

# GENERAL INFORMATION

## HOHNER AUTOMATICOS, S.L

*The ideal collaborator for your project*

The central headquarters of Hohner Automaticos SL is situated in Breda, province of Girona, in the northwest of Spain, only a few kilometres away from the French border and very close to Barcelona, in one of the most deeply-rooted industrial networks of the country and with big firms, whose common impulse is investment in I+D+I.

Hohner Automáticos SL was founded in 1983. One of the founding partners, Juan Liarte, is still the major shareholder of the firm, thus guaranteeing the continuity and the compliance of the strategic plan that has taken the firm to the present level of development, on the basis of some fundamental, permanent and absolute values, such as **integrity, respect for the individual person** and the **environmental responsibility** and also on the basis of some of the firm's values: **client orientation**, investment in investigation and development and all those tools that help us become better as a firm at service of a client and of a very demanding market.

### ■ Our Quality Policy

We are a **client orientated** organisation. We are supported by a solid quality system that consolidates us as an **EFFICIENT, FLEXIBLE** and **EFFECTIVE** firm.

We foment the communication among all levels of our organisation. We believe that training is a fundamental tool for the personal development of our team. **Motivation** and participation of the personnel are fundamental points in our firm's policies.

**Continuous improvement** is a permanent objective for each person within the organisation. We work so that the continuous product, process and system improvement becomes reality, and we do this on the basis of data and information analysis.

Hohner Automáticos S.L. invests in investigation, development and innovation, thus assuring the long time success of the Firm.



Collaboration



Environmental responsibility



Design

Training



Communication





Optical manufacturing



Mechanical manufacturing



Electronic manufacturing

## ■ Our installations

One of the strong points of our firm is client service, and one of the tools that makes us flexible is the combination of our own engineering department that is available to the client for all types of application assessments, combined with our own departments of optical, mechanical and electronic manufacturing, which allows us to cover all the necessities of our clients with maximum efficacy.

## ■ Hohner Global

Our worldwide distributors are a team of very well trained persons who are familiar with the applications in the different sectors where our sensors can be applied.

*You have a Hohner distributor very close to you*



# QUALITY CERTIFICATION

BUREAU VERITAS  
Certification



## Certification

Awarded to

**HOHNER AUTOMÁTICOS, S.L.**

GIRONA

C/ SANT FRANCESC S/N, PROLONGACION, 17400, BREDÀ,

Bureau Veritas certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

STANDARD

**ISO 9001:2008**

SCOPE OF SUPPLY

DESIGN, MANUFACTURE AND SALES OF INCREMENTAL AND ABSOLUTE ENCODERS.

Original Approval Date : **16 April 2004**

Subject to the continued satisfactory operation of the organisation's Management System, this certificate is valid until :

**23 January 2013**

To check the validity of this certificate please call : 91 270 22 00

Further clarification regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation

Certificate Number **ES019918**

Date: **08 June 2010**

Managing office: BUREAU VERITAS CERTIFICATION SA  
Issuing office: BUREAU VERITAS CERTIFICATION SA  
C/ Valporello Primers 22-24  
Edificio Casba, Pol. Ind. La granja  
28108 Alcobendas Madrid







# TECHNICAL CONSIDERATIONS

## ELECTRICAL INSTALLATION INSTRUCTIONS

An incremental pulse generator in combination with an electronic counter or microprocessor is a precise method of measuring angular and linear displacements, but in any case, in order to guarantee this precision (not degraded by electrical interference), certain codes have to be taken into account.

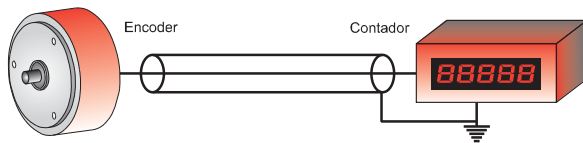
A- Reduce interference by employing screened cable that is correctly connected to earth, a suitable choice of counter position, cable output, adequate voltage and the possibility of using a differential level output (complementary).

B- Attenuate interference due to high frequency by means of an RC filter.

The various problems that may be encountered when installing a generator system-control system are listed below, together with some solutions for them.

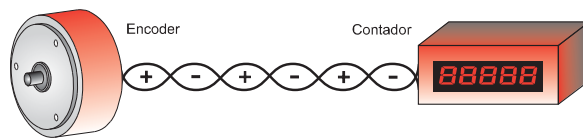
### Electrostatic coupling or interference

Electric interference can be reduced by taking the corresponding precautions. The signals produced by the generator must be carried over suitable screened cables that are connected to earth at only one end. Unscreened wiring is only suitable for short runs and interference-free locations.



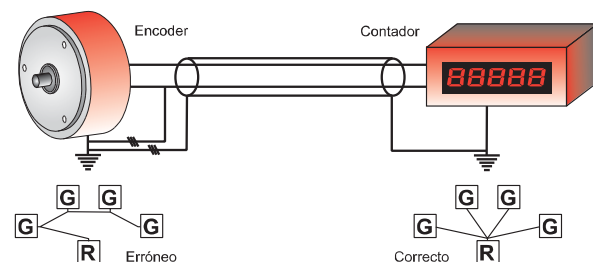
### Electromagnetic coupling or interference

This type of effects with wide radii of action are more difficult to combat, one type of protection that can be employed is twisted pair wiring, which is normally sufficient as the voltages induced in the two conductors cancel each other out.



### Earth point selection

The following rule should be followed when selecting an earth point: the earth connection must be made at only one point of the electric circuit, all other system points that require an earth connection must be made to this one single point.



### Cable run

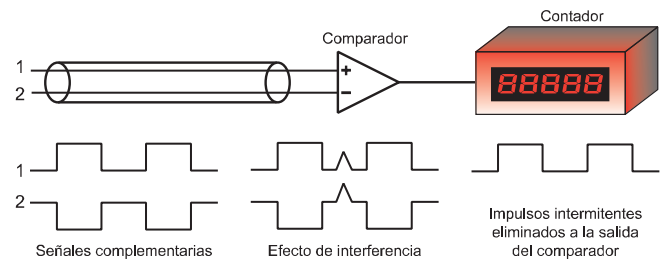
The cable between the generator and the counter must be separate from the high-voltage wiring and follow the shortest, most direct path between them.

### Differential receiver

One effective form of interference rejection is to use a differential receiver. The signal and its complement are fed to the two inputs of the comparator. The comparator amplifies the difference between the two inputs and any interference pulses are ignored.

Signal loss over long distances.

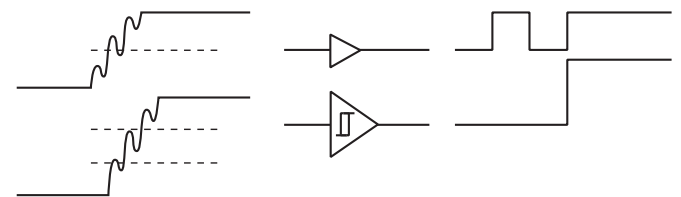
Voltage drops over long wiring runs can lead to problems. It is not only the current fed to the generator that is reduced, but that the high signal is reduced and the low signal is greater, therefore the resulting signal is outside the required limits. This is especially important in 5v systems, but 12v systems are also vulnerable to these effects.



### Deformed pulses

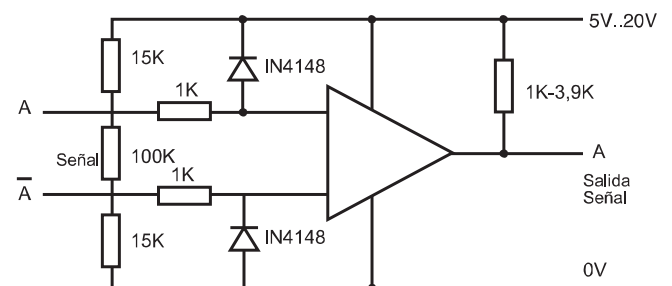
The presence of noise in slow signal changes can cause interference and give false measurement readings. This effect can be eliminated by using a Schmitt Trigger circuit at the input to the counter.

This circuit will ignore any changes in voltage that are less than the hysteresis.



### Recommended input circuit

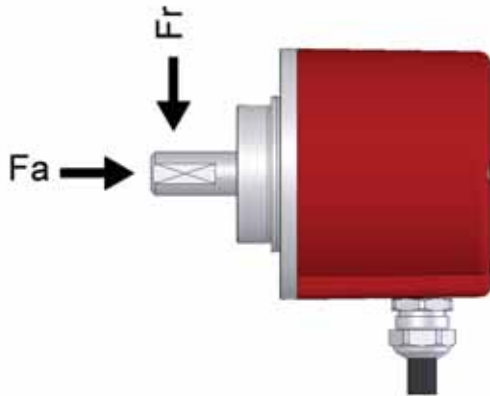
The following circuit provides high noise immunity and can be employed at 50 kHz



# TECHNICAL CONSIDERATIONS

## MECHANICAL INSTALLATION INSTRUCTIONS

All our pulse generators are fitted with preloaded ball bearings. The lifetime of these bearings largely depends on the load supported by the encoder shaft. Minimising this load is very important in order to guarantee a reasonable encoder lifetime. Under no circumstances should the axial ( $F_a$ ) and radial ( $F_r$ ) components at the end of the shaft must not exceed, even briefly, the established limits for each of the series.



There are several solutions for protecting the shaft from excessive loads depending on the encoder types and its applications:

### ■ Solid shaft encoders: connection with machine shaft

If the connection between the encoder shaft and that of the machine is rigid, any misalignment between the two can lead to very high loads on the bearings. In order to prevent this, the shafts must be connected by means of flexible couplings that are able to absorb the expected misalignment, vibration and any possible axial shaft movement.

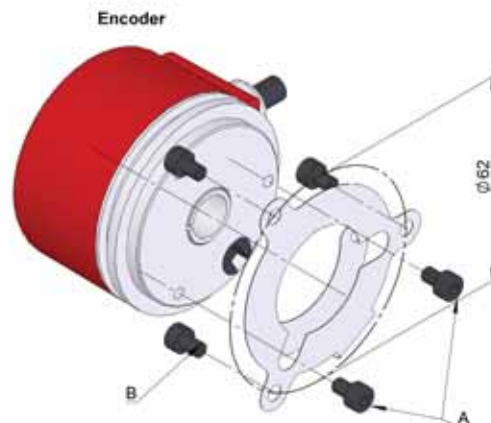
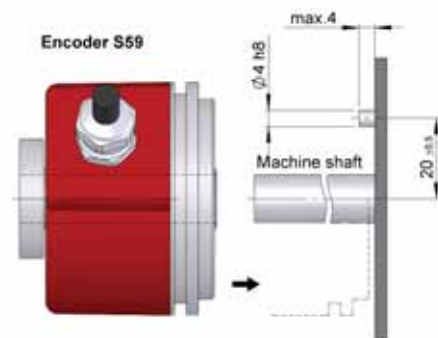
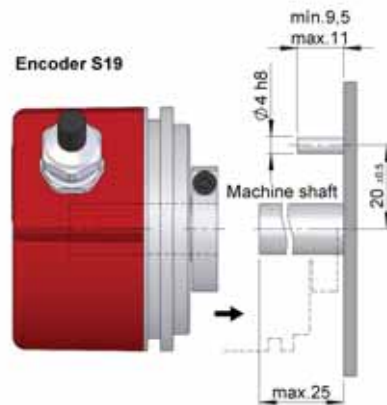
### ■ Solid shaft encoders: connections to measuring wheels, pulleys and pinions

These components can be fixed directly to the encoder shaft provided there are no radial loads produced in excess of the acceptable limits. Otherwise, an auxiliary shaft must be installed to support these components.

If measuring wheels are employed or rack and pinion measuring systems, it is possible that constant free-play cannot be guaranteed, which would make it necessary to use a flexible angle to secure the encoder to the machine chassis, making it possible to move it.

### ■ Hollow shaft encoders

In most cases these are fixed to a rigid shaft. In these cases, the encoder body must never be rigidly fixed to the machine chassis; instead, it must be simply prevented from rotating with the shaft. This may be achieved with an elastic flange or retaining pin.



### ■ PROTECTION AGAINST CONTACT

In order to comply with the CE Machine Directive, after installing the encoder, all rotating parts, such as shafts, couplings, wheels and clamps etc, must be protected against accidental contact during machine use.

# OVERVIEW **INCREMENTAL**

## SOLID SHAFT

## HOLLOW SHAFT

### SERIE 10



IP65  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 30 IP67



IP67  
Ø Ext. 90 mm  
Up to 10.000 pulses

### SERIE 19



IP65  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 10 IP67



IP67  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 36



IP64  
Ø Ext. 36,5 mm  
Up to 3.600 pulses

### SERIE 59



IP65  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 58



IP65  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 26



IP64  
Ø Ext. 24 mm  
Up to 1.024 pulses

### SERIE 77



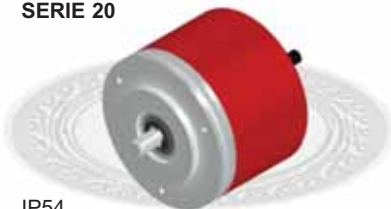
IP65  
Ø Ext. 77 mm  
Up to 5.000 pulses

### SERIE 64



IP54  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 20



IP54  
Ø Ext. 58 mm  
Up to 1.024 pulses

### SERIE 80



IP54  
Ø Ext. 100 mm  
Up to 5.000 pulses

### SERIE 66



IP64  
Ø Ext. 58 mm  
Up to 10.000 pulses

### SERIE 21



IP41  
Ø Ext. 40 mm  
Up to 500 pulses

### SERIE 22



IP64  
Ø Ext. 36,5 mm  
Up to 3.600 pulses

### SERIE 30



IP65  
Ø Ext. 90 mm  
Up to 10.000 pulses

### SERIE 11



IP64  
Ø Ext. 58 mm  
Up to 1.024 pulses

### SERIE 28



IP64  
Ø Ext. 24 mm  
Up to 1.024 pulses

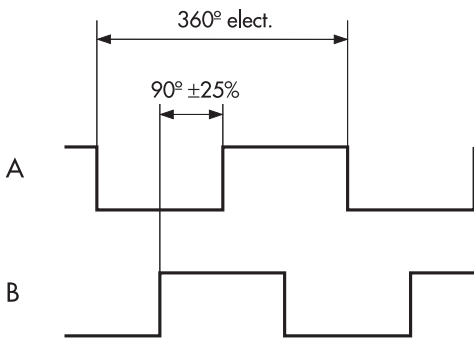
# INCREMENTAL ENCODERS

Incremental encoders are probably the most common type of encoder employed in industry because of the wide variety of applications in which they can be used.

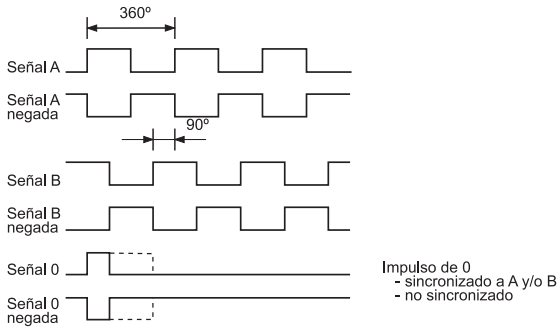
Incremental encoders generate pulses when the shaft is rotated, where the number of pulses per turn can determine a measurement of speed, length or position.

They can be classified, according to function, into unidirectional (a single output channel A), employed whenever it is not necessary to detect the direction of rotation, such as addition and subtraction in counters or tachometers, and bi-directional (with two output channels A and B), which allows the detection of rotation direction, with channel B being 90° out of phase with channel A.

## DIGITAL SIGNALS



A third reference or zero signal (0 output channel) can be made available, which provides a pulse for each full turn of the shaft that, for example, permits a position reference to be determined and this signal can be synchronised with respect to channel A or B, or to both, and it can also be non-synchronised. All these signals are also available in inverted form, usually employed in environments where there is noise and/or long wiring runs.



## Maximum frequency response

This is the maximum frequency at which the encoder can electrically respond, it refers to the number of output pulses the encoder can produce per second. This frequency is related to the encoder shaft rotation speed and the number of pulses, so that:

$$\text{Frequency (Hz)} = \frac{\text{No of shaft turns per minute}}{60} \cdot \text{No of encoder pulses}$$

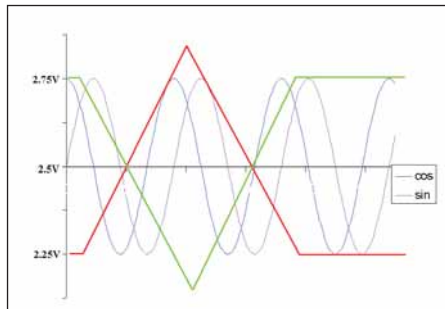
## Precision

The unit of measure that defines the encoder precision is the "electrical degree". This is:

$$360^\circ \text{ electrical} = \frac{360^\circ \text{ mechanical}}{\text{No of encoder pulses}}$$

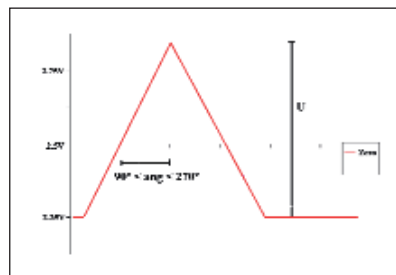
The error of a rotating encoder is not accumulative, it does not increment when the shaft rotates more than a full turn.

## SIN COS signals



## Rotation direction

The rotation direction criterion of the sine encoder is that shown in the figure. Therefore A goes before B if the shaft turns clockwise when observed from its own shaft.



## Signals A Ainv, B Binv and Z Zinv

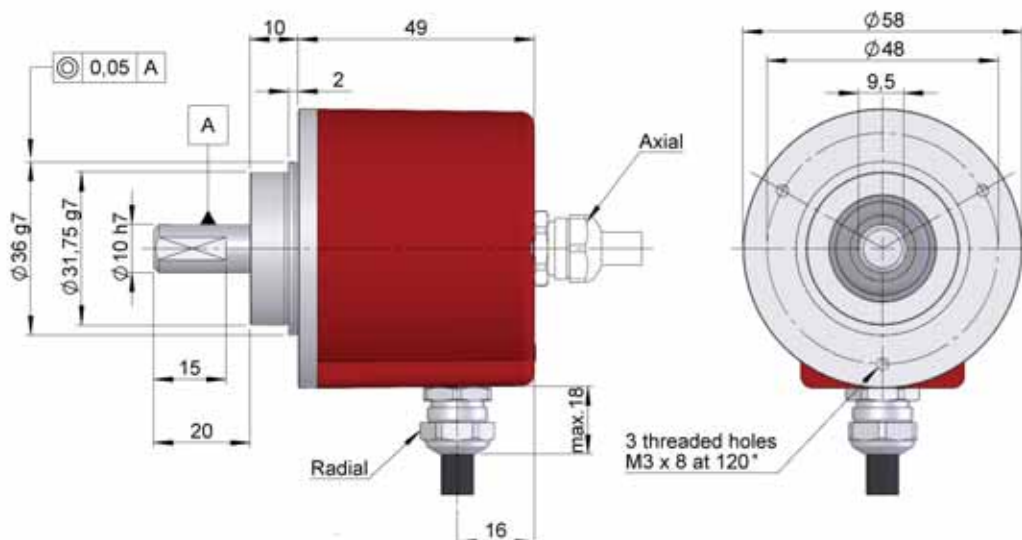
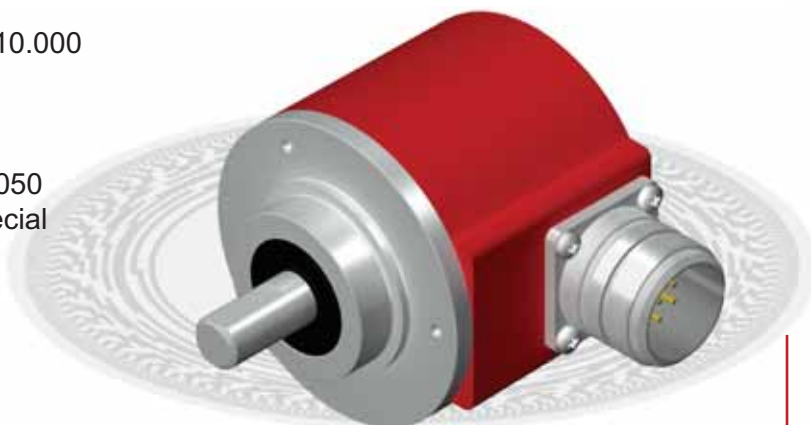
Signal A (cos) goes before B (sen) 90 degrees. The median value of signals A and B is 2,5V DC. Both signals can be obtained in their negative form Ainv and Binv as well as Zinv (Fig 1). The reference signal is Z (zero). The distance from zero mode to the peak value of Z is within a 90 to 270° electronics interval, as shown in figure 2. The tool component U is maintained between 0,2 < U < 1 V.



# SERIE 10

## INCREMENTAL SOLID SHAFT ENCODER FOR INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- External diameter 58 mm
- Shaft from 6 to 12 mm
- Protection class IP65 according to DIN 40050
- Executions mechanical, electronic and special optics forms available on request
- Connection by cable (any cable lenght available) or industrial connector



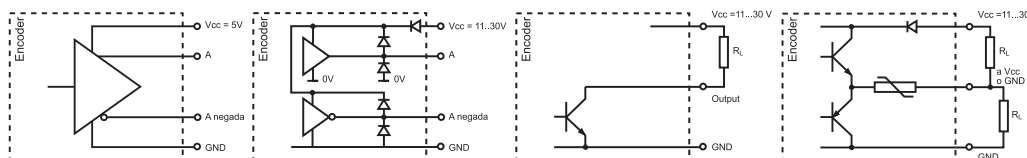
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .  |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 40 N.  |
| Maximum load permitted on radial shaft                      | 60 N.  |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Maximum pulses per turn                                     | 10.000.  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lenghts available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|---------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     | 11...30 V                 | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     | Typical: 45 mA<br>Max: 150 mA |
| Max.load capability                      | ±20 mA                        | ±30 mA                        | 40 mA                     | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m (a 24 V)             | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              | $V_{OL} < 0,4 V$ (a 24 V) | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{cc} - 3 V$       | $V_{OH} > 22 V$ (a 24 V)  | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 100 kHz                   | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Not permanent             | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                       | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                           |                               |

### CONNECTION

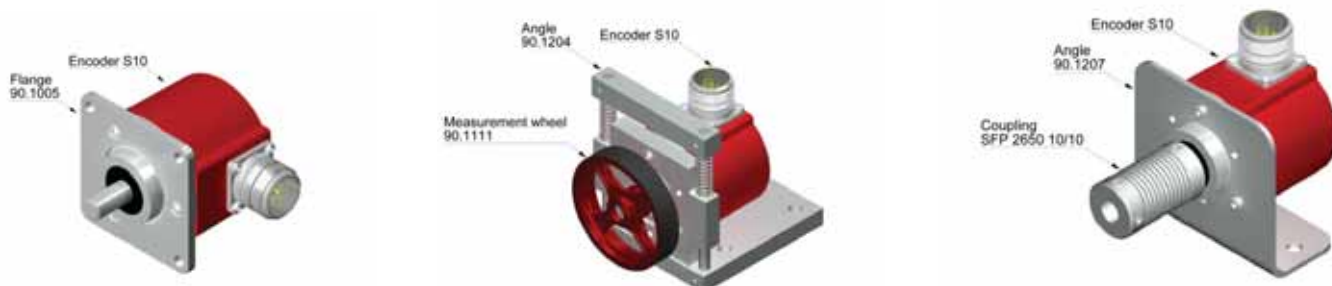


|               | Cable 5x0.14 | Cable 3x2x0.14+2x0.34 | 90.9504<br>DIN 43650 | 90.9507<br>Mil 7p | 90.9508<br>M12 8p | 90.9510<br>Mil 10p | 90.9512<br>M23 12p |
|---------------|--------------|-----------------------|----------------------|-------------------|-------------------|--------------------|--------------------|
| GND           | Yellow       | Black                 | 1                    | A                 | 1                 | A                  | 1                  |
| Vcc           | White        | Red                   | 2                    | B                 | 2                 | B                  | 2                  |
| A             | Brown        | Yellow                | 3                    | C                 | 3                 | C                  | 3                  |
| B             | Green        | Green                 | 4                    | D                 | 4                 | D                  | 4                  |
| A inverted    |              | Brown                 |                      | E                 | 5                 | E                  | 5                  |
| B inverted    |              | Blue                  |                      | F                 | 6                 | F                  | 6                  |
| 0 (reference) | Grey         | Grey                  |                      | G                 | 7                 | G                  | 7                  |
| 0 inverted    | Grey         | Orange                |                      | G                 | 8                 | H                  | 8                  |

## ORDERING CODE

| SERIE | SHAFT  | FLANGE  | OUTPUT SIGNALS  | CONNECTION   | ELECTRONIC OUTPUT   | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|--|---|---|--|---|---------------|------------------|
| 10    | ●  | ●   | ●   | ●  | ●   | ●●●●●●●●      | ●●●●●●●●         |
|       | 1- Ø10 x 20 mm<br>2- Ø6 x 10 mm<br>3- Ø8 x 20 mm<br>5- Ø9,52 x 20 mm<br>6- Ø6,35 x 10 mm<br>8- Ø12 x 20 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>7- 90.1006 | 1- A<br>2- A + B<br>3- A + B + $\tilde{0}$<br>5- $\overline{AA} + \overline{BB}$<br>6- $\overline{AA} + \overline{BB} + 0\tilde{0}$<br>9- A + B + 0 | 1- Radial 90.9504<br>3- Radial cable<br>4- Radial 90.9507<br>5- Radial 90.9512<br>6- Axial 90.9504<br>8- Axial cable<br>9- Axial 90.9507<br>0- Axial 90.9512<br>M- Radial 90.9510<br>N- Axial 90.9510<br>L- Radial 90.9508<br>K- Axial 90.9508 | 0- Open collector NPN 11..30V<br>1- Push-Pull 11..30V (without inverted)<br>7- Standard RS422. 5V. Compatible TTL<br>9- Differential line driver. Push-Pull 11..30V |               |                  |

## ACCESSORIES

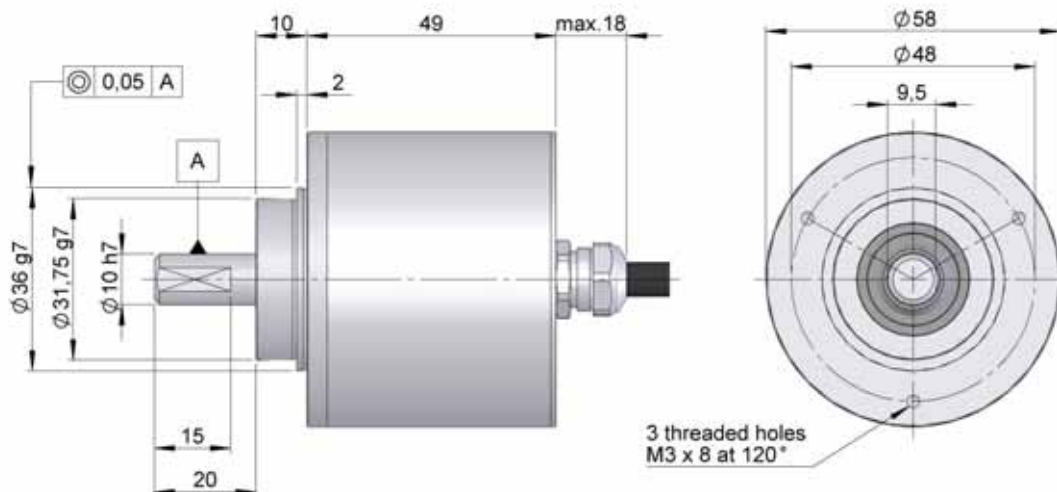


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 10 IP67

## INCREMENTAL SOLID SHAFT ENCODER FOR SEVERE INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- External diameter 58 mm
- Shaft 10 mm
- Protection class IP67 according to DIN 40050
- Executions mechanical, electronic and special optics available on request
- Connection by cable (any cable length available) or industrial connector



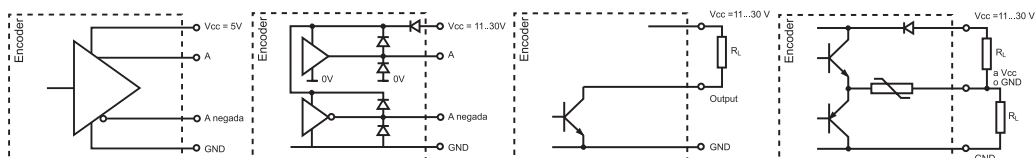
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium/Stainless steel   |
| Shaft   | Stainless steel   |
| Bearings  | Ballraces   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm  |
| Protection against dust and splashes according to DIN 40050 | IP67  |
| Rotor inertia moment  | 30 gcm <sup>2</sup>   |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm  |
| Maximum load permitted on axial shaft                       | 60 N  |
| Maximum load permitted on radial shaft                      | 120 N   |
| Weight aprox.   | 0,5 Kg  |
| Operating temperature range                                 | -20°C a +80°C   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz)  |
| Shock   | 1000 m/s <sup>2</sup> (6ms)   |
| Maximum pulses per turn                                     | 10.000  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lengths available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|---------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     | 11...30 V                 | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     | Typical: 45 mA<br>Max: 150 mA |
| Max.load capability                      | $\pm$ 20 mA                   | $\pm$ 30 mA                   | 40 mA                     | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m (a 24 V)             | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              | $V_{OL} < 0,4 V$ (a 24 V) | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{CC} - 3 V$       | $V_{OH} > 22 V$ (a 24 V)  | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 100 kHz                   | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Not permanent             | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                       | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                           |                               |

### CONNECTION



|               | Cable 5x0.14 | Cable 3x2x0,14+2x0,34 | 90.9508<br>M12 8p |
|---------------|--------------|-----------------------|-------------------|
| GND           | Yellow       | Black                 | 1                 |
| Vcc           | White        | Red                   | 2                 |
| A             | Brown        | Yellow                | 3                 |
| B             | Green        | Green                 | 4                 |
| A inverted    |              | Brown                 | 5                 |
| B inverted    |              | Blue                  | 6                 |
| 0 (reference) | Grey         | Grey                  | 7                 |
| 0 inverted    | Grey         | Orange                | 8                 |

## ORDERING CODE

| SERIE                                  | SHAFT                       | FLANGE  | OUTPUT SIGNALS  | CONNECTION   | ELECTRONIC OUTPUT   | PULSES NUMBER | SPECIAL CUSTOMER |
|--|-----------------------------|---------|---|--|---|---------------|------------------|
| 10I- Stainless steel<br>10A- Aluminium | 1- $\varnothing$ 10 x 20 mm | 1- None | 1- A<br>2- A + B<br>3- A + B + $\tilde{0}$<br>5- $\tilde{A}\tilde{A}$ + $\tilde{B}\tilde{B}$<br>6- $\tilde{A}\tilde{A}$ + $\tilde{B}\tilde{B}$ + $\tilde{0}\tilde{0}$<br>9- A + B + 0 | 3- Radial cable<br>L- Radial 90.9508<br>8- Axial cable<br>K- Axial 90.9508 | 0- Open collector NPN 11..30V<br>1- Push-Pull 11..30V (without inverted)<br>7- Standard RS422. 5V. Compatible TTL<br>9- Differential line driver. Push-Pull 11..30V |               |                  |

- The option 10I is only available with axial connection output (8)

## ACCESSORIES



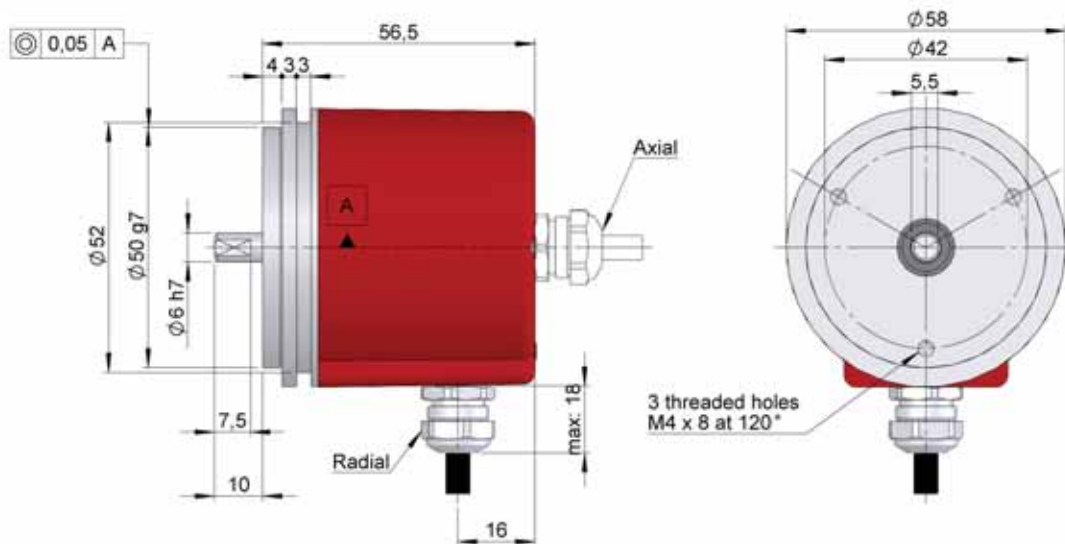
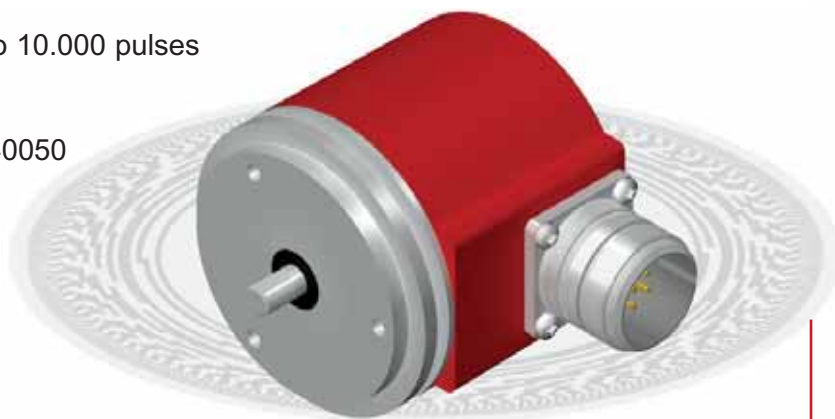
All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".



