracy

<table>
<thead>
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<th>MHAD 50</th>
<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>±0.3° (-40...+85 °C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>±0.25° (+20 °C)</td>
<td></td>
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</table>

### Pulses per revolution

<table>
<thead>
<tr>
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<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>1024...8192</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1...131072</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1...262144</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1...524288</td>
<td></td>
<td></td>
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</table>

### Sine periods per revolution

<table>
<thead>
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<th>Sine periods per revolution</th>
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<th>MHAP 200</th>
<th>MHAP 400</th>
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<tbody>
<tr>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1...16384</td>
<td></td>
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</tr>
<tr>
<td>1...32768</td>
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<td></td>
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### Operating temperature

<table>
<thead>
<tr>
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<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40...+85 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-20...+85 °C</td>
<td></td>
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### Protection

<table>
<thead>
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<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 67</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP 66, IP 67</td>
<td></td>
<td></td>
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### Operating speed

<table>
<thead>
<tr>
<th>Operating speed</th>
<th>MHAD 50</th>
<th>MHAP 100</th>
<th>MHAP 200</th>
<th>MHAP 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤6000 rpm</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>≤8000 rpm</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>≤4000 rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤2000 rpm</td>
<td></td>
<td></td>
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</tbody>
</table>
Bearingless encoders
For large shaft diameters

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 mm

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.

Learn more:
www.baumer.com/bearingless

Features
- Magnetic belt encoder with adapter wheel
- Incremental
- Pulses per revolution up to 131,072
- For shaft ø90...300 mm
- Magnetic belt encoder with adapter wheel
- 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 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
- S12...131,072
- 1024...4096

Sine periods per revolution
- S12...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
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
<table>
<thead>
<tr>
<th>MDRM 18</th>
<th>MDRM 18</th>
<th>MDRM 18</th>
<th>MDRM 18</th>
</tr>
</thead>
</table>

Sensor housing  | Cyclindrical threaded
Angular range    | 120° linear | 270° linear | 160° linear | 360° linear
Resolution       | 0.09°      | 0.09°      | 0.09°      | 1.41°
Sensing distance max. | 5 mm       | 5 mm       | 4 mm       | 5 mm
(with magnet rotor MSFS) | (with magnet rotor MSFS) | (with magnet rotor MSFS) | (with magnet rotor MSFS)
Output circuit   | Current output |
Output signal    | 4...20 mA    | 0.5...4.5 VDC | 0...4.3 VDC | 0...5 VDC
Response time    | <2 ms       |
Dimensions (sensing head) | 18 mm     |
Connection       | Cable 2 m   | Cable 2 m   | Cable 2 m   | Cable 2 m
Mating connector M12 | Connector M12 | Connector M8 | Connector M12 |
Voltage supply   | 15...30 VDC | 5 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 detection principle ensures output of the correct rotation angle even after power failure.
### Bearingless encoders
#### Analog magnetic rotary encoders

**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°

<table>
<thead>
<tr>
<th>Product family</th>
<th>MDFM 20</th>
<th>MDFM 20</th>
<th>MDFM 20</th>
<th>MDFM 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor housing</td>
<td>Rectangular</td>
<td>Rectangular</td>
<td>Rectangular</td>
<td>Rectangular</td>
</tr>
<tr>
<td>Angular range</td>
<td>270° linear</td>
<td>360° linear</td>
<td>360° linear</td>
<td>360° linear</td>
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<tr>
<td>Resolution</td>
<td>0.09°</td>
<td>1.41°</td>
<td>0.09°</td>
<td>1.41°</td>
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<tr>
<td>Sensing distance max.</td>
<td>5 mm (with magnet rotor MSFS)</td>
<td>4 mm (with magnet rotor MSFS)</td>
<td>5 mm (with magnet rotor MSFS)</td>
<td>4 mm (with magnet rotor MSFS)</td>
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<tr>
<td>Output circuit</td>
<td>Current output</td>
<td>Voltage output</td>
<td>Voltage output</td>
<td></td>
</tr>
<tr>
<td>Output signal</td>
<td>4...20 mA</td>
<td>0...4.3 VDC</td>
<td>0...5 VDC</td>
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<tr>
<td>Response time</td>
<td>&lt;4 ms</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Dimensions (sensing head)</td>
<td>20 x 30 x 8 mm</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Connection</td>
<td>Cable 2 m M8</td>
<td></td>
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<tr>
<td>Voltage supply</td>
<td>15...30 VDC</td>
<td>4.7...7.5 VDC</td>
<td>4.75...5.25 VDC</td>
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<tr>
<td>Operating temperature</td>
<td>-40...+85 °C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Protection</td>
<td>IP 67</td>
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</table>
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- **Baumer Capacitive Sensors**
- **Baumer Inductive Sensors**
- **other Baumer products**

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