# SERIE 58

## INCREMENTAL SOLID SHAFT ENCODER FOR INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- External diameter 58 mm
- Shaft 6 mm
- Protection class IP65 according to DIN 40050
- Synchro flange
- Connection by cable (any cable length available) or industrial connector



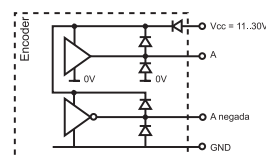
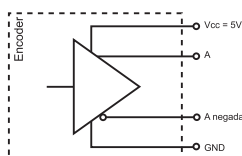
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | $1 \times 10^{10}$ rev.  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | $30 \text{ gcm}^2$ .   |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 40 N.  |
| Maximum load permitted on radial shaft                      | 60 N.  |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | $100 \text{ m/s}^2$ (10Hz...2000Hz).   |
| Shock   | $1000 \text{ m/s}^2$ (6ms).  |
| Maximum pulses per turn                                     | 10.000.  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable length available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |

### CONNECTION

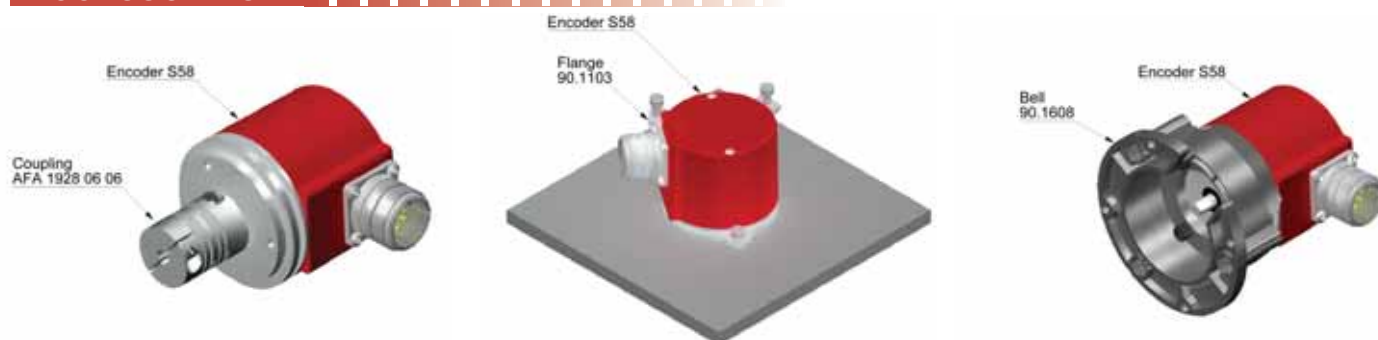


|               | Cable 3x2x0,14+2x0,34 | 90.9508<br>M12 8p | 90.9512<br>M23 12p |
|---------------|-----------------------|-------------------|--------------------|
| GND           | Black                 | 1                 | 1                  |
| Vcc           | Red                   | 2                 | 2                  |
| A             | Yellow                | 3                 | 3                  |
| B             | Green                 | 4                 | 4                  |
| A inverted    | Brown                 | 5                 | 5                  |
| B inverted    | Blue                  | 6                 | 6                  |
| 0 (reference) | Grey                  | 7                 | 7                  |
| 0 inverted    | Orange                | 8                 | 8                  |

## ORDERING CODE

| SERIE | SHAFT              | FLANGE          | OUTPUT SIGNALS   | CONNECTION   | ELECTRONIC OUTPUT   | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|--------------------|-----------------|--|--|---|---------------|------------------|
| 58    | ●<br>1- Ø6 x 10 mm | ●<br>1- Synchro | ●<br>1- $\tilde{A}\tilde{A} + \tilde{B}\tilde{B} + 0\tilde{0}$<br>2- $\tilde{A}\tilde{A} + \tilde{B}\tilde{B}$ | ●<br>1- Axial cable<br>2- Radial cable<br>3- Axial 90.9512<br>4- Radial 90.9512<br>5- Axial 90.9508<br>6- Radial 90.9508 | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V. | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES

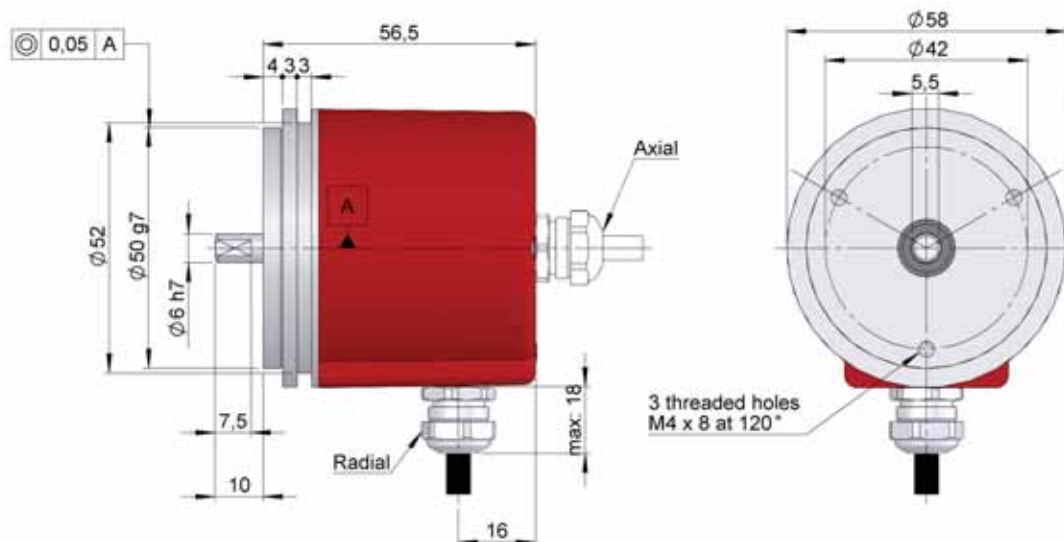
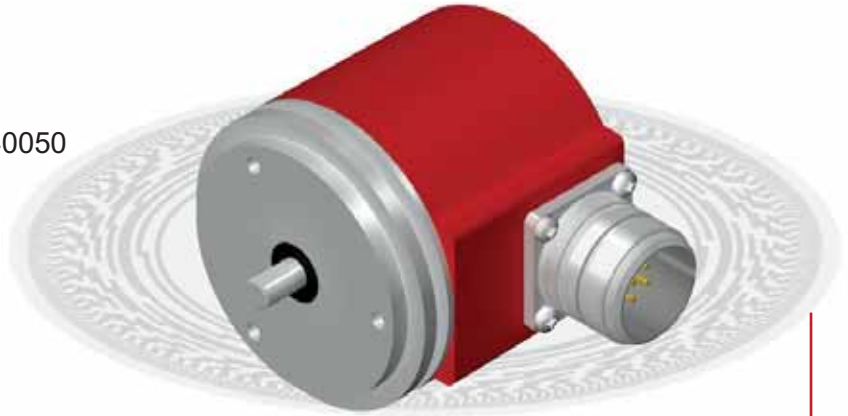


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 58 SIN/COS

## INCREMENTAL SOLID SHAFT ENCODER FOR INDUSTRIAL APPLICATIONS

- Available 1024 or 2048 pulses
- External diameter 58 mm
- Shaft 6 mm
- Protection class IP65 according to DIN 40050
- Synchro flange
- Connection by cable (any cable length available) or industrial connector



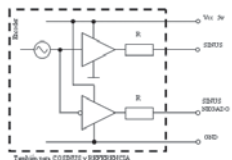
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

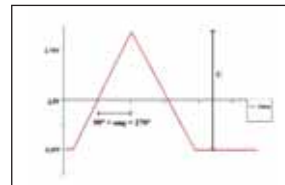
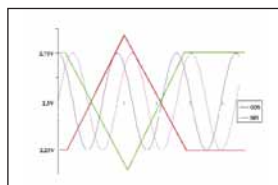
|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .  |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 40 N.  |
| Maximum load permitted on radial shaft                      | 60 N.  |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Maximum pulses per turn                                     | 1024 or 2048 pulses  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable length available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|                                       | Sine-wave                     |
|---------------------------------------|-------------------------------|
| Power supply                          | 5 V ±5%                       |
| Consumption                           | Typical: 80 mA<br>Max: 150 mA |
| Max. signal delay                     | 90° Electrics                 |
| Length of cable allowed               | 50 m                          |
| Signal type                           | Sin/Cos                       |
| Output signal level                   | 0.6 a 1.2 Vpp                 |
| Reference                             | 0.2 a 1 V                     |
| Frequency                             | 200 kHz                       |
| Protection against polarity inversion | No                            |



### CONNECTION

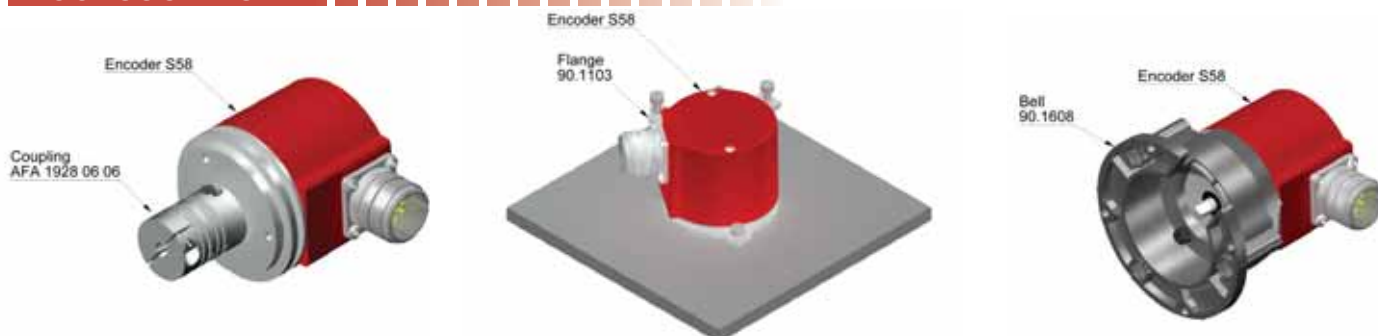


|               | Cable 3x2x0,14+2x0,34 | 90.9508<br>M12 8p | 90.9512<br>M23 12p |
|---------------|-----------------------|-------------------|--------------------|
| GND           | Black                 | 1                 | 1                  |
| Vcc           | Red                   | 2                 | 2                  |
| A             | Yellow                | 3                 | 3                  |
| B             | Green                 | 4                 | 4                  |
| A inverted    | Brown                 | 5                 | 5                  |
| B inverted    | Blue                  | 6                 | 6                  |
| 0 (reference) | Grey                  | 7                 | 7                  |
| 0 inverted    | Orange                | 8                 | 8                  |

## ORDERING CODE

| SERIE | SHAFT              | FLANGE          | OUTPUT SIGNALS  | CONNECTION   | ELECTRONIC OUTPUT        | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|--------------------|-----------------|---|--|--------------------------|---------------|------------------|
| 58S   | ●<br>1- Ø6 x 10 mm | ●<br>1- Synchro | ●<br>1- A $\tilde{A}$ + B $\tilde{B}$ + 0 $\tilde{0}$<br>2- A $\tilde{A}$ + B $\tilde{B}$ | ●<br>1- Axial cable<br>2- Radial cable<br>3- Axial 90.9512<br>4- Radial 90.9512<br>5- Axial 90.9508<br>6- Radial 90.9508 | ●<br>7- SIN/COS 1Vpp 5V. | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".



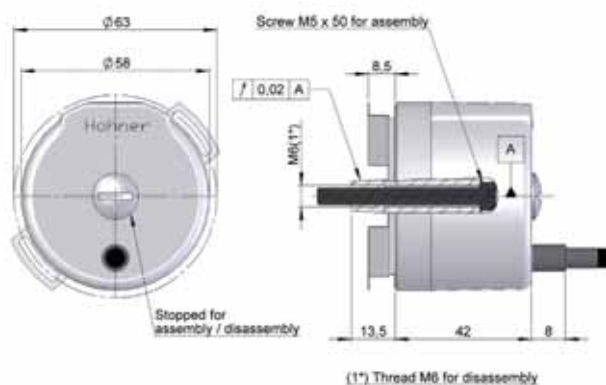
# SERIE 64

## CONIC SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

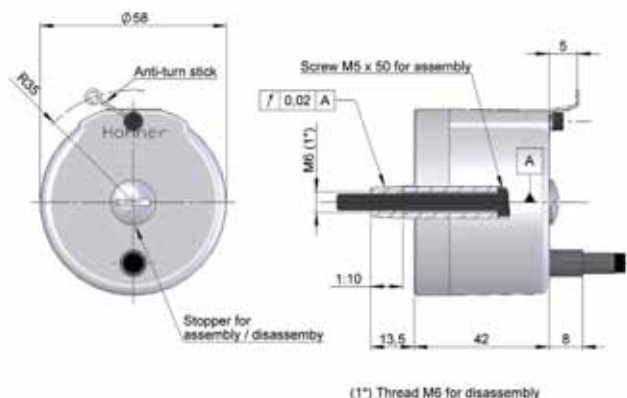
- Any number of pulses available from 1 to 10.000 pulses
- External diameter 58 mm
- Conic shaft 1:10
- Protection class IP54 according to DIN 40050
- Connection by cable (any cable length available) or industrial connector



### Antirotation for elastic flange



### Antirotation bar



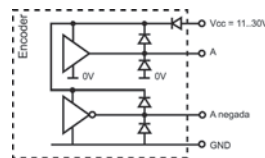
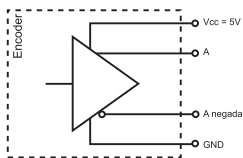
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

## MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium.  |
| Shaft   | Stainless Steel.  |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.   |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP54.   |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .   |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.   |
| Maximum load permitted on axial shaft                       | 40 N.   |
| Maximum load permitted on radial shaft                      | 60 N.   |
| Weight aprox.   | 0,5 Kg.   |
| Operating temperature range                                 | -20°C to +80°C.   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).   |
| Shock   | 1000 m/s <sup>2</sup> (6ms).  |
| Maximum pulses per turn                                     | 10.000.   |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lengths available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |

### CONNECTION



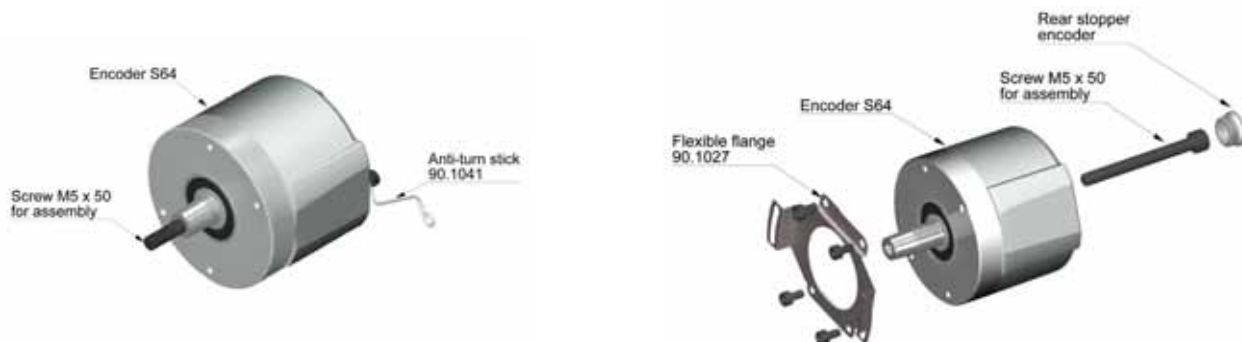
Cable 3x2x0,14+2x0,34

|               |        |
|---------------|--------|
| GND           | Black  |
| Vcc           | Red    |
| A             | Yellow |
| B             | Green  |
| A inverted    | Brown  |
| B inverted    | Blue   |
| 0 (reference) | Grey   |
| 0 inverted    | Orange |

## ORDERING CODE

| SERIE | SHAFT              | ANTIROTATION SYSTEM   | OUTPUT SIGNALS  | CONNECTION          | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|--------------------|---|---|---------------------|--|---------------|------------------|
| 64    | ●<br>1- Conic 1:10 | ●<br>↓<br>1- Elastic flange 90.1027<br>2- Antirotation bar 90.1041<br>3- None | ●<br>1- A $\tilde{A}$ + B $\tilde{B}$ + 0 $\tilde{0}$<br>1- A $\tilde{A}$ + B $\tilde{B}$ | ●<br>1- Axial cable | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V. Compatible TTL | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

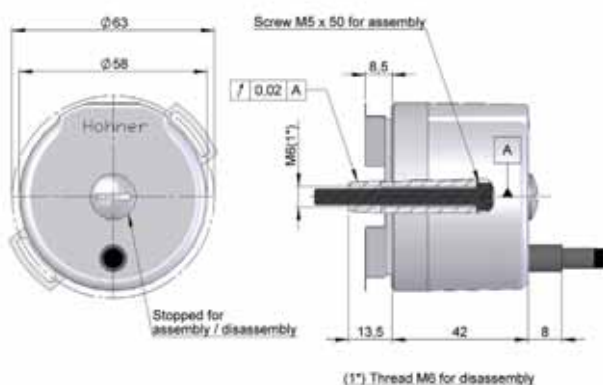
# SERIE 64 SIN/COS

## CONIC SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

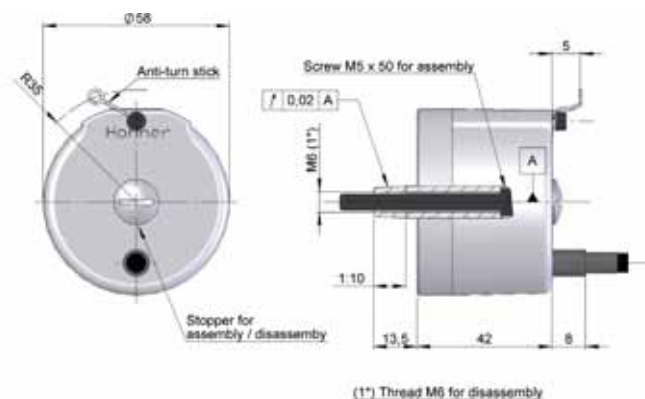
- Available 1024 and 2048 pulses
- External diameter 58 mm
- Conic shaft 1:10
- Protection class IP54 according to DIN 40050
- Connection by cable (any cable length available) or industrial connector



### Antirotation for elastic flange



### Antirotation bar



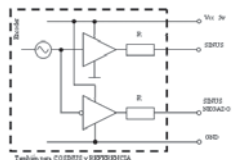
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

## MECHANICAL SPECIFICATIONS

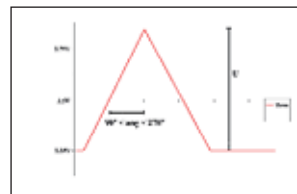
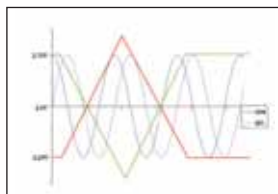
|   |                                       |
|---|---------------------------------------|
| Housing   | Aluminium.                            |
| Shaft   | Stainless Steel.                      |
| Bearings  | Ballraces.                            |
| Bearings lifetime   | $1 \times 10^{10}$ rev.               |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.                             |
| Protection against dust and splashes according to DIN 40050 | IP54.                                 |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .                 |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.                       |
| Maximum load permitted on axial shaft                       | 40 N.                                 |
| Maximum load permitted on radial shaft                      | 60 N.                                 |
| Weight aprox.   | 0,5 Kg.                               |
| Operating temperature range                                 | -20°C to +80°C.                       |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz). |
| Shock   | 1000 m/s <sup>2</sup> (6ms).          |
| Pulses number available                                     | 1024 and 2048.                        |
| Axial connection  | Cable 2 metres.                       |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|                                       | Sine-Wave                     |
|---------------------------------------|-------------------------------|
| Power supply                          | 5 V ±5%                       |
| Consumption                           | Typical: 80 mA<br>Max: 150 mA |
| Max. load capability                  | 90° Electrics                 |
| Length of cable allowed               | 50 m                          |
| Signal type                           | Sin/Cos                       |
| Output signal level                   | 0.6 a 1.2 Vpp                 |
| Reference                             | 0.2 a 1 V                     |
| Frequency                             | 200 kHz                       |
| Protection against polarity inversion | No                            |



### CONNECTION



Cable 3x2x0,14+2x0,34

|               |        |
|---------------|--------|
| GND           | Black  |
| Vcc           | Red    |
| A             | Yellow |
| B             | Green  |
| A inverted    | Brown  |
| B inverted    | Blue   |
| 0 (reference) | Grey   |
| 0 inverted    | Orange |

## ORDERING CODE

| SERIE | SHAFT              | ANTIROTATION SYSTEM   | OUTPUT SIGNALS  | CONNECTION          | ELECTRONIC OUTPUT        | PULSES NUMBER   | SPECIAL CUSTOMER |
|-------|--------------------|---|---|---------------------|--------------------------|-----------------|------------------|
| 64S   | ●<br>1- Conic 1:10 | ●<br>↓<br>1- Elastic flange 90.1027<br>2- Antirotation bar 90.1041<br>3- None | ●<br>1- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>2- A $\bar{A}$ + B $\bar{B}$ | ●<br>1- Axial cable | ●<br>7- SIN/COS 1Vpp 5V. | ● ● ● ● ● ● ● ● | ● ● ● ● ● ● ● ●  |

## ACCESSORIES



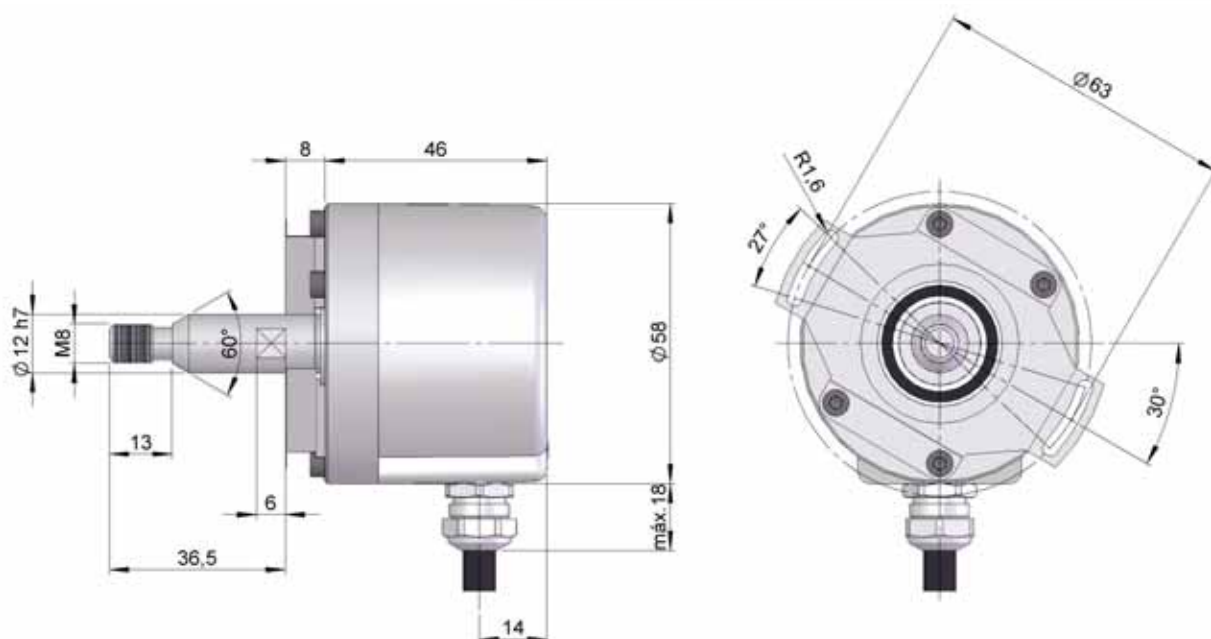
All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".



# SERIE 66

## THREAD SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- External diameter 58 mm
- Thread shaft M8
- Protection class IP64 according DIN 40050
- Connection by cable (any cable length available) or industrial connector



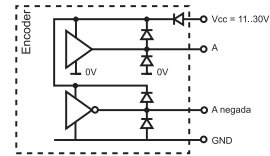
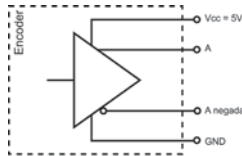
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | $1 \times 10^{10}$ rev.  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP64.  |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .  |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 40 N.  |
| Maximum load permitted on radial shaft                      | 60 N.  |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Maximum pulses per turn                                     | 10.000.  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lengths available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)    | Push-Pull Differential       |
|--|------------------------------|------------------------------|
| Power supply                             | 5 V ±5%                      | 11...30 V                    |
| Consumption                              | Tipico: 70 mA<br>Max: 150 mA | Tipico: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                       | ±30 mA                       |
| Length of cable allowed                  | 1200 m                       | 100 m                        |
| "Low" signal level                       | $V_{OL} < 0,5 V$             | $V_{OL} < 2.5 V$             |
| "High" signal level                      | $V_{OH} > 2.5 V$             | $V_{OH} > V_{CC} - 3 V$      |
| Frequency                                | 300 kHz                      | 200 kHz                      |
| Short circuit protection                 | Yes                          | Yes                          |
| Protection against polarity inversion    | No                           | Yes                          |
| Channel B leads (90° electric) channel A |                              |                              |

### CONNECTION

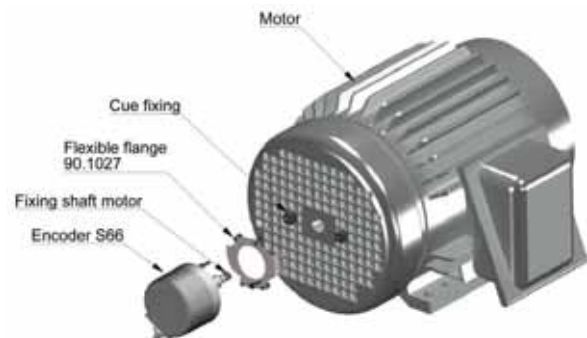


|               | Cable 6x2x0,14+2x0,34 | 90.9513<br>M16 12p |
|---------------|-----------------------|--------------------|
| GND           | Black                 | K - L              |
| Vcc           | Red                   | B - M              |
| A             | Yellow                | E                  |
| B             | Green                 | H                  |
| A inverted    | Brown                 | F                  |
| B inverted    | Blue                  | A                  |
| 0 (reference) | Grey                  | C                  |
| 0 inverted    | Orange                | D                  |

## ORDERING CODE

| SERIE | SHAFT             | ANTIROTATION SYSTEM  | OUTPUT SIGNALS  | CONNECTION                                | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|-------------------|--|---|---|--|---------------|------------------|
| 66    | ●<br>1- Thread M8 | ●<br>↓<br>1- Elastic flange 90.1027<br>2- Antirotation bar 90.1041<br>3- Without antirotation system | ●<br>1- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>2- A $\bar{A}$ + B $\bar{B}$ | ●<br>1- Radial cable<br>2- Radial 90.9513 | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V. Compatible TTL | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES

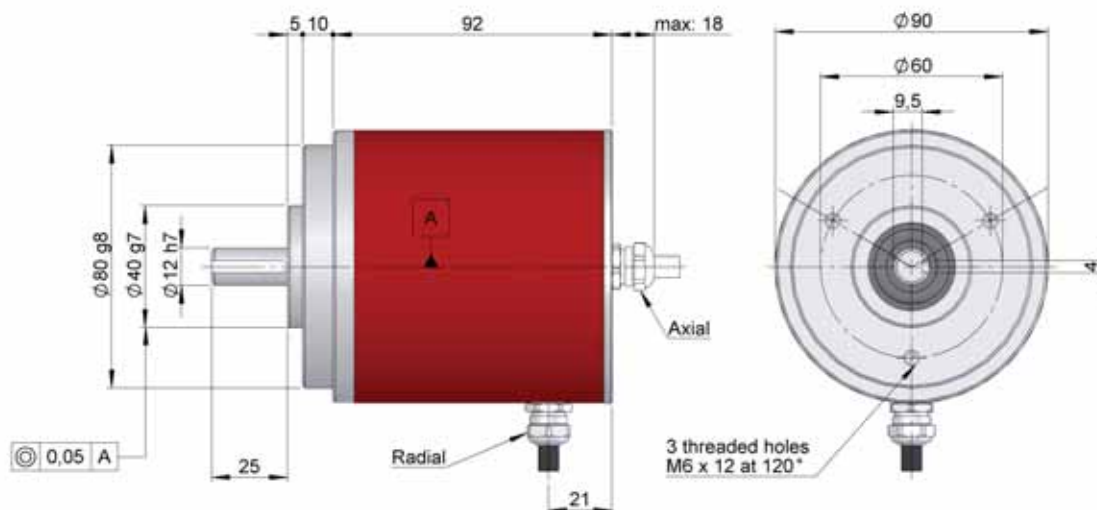


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 30

## SOLID SHAFT INCREMENTAL ENCODER FOR HEAVY DUTY INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- External diameter 90 mm
- Shaft 12 mm
- Protection class IP65 according to DIN 40050
- Executions mechanical, electronic and special optics available on request
- Connection by cable (any cable length available) or industrial connector



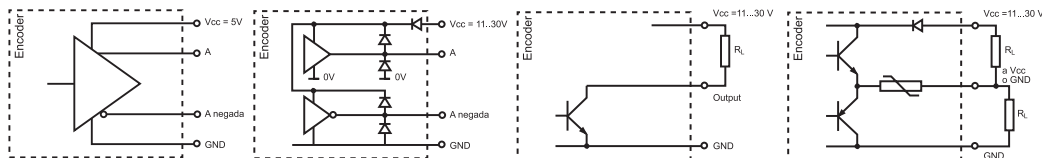
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | $1 \times 10^{10}$ rev.  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | 270 gcm <sup>2</sup> .   |
| Starting torque at 20°C (68°F) ,                            | Max. / 5,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 80 N.  |
| Maximum load permitted on radial shaft                      | 100 N.   |
| Weight aprox.   | 1,2 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Maximum pulses per turn                                     | 10.000.  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lengths available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|---------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     | 11...30 V                 | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | $\pm$ 20 mA                   | $\pm$ 30 mA                   | 40 mA                     | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m (a 24 V)             | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              | $V_{OL} < 0,4 V$ (a 24 V) | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{cc} - 3 V$       | $V_{OH} > 22 V$ (a 24 V)  | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 100 kHz                   | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Not permanent             | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                       | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                           |                               |

### CONNECTION

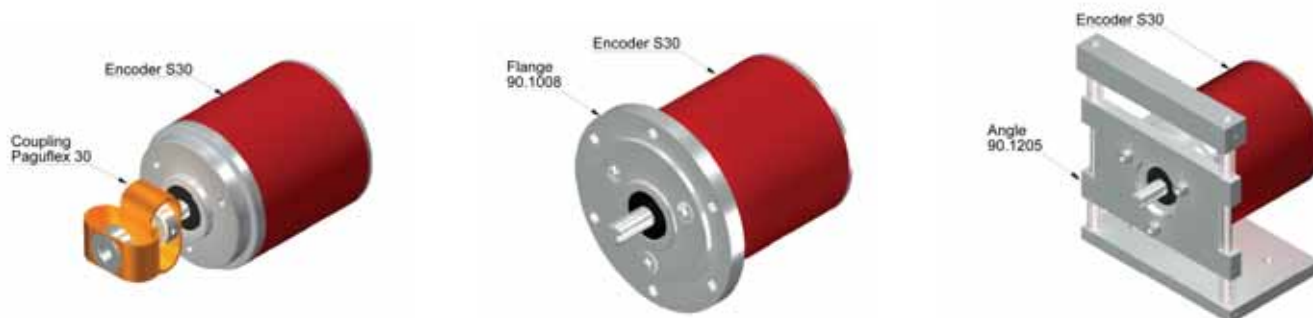


|               | Cable 5x0.14 | Cable 3x2x0.14+2x0.34 | 90.9504<br>DIN43650 4p | 90.9507<br>Mil 7p | 90.9510<br>Mil 10p | 90.9512<br>M2312p |
|---------------|--------------|-----------------------|------------------------|-------------------|--------------------|-------------------|
| GND           | Yellow       | Black                 | 1                      | A                 | A                  | 1                 |
| Vcc           | White        | Red                   | 2                      | B                 | B                  | 2                 |
| A             | Brown        | Yellow                | 3                      | C                 | C                  | 3                 |
| B             | Green        | Green                 | 4                      | D                 | D                  | 4                 |
| A inverted    |              | Brown                 |                        | E                 | E                  | 5                 |
| B inverted    |              | Blue                  |                        | F                 | F                  | 6                 |
| 0 (reference) | Grey         | Grey                  |                        | G                 | G                  | 7                 |
| 0 inverted    | Grey         | Orange                |                        | G                 | H                  | 8                 |

### ORDERING CODE

| SERIE            | OUTPUT SIGNALS   | CONNECTION        | ELECTRONIC OUTPUT                              | PULSES NUMBER   | SPECIAL CUSTOMER |
|------------------|------------------|-------------------|--|-----------------|------------------|
| 30               | ●                | ●                 | ●  | ● ● ● ● ● ● ● ● | ● ● ● ● ● ● ● ●  |
| 30- A            | 30- A + B        | 0- Axial cable    | 0- Open collector NPN 11..30V                  |                 |                  |
| 40- A + B        | 42- A + B + 0    | 1- Axial 90.9504  | 1- Push-Pull 11..30V (without inverted)        |                 |                  |
| 43- A + B + 0    | 43- A + B + 0    | 3- Axial 90.9507  | 7- Standard RS422. 5V. Compatible TTL          |                 |                  |
| 35- AA + BB      | 35- AA + BB      | 4- Axial 90.9512  | 9- Differential line driver. Push-Pull 11..30V |                 |                  |
| 36- AA + BB + 00 | 36- AA + BB + 00 | 5- Radial cable   |  |                 |                  |
|                  |                  | 6- Radial 90.9504 |  |                 |                  |
|                  |                  | 8- Radial 90.9507 |  |                 |                  |
|                  |                  | 9- Radial 90.9512 |  |                 |                  |
|                  |                  | M- Axial 90.9510  |  |                 |                  |
|                  |                  | N- Radial 90.9510 |  |                 |                  |

### ACCESSORIES

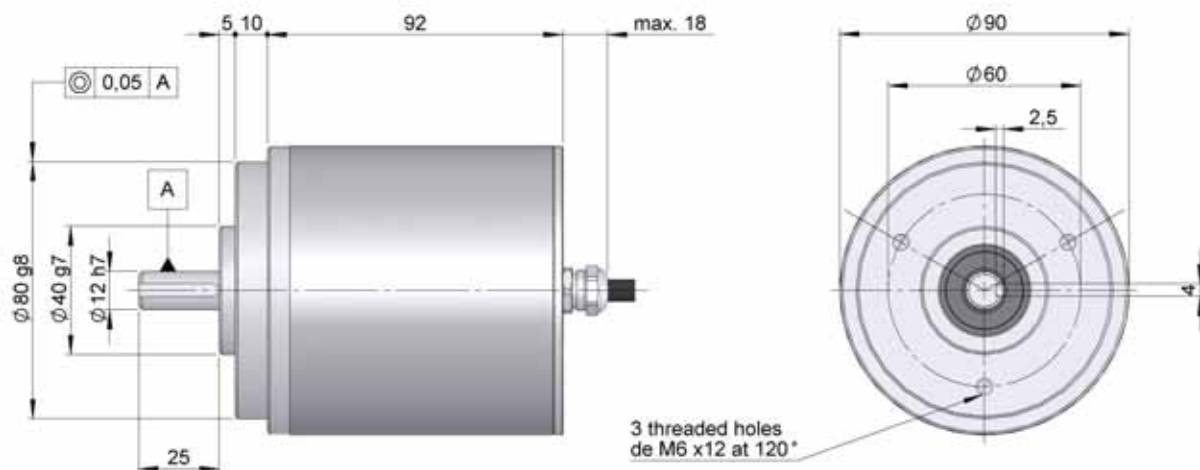


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 30 IP67

## SOLID SHAFT INCREMENTAL ENCODER FOR SEVERE AND HEAVY DUTY INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- External diameter 90 mm
- Shaft 12 mm
- Protection class IP67 according to DIN 40050
- Executions mechanical, electronic and special optics available on request
- Connection by cable (any cable length available) or industrial connector



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

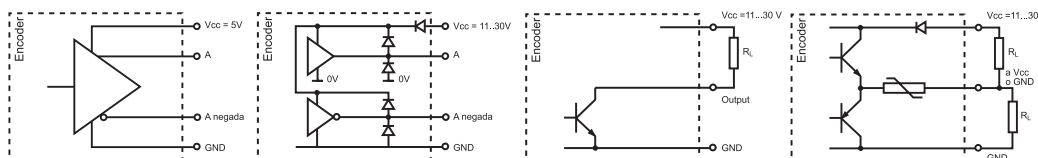
### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium/Stainless Steel.                              |
| Shaft   | Stainless Steel.  |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                                 |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP67.   |
| Rotor inertia moment  | 270 gcm <sup>2</sup> .                                  |
| Starting torque at 20°C (68°F) ,                            | Max. / 5,0 Ncm.   |
| Maximum load permitted on axial shaft                       | 80 N.   |
| Maximum load permitted on radial shaft                      | 100 N.  |
| Weight aprox.   | 1,2 Kg.   |
| Operating temperature range                                 | -20°C to +80°C.   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).                   |
| Shock   | 1000 m/s <sup>2</sup> (6ms).                            |
| Maximum pulses per turn                                     | 10.000.   |
| Axial or radial connection                                  | Cable 2 metres (other cable length available on order). |



## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|---------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     | 11...30 V                 | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        | 40 mA                     | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m (a 24 V)             | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              | $V_{OL} < 0,4 V$ (a 24 V) | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{CC} - 3 V$       | $V_{OH} > 2,2 V$ (a 24 V) | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 100 kHz                   | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Not permanent             | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                       | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                           |                               |

### CONNECTION



|               | Cable 5x0.14 | Cable 3x2x0,14+2x0,34 | 90.9512<br>M23 12p |
|---------------|--------------|-----------------------|--------------------|
| GND           | Yellow       | Black                 | 1                  |
| Vcc           | White        | Red                   | 2                  |
| A             | Brown        | Yellow                | 3                  |
| B             | Green        | Green                 | 4                  |
| A inverted    |              | Brown                 | 5                  |
| B inverted    |              | Azul                  | 6                  |
| 0 (reference) | Grey         | Grey                  | 7                  |
| 0 inverted    | Grey         | Orange                | 8                  |

## ORDERING CODE

| SERIE                | OUTPUT SIGNALS                         | CONNECTION       | ELECTRONIC OUTPUT                              | PULSES NUMBER | SPECIAL CUSTOMER |
|----------------------|--|------------------|--|---------------|------------------|
| 30I- Stainless Steel | 30- A                                  | 0- Axial cable   | 0- Open collector NPN 11..30V                  | ●●●●●●●●      | ●●●●●●●●         |
| 30A- Aluminium       | 40- A + B                              | 4- Axial 90.9512 | 1- Push-Pull 11..30V (without inverted)        | ●●●●●●●●      | ●●●●●●●●         |
|                      | 42- A + B + 0                          |                  | 7- Standard RS422. 5V. Compatible TTL          | ●●●●●●●●      | ●●●●●●●●         |
|                      | 43- A + B + 0                          |                  | 9- Differential line driver. Push-Pull 11..30V | ●●●●●●●●      | ●●●●●●●●         |
|                      | 35- A $\tilde{A}$ + B $\tilde{B}$      |                  |  |               |                  |
|                      | 36- A $\tilde{A}$ + B $\tilde{B}$ + 00 |                  |  |               |                  |

- The option 30I is only available with axial connection output (0)

## ACCESSORIES

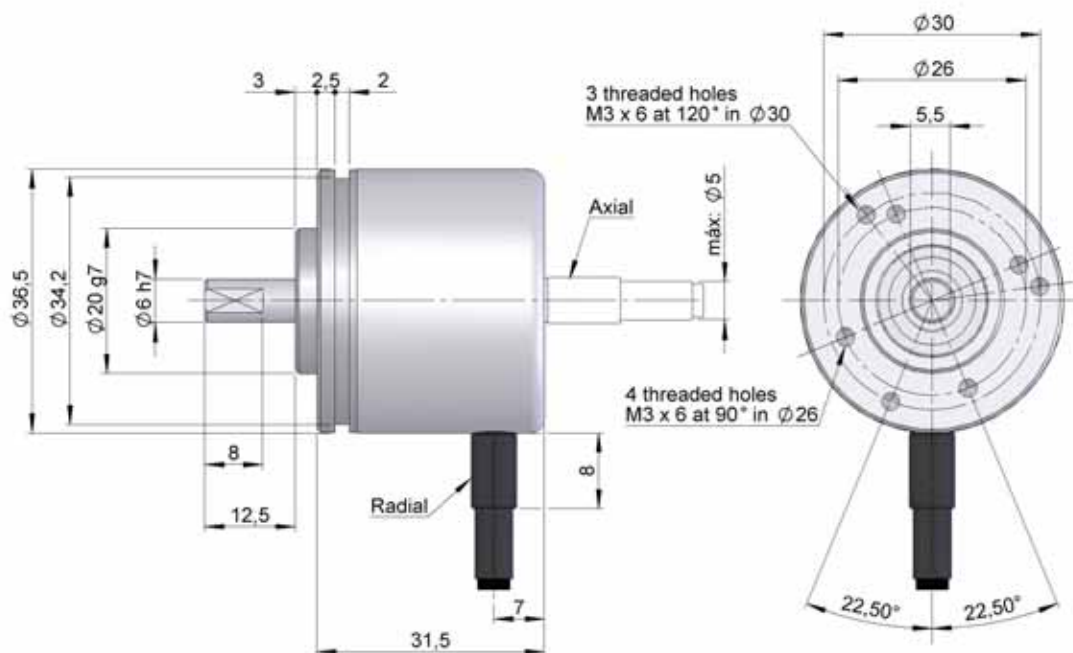


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 36

## INCREMENTAL SOLID SHAFT ENCODER FOR INDUSTRIAL APPLICATIONS

- Resolution up to 3600 pulses per turn
- External diameter 36,5 mm
- Shaft 6 mm
- Protection class IP64 according to DIN 40050
- Excellent flange flexibility and various configurations
- Special mechanical, electronic and optical available on order
- Connection by cable (any cable length available) or air industrial connector



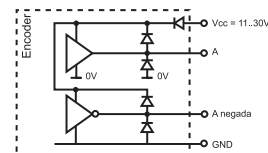
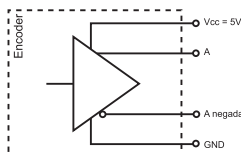
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.                                       |
| Bearings  | Ballraces.   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                                |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP64.  |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .                                  |
| Starting torque at 20°C (68°F) ,                            | Max. / 0,5 Ncm.  |
| Maximum load permitted on axial shaft                       | 20 N.  |
| Maximum load permitted on radial shaft                      | 40 N.  |
| Weight aprox.   | 0,08 Kg.   |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).                  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).                           |
| Maximum pulses per turn                                     | 3600.  |
| Axial or radial connection                                  | Cable 2 metres (other cable length available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | <b>RS422<br/>(TTL compatible)</b> | <b>Push-Pull Differential</b> |
|--|-----------------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                      | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA     | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | $\pm$ 20 mA                       | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                            | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$                  | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$                  | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                           | 200 kHz                       |
| Short circuit protection                 | Yes                               | Yes                           |
| Protection against polarity inversion    | No                                | Yes                           |
| Channel A leads (90° electric) channel B |                                   |                               |

### CONNECTION

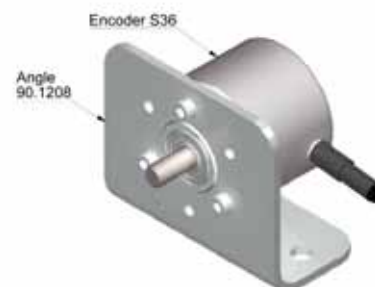


|               | <b>Cable 5x0,14</b> | <b>Cable 8x0,14</b> |
|---------------|---------------------|---------------------|
| GND           | White               | White               |
| Vcc           | Brown               | Brown               |
| A             | Green               | Green               |
| B             | Yellow              | Grey                |
| A inverted    |                     | Yellow              |
| B inverted    |                     | Rose                |
| 0 (reference) | Grey                | Blue                |
| 0 inverted    | Grey                | Red                 |

## ORDERING CODE

| SERIE | FIXATION         | OUTPUT SIGNALS                       | CONNECTION                             | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|------------------|--------------------------------------|--|--|---------------|------------------|
| 36    | ●<br>1- Clamping | ●<br>3- A + B + 0<br>7- AA + BB + 00 | ●<br>1- Axial cable<br>2- Radial cable | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V. Compatible TTL | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES

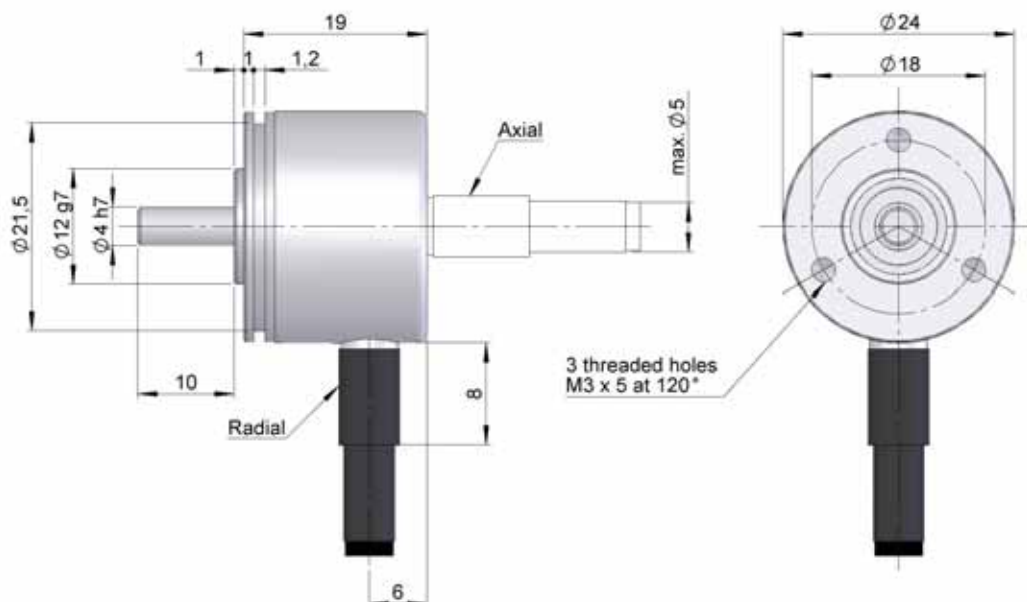


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 26

## SOLID SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

- Resolution up to 1024 pulses per turn
- External diameter 24 mm
- Shaft 4 or 6 mm
- Protection class IP64 according to DIN 40050
- Connection by cable (any cable length available) or air industrial connector



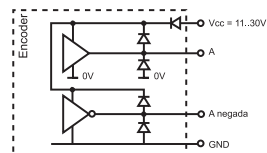
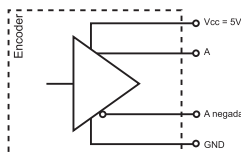
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium.  |
| Shaft   | Stainless Steel.  |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                                 |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP64.   |
| Rotor inertia moment  | 2 gcm <sup>2</sup> .                                    |
| Starting torque at 20°C (68°F) ,                            | Max. / 0,1 Ncm.   |
| Maximum load permitted on axial shaft                       | 20 N.   |
| Maximum load permitted on radial shaft                      | 10 N.   |
| Weight aprox.   | 0,06 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).                   |
| Shock   | 1000 m/s <sup>2</sup> (6ms).                            |
| Maximum pulses per turn                                     | 1.024.  |
| Axial or radial connection                                  | Cable 2 metres (other cable lengths available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | $\pm$ 20 mA                   | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel A leads (90° electric) channel B |                               |                               |

### CONNECTION



|               | Cable 5x0,14 | Cable 8x0,14 |
|---------------|--------------|--------------|
| GND           | White        | White        |
| Vcc           | Brown        | Brown        |
| A             | Green        | Green        |
| B             | Yellow       | Grey         |
| A inverted    |              | Yellow       |
| B inverted    |              | Rose         |
| 0 (reference) | Grey         | Blue         |
| 0 inverted    | Grey         | Red          |

## ORDERING CODE

| SERIE | SHAFT                     | OUTPUT SIGNALS                       | CONNECTION                             | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---------------------------|--------------------------------------|--|--|---------------|------------------|
| 26    | ●<br>1- Ø4 mm<br>2- Ø6 mm | ●<br>3- A + B + 0<br>7- AA + BB + 00 | ●<br>1- Axial cable<br>2- Radial cable | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V. Compatible TTL | ●●●●●●●●      | ●●●●●●           |

## ACCESSORIES



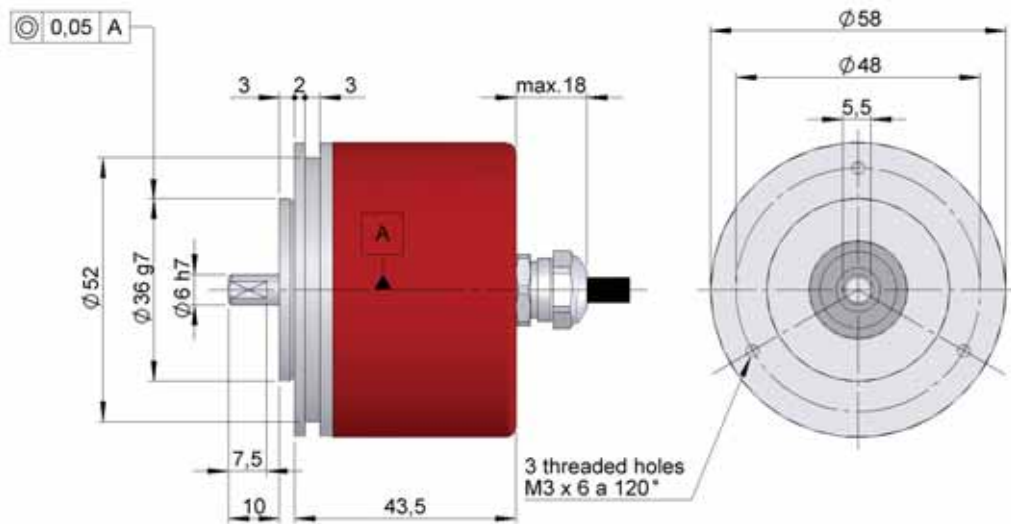
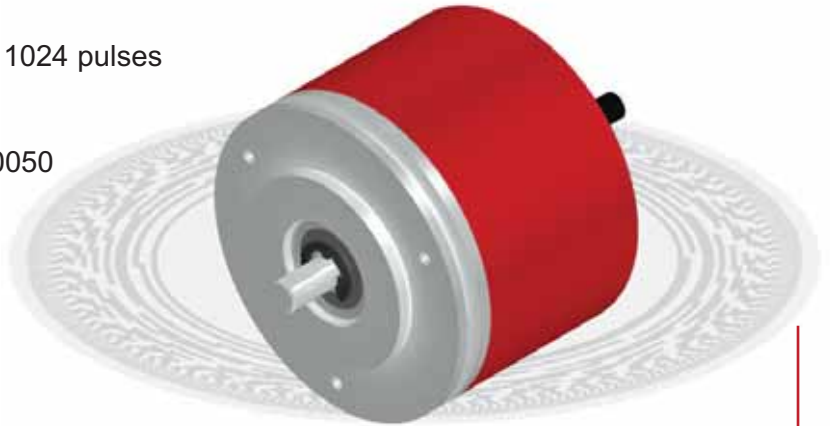
All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".



# SERIE 20

## SOLID SHAFT INCREMENTAL ENCODER FOR SIMPLE INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 1024 pulses
- External diameter 58 mm
- Shaft 6 mm
- Protection class IP54 according to DIN 40050
- Different flanges available
- Connection by cable (any cable length available or air industrial connector)



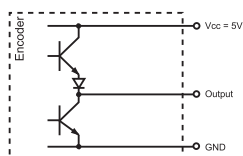
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

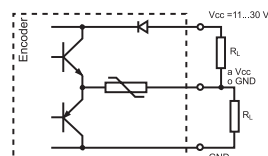
|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                                  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP54.  |
| Rotor inertia moment  | 10 gcm <sup>2</sup> .                                    |
| Starting torque at 20°C (68°F) ,                            | Max. / 0,5 Ncm.  |
| Maximum load permitted on axial shaft                       | 20 N.  |
| Maximum load permitted on radial shaft                      | 30 N.  |
| Weight aprox.   | 0,3 Kg.  |
| Operating temperature range                                 | -20°C to +60°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).                    |
| Shock   | 1000 m/s <sup>2</sup> (6ms).                             |
| Maximum pulses per turn                                     | 1.024.   |
| Axial connection  | Cable 2 metres (other cable lengths available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



TTL



Push-Pull

|  |                                |                               |
|--|--------------------------------|-------------------------------|
| Power supply                             | 5 V                            | 11...30V                      |
| Consumption                              | Typical: 120 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±40 mA                         | ±30 mA                        |
| Length of cable allowed                  | 100 m                          | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,2 V$               | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,4 V$               | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 100 kHz                        | 200 kHz                       |
| Short circuit protection                 | Yes                            | Yes                           |
| Protection against polarity inversion    | No                             | Yes                           |
| Channel B leads (90° electric) channel A |                                |                               |

### CONNECTION

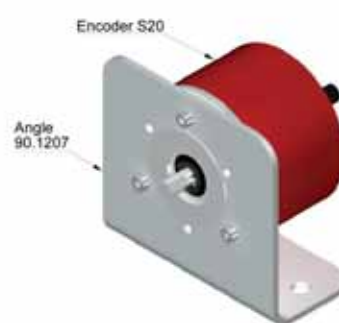
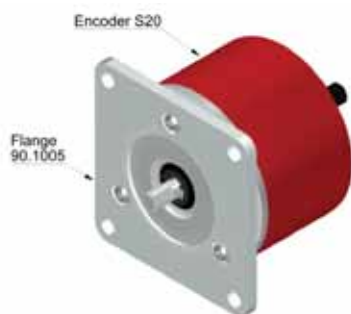


|               | Cable 5x0.14 | Cable 3x2x0,14+2x0,34 |
|---------------|--------------|-----------------------|
| GND           | Yellow       | Black                 |
| Vcc           | White        | Red                   |
| A             | Brown        | Yellow                |
| B             | Green        | Green                 |
| A inverted    |              | Brown                 |
| B inverted    |              | Blue                  |
| 0 (reference) | Grey         | Grey                  |
| 0 inverted    | Grey         | Orange                |

## ORDERING CODE

| SERIE | SHAFT              | FLANGE  | OUTPUT SIGNALS  | CONNECTION          | ELECTRONIC OUTPUT                                    | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|--------------------|---|---|---------------------|--|---------------|------------------|
| 20    | ●<br>1- Ø6 x 10 mm | ●<br>1-None<br>2- 90.1002<br>3- 90.1004<br>4- 90.1005 | ●<br>1- A<br>2- A + B<br>3- A + B + 0<br>5- A + B<br>6- A + B + 0<br>9- A + B + 0 | ●<br>2- Axial cable | ●<br>1- Push-Pull 11..30V<br>2- Line driver. TTL 5V. | ●●●●●         | ●●●●●            |

## ACCESSORIES

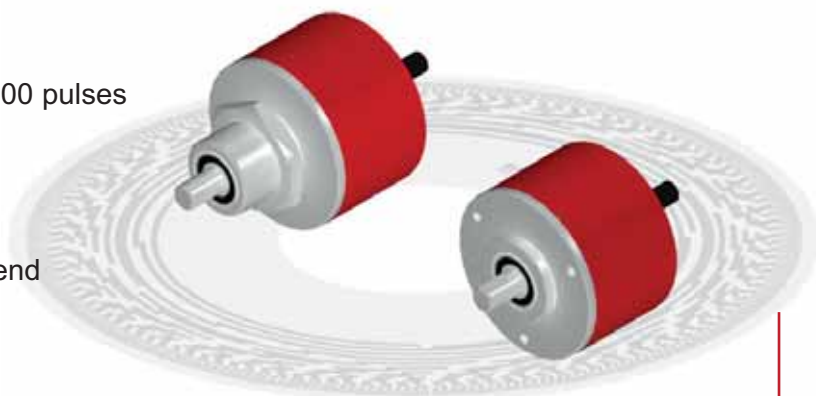


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

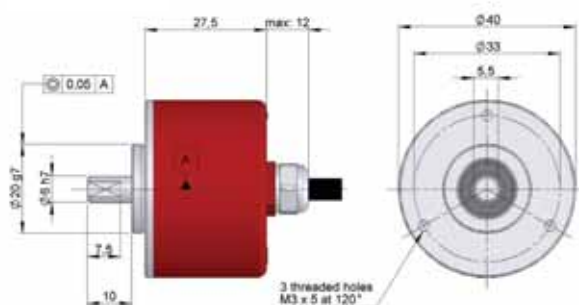
# SERIE 21

## SOLID SHAFT INCREMENTAL ENCODER FOR SIMPLE INDUSTRIAL APPLICATIONS

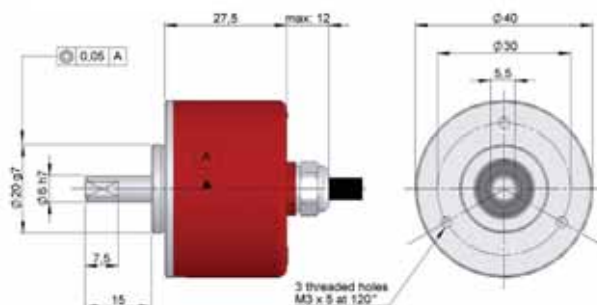
- Any number of pulses available from 1 to 500 pulses
- External diameter 40 mm
- Shaft 6 mm
- Protection class IP41 according DIN40050
- Connection by cable (any cable length available) or air industrial connector at the end



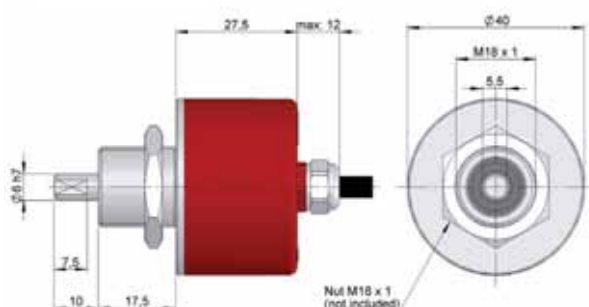
Mechanical A



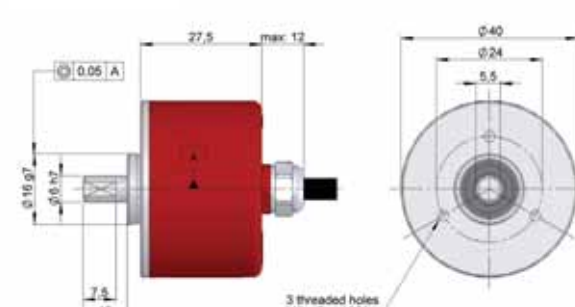
Mechanical B



Mechanical C



Mechanical D



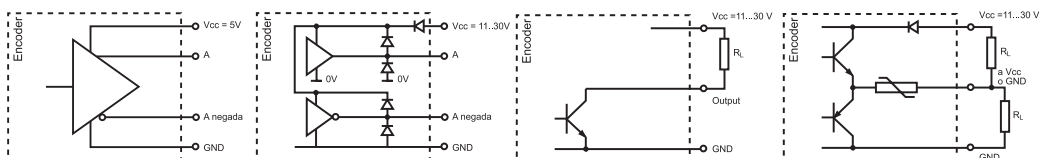
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium.  |
| Shaft   | Stainless Steel.  |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                                 |
| Maximum number of revolutions permitted mechanically        | 5000 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP41.   |
| Rotor inertia moment  | 10 gcm <sup>2</sup> .                                   |
| Starting torque at 20°C (68°F) ,                            | Max. / 0,4 Ncm.   |
| Maximum load permitted on axial shaft                       | 5 N.  |
| Maximum load permitted on radial shaft                      | 5 N.  |
| Weight aprox.   | 0,2 Kg.   |
| Operating temperature range                                 | -20°C to +60°C.   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).                   |
| Shock   | 1000 m/s <sup>2</sup> (6ms).                            |
| Maximum pulses per turn                                     | 500.  |
| Axial connection  | Cable 1 metre (other cable lengths available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|---------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     | 11...30 V                 | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | $\pm$ 20 mA                   | $\pm$ 30 mA                   | 40 mA                     | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m (a 24 V)             | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              | $V_{OL} < 0,4 V$ (a 24 V) | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{CC} - 3 V$       | $V_{OH} > 22 V$ (a 24 V)  | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 100 kHz                   | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Not permanent             | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                       | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                           |                               |

### CONNECTION



|               | Cable 5x0.14 | Cable 3x2x0,14+2x0,34 |
|---------------|--------------|-----------------------|
| GND           | Yellow       | Black                 |
| Vcc           | White        | Red                   |
| A             | Brown        | Yellow                |
| B             | Green        | Green                 |
| A inverted    |              | Brown                 |
| B inverted    |              | Blue                  |
| 0 (reference) | Grey         | Grey                  |
| 0 inverted    | Grey         | Orange                |

## ORDERING CODE

| SERIE | MECHANICAL OPTION                              | OUTPUT SIGNALS  | ELECTRONIC OUTPUT   | PULSES NUMBER |
|-------|--|---|---|---------------|
| 21    | ●  | ●   | ●   | ● ● ●         |
|       | 1- A<br>2- B<br>3- C<br>4- D<br>see dimensions | 1- A<br>2- A + B<br>3- A + B + 0<br>4- A + B + 0<br>7- $\tilde{A}\tilde{A} + \tilde{B}\tilde{B} + 0\tilde{0}$<br>8- AA + BB | 0- Open collector NPN 11..30V<br>1- Push-Pull 11..30V (without inverted)<br>7- Standard RS422. 5V. Compatible TTL<br>9- Differential line driver. Push-Pull 11..30V |               |

## ACCESSORIES

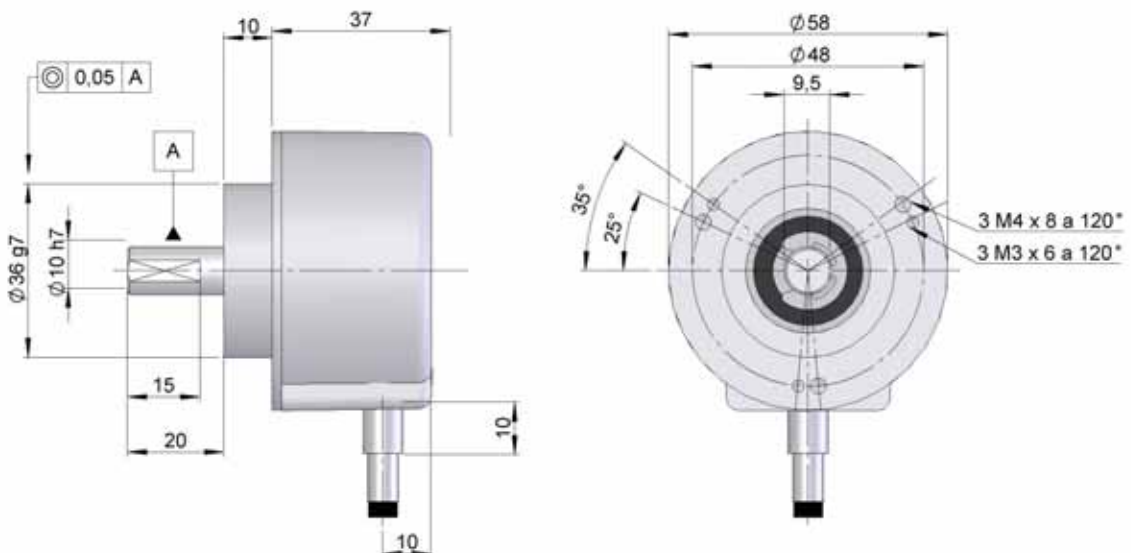


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 11

## INCREMENTAL SOLID SHAFT ENCODER LOW COST FOR INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 1024 pulses
- External diameter 58 mm
- Shaft 10 mm
- Protection class IP64 according to DIN 40050
- Connection by cable (any cable length available or air industrial connector)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

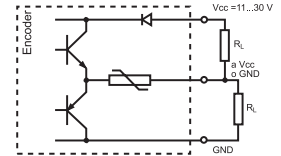
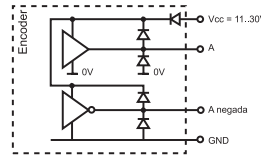
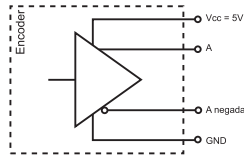
### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium   |
| Shaft   | Stainless steel   |
| Bearings  | Ballraces   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm  |
| Protection against dust and splashes according to DIN 40050 | IP64  |
| Rotor inertia moment  | 30 gcm <sup>2</sup>   |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm  |
| Maximum load permitted on axial shaft                       | 40 N  |
| Maximum load permitted on radial shaft                      | 60 N  |
| Weight aprox.   | 0,5 Kg  |
| Operating temperature range                                 | -20°C a +80°C   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz)  |
| Shock   | 1000 m/s <sup>2</sup> (6ms)   |
| Maximum pulses per turn                                     | 1024  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lengths available on order) |



# ELECTRICAL SPECIFICATIONS

## OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max.load capability                      | $\pm$ 20 mA                   | $\pm$ 30 mA                   | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{CC} - 3 V$       | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                               |

## CONNECTION

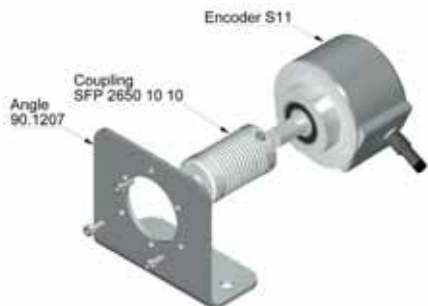


|               | Cable 5x0.14 | Cable 3x2x0,14+2x0,34 |
|---------------|--------------|-----------------------|
| GND           | Yellow       | Black                 |
| Vcc           | White        | Red                   |
| A             | Brown        | Yellow                |
| B             | Green        | Green                 |
| A inverted    |              | Brown                 |
| B inverted    |              | Blue                  |
| 0 (reference) | Grey         | Grey                  |
| 0 inverted    | Grey         | Orange                |

## ORDERING CODE

| SERIE | SHAFT               | FLANGE      | OUTPUT SIGNALS  | CONNECTION           | ELECTRONIC OUTPUT   | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---------------------|-------------|---|----------------------|---|---------------|------------------|
| 11    | ●<br>1- Ø10 x 20 mm | ●<br>1-None | ●<br>1- A<br>2- A + B<br>3- A + B + 0<br>5- A $\bar{A}$ + B $\bar{B}$<br>6- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>9- A + B + 0 | ●<br>3- Radial cable | ●<br>1- Push-Pull 11..30V (without inverted)<br>7- Standard RS422. 5V. Compatible TTL<br>9- Differential line driver. Push-Pull 11..30V | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES

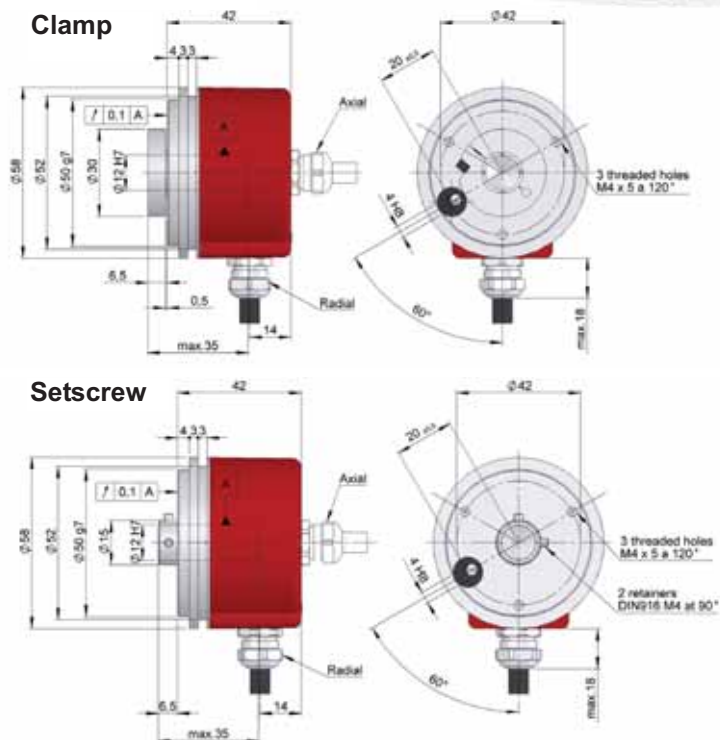
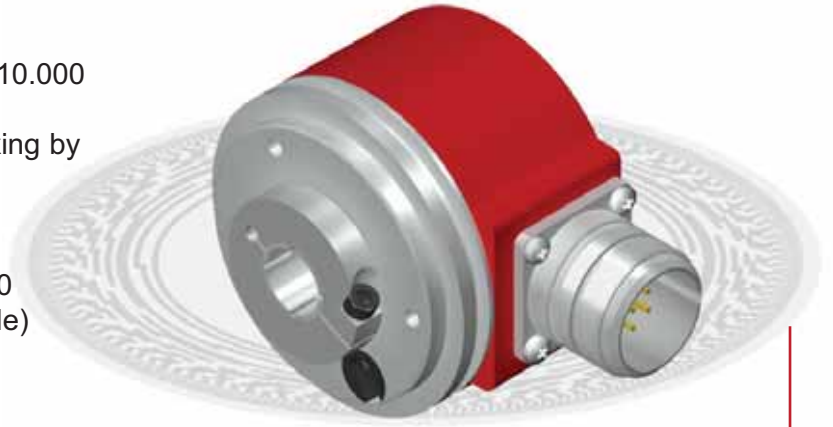


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 19

## BLIND HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

- Any number of pulses available from 1 to 10.000 pulses
- Easy to install, two mechanical options, fixing by setscrew or clamp
- External diameter 58 mm
- Blind hollow shaft up to 14 mm
- Protection class IP65 according DIN 40050
- Cable conection (any cable lenght available) or industrial connector.



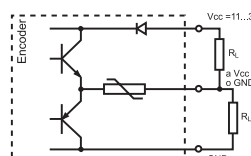
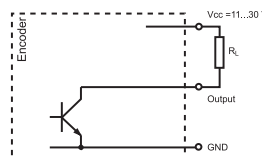
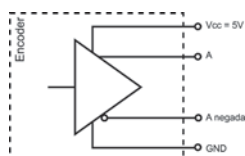
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium.  |
| Shaft   | Stainless Steel.  |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.   |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP65.   |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .   |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.   |
| Maximum load permitted on axial shaft                       | 40 N.   |
| Maximum load permitted on radial shaft                      | 60 N.   |
| Permitted misalignment :Flexible clamp 90.1014/90.1024      | ± 0,5mm axial, ± 0,3mm radial..   |
| Weight aprox.   | 0,5 Kg.   |
| Operating temperature range                                 | -20°C to +80°C.   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).   |
| Shock   | 1000 m/s <sup>2</sup> (6ms).  |
| Maximum pulses per turn                                     | 10.000  |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lenghts available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        | Push-Pull<br>without inverted |
|--|-------------------------------|-------------------------------|---------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     | 11...30 V                 | 11...30V                      |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        | 40 mA                     | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         | 50 m (a 24 V)             | 50 m                          |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              | $V_{OL} < 0,4 V$ (a 24 V) | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{cc} - 3 V$       | $V_{OH} > 2,2 V$ (a 24 V) | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       | 100 kHz                   | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           | Not permanent             | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           | Yes                       | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |                           |                               |

### CONNECTION

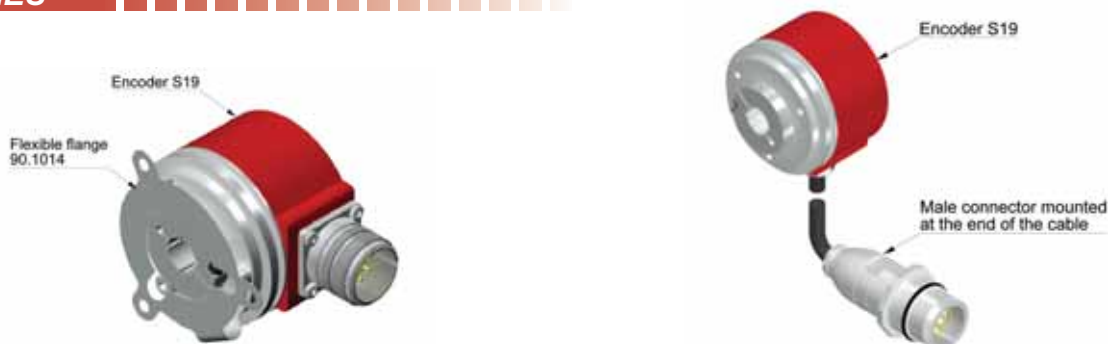


|               | Cable 5x0.14 | Cable 3x2x0,14+2x0,34 | 90.9508<br>M12 8p | 90.9512<br>M23 12p |
|---------------|--------------|-----------------------|-------------------|--------------------|
| GND           | Yellow       | Black                 | 1                 | 1                  |
| Vcc           | White        | Red                   | 2                 | 2                  |
| A             | Brown        | Yellow                | 3                 | 3                  |
| B             | Green        | Green                 | 4                 | 4                  |
| A inverted    |              | Brown                 | 5                 | 5                  |
| B inverted    |              | Blue                  | 6                 | 6                  |
| 0 (reference) | Grey         | Grey                  | 7                 | 7                  |
| 0 inverted    | Grey         | Orange                | 8                 | 8                  |

## ORDERING CODE

| SERIE | MECHANICAL OPTION            | BLIND-HOLLOW SHAFT  | OUTPUT SIGNALS  | CONNECTION   | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|------------------------------|---|---|--|--|---------------|------------------|
| 19    | ●<br>1- Clamp<br>2- Setscrew | ●<br>1- Ø6 x 26 mm<br>3- Ø8 x 26 mm<br>4- Ø10 x 26 mm<br>5- Ø12 x 26 mm<br>7- Ø14 x 26 mm | ●<br>1- A<br>2- A + B<br>3- A + B + 0<br>5- A $\tilde{A}$ + B $\tilde{B}$<br>6- A $\tilde{A}$ + B $\tilde{B}$ + 0 $\tilde{0}$<br>9- A + B + 0 | ●<br>3- Radial cable<br>5- Radial 90.9512<br>L- Radial 90.9508 | ●<br>0- Open collector NPN 11..30V<br>1- Push-Pull 11..30V (without inverted)<br>7- Standard RS422. 5V. Compatible TTL<br>9- Differential line driver. Push-Pull 11..30V | ●●●●●●●●      | ●●●●●●           |

## ACCESSORIES

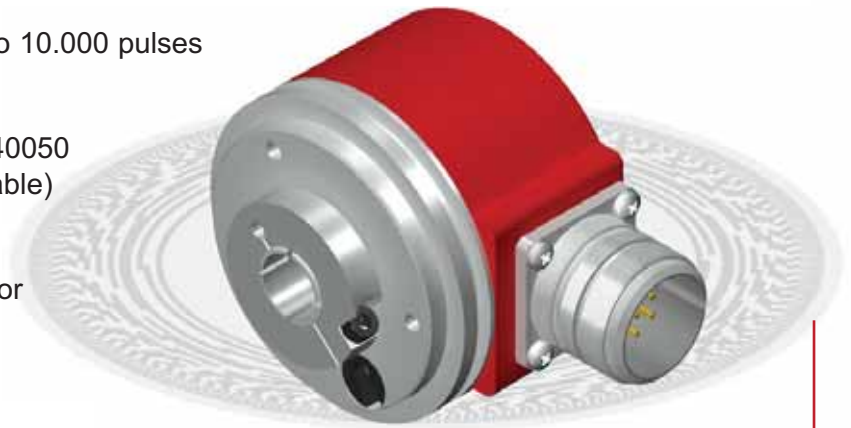


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

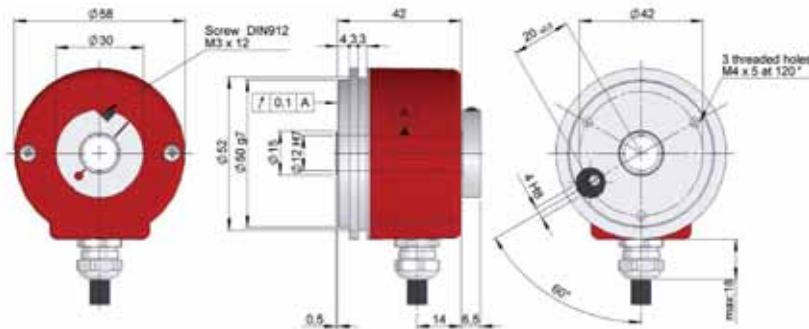
# SERIE 59

## HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

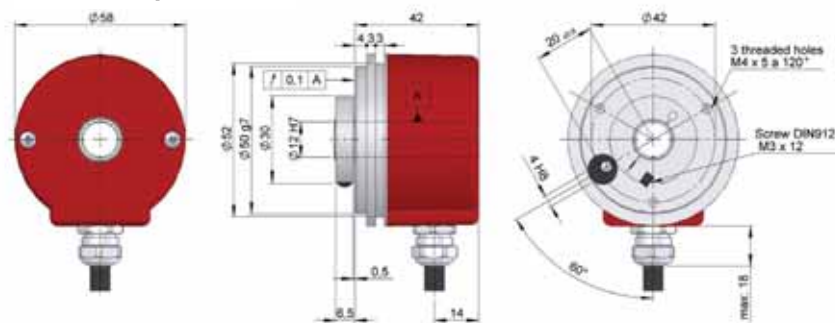
- Any number of pulses available from 1 to 10.000 pulses
- External diameter 58 mm
- Hollow shaft 10, 12 or 14 mm
- Protection class IP65 according to DIN 40050
- Cable connection (any cable length available) or industrial connector.
- Fixed to shaft with front or rear clamp
- Anti-rotation system using elastic flange or centre pin



Rear clamp



Front clamp



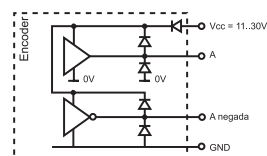
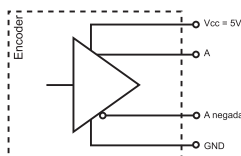
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Treated aluminium/Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.  |
| Housing fixation  | Elastic flange.  |
| Shaft fixation  | Front or Rear clamp..  |
| Hollow shaft diameter                                       | 10, 12 or 14 mm.   |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .  |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 40 N.  |
| Maximum load permitted on radial shaft                      | 60 N.  |
| Permitted misalignment :Flexible clamp 90.1014/90.1024      | ± 0,5mm axial, ± 0,3mm radial..  |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Maximum pulses per turn                                     | 10.000   |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable length available on order) |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{CC} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |

### CONNECTION

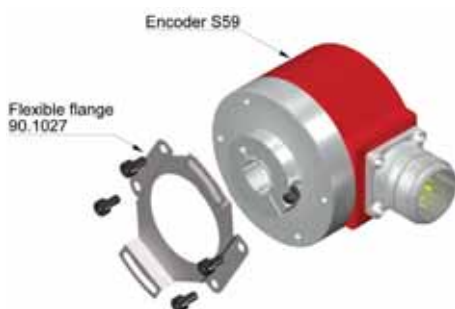


|               | Cable 3x2x0,14+2x0,34 | 90.9508<br>M12 8p | 90.9512<br>M23 12p |
|---------------|-----------------------|-------------------|--------------------|
| GND           | Black                 | 1                 | 1                  |
| Vcc           | Red                   | 2                 | 2                  |
| A             | Yellow                | 3                 | 3                  |
| B             | Green                 | 4                 | 4                  |
| A inverted    | Brown                 | 5                 | 5                  |
| B inverted    | Blue                  | 6                 | 6                  |
| 0 (reference) | Grey                  | 7                 | 7                  |
| 0 inverted    | Orange                | 8                 | 8                  |

## ORDERING CODE

| SERIE | FIXATION                                    | HOLLOW SHAFT                             | OUTPUT SIGNALS  | CONNECTION   | ELECTRONIC OUTPUT   | PULSES NUMBER   | SPECIAL CUSTOMER |
|-------|---|--|---|--|---|-----------------|------------------|
| 59    | ●<br>↓<br>1- Rear clamp<br>2- Frontal clamp | ●<br>1- Ø10 mm<br>2- Ø12 mm<br>3- Ø14 mm | ●<br>1- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>2- A $\bar{A}$ + B $\bar{B}$ | ●<br>1- Radial cable<br>2- Radial 90.9512<br>3- Radial 90.9508 | ●<br>↓<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V | ● ● ● ● ● ● ● ● | ● ● ● ● ● ● ● ●  |

## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".



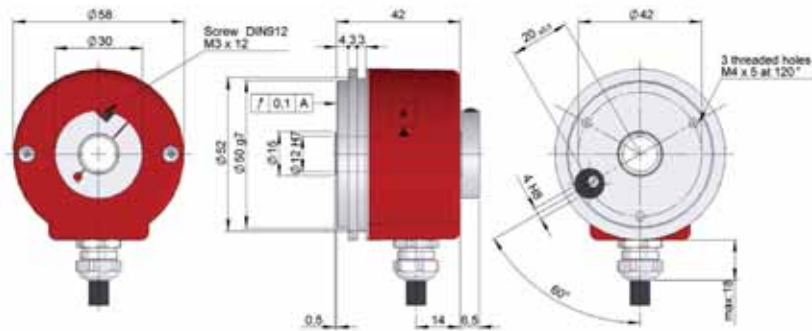
# SERIE 59 SIN/COS

## HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

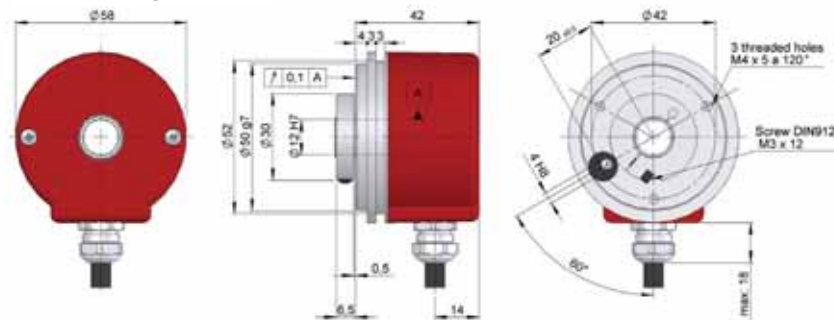
- Resolution 1024 and 2048 pulses per turn
- External diameter 58 mm
- Hollow shaft 10, 12 or 14 mm
- Protection class IP65 according to DIN 40050
- Cable connection (any cable length available) or industrial connector.
- Fixed to shaft with front or rear clamp.
- Anti-rotation system using elastic flange or centre pin.



Rear clamp



Front clamp



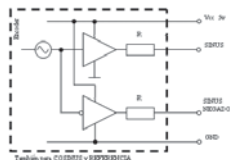
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

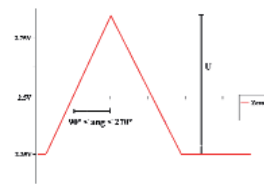
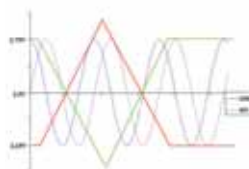
|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Treated aluminium/Stainless Steel.   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.  |
| Housing fixation  | Elastic flange.  |
| Shaft fixation  | Front or Rear clamp.   |
| Hollow shaft diameter                                       | 10, 12 or 14 mm.   |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .  |
| Starting torque at 20°C (68°F) ,                            | Max. / 2,0 Ncm.  |
| Maximum load permitted on axial shaft                       | 40 N.  |
| Maximum load permitted on radial shaft                      | 60 N.  |
| Permitted misalignment :Flexible clamp 90.1014/90.1024      | ± 0,5mm axial, ± 0,3mm radial.   |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Pulses per turn   | 1024 and 2048.   |
| Axial or radial connection                                  | Cable 2 metres or industrial connector (other cable lengths available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|                                       | Sine-Wave                     |
|---------------------------------------|-------------------------------|
| Power supply                          | 5 V ±5%                       |
| Consumption                           | Typical: 80 mA<br>Max: 150 mA |
| Max. signal delay                     | 90° Electrics                 |
| Length of cable allowed               | 50 m                          |
| Signal type                           | Sin/Cos                       |
| Output signal level                   | 0.6 a 1.2 Vpp                 |
| Reference                             | 0.2 a 1 V                     |
| Frequency                             | 200 kHz                       |
| Protection against polarity inversion | No                            |



### CONNECTION



|               | Cable 3x2x0,14+2x0,34 | 90.9512<br>M23 12p |
|---------------|-----------------------|--------------------|
| GND           | Black                 | 1                  |
| Vcc           | Red                   | 2                  |
| A             | Yellow                | 3                  |
| B             | Green                 | 4                  |
| A inverted    | Brown                 | 5                  |
| B inverted    | Blue                  | 6                  |
| 0 (reference) | Grey                  | 7                  |
| 0 inverted    | Orange                | 8                  |

## ORDERING CODE

| SERIE | FIXATION                                  | HOLLOW SHAFT                             | OUTPUT SIGNALS  | CONNECTION                                | ELECTRONIC OUTPUT            | PULSES NUMBER   | SPECIAL CUSTOMER |
|-------|---|--|---|---|------------------------------|-----------------|------------------|
| 59S   | ●<br>↓<br>1- Rear clamp<br>2- Front clamp | ●<br>1- Ø10 mm<br>2- Ø12 mm<br>3- Ø14 mm | ●<br>1- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>2- A $\bar{A}$ + B $\bar{B}$ | ●<br>1- Radial cable<br>2- Radial 90.9512 | ●<br>↓<br>7- SIN/COS 1Vpp 5V | ● ● ● ● ● ● ● ● | ● ● ● ● ● ● ● ●  |

## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

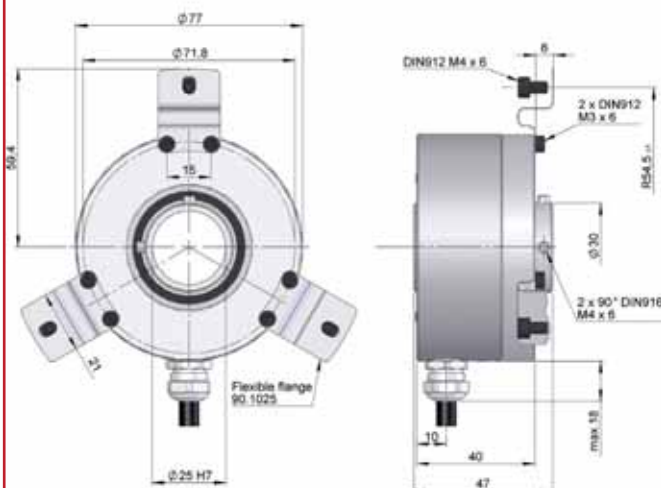
# SERIE 77

## HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

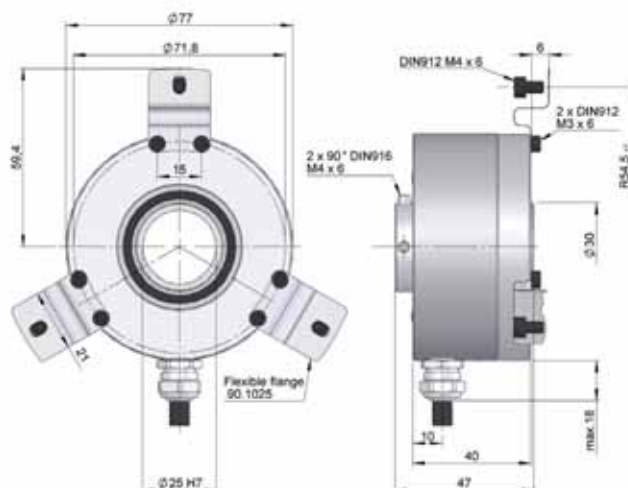
- Resolution up to 5.000 pulses per turn
- External diameter 77 mm
- Hollow shaft from 15 to 25 mm
- Protection class IP65 according to DIN 40050
- Connection by cable (any cable length available) or industrial connector.
- Fixed to shaft with front or rear setscrews
- Anti-rotation system using elastic flange



Front screws



Rear screws



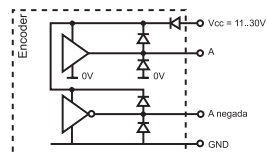
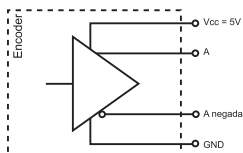
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |  |
|---|--|
| Housing   | Aluminium.   |
| Shaft   | Aluminium (optional, stainless Steel).   |
| Bearings  | Ballraces.   |
| Bearings lifetime   | $1 \times 10^{10}$ rev.  |
| Housing fixation  | Elastic flange 90.1025.  |
| Shaft fixation  | Front or Rear clamp.   |
| Hollow shaft diameter                                       | 15..25 mm.   |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |
| Protection against dust and splashes according to DIN 40050 | IP65.  |
| Rotor inertia moment  | Max. 1 Kg cm <sup>2</sup> .  |
| Starting torque at 20°C (68°F) ,                            | Max. 4 Ncm.  |
| Maximum load permitted on axial shaft                       | 100 N.   |
| Maximum load permitted on radial shaft                      | 200 N.   |
| Permitted misalignment: Elastic flange 90.1025 (one)        | $\pm 0.5$ mm axial, $\pm 0.3$ mm radial.   |
| Elastic flange 90.1025 (three)                              | $\pm 0.4$ mm axial, $\pm 0.2$ mm radial.   |
| Weight aprox.   | 0,5 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.  |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).  |
| Shock   | 1000 m/s <sup>2</sup> (6ms).   |
| Maximum pulses per turn                                     | 5.000  |
| Radial connection   | Cable 2 metres or industrial connector (other cable lengths available on order). |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |

### CONNECTION

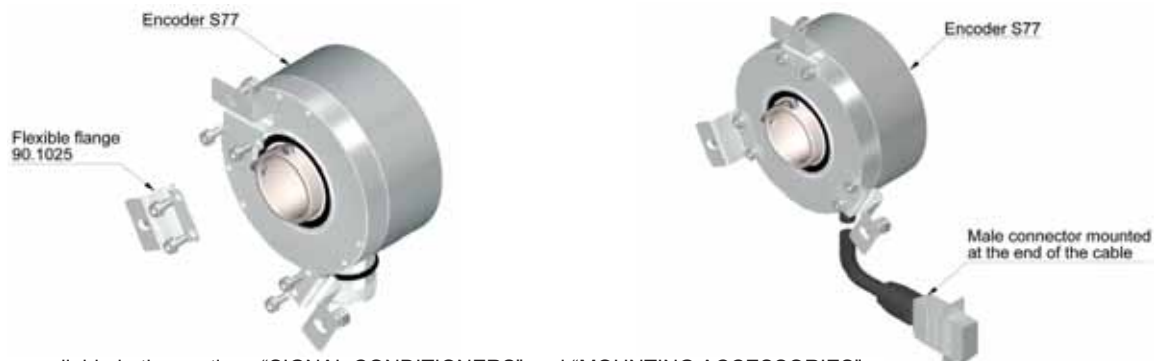


|               | Cable 3x2x0,14+2x0,34 | 90.9512<br>M23 12p |
|---------------|-----------------------|--------------------|
| GND           | Black                 | 1                  |
| Vcc           | Red                   | 2                  |
| A             | Yellow                | 3                  |
| B             | Green                 | 4                  |
| A inverted    | Brown                 | 5                  |
| B inverted    | Blue                  | 6                  |
| 0 (reference) | Grey                  | 7                  |
| 0 inverted    | Orange                | 8                  |

## ORDERING CODE

| SERIE | FIXATION  | HOLLOW SHAFT  | OUTPUT SIGNALS  | CONNECTION                                | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---|---|---|---|--|---------------|------------------|
| 77    | ●<br>↓<br>1- Rear setscrews<br>2- Front setscrews | ●<br>15- Ø15 mm<br>16- Ø16 mm<br>18- Ø18 mm<br>20- Ø20 mm<br>24- Ø24 mm<br>25- Ø25 mm | ● ●<br>1- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>2- A $\bar{A}$ + B $\bar{B}$ | ●<br>1- Radial cable<br>2- Radial 90.9512 | ●<br>↓<br>1- Differential line driver. Push-Pull 11...30V<br>2- Standard RS422. 5V | ● ● ● ● ● ●   | ● ● ● ● ● ●      |

## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

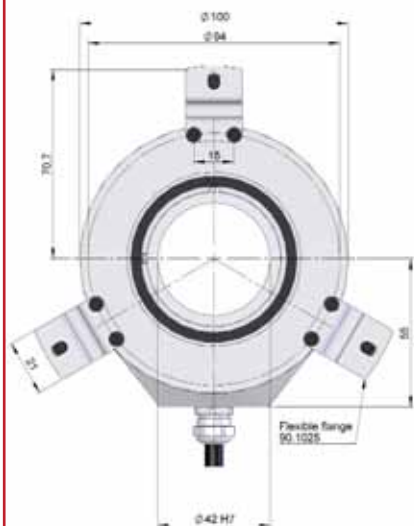
# SERIE 80

## HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

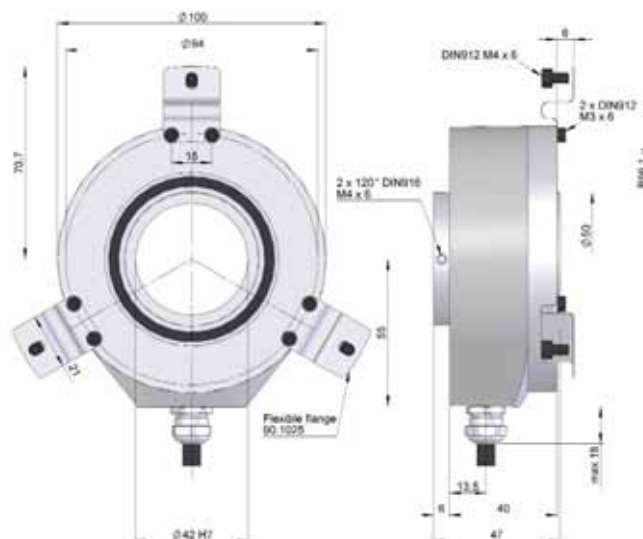
- Resolution up to 5.000 pulses per turn
- External diameter 100 mm
- Hollow shaft from 30 to 42 mm
- Protection class IP65 according to DIN 40050
- Cable connection (any cable length available) or industrial connector.
- Fixed to shaft with front or rear setscrews.
- Anti-rotation system using elastic flange



Front screws



Rear screws



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

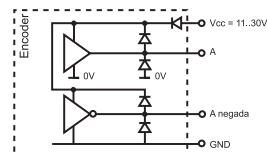
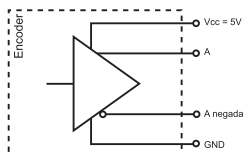
### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium.  |
| Shaft   | Stainless Steel.  |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.   |
| Housing fixation  | Elastic flange 90.1025.   |
| Shaft fixation  | Front or Rear clamp..   |
| Hollow shaft diameter                                       | 25.42 mm.   |
| Maximum number of revolutions permitted mechanically        | 3500 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP65.   |
| Rotor inertia moment  | Max. 1-1,8 Kg cm <sup>2</sup> .   |
| Starting torque at 20°C (68°F) ,                            | Max. 4 Ncm.   |
| Maximum load permitted on axial shaft                       | 100 N.  |
| Maximum load permitted on radial shaft                      | 200 N.  |
| Permitted misalignment: Elastic flange 90.1025 (one)        | ±0.5 mm axial, ±0.3 mm radial.  |
| Elastic flange 90.1025 (three)                              | ±0.4 mm axial, ±0.2 mm radial.  |
| Weight aprox.   | 0,7 Kg.   |
| Operating temperature range                                 | -20°C to +80°C.   |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).   |
| Shock   | 1000 m/s <sup>2</sup> (6ms).  |
| Maximum pulses per turn                                     | 5.000   |
| Radial connection   | Cable 2 metres or industrial connector (other cable lengths available on order) |



## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V ±5%                       | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | ±20 mA                        | ±30 mA                        |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 V$              |
| "High" signal level                      | $V_{OH} > 2.5 V$              | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel B leads (90° electric) channel A |                               |                               |

### CONNECTION



|               | Cable 3x2x0,14+2x0,34 | 90.9512<br>M23 12p |
|---------------|-----------------------|--------------------|
| GND           | Black                 | 1                  |
| Vcc           | Red                   | 2                  |
| A             | Yellow                | 3                  |
| B             | Green                 | 4                  |
| A inverted    | Brown                 | 5                  |
| B inverted    | Blue                  | 6                  |
| 0 (reference) | Grey                  | 7                  |
| 0 inverted    | Orange                | 8                  |

## ORDERING CODE

| SERIE | FIXATION  | HOLLOW SHAFT  | OUTPUT SIGNALS  | CONNECTION                                | ELECTRONIC OUTPUT   | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---|---|---|---|---|---------------|------------------|
| 80    | ●<br>↓<br>1- Rear setscrews<br>2- Front setscrews | ● ●<br>30- Ø30 mm<br>32- Ø32 mm<br>38- Ø38 mm<br>40- Ø40 mm<br>42- Ø42 mm | ●<br>1- A $\bar{A}$ + B $\bar{B}$ + 0 $\bar{0}$<br>2- A $\bar{A}$ + B $\bar{B}$ | ●<br>1- Radial cable<br>2- Radial 90.9512 | ●<br>↓<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V | ● ● ● ● ●     | ● ● ● ● ●        |

## ACCESSORIES



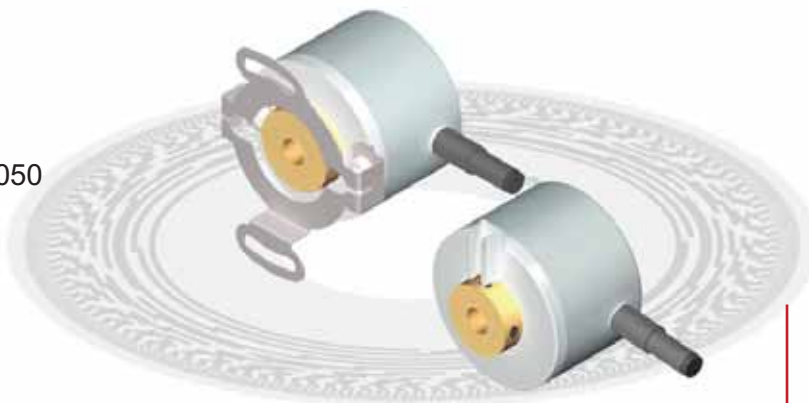
All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".



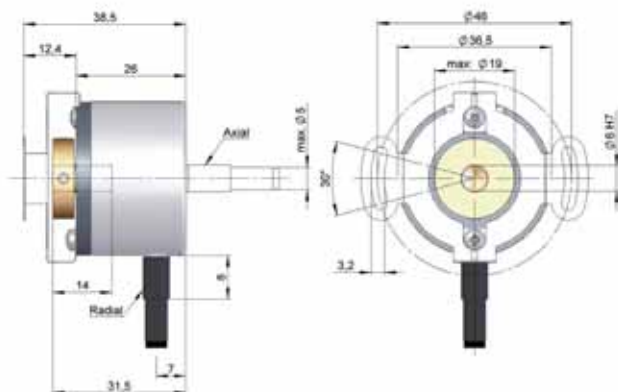
# SERIE 22

## BLIND HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

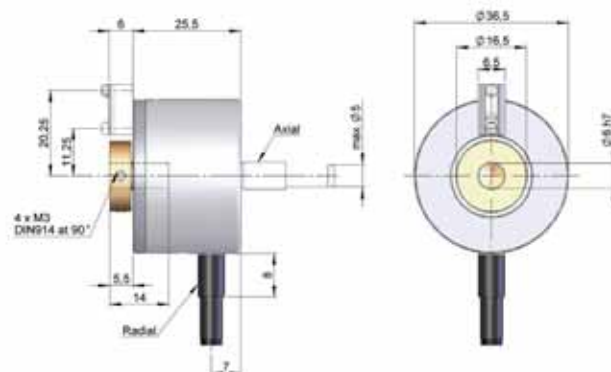
- Resolution up to 3600 pulses per turn
- External diameter 36,5 mm
- Blind hollow shaft up to 6 mm
- Protection class IP64 according to DIN 40050
- Cable connection (any cable lenght available ) or industrial connector.
- Antirotation system through pin torque support and elastic flange



**Elastic flange**



**Pin torque support**



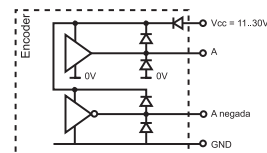
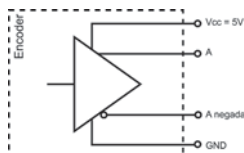
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

## MECHANICAL SPECIFICATIONS

|   |                                       |
|---|---------------------------------------|
| Housing   | Aluminium.                            |
| Shaft   | Brass / treated aluminium.            |
| Bearings  | Ballraces.                            |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.               |
| Body fixing   | Elastic flange or pin torque support. |
| Blind hollow shaft diameter                                 | 6 mm.                                 |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.                             |
| Protection against dust and splashes according to DIN 40050 | IP64.                                 |
| Rotor inertia moment  | 2 gcm <sup>2</sup> .                  |
| Starting torque at 20°C (68°F)                              | Máx 0,5 Ncm.                          |
| Maximum load permitted on axial shaft                       | Max. 15 N.                            |
| Maximum load permitted on radial shaft                      | Max. 15 N.                            |
| Weight aprox.   | 0,1 Kg.                               |
| Operating temperature range                                 | -20°C to +80°C.                       |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz). |
| Shock   | 1000 m/s <sup>2</sup> (6ms).          |
| Maximum pulses per turn                                     | 10.000                                |
| Axial or radial cable                                       | Cable 2 metres                        |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | $\pm$ 20 mA                   | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Short circuit protection                 | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel A leads (90° electric) channel B |                               |                               |

### CONNECTION

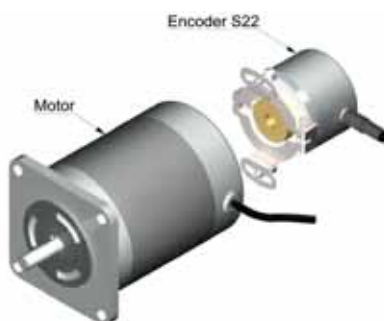


|               | Cable 5x0,14 | Cable 8x0,14 |
|---------------|--------------|--------------|
| GND           | White        | White        |
| Vcc           | Brown        | Brown        |
| A             | Green        | Green        |
| B             | Yellow       | Grey         |
| A inverted    |              | Yellow       |
| B inverted    |              | Rose         |
| 0 (reference) | Grey         | Blue         |
| 0 inverted    | Grey         | Red          |

## ORDERING CODE

| SERIE | ANTIROTATION SYSTEM                             | OUTPUT SIGNALS                       | CONNECTION                             | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---|--------------------------------------|--|--|---------------|------------------|
| 22    | ●<br>1- Elastic flange<br>2- Pin torque support | ●<br>3- A + B + 0<br>7- AA + BB + 00 | ●<br>1- Axial cable<br>2- Radial cable | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES

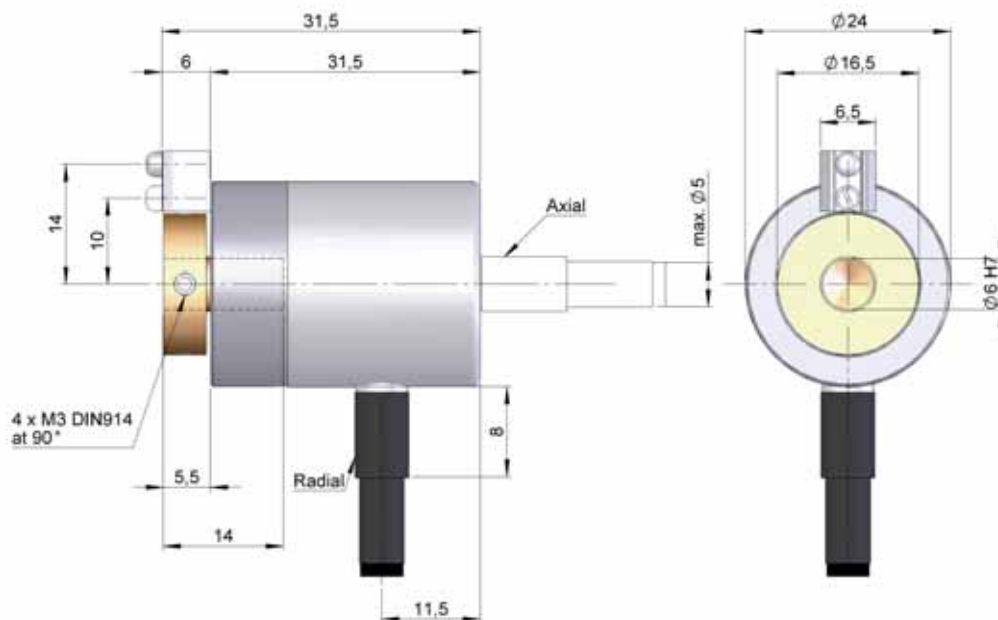
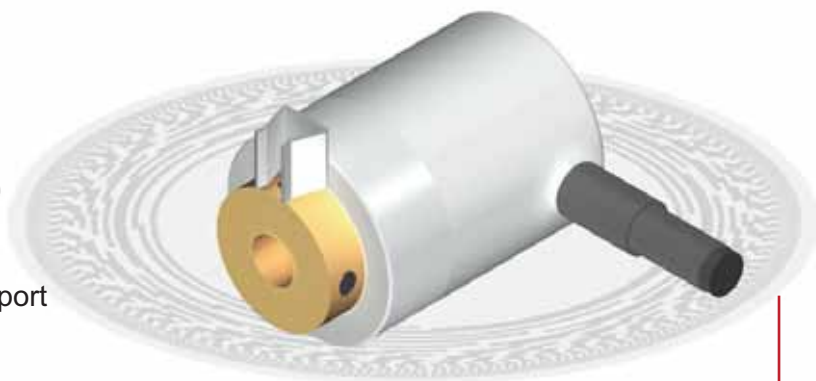


All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

# SERIE 28

## BLIND HOLLOW SHAFT INCREMENTAL ENCODER FOR INDUSTRIAL APPLICATIONS

- Resolution up to 1024 pulses per turn
- External diameter 24 mm
- Blind hollow shaft 4 or 6 mm
- Protection class IP64 according DIN 40050
- Cable connection (any cable length available) or industrial connector.
- Antirotation system through pin torque support



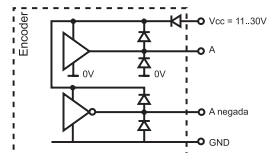
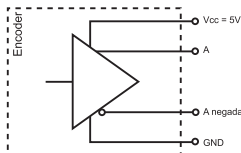
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing   | Aluminium.  |
| Shaft   | Brass / Treated aluminium..                           |
| Bearings  | Ballraces.  |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                               |
| Housing fixing  | Pin torque support.                                   |
| Blind hollow shaft diameter                                 | 4 or 6 mm.  |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.   |
| Protection against dust and splashes according to DIN 40050 | IP64.   |
| Rotor inertia moment  | 1 gcm <sup>2</sup> .                                  |
| Starting torque at 20°C (68°F)                              | Máx 0,5 Ncm.  |
| Maximum load permitted on axial shaft                       | Max. 10 N.  |
| Maximum load permitted on radial shaft                      | Max. 10 N.  |
| Weight aprox.   | 0,06 Kg.  |
| Operating temperature range                                 | -20°C to +80°C.                                       |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz).                 |
| Shock   | 1000 m/s <sup>2</sup> (6ms).                          |
| Maximum pulses per turn                                     | 1024.   |
| Axial or radial cable                                       | Cable 2 metres (any cable length available on order). |

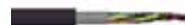
## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|  | RS422<br>(TTL compatible)     | Push-Pull Differential        |
|--|-------------------------------|-------------------------------|
| Power supply                             | 5 V $\pm$ 5%                  | 11...30 V                     |
| Consumption                              | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA |
| Max. load capability                     | $\pm$ 20 mA                   | $\pm$ 30 mA                   |
| Length of cable allowed                  | 1200 m                        | 100 m                         |
| "Low" signal level                       | $V_{OL} < 0,5 V$              | $V_{OL} < 2,5 V$              |
| "High" signal level                      | $V_{OH} > 2,5 V$              | $V_{OH} > V_{cc} - 3 V$       |
| Frequency                                | 300 kHz                       | 200 kHz                       |
| Shortcircuit protection                  | Yes                           | Yes                           |
| Protection against polarity inversion    | No                            | Yes                           |
| Channel A leads (90° electric) channel B |                               |                               |

### CONNECTION



|               | Cable 5x0,14 | Cable 8x0,14 |
|---------------|--------------|--------------|
| GND           | White        | White        |
| Vcc           | Brown        | Brown        |
| A             | Green        | Green        |
| B             | Yellow       | Grey         |
| A inverted    |              | Yellow       |
| B inverted    |              | Rose         |
| 0 (reference) | Grey         | Blue         |
| 0 inverted    | Grey         | Red          |

## ORDERING CODE

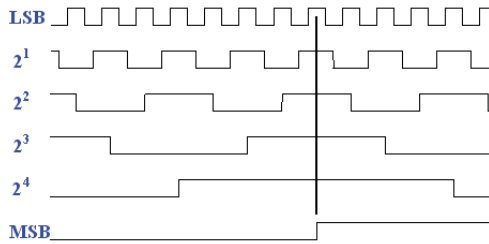
| SERIE | HOLLOW SHAFT              | OUTPUT SIGNALS                       | CONNECTION                             | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---------------------------|--------------------------------------|--|--|---------------|------------------|
| 28    | ●<br>1- Ø4 mm<br>2- Ø6 mm | ●<br>3- A + B + 0<br>7- AA + BB + 00 | ●<br>1- Axial cable<br>2- Radial cable | ●<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V | ●●●●●●●●      | ●●●●●●●●         |

## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

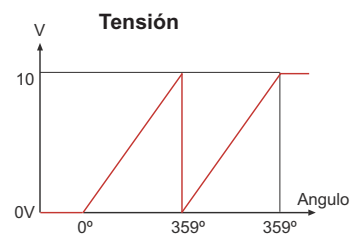
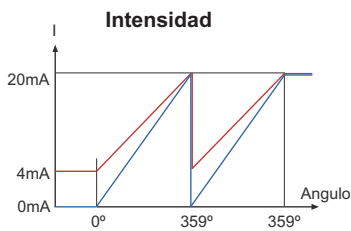
### Parallel



### SSI



### Analog



### Fieldbus



### SmarSens







# GENERAL INFORMATION **PARALLEL**

## PARALLEL AND PARALLEL PROGRAMMABLE ABSOLUT ENCODERS

The absolut encoders are widely employed throughout industry. Unlike incremental measurement systems, absolut encoders always provide the true positional value. If the system is mechanically moved while power is off, when it is restored, the actual position will be immediately read.

Hohner offers a wide variety of absolut encoders, singleturn and multiturn, serial, parallel or analogue outputs, together with a wide range of output codes. It also provides the possibility of programmable encoders that allow the user to program the encoder's most important parameters.

All this enables us to offer our customers solutions to assign a specific and unique value to each shaft position.

Absolut encoders are classified into two groups: singleturn and multiturn.

Singleturn absolut encoders code the 360° of a revolution into "n" point per turn and the code is repeated for each turn.

If a measurement is required for more than one turn of the shaft, a multiturn encoder is required, which is used to provide a precise position in longer paths.

### Programmable optical absolut encoders

All essential encoder parameters are user-programmable in our programmable absolut encoders.

Available for singleturn and multiturn encoders in various mechanical options.

The programming enables the user to select the zero of reference, the number of positions per turn, up to 8192 points per turn (13 bits), the number of turns in the multiturn case, up to 4096 turns, rotation direction and output code: Binary, Gray, Excess Gra and BCD.

There are advantages, such as the possibility of electronic misadjustment and optimisation in mechanical systems that are subject to tolerances etc.

Since the same encoder can be installed in different applications and their specific programming assigned during the actual installation, this translates into savings in both stock and maintenance.

### Programming the encoder

In order to program a hohner encoder, a PC is required, together with the programming software and the connection cable between the encoder and PC (the last two are supplied with the encoder).

The encoder is connected to a power supply (24vdc) and the communications cable is connected to



the PC serial port.

By following the simple instruction in the manual, the user will be able to program the most important encoder parameters in a simple manner.

### Output codes

In singleturn encoders, hohner can offer any resolution per turn, up to a maximum of 21 bits per turn (2.097.152 points per turn). Any number of turns 2n, can be provided up to 4096 turns, in other words 2, 4, 8, 16, 32 etc up to 4096. Codes are available in both clockwise and counter clockwise directions. In the clockwise direction, the code increases when the shaft rotates in a clockwise direction looking at the shaft. In the counter clockwise direction, the code increases when the shaft rotates in a counter clockwise direction looking at the shaft.

### Binary code

The binary code is based on 2, in other words, the information is coded using only "0" and "1".

### Gray code

The Gray code is a special form of binary code where only one bit changes from one combination to another, this permits higher transmission speeds and greater security, because in the case of natural binary codes, for example, "n" bits are changed and there is a series of intermediate steps that can be interpreted as other positions, and depending on the data read speed of the control system, one of these intermediate positions could constitute incorrect data if one bit changes faster than the others.

The Gray code is therefore, a very reliable code for data transmission because in all cases of on position to another, only one bit varies and there are no doubtful intermediate positions between one and the next.

In the resolutions that are not "2n", the Excess Gray code allows the last combination to the first to also change by only one bit. For example 360, 72 etc, this would be for an encoder with 360 positions:  $(512-360)/2 = \text{Excess } 76$ . the code would go from 76 to 435, so that position 76 to 435 would only change one bit.

### BCD code

In certain cases, the information processed by the system must be converted to decimal so that it may be more easily interpreted, this is the main reason why Binary Coded Decimal (BCD) exists. In BCD, each decimal number is directly coded in binary in order to represent the ten digits from zero to nine, which requires four bits, meaning that each decade needs four bits

| Dec | Binary Code    |                |                |                |                | Gray Code      |                |                |                |                | BCD Code       |                |                |                |                |                |                |                |
|-----|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|     |                |                |                |                |                |                |                |                |                |                | 2nd decade     |                |                |                | 1st decade     |                |                |                |
|     | 2 <sup>4</sup> | 2 <sup>3</sup> | 2 <sup>2</sup> | 2 <sup>1</sup> | 2 <sup>0</sup> | 2 <sup>4</sup> | 2 <sup>3</sup> | 2 <sup>2</sup> | 2 <sup>1</sup> | 2 <sup>0</sup> | 2 <sup>3</sup> | 2 <sup>2</sup> | 2 <sup>1</sup> | 2 <sup>0</sup> | 2 <sup>3</sup> | 2 <sup>2</sup> | 2 <sup>1</sup> | 2 <sup>0</sup> |
| 0   | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| 1   | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 1              |
| 2   | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              | 1              | 1              | 0              | 0              | 0              | 0              | 0              | 1              | 0              | 0              |
| 3   | 0              | 0              | 0              | 1              | 1              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 1              | 1              | 0              |
| 4   | 0              | 0              | 1              | 0              | 0              | 0              | 0              | 1              | 1              | 0              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              |
| 5   | 0              | 0              | 1              | 0              | 1              | 0              | 0              | 1              | 1              | 1              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 1              |
| 6   | 0              | 0              | 1              | 1              | 0              | 0              | 0              | 1              | 0              | 1              | 0              | 0              | 0              | 0              | 1              | 1              | 0              | 0              |
| 7   | 0              | 0              | 1              | 1              | 1              | 0              | 0              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 1              | 1              | 1              | 0              |
| 8   | 0              | 1              | 0              | 0              | 0              | 0              | 1              | 1              | 0              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              |
| 9   | 0              | 1              | 0              | 0              | 1              | 0              | 1              | 1              | 0              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 1              |
| 10  | 0              | 1              | 0              | 1              | 0              | 0              | 1              | 1              | 1              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              |
| 11  | 0              | 1              | 0              | 1              | 1              | 0              | 1              | 1              | 1              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 1              |
| 12  | 0              | 1              | 1              | 0              | 0              | 0              | 1              | 0              | 1              | 0              | 0              | 0              | 0              | 1              | 0              | 0              | 1              | 0              |
| 13  | 0              | 1              | 1              | 0              | 1              | 0              | 1              | 0              | 1              | 1              | 0              | 0              | 0              | 1              | 0              | 0              | 1              | 1              |
| 14  | 0              | 1              | 1              | 1              | 0              | 0              | 1              | 0              | 0              | 1              | 0              | 0              | 0              | 1              | 0              | 0              | 0              | 0              |
| 15  | 0              | 1              | 1              | 1              | 1              | 0              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 1              | 0              | 1              | 0              | 1              |
| 16  | 1              | 0              | 0              | 0              | 0              | 1              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 1              | 0              | 1              | 1              | 0              |













Correspondence table from Decimal to Binary, to Gray and to BCD.

# ABSOLUT ENCODERS **PARALLEL**

- Resolution up to 24 bits
- Solid (CS) and hollow shaft (HS)
- Protection class IP65 or IP67 according to DIN 40050
- Available any positions number per turn
- Direction, code, enable, store and reset selection
- Output codes: Binary, Gray, Gray excess or BCD
- Radial or axial connection, cable or connector output



## OVERVIEW

|                         | Diameter 58 mm  |  | Diameter 90 mm  |
|-------------------------|---|--|---|
|                         | Solid shaft   | Hollow shaft   | Solid shaft   |
| Singleturn              | CS10<br>CS10 IP67<br>  | HS10<br>    | CS30<br>CS30 IP67<br>  |
| Programmable singleturn | CSP10<br>              | HSP10<br>   | CSP30<br>              |
| Multiturn               | CM10<br>CM10 IP67<br> | HM10<br>   | CM30<br>CM30 IP67<br> |
| Programmable multiturn  | CMP10<br>            | HMP10<br> | CMP30<br>            |

## TECHNICAL SPECIFICATIONS

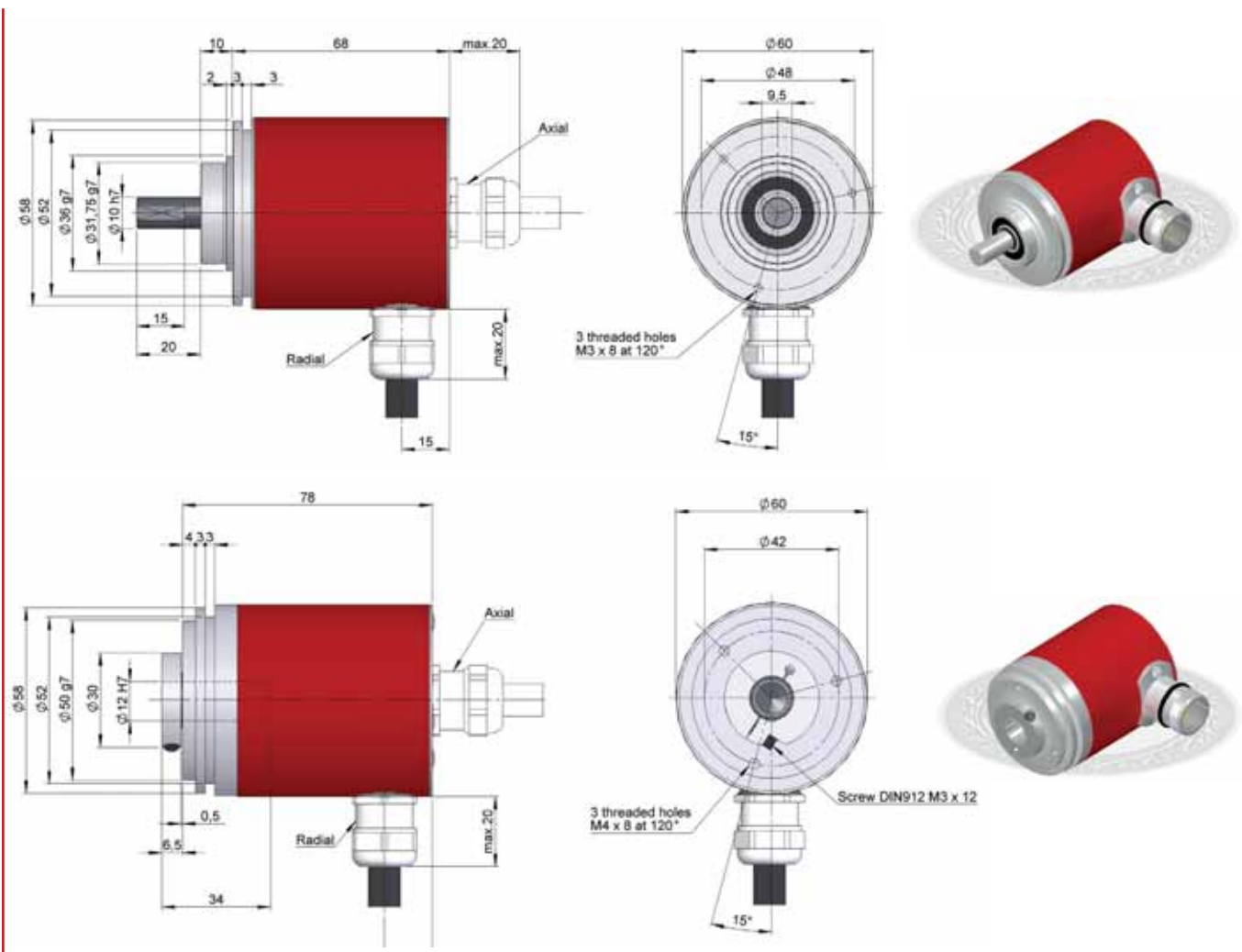
|   | Diameter 58 mm  | Diameter 90 mm       |
|---|---|----------------------|
| Housing   | Aluminium/Stainless steel                               |                      |
| Shaft   | Stainless steel   |                      |
| Bearings  | Ballraces   |                      |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                                 |                      |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.   |                      |
| Protection against dust and splashes according to DIN 40050 | IP65 / IP67.  |                      |
| Rotor inertia moment  | 30 gcm <sup>2</sup>                                     | 270 gcm <sup>2</sup> |
| Starting torque 20°C (68°F)                                 | Max. 2,0 Ncm  | Max. 5,0 Ncm         |
| Maximum load permitted on axial shaft                       | 40 N  | 80 N                 |
| Maximum load permitted on radial shaft                      | 60 N  | 100 N                |
| Misalignment permitted axial (blind hollow shaft)           | ±0.5 mm   | -                    |
| Misalignment permitted radial (blind hollow shaft)          | ±0.3 mm   | -                    |
| Weight aprox.   | 400 g ST, 500 g MT                                      | 1,2 kg ST, 1,3 kg MT |
| Operating temperature range                                 | -10°C a +70°C   |                      |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz)                    |                      |
| Shock   | 1000 m/s <sup>2</sup> (6ms)                             |                      |
| Consumption max.  | 100 mA (CS/HS), 150 mA (CM/HM)                          |                      |
| Power supply  | 10..30Vdc   |                      |
| Interface   | Parallel  |                      |
| Electrical output   | Push-pull, NPN, NPN Open Collector                      |                      |
| Configurable parameters (programmable series)               | Direction, code, store, enable, reset, preset1, preset2 |                      |
| Configurable parameters                                     | Direction and reset                                     |                      |
| Inputs  | Opto-coupled  |                      |
| Available codes   | Binary, gray and BCD                                    |                      |
| Max. points per turn  | 8192 positions (13 bits)                                |                      |
| Max. turns  | 4096 turns (12 bits)                                    |                      |
| Linearity   | ±1/2 LSB  |                      |
| Radial and axial connection                                 | 2 metres cable or industrial connector                  |                      |

ST: Singleturn MT: Multiturn

**hohner**  
AUTOMATICOS S.L.

**SINGLETURN ABSOLUT ENCODER**

- Singleturn resolution up to 13 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CS) and blind hollow shaft (HS)



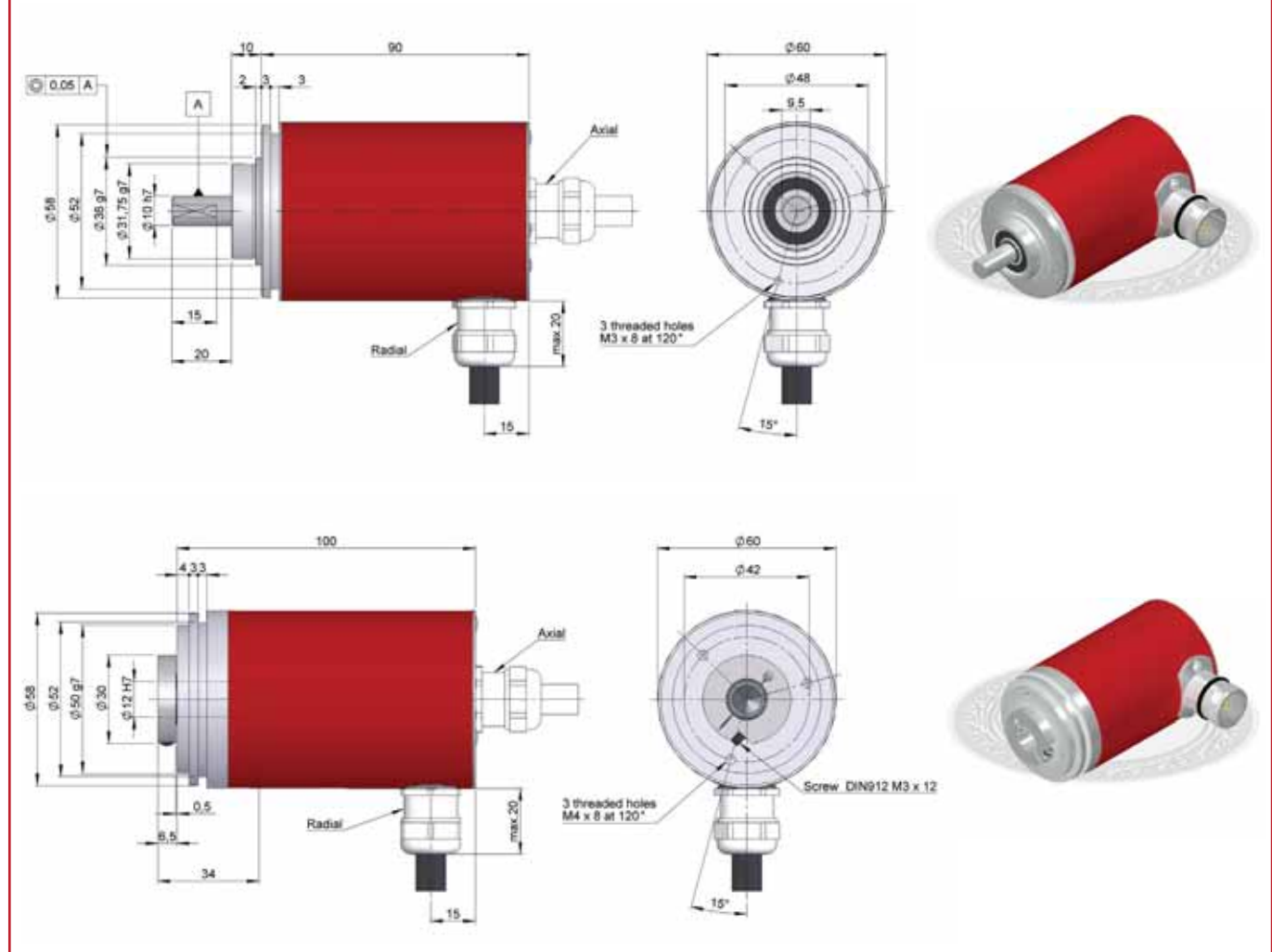
Previous mounting and installation of the encoder is recommended to read the section “TECHNICAL CONSIDERATIONS”.

**ORDERING CODE**

| TYPE  | SERIE | SHAFT   | FLANGE  | CONNEC-TION  | AXIAL RADIAL          | INTERFACE   | CODE   | IP      | POWER SUPPLY OUTPUT   | CONFIG. PARAMETERS       | RESOLUTION | SPECIAL CUSTOMER |
|---|-------|---|---|--|-----------------------|-------------|--|---------|---|--------------------------|------------|------------------|
| CS- Singleturn<br>Solid shaft<br>HS- Singleturn<br>Blind hollow shaft | 10    | •   | •   | •  | •                     | •           | •  | •       | •   | •                        | •          | •                |
|   |       | 1- Solid Ø6x10 mm<br>2- Solid Ø10x20 mm<br>3- Blind hollow Ø12 mm<br>4- Blind hollow Ø10 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable<br>3- 90.9512<br>4- 90.9516<br>5- 90.9521 | 1- Axial<br>2- Radial | 0- Parallel | 1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- Gray excess CW<br>6- Gray excess CCW<br>7- BCD CW<br>8- BCD CCW | 1- IP65 | 2- 10...30 Vdc NPN<br>3- 10...30 Vdc Push-Pull<br>4- 10...30 Vdc NPN OC | R- Reset<br>S- Direction |            |                  |

**MULTITURN ABSOLUT ENCODER**

- Multiturn resolution up to 24 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CM) and blind hollow shaft (HM)



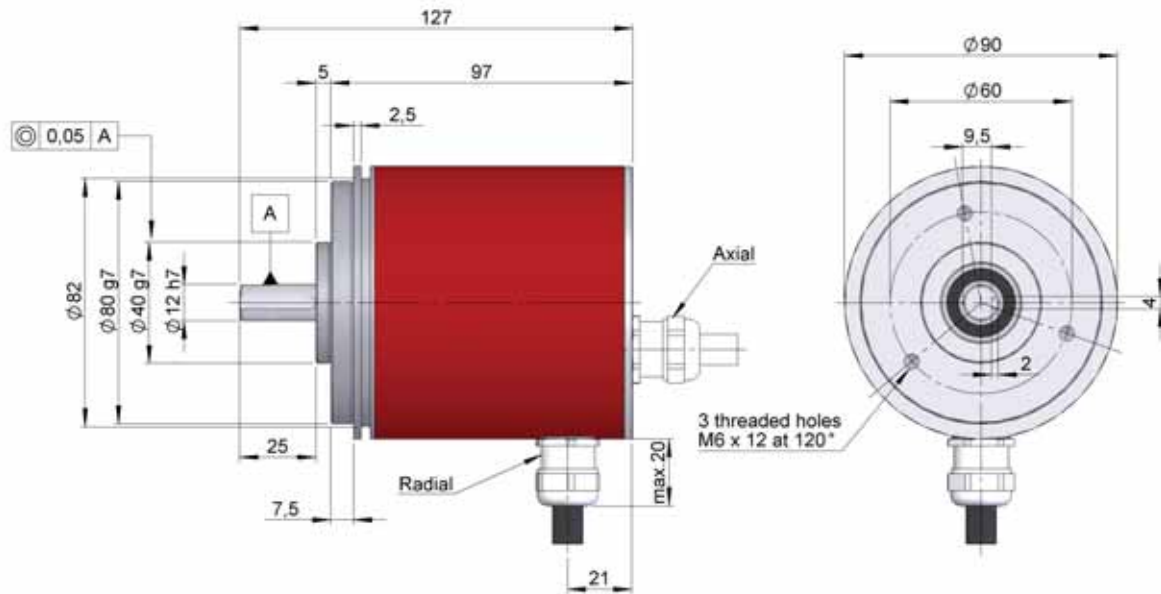
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE   | SERIE | SHAFT  | FLANGE   | CONNECTION  | AXIAL RADIAL                     | INTERFACE          | CODE  | IP             | POWER SUPPLY OUTPUT  | CONFIG. PARAMETERS                  | SINGLETURN RESOLUTION | MULTITURN RESOLUTION | SPECIAL CUSTOMER |
|--|-------|--|--|---|----------------------------------|--------------------|---|----------------|--|-------------------------------------|-----------------------|----------------------|------------------|
| <p>● ● 10</p> <p><b>CM-</b> Multiturn Solid shaft</p> <p><b>HM-</b> Multiturn Blind hollow shaft</p> |       |  |  |   |                                  |                    |   |                |  |                                     |                       |                      |                  |
|  |       | <p>1- Solid Ø10x20 mm</p> <p>2- Solid Ø6x10 mm</p> <p>3- Blind hollow Ø12 mm</p> <p>4- Blind hollow Ø10 mm</p> | <p>1- None</p> <p>2- 90.1002</p> <p>3- 90.1003</p> <p>4- 90.1004</p> <p>5- 90.1005</p> <p>6- 90.1006</p> | <p>1- Cable</p> <p>3- 90.9512</p> <p>4- 90.9516</p> <p>5- 90.9521</p> <p>6- 90.9526</p> | <p>1- Axial</p> <p>2- Radial</p> | <p>0- Parallel</p> | <p>1- Binary CW</p> <p>2- Binary CCW</p> <p>3- Gray CW</p> <p>4- Gray CCW</p> <p>5- Gray excess CW</p> <p>6- Gray excess CCW</p> <p>7- BCD CW</p> <p>8- BCD CCW</p> | <p>1- IP65</p> | <p>2- 10...30 Vdc NPN</p> <p>3- 10...30 Vdc Push-Pull</p> <p>4- 10...30 Vdc NPN OC</p> | <p>R- Reset</p> <p>S- Direction</p> |                       |                      |                  |

**ABSOLUT ENCODER FOR HEAVY DUTY INDUSTRIAL APPLICATIONS**

- Singleturn resolution (CS) up to 13 bits or multiturn (CM) up to 24 bits
- Protection class IP65 according to DIN 40050
- External diameter 90 mm
- Solid shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

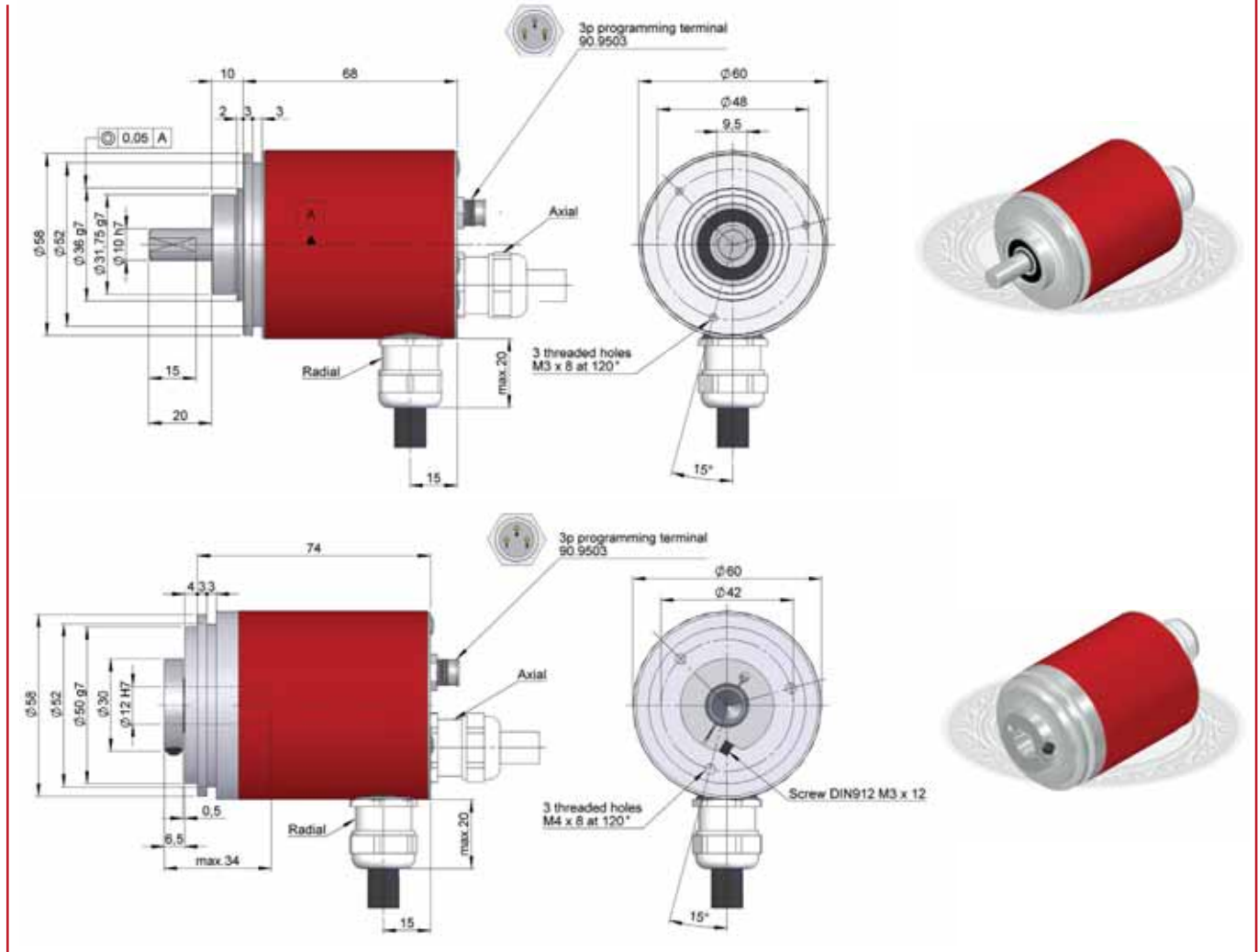
| TYPE   | SERIE | SHAFT  | FLANGE                                      | CONNECTION   | AXIAL RADIAL                               | INTERFACE   | CODE  | IP  | POWER SUPPLY OUTPUT                                 | CONFIG PARAMETERS                         | SINGLE-TURN RESOLUTION           | MULTITURN RESOLUTION             | SPECIAL CUSTOMER                 |
|--|-------|--|---|--|--|---|---|---|---|---|----------------------------------|----------------------------------|----------------------------------|
| <input checked="" type="radio"/> <b>CS-</b> Singleturn | 30    | <input checked="" type="radio"/> Ø12 x 25 mm | <input checked="" type="radio"/> 1- None    | <input checked="" type="radio"/> 1- Cable  | <input checked="" type="radio"/> 1- Axial  | <input checked="" type="radio"/> 0- Parallel  | <input checked="" type="radio"/> 1- Binary CW | <input checked="" type="radio"/> 1- IP65  | <input checked="" type="radio"/> 2- 10...30 Vdc NPN | <input checked="" type="radio"/> R- Reset | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |
| <input checked="" type="radio"/> <b>CM-</b> Multiturn  |       |  | <input checked="" type="radio"/> 3- 90.1006 | <input checked="" type="radio"/> 3- 90.9512<br><input checked="" type="radio"/> 4- 90.9516<br><input checked="" type="radio"/> 5- 90.9521<br><input checked="" type="radio"/> 6- 90.9526 | <input checked="" type="radio"/> 2- Radial | <input checked="" type="radio"/> 1- Binary CCW<br><input checked="" type="radio"/> 2- Binary CCW<br><input checked="" type="radio"/> 3- Gray CW<br><input checked="" type="radio"/> 4- Gray CCW<br><input checked="" type="radio"/> 5- Gray excess CW<br><input checked="" type="radio"/> 6- Gray excess CCW<br><input checked="" type="radio"/> 7- BCD CW<br><input checked="" type="radio"/> 8- BCD CCW |   | <input checked="" type="radio"/> 2- 10...30 Vdc Push-Pull<br><input checked="" type="radio"/> 4- 10...30 Vdc NPN OC | <input checked="" type="radio"/> S- Direction       | <input checked="" type="radio"/>          | <input checked="" type="radio"/> | <input checked="" type="radio"/> | <input checked="" type="radio"/> |



# PARALLEL PROGRAMMABLE SERIES CSP10 / HSP10

## SINGLETURN ABSOLUT ENCODERS

- Programming by PC up to 13 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CSP) and blind hollow shaft (HSP)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

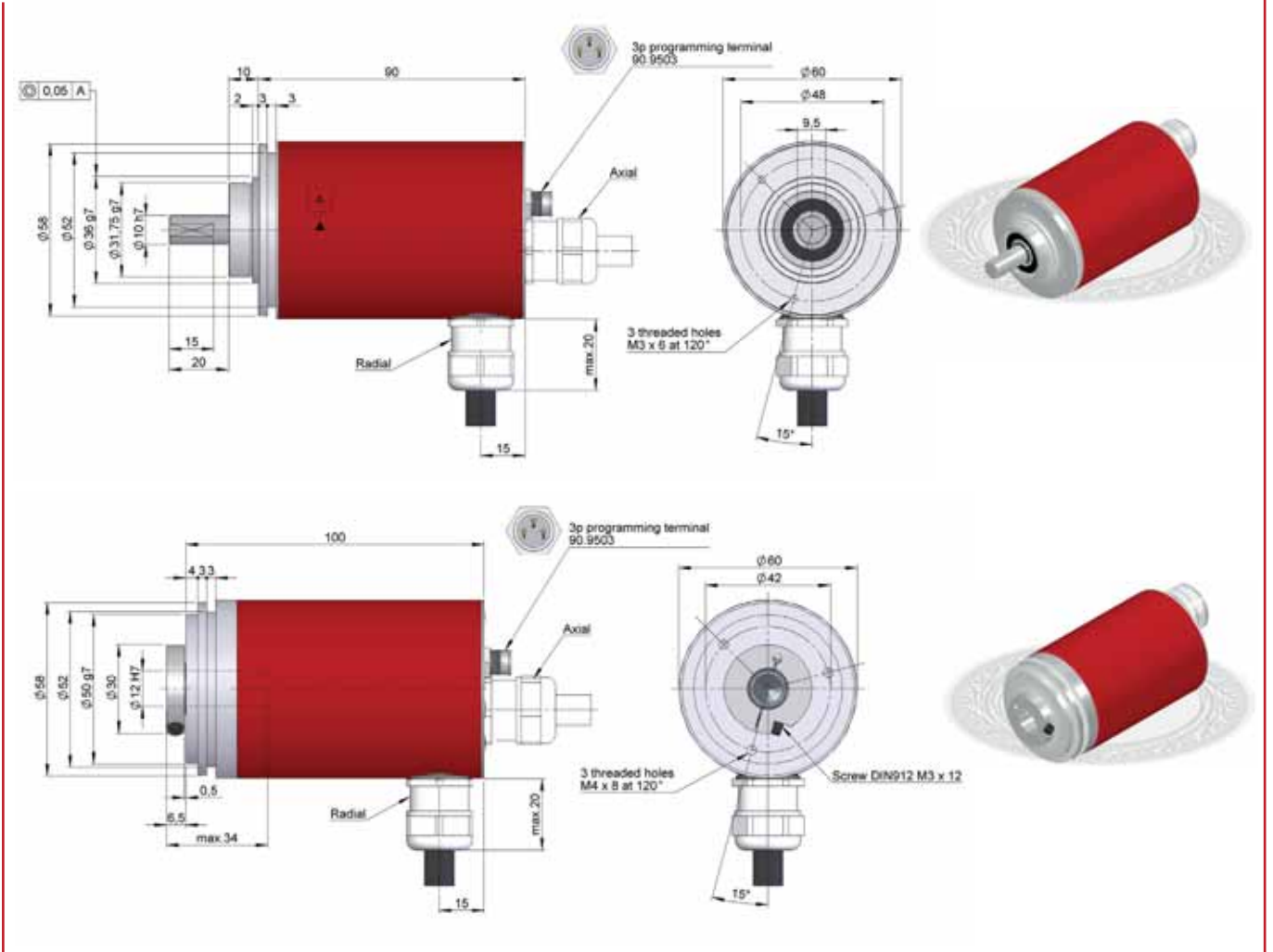
## ORDERING CODE

| TYPE                                      | SERIE | SHAFT | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE   | CODE          | IP      | POWER SUPPLY OUTPUT      | RESOLUTION | SPECIAL CUSTOMER |
|---|-------|-------|---|------------------------|-----------------------|-------------|---------------|---------|--------------------------|------------|------------------|
| ● ●                                       | 10    | ●     | ●   | ●                      | ●                     | ●           | ●             | ●       | ●                        | 8192       | ● ●              |
| CSP-Solid shaft<br>HSP-Blind hollow shaft |       | ↓     | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006               | ↓                      | 1- Axial<br>2- Radial | 0- Parallel | ↓             | 1- IP65 | ↓                        |            |                  |
|   |       |       | 1- Solid Ø6x10 mm<br>2- Solid Ø10x20 mm<br>3- Blind hollow Ø12 mm<br>4- Blind hollow Ø10 mm | 1- Cable<br>5- 90.9521 |                       |             | 9- Prog by PC |         | 3- 10...30 Vdc Push-Pull |            |                  |



**MULTITURN ABSOLUT ENCODER**

- Programming by PC up to 24 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CMP) and blind hollow shaft (HMP)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

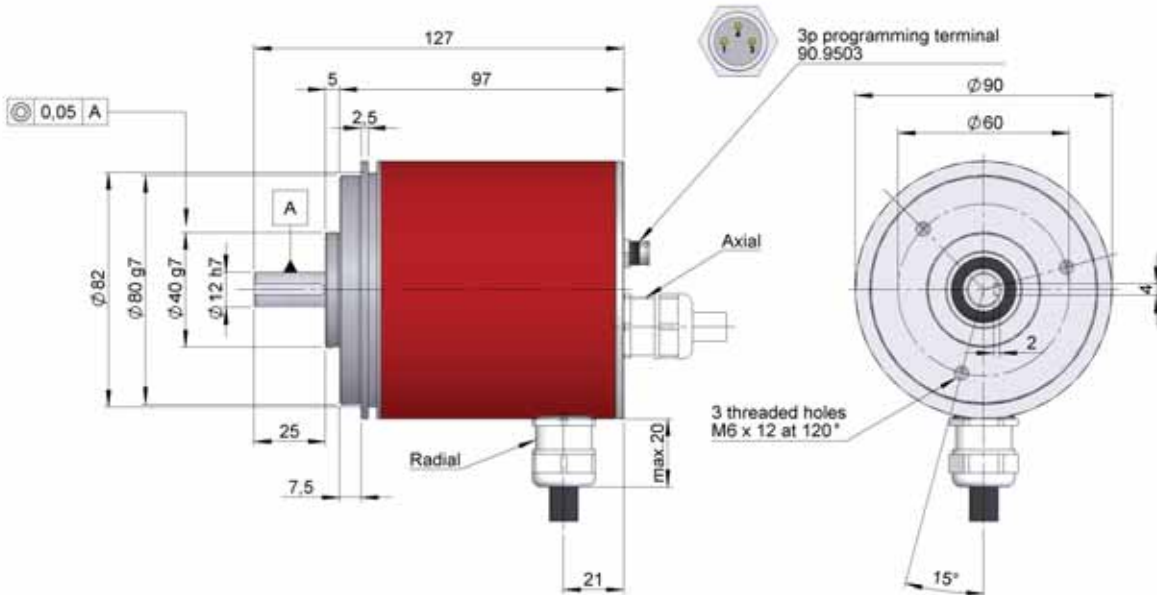
**ORDERING CODE**

| TYPE  | SERIE | SHAFT   | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE                    | CODE | IP      | POWER SUPPLY OUTPUT      | SINGLETURN RESOLUTION | MULTITURN RESOLUTION | SPECIAL CUSTOMER |
|---|-------|---|---|------------------------|-----------------------|------------------------------|------|---------|--------------------------|-----------------------|----------------------|------------------|
| ● ● ●   | 10    | ●   | ●   | ●                      | ●                     | ●                            | ●    | ●       | ●                        | 8192 / 2048           | ● ●                  |                  |
| <b>CMP-</b> Solid shaft<br><b>HMP-</b> Blind hollow shaft |       | 1- Solid Ø10 mm<br>2- Solid Ø6 mm<br>3- Blind hollow Ø12 mm<br>4- Blind hollow Ø10 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable<br>6- 90.9526 | 1- Axial<br>2- Radial | 0- Parallel<br>9- Prog by PC |      | 1- IP65 | 3- 10...30 Vdc Push-Pull |                       |                      |                  |

# PARALLEL PROGRAMMABLE SERIES CSP30 / CMP30

## PROGRAMMABLE ABSOLUT ENCODER FOR HEAVY DUTY INDUSTRIAL APPLICATIONS

- Programming by PC singleturn (CSP) up to 13 bits or multiturn (CMP) programming by PC up to 24 bits
- Protection class IP65 according to DIN 40050
- External diameter 90 mm
- Solid shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### ORDERING CODE

| TYPE                              | SERIE | SHAFT          | FLANGE                | CONNECTION                           | AXIAL RADIAL          | INTERFACE   | CODE          | IP      | POWER SUPPLY OUTPUT      | SINGLETURN RESOLUTION | MULTITURN RESOLUTION | SPECIAL CUSTOMER |
|-----------------------------------|-------|----------------|-----------------------|--------------------------------------|-----------------------|-------------|---------------|---------|--------------------------|-----------------------|----------------------|------------------|
| ● ● ●                             | 30    | ●              | ●                     | ●                                    | ●                     | ●           | ●             | ●       | ●                        | 8192 / 2048           | ● ●                  |                  |
| CSP- Singleturn<br>CMP- Multiturn |       | ↓              | 1- None<br>3- 90.1008 | ↓                                    | 1- Axial<br>2- Radial | 0- Parallel | ↓             | 1- IP65 | ↓                        |                       |                      |                  |
|                                   |       | 2- Ø12 x 25 mm |                       | 1- Cable<br>5- 90.9521<br>6- 90.9526 |                       |             | 9- Prog by PC |         | 3- 10...30 Vdc Push-Pull |                       |                      |                  |







# CONNECTION AND CONNECTORS

## CONNECTION CS / CSP / HS / HSP PARALLEL OUTPUT



|               | Cable 15 x 0.14 | Cable 25 x 0.14 | 90.9512<br>M23 12p | 90.9516<br>M23 16p | 90.9521<br>21p | 90.9526<br>26p |
|---------------|-----------------|-----------------|--------------------|--------------------|----------------|----------------|
| <b>GND</b>    | Black           | Black           | 1                  | 1                  | 1              | 1              |
| <b>Vcc</b>    | Red             | Red             | 2                  | 2                  | 2              | 2              |
| <b>Bit 0</b>  | Brown           | Brown           | 3                  | 3                  | 3              | 3              |
| <b>Bit 1</b>  | White           | White           | 4                  | 4                  | 4              | 4              |
| <b>Bit 2</b>  | Yellow          | Yellow          | 5                  | 5                  | 5              | 5              |
| <b>Bit 3</b>  | Green           | Green           | 6                  | 6                  | 6              | 6              |
| <b>Bit 4</b>  | Orange          | Pink            | 7                  | 7                  | 7              | 7              |
| <b>Bit 5</b>  | Violet          | Orange          | 8                  | 8                  | 8              | 8              |
| <b>Bit 6</b>  | Grey            | Grey            | 9                  | 9                  | 9              | 9              |
| <b>Bit 7</b>  | Blue            | Blue            | 10                 | 10                 | 10             | 10             |
| <b>Bit 8</b>  | White - Black   | Yellow - Black  | 11                 | 11                 | 11             | 11             |
| <b>Bit 9</b>  | White - Red     | Yellow - Red    | 12                 | 12                 | 12             | 12             |
| <b>Bit 10</b> | White - Brown   | Yellow - Brown  |                    | 13                 | 13             | 13             |
| <b>Bit 11</b> | White - Yellow  | Yellow - Green  |                    | 14                 | 14             | 14             |
| <b>Bit 12</b> | White - Blue    | Yellow - Grey   |                    | 15                 | 15             | 15             |
| <b>Bit 13</b> |                 | Yellow - Blue   |                    | 16                 | 16             | 16             |
| <b>Bit 14</b> |                 | White - Black   |                    |                    | 17             | 17             |
| <b>Bit 15</b> |                 | White - Red     |                    |                    | 18             | 18             |
| <b>DIR</b>    | White - Yellow  | White - Pink    | 11                 | 15                 | 20             | 25             |
| <b>RES</b>    | White - Blue    | White - Blue    | 12                 | 16                 | 21             | 26             |

## CONNECTION CM / CMP / HM / HMP PARALLEL OUTPUT



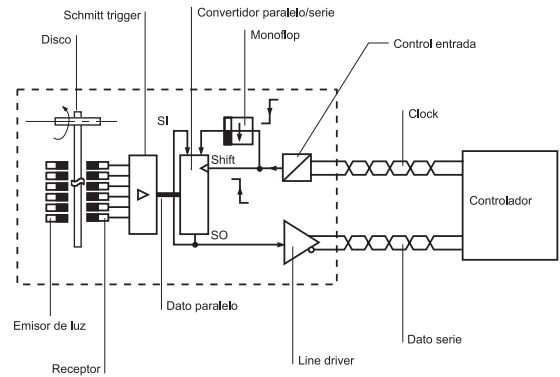
|               | Cable 15 x 0.14 | Cable 25 x 0.14 | Cable 36 x 0.14 | 90.9512<br>M23 12p | 90.9516<br>M23 16p | 90.9521<br>21p | 90.9526<br>26p | 90.9537<br>SUBD 37p |
|---------------|-----------------|-----------------|-----------------|--------------------|--------------------|----------------|----------------|---------------------|
| <b>GND</b>    | Black           | Black           | Black           | 1                  | 1                  | 1              | 1              | 1                   |
| <b>Vcc</b>    | Red             | Red             | Red             | 2                  | 2                  | 2              | 2              | 2                   |
| <b>Bit 0</b>  | Brown           | Brown           | Brown           | 3                  | 3                  | 3              | 3              | 3                   |
| <b>Bit 1</b>  | White           | White           | White           | 4                  | 4                  | 4              | 4              | 4                   |
| <b>Bit 2</b>  | Yellow          | Yellow          | Yellow          | 5                  | 5                  | 5              | 5              | 5                   |
| <b>Bit 3</b>  | Green           | Green           | Green           | 6                  | 6                  | 6              | 6              | 6                   |
| <b>Bit 4</b>  | Orange          | Pink            | Pink            | 7                  | 7                  | 7              | 7              | 7                   |
| <b>Bit 5</b>  | Violet          | Orange          | Orange          | 8                  | 8                  | 8              | 8              | 8                   |
| <b>Bit 6</b>  | Grey            | Grey            | Grey            | 9                  | 9                  | 9              | 9              | 9                   |
| <b>Bit 7</b>  | Blue            | Blue            | Blue            | 10                 | 10                 | 10             | 10             | 10                  |
| <b>Bit 8</b>  | White - Black   | Yellow - Black  | Yellow - Black  | 11                 | 11                 | 11             | 11             | 11                  |
| <b>Bit 9</b>  | White - Red     | Yellow - Red    | Yellow - Red    | 12                 | 12                 | 12             | 12             | 12                  |
| <b>Bit 10</b> | White - Brown   | Yellow - Brown  | Yellow - Brown  |                    | 13                 | 13             | 13             | 13                  |
| <b>Bit 11</b> | White - Yellow  | Yellow - Green  | Yellow - Green  |                    | 14                 | 14             | 14             | 14                  |
| <b>Bit 12</b> | White - Blue    | Yellow - Grey   | Yellow - Pink   |                    | 15                 | 15             | 15             | 15                  |
| <b>Bit 13</b> |                 | Yellow - Azul   | Yellow - Grey   |                    | 16                 | 16             | 16             | 16                  |
| <b>Bit 14</b> |                 | White - Black   | Yellow - Blue   |                    |                    | 17             | 17             | 17                  |
| <b>Bit 15</b> |                 | White - Red     | White - Black   |                    |                    | 18             | 18             | 18                  |
| <b>Bit 16</b> |                 | White - Brown   | White - Red     |                    |                    | 19             | 19             | 19                  |
| <b>Bit 17</b> |                 | White - Green   | White - Brown   |                    |                    | 20             | 20             | 20                  |
| <b>Bit 18</b> |                 | White - Pink    | White - Green   |                    |                    | 21             | 21             | 21                  |
| <b>Bit 19</b> |                 | White - Orange  | White - Pink    |                    |                    |                | 22             | 22                  |
| <b>Bit 20</b> |                 | White - Grey    | White - Orange  |                    |                    |                | 23             | 23                  |
| <b>Bit 21</b> |                 | White - Blue    | White - Grey    |                    |                    |                | 24             | 24                  |
| <b>Bit 22</b> |                 |                 | White - Blue    |                    |                    |                | 25             | 25                  |
| <b>Bit 23</b> |                 |                 | Green - Black   |                    |                    |                | 26             | 26                  |
| <b>DIR</b>    | White - Yellow  | Yellow - Pink   | Grey - Brown    | 11                 | 15                 | 20             | 25             | 36                  |
| <b>RES</b>    | White - Blue    | White - Blue    | Grey - Blue     | 12                 | 16                 | 21             | 26             | 37                  |



## ABSOLUT AND PROGRAMMABLE ABSOLUT SSI ENCODERS

In many cases, the data transmitted from one system to another are subjected to magnetic fields and noise, by using standard interfaces, such as RS485, the effects of such interference can be reduced. The "Synchronous Serial Interface" (SSI) is an industrial output standard that only requires four lines for data transmission. This transmission system for absolute encoders provides several advantages with respect to traditional parallel transmission and asynchronous serial methods:

- Reduced component count.
- Simple code modification.
- Data transmission between the encoder and the receiver are controlled by the receivers clock signal.
- High transmission speeds in function of distance and the data block to be transmitted.



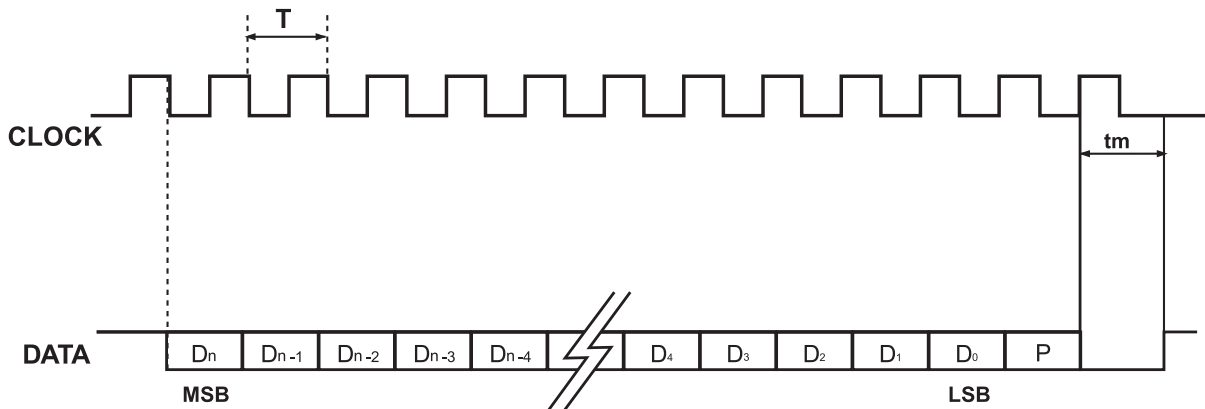
### Data format

The clock signal produced by the PLC or device connected to the encoder intervenes in the transmission. When no data is being transmitted, the encoder data serial output remains at a "1" level. When the clock rising edge appears, data transmission commences. Each clock rising edge transmits one bit for the current position. The transmission commences with the Most Significant Bit (MSB) and ends with the Least Significant Bit (LSB). When the "n" position bits have been transmitted, the special bit(s) are transmitted (this is optional). When transmission is completed, the clock signal is stopped for  $t_m$  (while data transmission remains at "0"). This causes the monostable (Sload) to reset and update the encoder position, so that the encoder is once again ready to transmit the new position.

P: This is the parity bit. It is used to establish whether the transmitted data is correct or not. It is a logic level "1" if the total number of "1s" in the block is even. If this number is odd, then it will be a "0".

A: This is the alarm bit. When it is a "1" it indicates insufficient power supply levels.

The total number of clock bits will be equal to the total number of resolution bits plus one. If the special bit is transmitted, an additional pulse must be added.

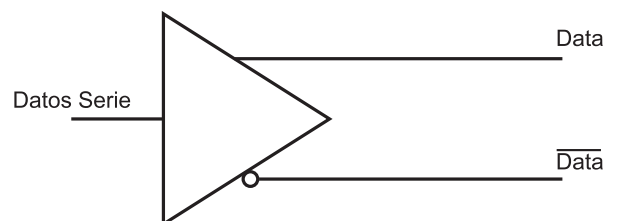
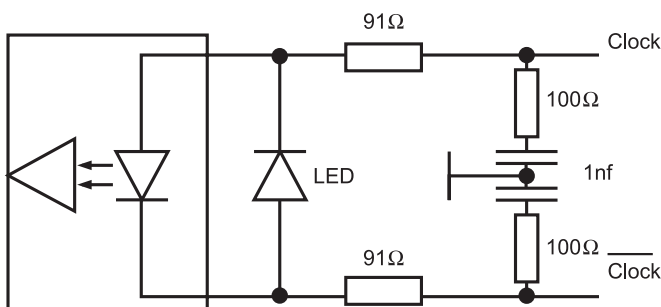


### CLK input circuit

Since the clock signal is an input to the encoder, it is protected by means of an optical coupler, which electrically isolates the encoder from the PLC or similar. In this way, the encoder is protected against over-voltages and overloads.

### DATA output circuit

This driver is supplied with a TTL signal at the input, which is converted into a differential signal at the output to cancel any possible noise that could interfere with the transmission.















# ABSOLUT ENCODERS SSI

- Resolution up to 25 bits
- Solid (CS) and blind hollow shaft (HS)
- Protection class IP65 or IP67 according to DIN 40050
- Available any number of positions per turn
- Direction, code, and reset selection
- Output codes: Binary or Gray
- Radial or axial connection, cable or connector output



## OVERVIEW

|                         | Diameter 58 mm  |  | Diameter 90 mm  |
|-------------------------|---|--|---|
|                         | Solid shaft   | Blind hollow shaft   | Solid shaft   |
| Singleturn              | CS10<br>CS10 IP67<br>  | HS10<br>    | CS30<br>CS30 IP67<br>  |
| Singleturn programmable | CSP10<br>              | HSP10<br>   | CSP30<br>              |
| Multiturn               | CM10<br>CM10 IP67<br> | HM10<br>   | CM30<br>CM30 IP67<br> |
| Multiturn programmable  | CMP10<br>            | HMP10<br> | CMP30<br>            |

## TECHNICAL SPECIFICATIONS

|   | Diameter 58 mm                                       | Diameter 90 mm       |
|---|--|----------------------|
| Housing   | Aluminium/Stainless steel                            |                      |
| Shaft   | Stainless steel                                      |                      |
| Bearings  | Ballraces  |                      |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.                              |                      |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.  |                      |
| Protection against dust and splashes according to DIN 40050 | IP65 / IP67.   |                      |
| Rotor inertia moment  | 30 gcm <sup>2</sup>                                  | 270 gcm <sup>2</sup> |
| Starting torque 20°C (68°F)                                 | Máx. 2,0 Ncm   | Máx. 5,0 Ncm         |
| Maximum load permitted on axial shaft                       | 40 N   | 80 N                 |
| Maximum load permitted on radial shaft                      | 60 N   | 100 N                |
| Misalignment permitted axial (blind hollow shaft)           | ±0.5 mm  | -                    |
| Misalignment permitted radial (blind hollow shaft)          | ±0.3 mm  | -                    |
| Weight aprox.   | 400 g ST, 500 g MT                                   | 1,2 kg ST, 1,3 kg MT |
| Operating temperature range                                 | -10°C a +70°C  |                      |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz)                 |                      |
| Shock   | 1000 m/s <sup>2</sup> (6ms)                          |                      |
| Consumption max.  | 100 mA (CS/HS), 150 mA (CM/HM)                       |                      |
| Power supply  | 10..30Vdc  |                      |
| Interface   | SSI  |                      |
| Electrical output   | RS422  |                      |
| Configurable parameters (programmable series)               | Direction, code, reset, preset1, preset2, resolution |                      |
| Configurable parameters                                     | Direction and reset                                  |                      |
| Inputs  | Opto-coupled   |                      |
| Available codes   | Binary and Gray                                      |                      |
| Max. points per turn  | 8192 positions (13 bits)                             |                      |
| Max. turns  | 4096 turns (12 bits)                                 |                      |
| Linearity   | ±1/2 LSB   |                      |
| Radial and axial connection                                 | 2 metres cable or industrial connector               |                      |

ST: Singleturn MT: Multiturn

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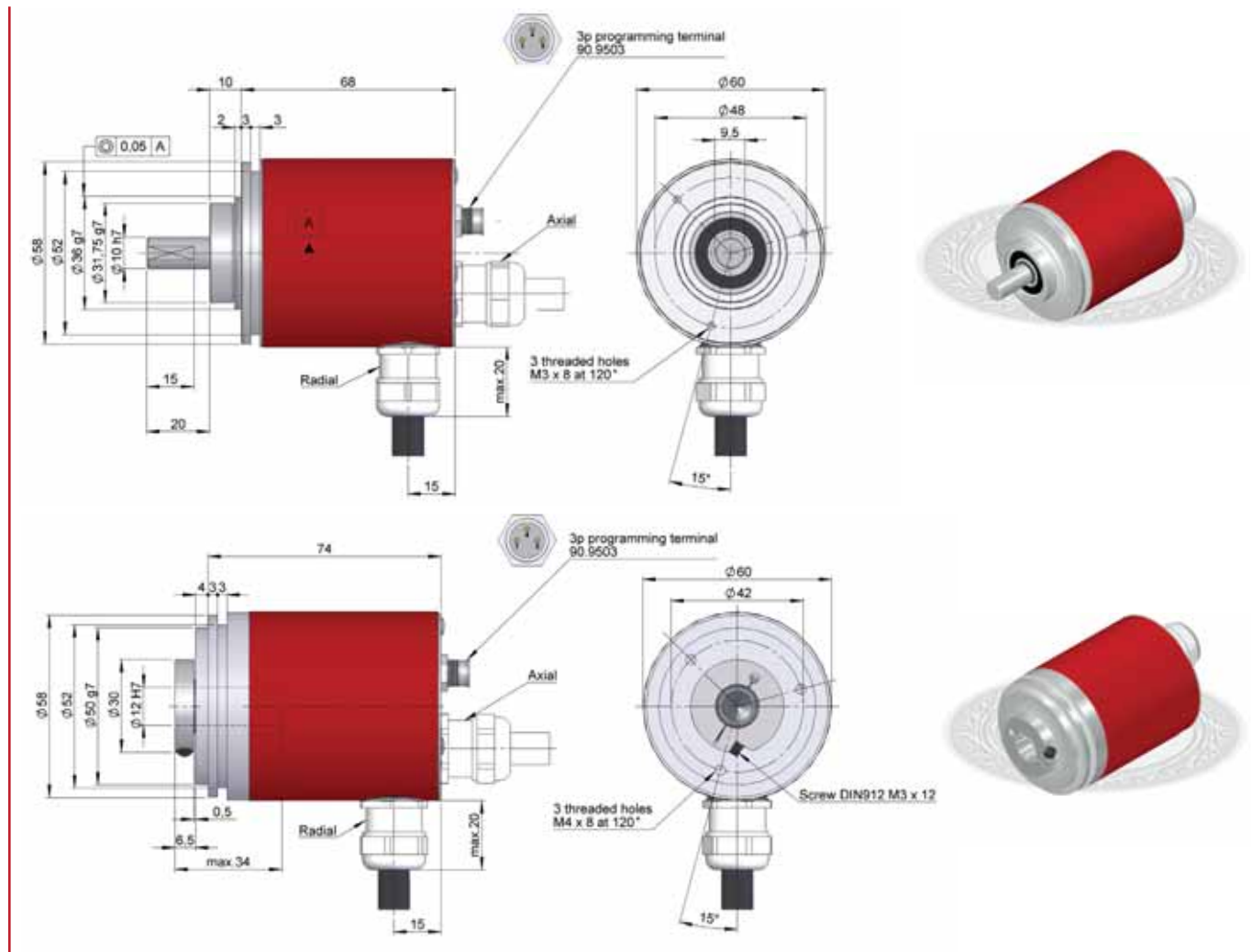






**SINGLETURN ABSOLUT ENCODERS**

- Programming by PC up to 13 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CSP) and blind hollow shaft (HSP)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

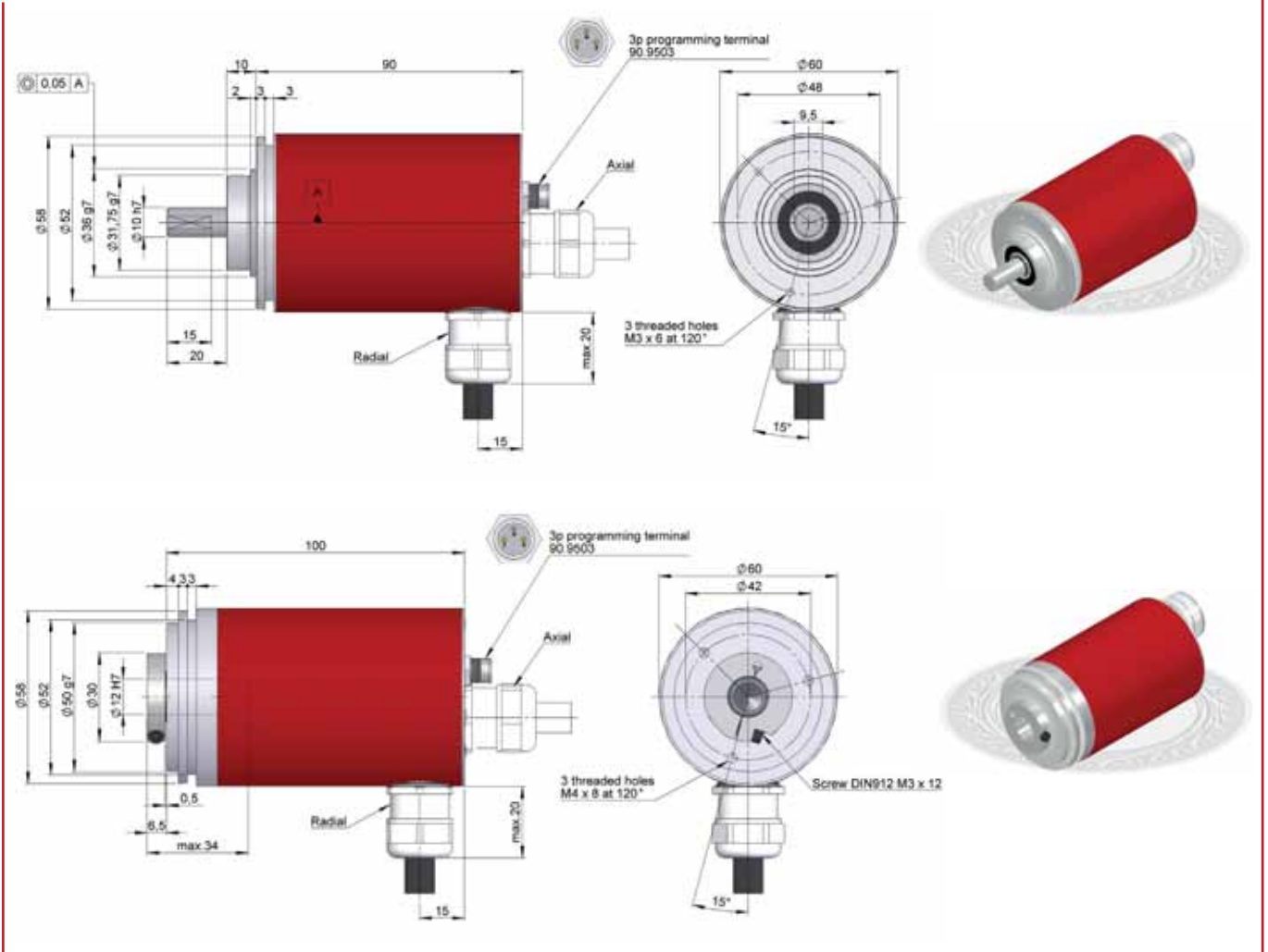
**ORDERING CODE**

| TYPE                                      | SERIE | SHAFT   | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE | CODE          | IP      | POWER SUPPLY OUTPUT  | RESOLUTION | SPECIAL CUSTOMER |
|---|-------|---|---|------------------------|-----------------------|-----------|---------------|---------|----------------------|------------|------------------|
| ● ●                                       | 10    | ●   | ●   | ●                      | ●                     | ●         | ●             | ●       | ●                    | 8192       | ● ●              |
| CSP-Solid shaft<br>HSP-Blind hollow shaft |       |   | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 |                        | 1- Axial<br>2- Radial | 1- SSI    |               | 1- IP65 |                      |            |                  |
|   |       |   |   |                        |                       |           | 9- Prog by PC |         | 0- 10...30 Vdc RS485 |            |                  |
|   |       | 1- Solid Ø6x10 mm<br>2- Solid Ø10x20 mm<br>3- Blind hollow Ø12 mm<br>4- Blind hollow Ø10 mm |   | 1- Cable<br>3- 90.9512 |                       |           |               |         |                      |            |                  |



**MULTITURN ABSOLUT ENCODER**

- Programming by PC up to 25 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CMP) and blind hollow shaft (HMP)



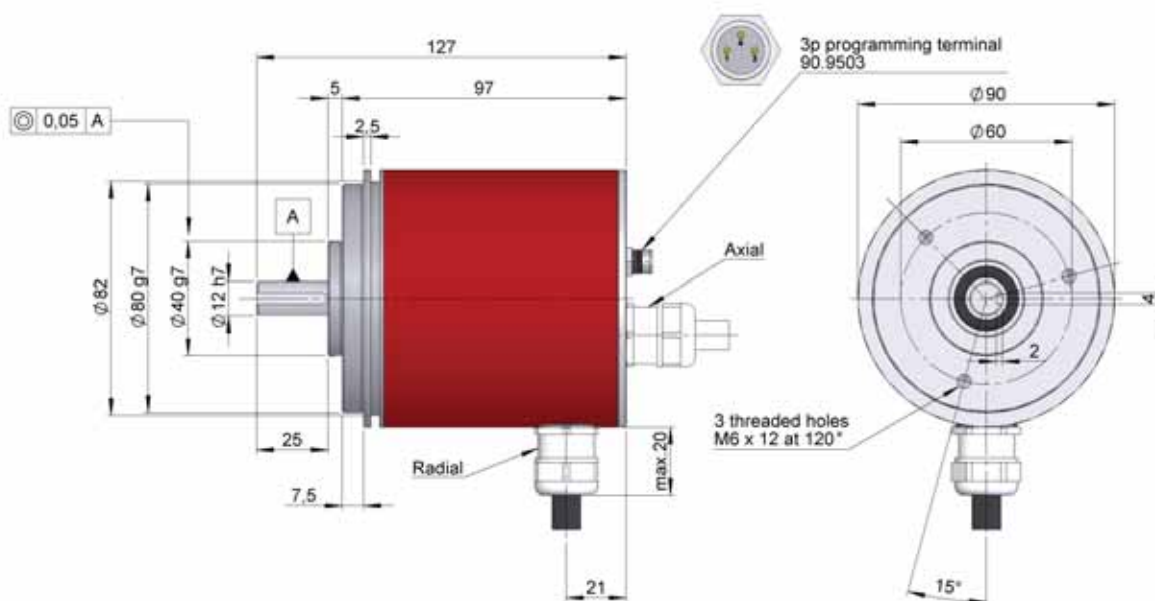
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE  | SERIE | SHAFT   | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE | CODE          | IP      | POWER SUPPLY OUTPUT  | SINGLETURN RESOLUTION | MULTITURN RESOLUTION | SPECIAL CUSTOMER |
|---|-------|---|---|------------------------|-----------------------|-----------|---------------|---------|----------------------|-----------------------|----------------------|------------------|
| ● ● ●   | 10    | ●   | ●   | ●                      | ●                     | ●         | ●             | ●       | ●                    | 8192 / 4096           | ● ●                  |                  |
| <b>CMP</b> - Solid shaft<br><b>HMP</b> - Blind hollow shaft |       | 1- Solid Ø10 mm<br>2- Solid Ø6 mm<br>3- Blind hollow Ø12 mm<br>4- Blind hollow Ø10 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable<br>3- 90.9512 | 1- Axial<br>2- Radial | 1- SSI    | 9- Prog by PC | 1- IP65 | 0- 10...30 Vdc RS485 |                       |                      |                  |

**PROGRAMMABLE ABSOLUT ENCODER FOR HEAVY DUTY INDUSTRIAL APPLICATIONS**

- Programming by PC singleturn (CSP) up to 13 bits or multiturn (CMP) programming by PC up to 25 bits
- Protection class IP65 according to DIN 40050
- External diameter 90 mm
- Solid shaft



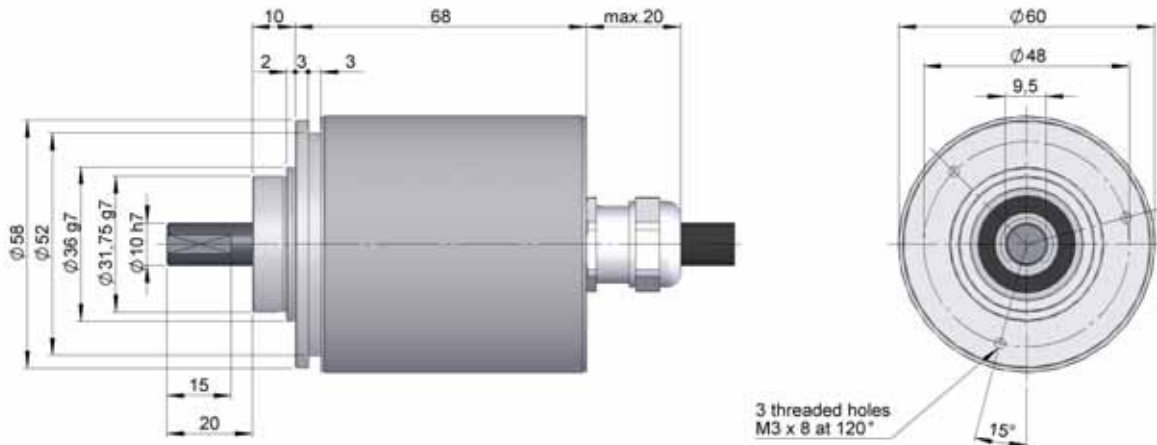
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE                              | SERIE | SHAFT                       | FLANGE                | CONNECTION             | AXIAL RADIAL          | INTERFACE | CODE          | IP      | POWER SUPPLY OUTPUT  | SINGLETURN RESOLUTION | MULTITURN RESOLUTION | SPECIAL CUSTOMER |
|-----------------------------------|-------|-----------------------------|-----------------------|------------------------|-----------------------|-----------|---------------|---------|----------------------|-----------------------|----------------------|------------------|
| ● ● ●                             | 30    | ●                           | ●                     | ●                      | ●                     | ●         | ●             | ●       | ●                    | 8192 / 4096           | ● ●                  |                  |
| CSP- Singleturn<br>CMP- Multiturn |       | 2- $\varnothing 12$ x 25 mm | 1- None<br>3- 90.1008 | 1- Cable<br>3- 90.9512 | 1- Axial<br>2- Radial | 1- SSI    | 9- Prog by PC | 1- IP65 | 0- 10...30 Vdc RS485 |                       |                      |                  |

**SINGLETURN ABSOLUT ENCODER FOR SEVERE APPLICATIONS**

- Singleturn resolution up to 13 bits
- Protection class IP67 according to DIN 40050
- External diameter 58 mm
- Solid shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

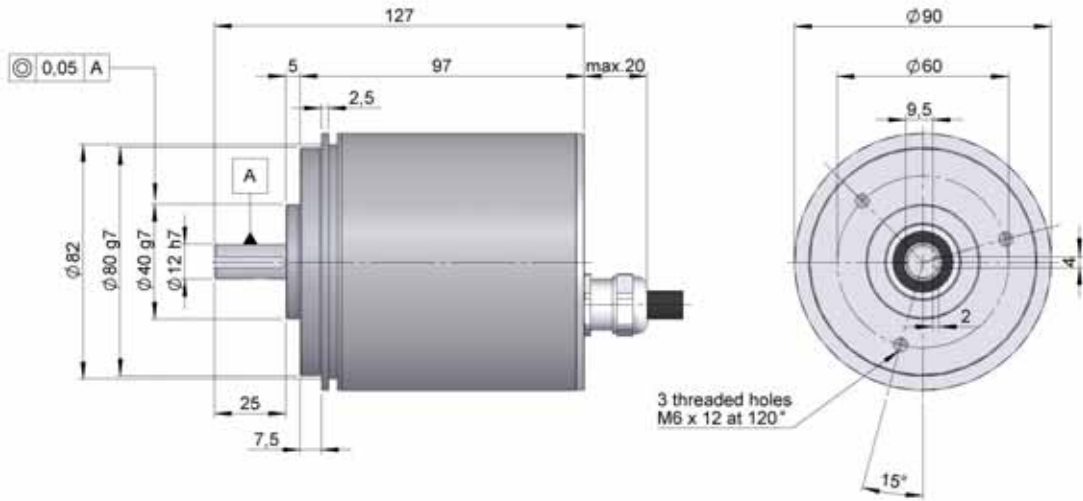
**ORDERING CODE**

| TYPE                 | SERIE | SHAFT                           | FLANGE  | CONNECTION | AXIAL RADIAL | INTERFACE | CODE   | IP                                 | POWER SUPPLY OUTPUT  | CONFIG. PARAMETERS | RESOLUTION | SPECIAL CUSTOMER |
|----------------------|-------|---------------------------------|---|------------|--------------|-----------|--|------------------------------------|----------------------|--------------------|------------|------------------|
| ● ● ● CS- Singleturn | 10    | ●                               | ●   | ●          | ●            | ●         | ●  | ●                                  | ●                    | ● ● ● ● ●          | ● ● ● ● ●  | ● ● ● ● ●        |
|                      |       | 1- Ø6 x 10 mm<br>2- Ø10 x 20 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable   | 1- Axial     | 1- SSI    | 1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW | 2- Stainless steel IP67<br>3- IP67 | 0- 10...30 Vdc RS485 | S- Direction       |            |                  |



**ABSOLUT ENCODER FOR SEVERE AND HEAVY DUTY INDUSTRIAL APPLICATIONS**

- Singleturn resolution (CS) up to 13 bits or multiturn (CM) up to 24 bits
- Protection class IP67 according to DIN 40050
- External diameter 90 mm
- Solid shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE  | SERIE | SHAFT                    | FLANGE                      | CONNECTION         | AXIAL RADIAL  | INTERFACE   | CODE   | IP                                      | POWER SUPPLY OUTPUT            | CONFIG PARAMETERS | SINGLETURN RESOLUTION | MULTITURN RESOLUTION | SPECIAL CUSTOMER |
|---|-------|--------------------------|-----------------------------|--------------------|---------------|-------------|--|---|--------------------------------|-------------------|-----------------------|----------------------|------------------|
| ● ● 30<br><b>CS-</b> Singleturn<br><b>CM-</b> Multiturn |       | ●<br>↓<br>2- Ø12 x 25 mm | ●<br>1- Nonet<br>3- 90.1008 | ●<br>↓<br>1- Cable | ●<br>1- Axial | ●<br>1- SSI | ●<br>↓<br>1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW | ●<br>2- Stainless steel IP67<br>3- IP67 | ●<br>↓<br>0- 10...30 Vdc RS485 | ●<br>S- Direction | ●●●●●●●●●●            | ●●●●●●●●●●           | ●●●●●            |

# CONNECTION AND CONNECTORS

## ■ SSI OUTPUT CONNECTION



| Cable 3x2x0.14+2x0.34 |        | 90.9512<br>M23 12p |
|-----------------------|--------|--------------------|
| GND                   | Black  | 1                  |
| Vcc                   | Red    | 2                  |
| Data +                | Yellow | 3                  |
| Data -                | Green  | 4                  |
| Clock +               | Brown  | 5                  |
| Clock -               | Blue   | 6                  |
| DIR                   | Grey   | 11                 |



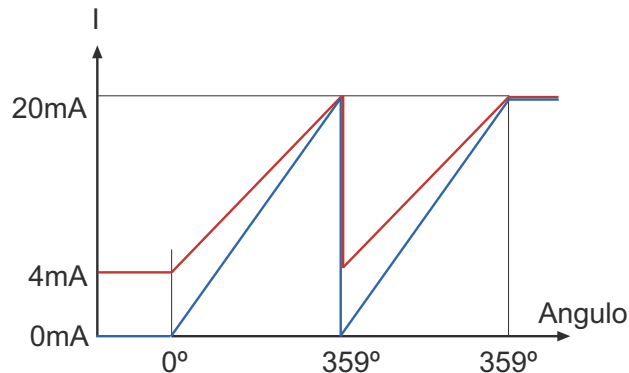
# GENERAL INFORMATION **ANALOG**

## ABSOLUT AND PROGRAMMABLE ABSOLUT ANALOG ENCODERS

### ■ Analog interface

The analog interface has two outputs: one provides the absolute position measurement as a voltage (0/10v), and the other as a current (0/20mA or 4/20mA). Both outputs come from a singleturn absolute encoder with a 12bit resolution, with the 0 absolute position (0 degrees) having a value of 0v at the V+ output and 4 or 0 mA at the I+ output.

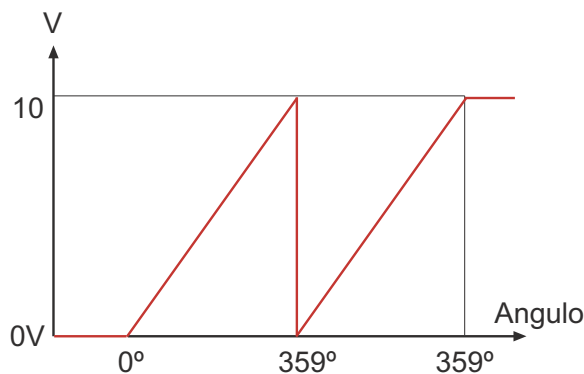
When the absolute position is 4095 (359 degrees) the V+ output will be 10v and the I+ output will be 20mA. These outputs consist of four wires (two per output) I+, I- and V+, V-. Thus forming two measurement loops. Depending on the measurement system implemented by the customer, one or the other output will be used.



### ■ Current output

#### Electrical specifications

|                        |   |
|------------------------|---|
| Output form            | 0/20mA o 4/20mA                         |
| Resolution             | Up to 12 bits (4096 positions) for 360° |
| Thermal stability      | ±20 ppm/°C                              |
| Update frequency       | 100KHz                                  |
| Linearity error        | 0.07% of the active angle               |
| R <sub>LOAD</sub> máx. | (V <sub>IN</sub> - 2 V)/20mA)           |
| R <sub>LOAD</sub> min. | 150Ω                                    |



### ■ Voltage output

#### Electrical specifications









|                                 |   |
|---------------------------------|---|
| Output form                     | 0/10V (Vcc min.=12V)                    |
| Resolution                      | Up to 12 bits (4096 positions) for 360° |
| Slew Rate                       | 0.7V/us                                 |
| Update frequency                | 100KHz                                  |
| Linearity error                 | 0.05% of the active angle               |
| Load resistance                 | >5kΩ                                    |
| Protection against shortcircuit | Yes                                     |

# ABSOLUT ENCODERS ANALOG

- Interface analog current loop output 4..20mA, 0..20mA and 0..10 V voltage output
- Resolution 10 or 12 bits
- Solid or blind hollow shaft
- Protection class IP65 or IP67 according to DIN 40050
- Direction and range selectable
- Radial or axial connection, cable or connector output



## OVERVIEW

|                        | Diameter 58 mm  |  | Diameter 90 mm  |
|------------------------|---|--|---|
|                        | Solid shaft   | Hollow shaft   | Solid shaft   |
| Singleturn             | CS10<br>CS10 IP67<br>  | HS10<br>    | CS30<br>CS30 IP67<br>  |
| Multiturn              | CM10<br>CM10 IP67<br> | HM10<br>   | CM30<br>CM30 IP67<br> |
| Multiturn programmable | CMP10<br>            | HMP10<br> |   |

## TECHNICAL SPECIFICATIONS

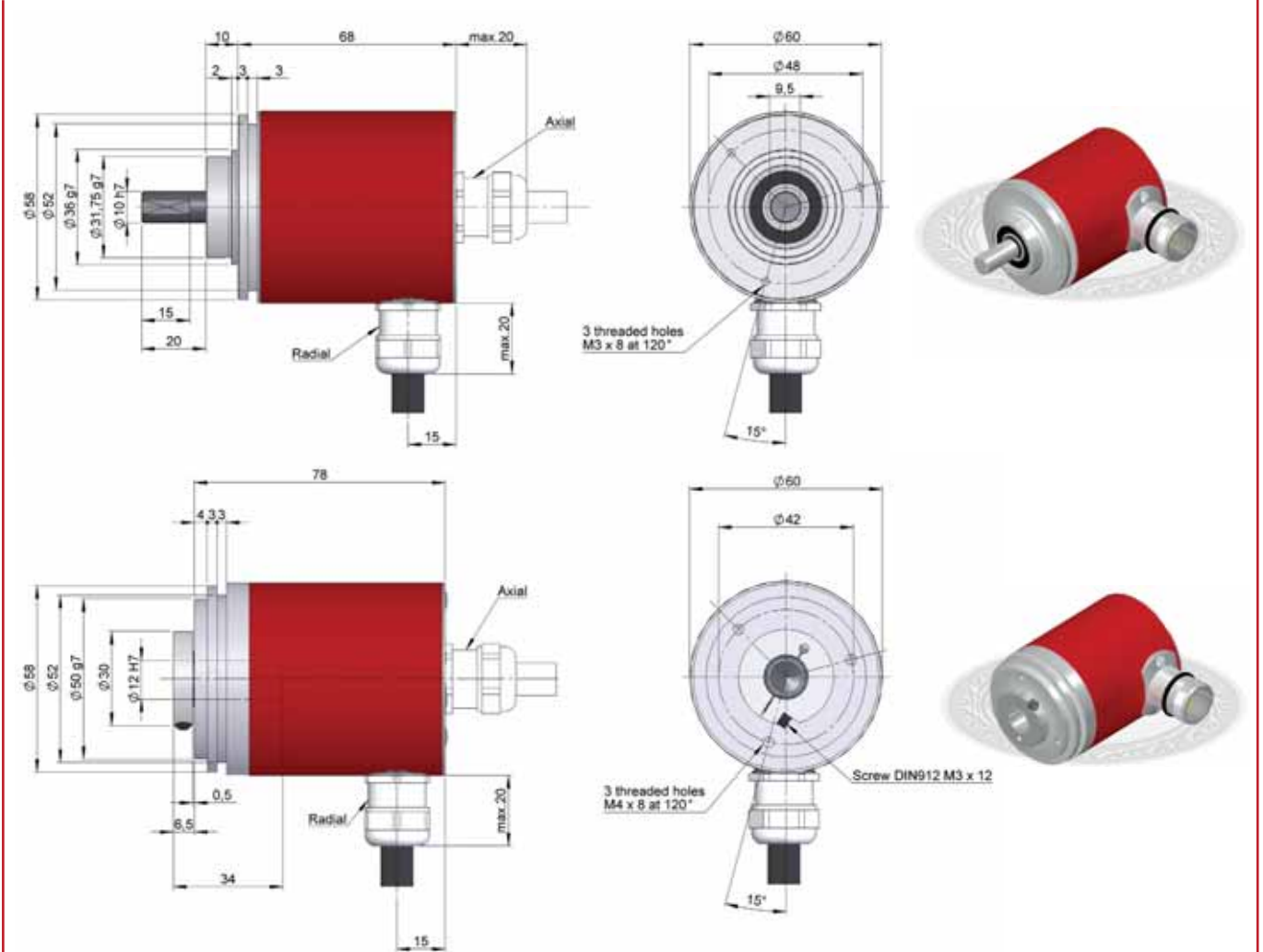
|   | Diameter 58 mm      | Diameter 90 mm                         |
|---|---------------------|--|
| Housing   |                     | Aluminium/Stainless steel              |
| Shaft   |                     | Stainless steel                        |
| Bearings  |                     | Ballraces                              |
| Bearings lifetime   |                     | 1x10 <sup>10</sup> rev.                |
| Maximum number of revolutions permitted mechanically        |                     | 6000 rpm.                              |
| Protection against dust and splashes according to DIN 40050 |                     | IP65 / IP67.                           |
| Rotor inertia moment  | 30 gcm <sup>2</sup> | 270 gcm <sup>2</sup>                   |
| Starting torque 20°C (68°F)                                 | Máx. 2,0 Ncm        | Máx. 5,0 Ncm                           |
| Maximum load permitted on axial shaft                       | 40 N                | 80 N                                   |
| Maximum load permitted on radial shaft                      | 60 N                | 100 N                                  |
| Misalignment permitted axial (blind hollow shaft)           | ±0.5 mm             | -                                      |
| Misalignment permitted radial (blind hollow shaft)          | ±0.3 mm             | -                                      |
| Weight aprox.   | 400 g ST, 500 g MT  | 1,2 kg ST, 1,3 kg MT                   |
| Operating temperature range                                 |                     | -10°C a +70°C                          |
| Vibration   |                     | 100 m/s <sup>2</sup> (10Hz..2000Hz)    |
| Shock   |                     | 1000 m/s <sup>2</sup> (6ms)            |
| Consumption max.  |                     | 100 mA (CS/HS), 150 mA (CM/HM)         |
| Power supply  |                     | 10..30Vdc                              |
| Interface   |                     | Analogue                               |
| Electrical output   |                     | 0..20mA, 0..10v, 4..20mA               |
| Configurable parameter (programmable series)                |                     | Range                                  |
| Configurable parameters                                     |                     | Direction                              |
| Resolution  |                     | 10 or 12 bits                          |
| Maximum range   |                     | 4096 turns                             |
| Radial and axial connection                                 |                     | 2 metres cable or industrial connector |

ST: Singleturn MT: Multiturn

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**SINGLETURN ABSOLUT ENCODER**

- Singleturn resolution up to 12 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CS) and blind hollow shaft (HS)



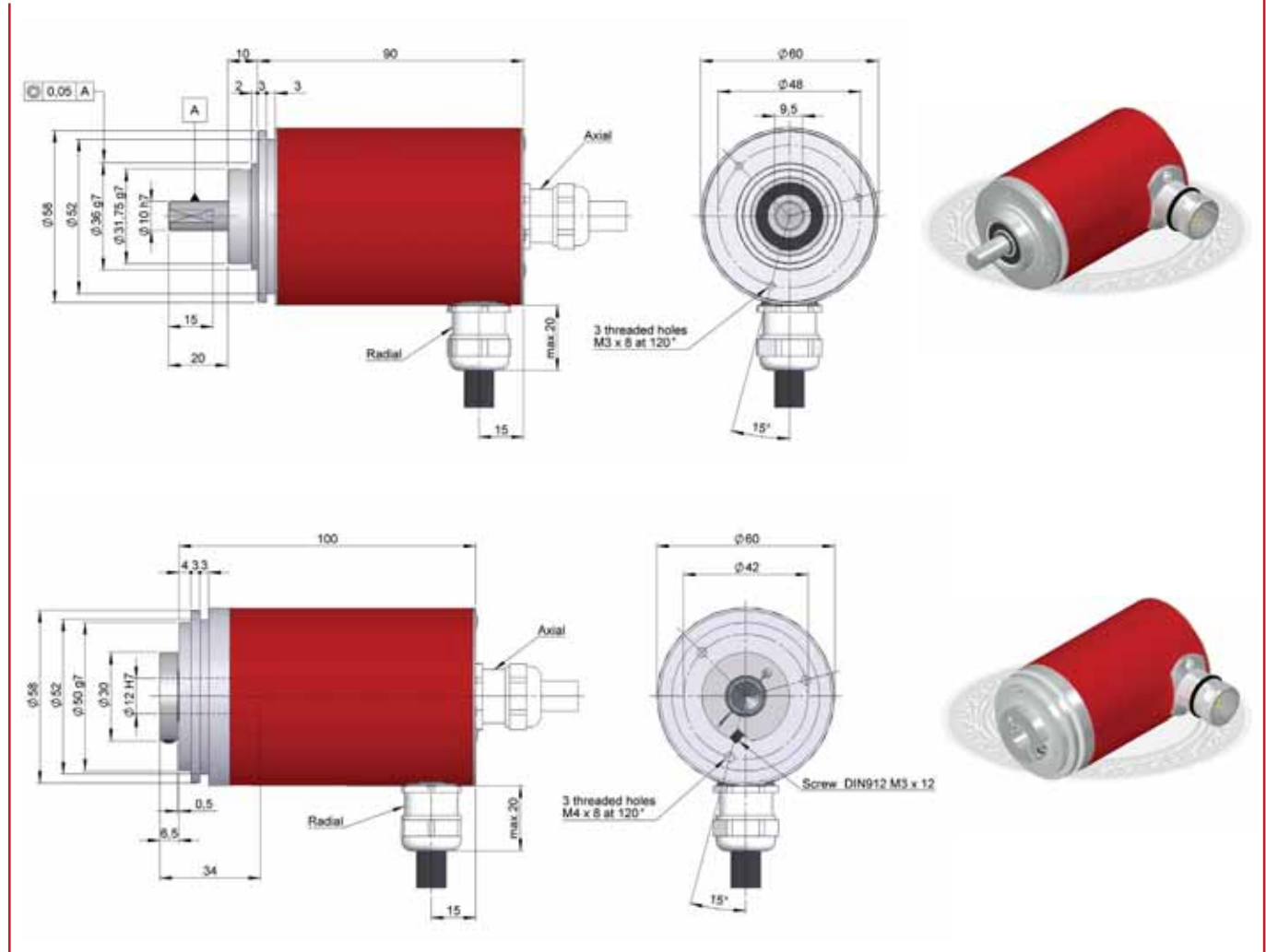
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE                                 | SERIE | SHAFT | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE | CODE                                 | IP      | POWER SUPPLY OUTPUT  | CONFIG. PARAMETERS | RESOLUTION                     | RANGE   | SPECIAL CUSTOMER |
|--------------------------------------|-------|-------|---|------------------------|-----------------------|-----------|--------------------------------------|---------|--|--------------------|--------------------------------|---|------------------|
| ● ● 10                               |       | ●     | ●   | ●                      | ●                     | ●         | ●                                    | ●       | ●  | ● ● ● ●            | ● ● ● ●                        | ● ● ● ●   | ● ●              |
| CS- Singleturn<br>Solid shaft        |       | ↓     | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | ↓                      | 1- Axial<br>2- Radial | 2- Analog | ↓                                    | 1- IP65 | ↓  | S- Direction       | 1024- 10 bits<br>4096- 12 bits | Blank-360 degrees<br>180- 180 degrees<br>90- 90 degrees<br>45- 45 degrees |                  |
| HS- Singleturn<br>Blind hollow shaft |       |       |   |                        |                       |           | 1- Clockwise<br>2- Counter clockwise |         | 5- 0...20mA, 15-30V<br>6- 4...20mA, 15-30V<br>7- 0...10V, 15-30V |                    |                                |   |                  |
|                                      |       |       |   | 1- Cable<br>3- 90.9512 |                       |           |                                      |         |  |                    |                                |   |                  |

**MULTITURN ABSOLUT ENCODER**

- Resolution up to 12 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CM) and blind hollow shaft (HM)



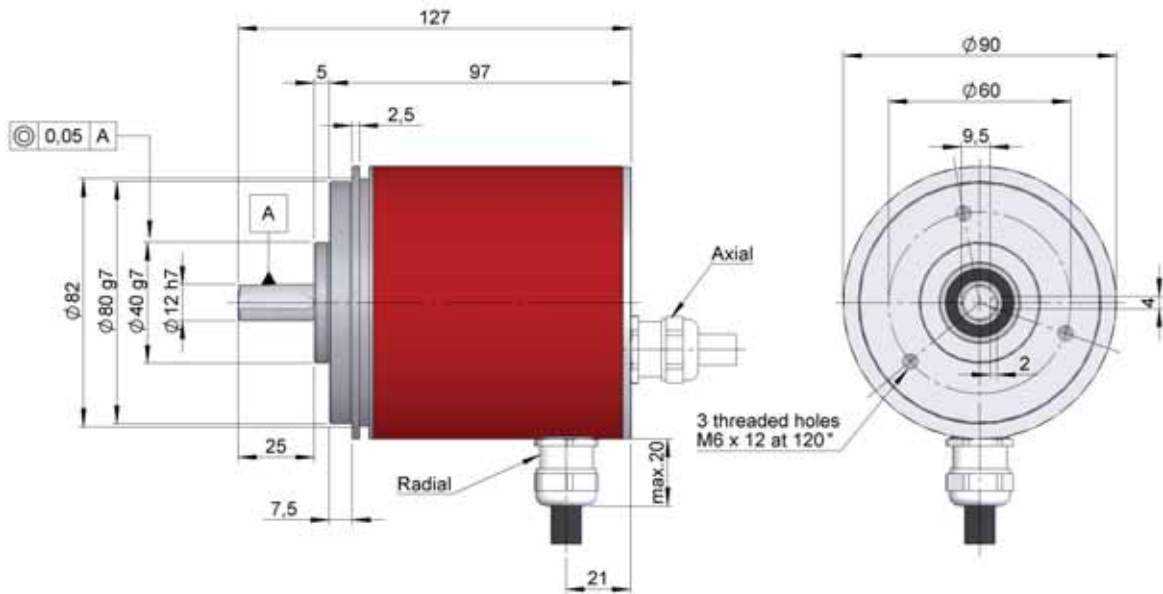
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE  | SERIE | SHAFT   | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE | CODE                                 | IP      | POWER SUPPLY OUTPUT  | RESOLUTION                     | RANGE  | SPECIAL CUSTOMER |
|---|-------|---|---|------------------------|-----------------------|-----------|--------------------------------------|---------|--|--------------------------------|--|------------------|
| ● ●   | 10    | ●   | ●   | ●                      | ●                     | ●         | ●                                    | ●       | ●  | ● ● ● ●                        | ● ● ● ●  | ● ● ● ●          |
| <b>CM-</b> Multiturn<br>Solid shaft<br><b>HM-</b> Multiturn<br>Blind hollow shaft |       | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable<br>3- 90.9512 | 1- Axial<br>2- Radial | 2- Analog | 1- Clockwise<br>2- Counter clockwise | 1- IP65 | 5- 0...20mA, 15-30V<br>6- 4...20mA, 15-30V<br>7- 0...10V, 15-30V | 1024- 10 bits<br>4096- 12 bits | 2- 2 turns<br>4- 4 turns<br>8- 8 turns<br>16- 16 turns<br>32- 32 turns<br>64- 64 turns<br>128- 128 turns<br>256- 256 turns<br>512- 512 turns<br>1024- 1024 turns<br>2048- 2048 turns<br>4096- 4096 turns |                  |

**ABSOLUT ENCODER FOR HEAVY DUTY INDUSTRIAL APPLICATIONS**

- Singleturn resolution (CS) or multiturn (CM) up to 12 bits
- Protection class IP65 according to DIN 40050
- External diameter 90 mm
- Solid shaft



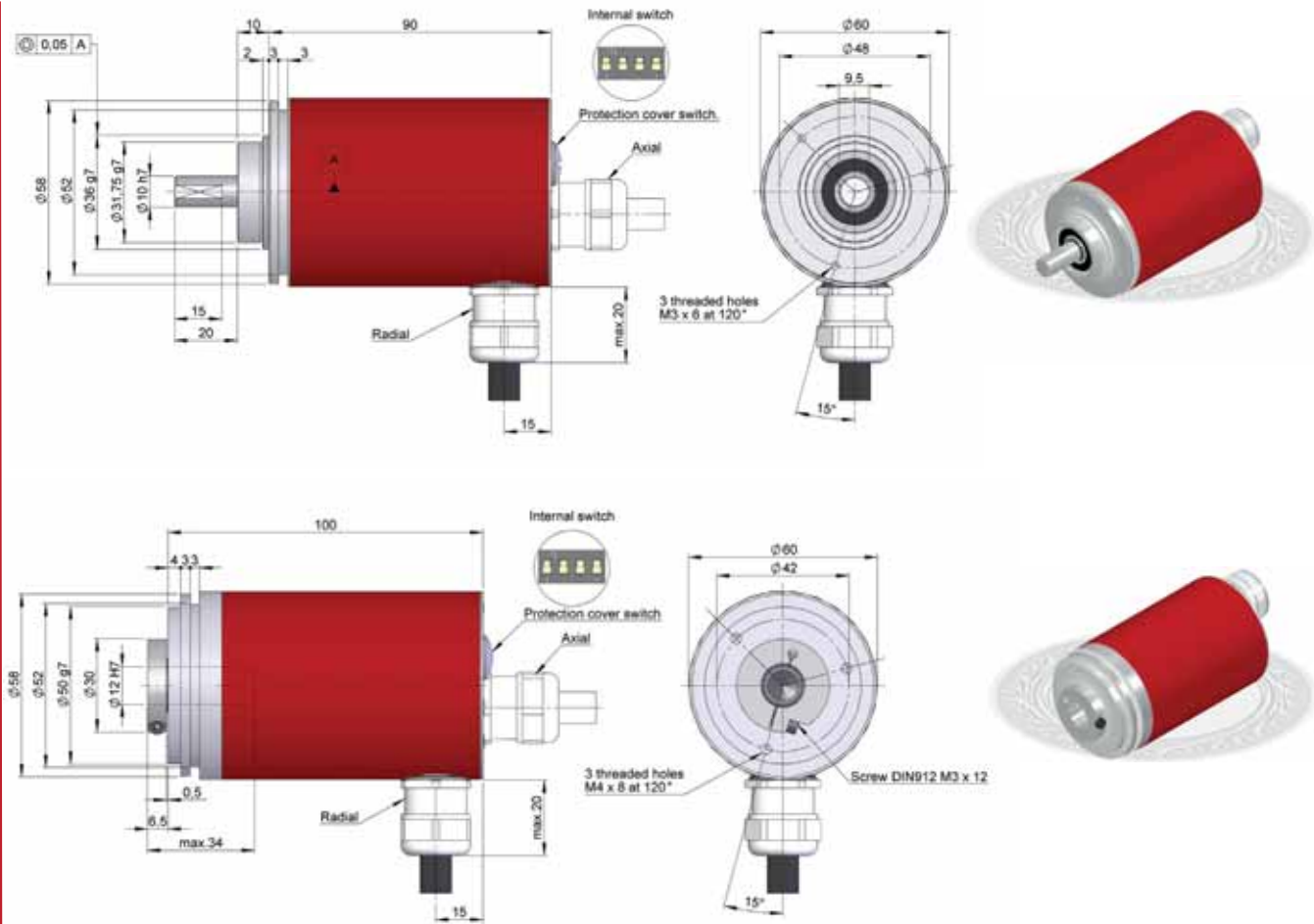
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE                                  | SERIE  | SHAFT            | FLANGE                    | CONNECTION                 | AXIAL RADIAL              | INTERFACE   | CODE                                     | IP        | POWER SUPPLY OUTPUT  | CONFIG. PARAMETERS               | RESOLUTION   | RANGE  | SPECIAL CUSTOMER                      |
|---------------------------------------|--------|------------------|---------------------------|----------------------------|---------------------------|-------------|--|-----------|--|----------------------------------|--|--|---------------------------------------|
| ● ● CS- Singleturn<br>● CM- Multiturn | ● ● 30 | ● 2- Ø12 x 25 mm | ● 1- None<br>● 3- 90.1006 | ● 1- Cable<br>● 3- 90.9512 | ● 1- Axial<br>● 2- Radial | ● 2- Analog | ● 1- Clockwise<br>● 2- Counter clockwise | ● 1- IP65 | ● 5- 0...20mA, 15-30V<br>● 6- 4...20mA, 15-30V<br>● 7- 0...10V, 15-30V | ● S- Direction (only singleturn) | ● ● ● ● ● 1024- 10 bits<br>● ● ● ● ● 4096- 12 bits | ● ● ● ● 45- 1/8 turn<br>● ● ● ● 90- 1/4 turn<br>● ● ● ● 180- 1/2 turn<br>● ● ● ● Blank- 1 turn<br>● ● ● ● 2- 2 turns<br>● ● ● ● 4- 4 turns<br>● ● ● ● 8- 8 turns<br>● ● ● ● 16- 16 turns<br>● ● ● ● 32- 32 turns<br>● ● ● ● 64- 64 turns<br>● ● ● ● 128- 128 turns<br>● ● ● ● 256- 256 turns<br>● ● ● ● 512- 512 turns<br>● ● ● ● 1024- 1024 turns<br>● ● ● ● 2048- 2048 turns<br>● ● ● ● 4096- 4096 turns | ● ● CS-singleturn<br>● ● CM-multiturn |

CONFIGURABLE ABSOLUT MULTITURN ENCODER

- Resolution up to 12 bits
- Configurable range by switch up to 4096 turns
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft (CM) and blind hollow shaft (HM)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

ORDERING CODE

| TYPE  | SERIE | SHAFT   | FLANGE  | CONNECTION             | AXIAL RADIAL          | INTERFACE | CODE                                 | IP      | POWER SUPPLY OUTPUT  | RESOLUTION                     | SPECIAL CUSTOMER |
|---|-------|---|---|------------------------|-----------------------|-----------|--------------------------------------|---------|--|--------------------------------|------------------|
| ● ●   | 10    | ●   | ●   | ●                      | ●                     | ●         | ●                                    | ●       | ●  | ● ● ● ● ● ● ● ●                | ● ●              |
| CMP- Solid shaft<br>HMP- Blind hollow shaft |       | 1- Solid Ø10x20 mm<br>2- Solid Ø6x10 mm<br>3- Blind hollow Ø12 mm<br>4- Blind hollow Ø10 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable<br>3- 90.9512 | 1- Axial<br>2- Radial | 2- Analog | 1- Clockwise<br>2- Counter clockwise | 1- IP65 | 5- 0...20mA, 15-30V<br>6- 4...20mA, 15-30V<br>7- 0...10V, 15-30V | 1024- 10 bits<br>4096- 12 bits |                  |

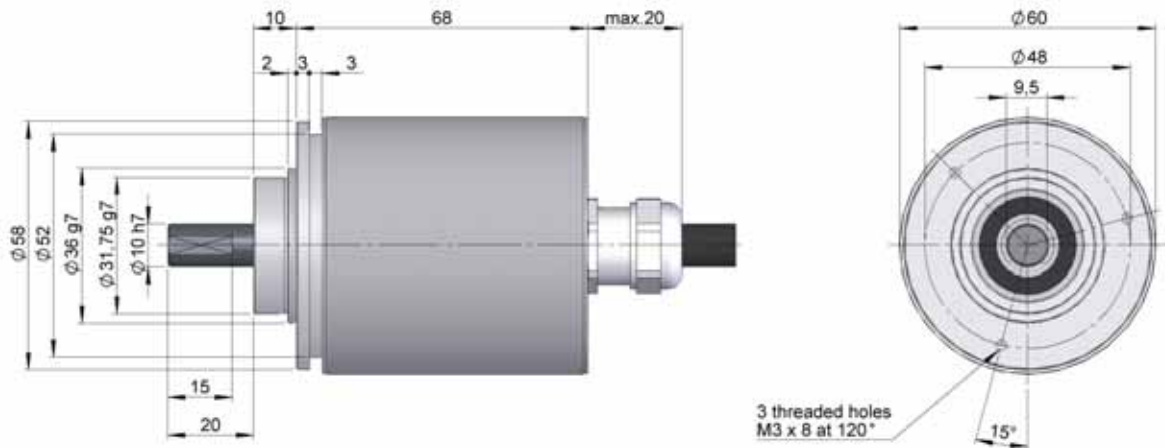
CONFIGURABLE RANGE

|                     |          |          |          |        |         |         |         |          |          |          |           |           |           |            |            |            |
|---------------------|----------|----------|----------|--------|---------|---------|---------|----------|----------|----------|-----------|-----------|-----------|------------|------------|------------|
| Switch 1            | ON       | OFF      | ON       | ON     | ON      | OFF     | ON      | OFF      | ON       | OFF      | ON        | OFF       | ON        | OFF        | ON         | OFF        |
| Switch 2            | ON       | ON       | OFF      | OFF    | ON      | ON      | OFF     | OFF      | ON       | ON       | OFF       | OFF       | ON        | ON         | OFF        | OFF        |
| Switch 3            | ON       | ON       | ON       | ON     | OFF     | OFF     | OFF     | OFF      | ON       | ON       | ON        | ON        | OFF       | OFF        | OFF        | OFF        |
| Switch 4            | ON       | ON       | ON       | ON     | ON      | ON      | ON      | ON       | OFF      | OFF      | OFF       | OFF       | OFF       | OFF        | OFF        | OFF        |
| Analog output range | 1/8 turn | 1/4 turn | 1/2 turn | 1 turn | 2 turns | 4 turns | 8 turns | 16 turns | 32 turns | 64 turns | 128 turns | 256 turns | 512 turns | 1024 turns | 2048 turns | 4096 turns |



**SINGLETURN ABSOLUT ENCODER FOR SEVERE INDUSTRIAL APPLICATIONS**

- Singleturn resolution up to 12 bits
- Protection class IP67 according to DIN 40050
- External diameter 58 mm
- Solid shaft



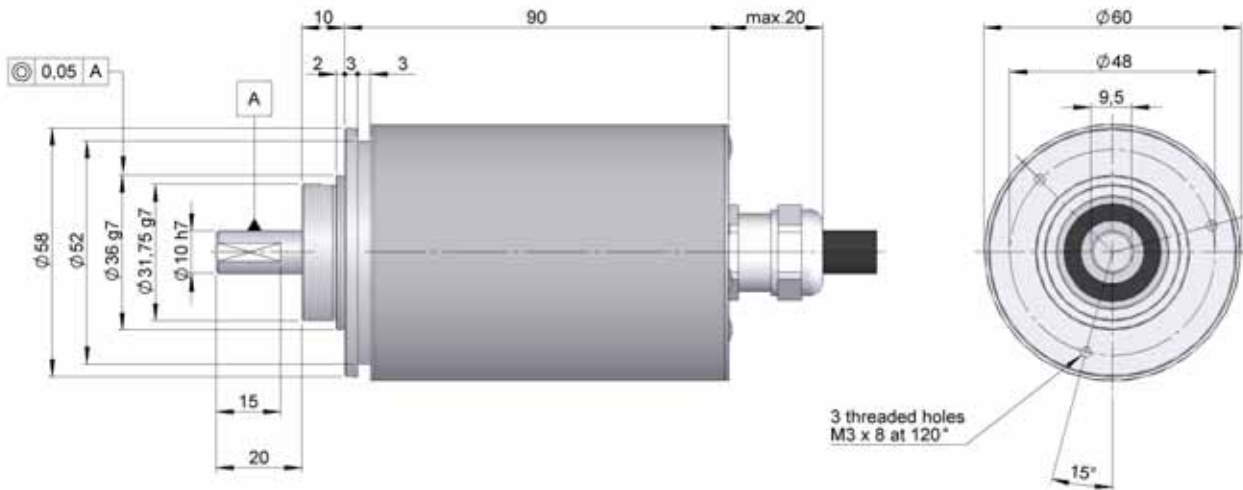
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE                 | SERIE | SHAFT                           | FLANGE  | CONNEX-TION | AXIAL RADIAL | INTERFACE | DIRECTIO                             | IP                                 | POWER SUPPLY OUTPUT  | CONFIG PARAMETERS | RESOLUTION                     | RANGE  | SPECIAL CUSTOMER |
|----------------------|-------|---------------------------------|---|-------------|--------------|-----------|--------------------------------------|------------------------------------|--|-------------------|--------------------------------|--|------------------|
| ● ● ● CS- Singleturn | 10    | ●                               | ●   | ●           | ●            | ●         | ●                                    | ●                                  | ●  | ●                 | ● ● ● ●                        | ● ● ● ●  | ● ● ●            |
|                      |       | 1- Ø6 x 10 mm<br>2- Ø10 x 20 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable    | 1- Axial     | 2- Analog | 1- Clockwise<br>2- Counter clockwise | 2- Stainless steel IP67<br>3- IP67 | 5- 0...20mA, 15-30V<br>6- 4...20mA, 15-30V<br>7- 0...10V, 15-30V | S- Direction      | 1024- 10 bits<br>4096- 12 bits | Blank- 360 degrees<br>180- 180 degrees<br>90- 90 degrees<br>45- 45 degrees |                  |

**MULTITURN ABSOLUT ENCODER FOR SEVERE INDUSTRIAL APPLICATIONS**

- Multiturn resolution up to 12 bits
- Protection class IP67 according to DIN 40050
- External diameter 58 mm
- Solid shaft



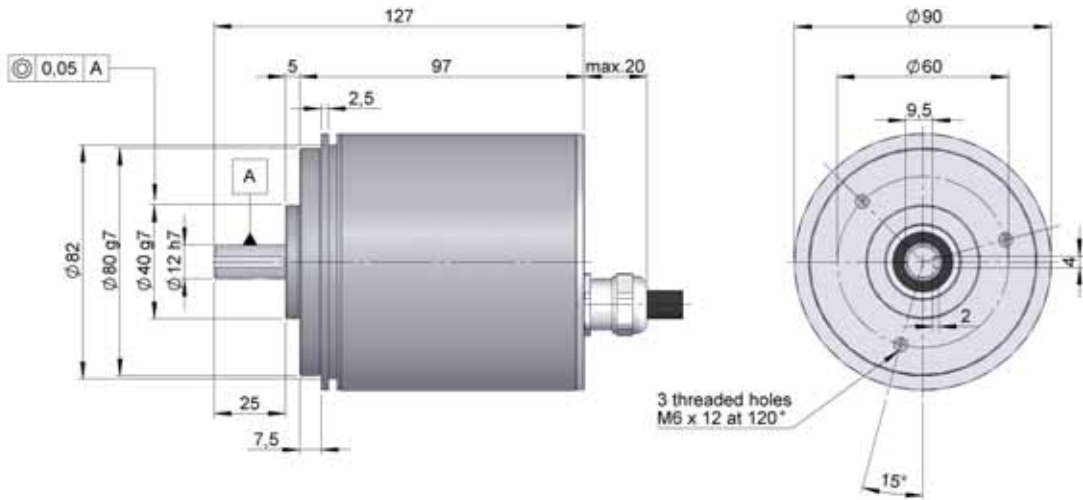
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE              | SERIE | SHAFT          | FLANGE  | CONNECTION | AXIAL RADIAL | INTERFACE | CODE                                 | IP                                 | POWER SUPPLY OUTPUT  | RESOLUTION                     | RANGE  | SPECIAL CUSTOMER |
|-------------------|-------|----------------|---|------------|--------------|-----------|--------------------------------------|------------------------------------|--|--------------------------------|--|------------------|
| ● ● CM- Multiturn | 10    | ●              | ●   | ●          | ●            | ●         | ●                                    | ●                                  | ●  | ● ● ● ●                        | ● ● ● ●  | ● ● ● ●          |
|                   |       | 1- Ø10 x 20 mm | 1- None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable   | 1- Axial     | 2- Analog | 1- Clockwise<br>2- Counter clockwise | 2- Stainless steel IP67<br>3- IP67 | 5- 0...20mA, 15-30v<br>6- 4...20mA, 15-30v<br>7- 0...10v, 15-30v | 1024- 10 bits<br>4096- 12 bits | 2- 2 turns<br>4- 4 turns<br>8- 8 turns<br>16- 16 turns<br>32- 32 turns<br>64- 64 turns<br>128- 128 turns<br>256- 256 turns<br>512- 512 turns<br>1024- 1024 turns<br>2048- 2048 turns<br>4096- 4096 turns |                  |

**ABSOLUT ENCODER FOR EXTREME AND SEVERE INDUSTRIAL APPLICATIONS**

- Singleturn resolution (CS) or multiturn (CM) up to 12 bits
- Protection class IP67 according to DIN 40050
- External diameter 90 mm
- Solid shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE                                  | SERIE  | SHAFT               | FLANGE                     | CONNECTION    | AXIAL RADIAL | INTERFACE   | CÓDIGO                                    | IP                                     | POWER SUPPLY OUTPUT   | CONFIG. PARAMETERS               | RESOLUTION                                  | RANGE   | SPECIAL CUSTOMER              |
|---------------------------------------|--------|---------------------|----------------------------|---------------|--------------|-------------|---|--|---|----------------------------------|---|---|-------------------------------|
| ● ● CS- Singleturn<br>● CM- Multiturn | ● ● 30 | ●<br>2- Ø12 x 25 mm | ●<br>1- None<br>3- 90.1008 | ●<br>1- Cable | ● 1- Axial   | ● 2- Analog | ●<br>1- Clockwise<br>2- Counter clockwise | ● 2- Stainless steel IP67<br>● 3- IP67 | ●<br>5- 0...20mA, 15-30V<br>6- 4...20mA, 15-30V<br>7- 0...10V, 15-30V | ● S- Direction (only singleturn) | ● ● ● ● ●<br>1024- 10 bits<br>4096- 12 bits | ● ● ● ● ●<br>45- 1/8 turn<br>90- 1/4 turn<br>180- 1/2 turn<br>Blank- 1 turn<br>2- 2 turns<br>4- 4 turns<br>8- 8 turns<br>16- 16 turns<br>32- 32 turns<br>64- 64 turns<br>128- 128 turns<br>256- 256 turns<br>512- 512 turns<br>1024- 1024 turns<br>2048- 2048 turns<br>4096- 4096 turns | CS-singleturn<br>CM-multiturn |

# CONNECTION AND CONNECTORS

## ANALOG OUTPUT CONNECTIONS



|               | Cable 5 x 0.14<br>Output current | Cable 5 x 0.14<br>Output voltage | 90.9512<br>M23 12p |
|---------------|----------------------------------|----------------------------------|--------------------|
| <b>GND</b>    | Yellow                           | Yellow                           | 1                  |
| <b>Vcc</b>    | White                            | White                            | 2                  |
| <b>I +</b>    | Brown                            | -                                | 3                  |
| <b>I -</b>    | Green                            | -                                | 4                  |
| <b>V +</b>    | -                                | Brown                            | 5                  |
| <b>V -</b>    | -                                | Green                            | 6                  |
| <b>DIR</b>    | Grey                             | Grey                             | 7                  |
| <b>Screen</b> | Screen                           | Screen                           | 12                 |

## **FIELD BUS ABSOLUT ENCODERS**

### ■ PROFIBUS

Profibus DP is a digital communications network that connects and is useful as a communication network between industrial controllers and Input/Output devices. Each device is a node in the network and should be identified unmistakably. Profibus DO is a network in the form of "master-server" with a token bus that is compatible with multiple hierarchies and message prioritizations.

We can connect up to 32 elements (master or slave) in one sole network segment. If you wish to install more than 32 elements, repeaters should be used in order to interconnect the different segments. The network should be finished at the beginning and the end of each segment with an active bus termination.

The encoder presents a bus termination in the inside of it or an external one can be installed.

The following functionalities are integrated in the encoders Profibus Hohner:

- Galvanic isolation of the bus with DC/DC
- Line Driver according to RS-485. max. 12MB

- Diagnosis led: Indication led of functioning state and the power supply led.
- Direction programmable by micro switches. The allowed value range is from 1...126. Each node number should be used one sole time in one network. During the initialization of the encoder, the micro switches are read by the firmware.
- The communication velocity is adjusted by the software. Normally the master of the system adjusts it. All of the modules in the same segment of the Profibus network should be adjusted to the same communication velocity.
- They can be programmed in accordance with the profile of the Profibus encoder in Class 1 and Class 2.

Configurable parameters:

- Rotation direction
- Scaling factor
- Number of positions per turn and total resolution
- Preset value.
- Diagnosis mode.

### ■ DEVICENET

DeviceNet is a digital communications network that connects and is useful as a communication network between industrial controllers and Input/Output devices. Each device is a node in the network and should be identified unmistakably. DeviceNet is a network in the form of "producer-consumer" with a token bus that is compatible with multiple hierarchies and message prioritizations. DeviceNet can be configured to operate in the "master-slave" mode using "point to point" messages. Device Net supports the capacity of having a power supply integrated in its bus, which allows reducing the connection points

The following functionalities are integrated in the Devicenet Hohner encoders:

- We can have up to 64 nodes (0...63). Each Node Number should be used one sole time in one network. During the initialization of the devices the Node Number micro switches are read by the firmware.
- Galvanic isolation with DC/DC

- A Bus termination resistance is available and can be selected by the micro switch
- Communication modes: polled, cyclic and cos.
- Communication velocity selectable through micro switches: 125 kBits/sec, 250 kBits/sec or 500 kBits/sec.

Configurable parameters:

- Rotation direction.
- Scaling factor
- Number of positions per turn and total resolution
- Preset.
- Diagnosis mode.

### ■ CANOPEN

CANOpen is a digital communications network that connects and is useful as a communication network between industrial controllers and Input/Output devices. Each device is a node in the network and should be identified unmistakably.

CANOpen is a network in the form of "producer-consumer" with a token bus that is compatible with multiple hierarchies and message prioritizations.

CANOpen can be configured to operate in the "master-slave" mode using "point to point" messages.

CANOpen supports the capacity of having a power supply integrated in its bus, which allows reducing the connection points

The following functionalities are integrated in the CANOpen encoders:

- We can have up to 64 nodes (0...63). Each Node Number should be used one sole time in one network.

During the initialization of the devices the Node Number micro switches are read by the firmware.

- A Bus termination resistance is available and can be selected by the micro switch
- Communication modes: polled, cyclic and cos.
- Communication velocity selectable through micro switches: 10...1000 kBits/sec

Configurable parameters:










- Rotation direction.
- Scaling.
- Number of pulses per turn and number of turns
- Total resolution
- Preset.
- Offset

# ABSOLUT ENCODERS **FIELDBUS**

- Resolution up to 25 bits
- Solid or blind hollow shaft
- Protection class IP65 according to DIN 40050
- Any number of positions per turn available
- Interface: Devicenet, Canopen and Profibus
- Industrial plug connection



## OVERVIEW

|           | Clamping   | Synchro   | Blind hollow   |
|-----------|--|---|--|
| Devicenet | CM10    | CM10    | HM10    |
| Canopen   | CM10   | CM10   | HM10   |
| Profibus  | CM10  | CM10  | HM10  |

## TECHNICAL SPECIFICATIONS

|   |                                      |
|---|--------------------------------------|
| Housing   | Aluminium                            |
| Shaft   | Stainles steel                       |
| Bearings  | Ballraces                            |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.              |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.                            |
| Protection against dust and splashes according to DIN 40050 | IP65                                 |
| Rotor inertia moment  | 30 gcm <sup>2</sup>                  |
| Starting torque a 20°C (68°F)                               | Max. 2,0 Ncm                         |
| Maximum load permitted on axial shaft                       | 40 N.                                |
| Maximum load permitted on radial shaft                      | 60 N.                                |
| Misalignment permitted axial (blind hollow shaft)           | ±0.5 mm                              |
| Misalignment permitted radial (blind hollow shaft)          | ±0.3 mm                              |
| Weight aprox.   | 400 g ST, 500 g MT                   |
| Operating temperature range                                 | -10°C a +70°C                        |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz) |
| Shock   | 1000 m/s <sup>2</sup> (6ms)          |
| Consumption max   | 100 mA (CS/HS), 150 mA (CM/HM)       |
| Power supply  | 10...30Vdc                           |
| Interface   | Devicenet, CanOpen, Profibus         |
| Max. points per turn  | 8192 positions (13 bits)             |
| Max. turns  | 4096 turns (12 bits)                 |
| Linearity   | ±1/2 LSB                             |
| Radial connection   | Industrial connector                 |

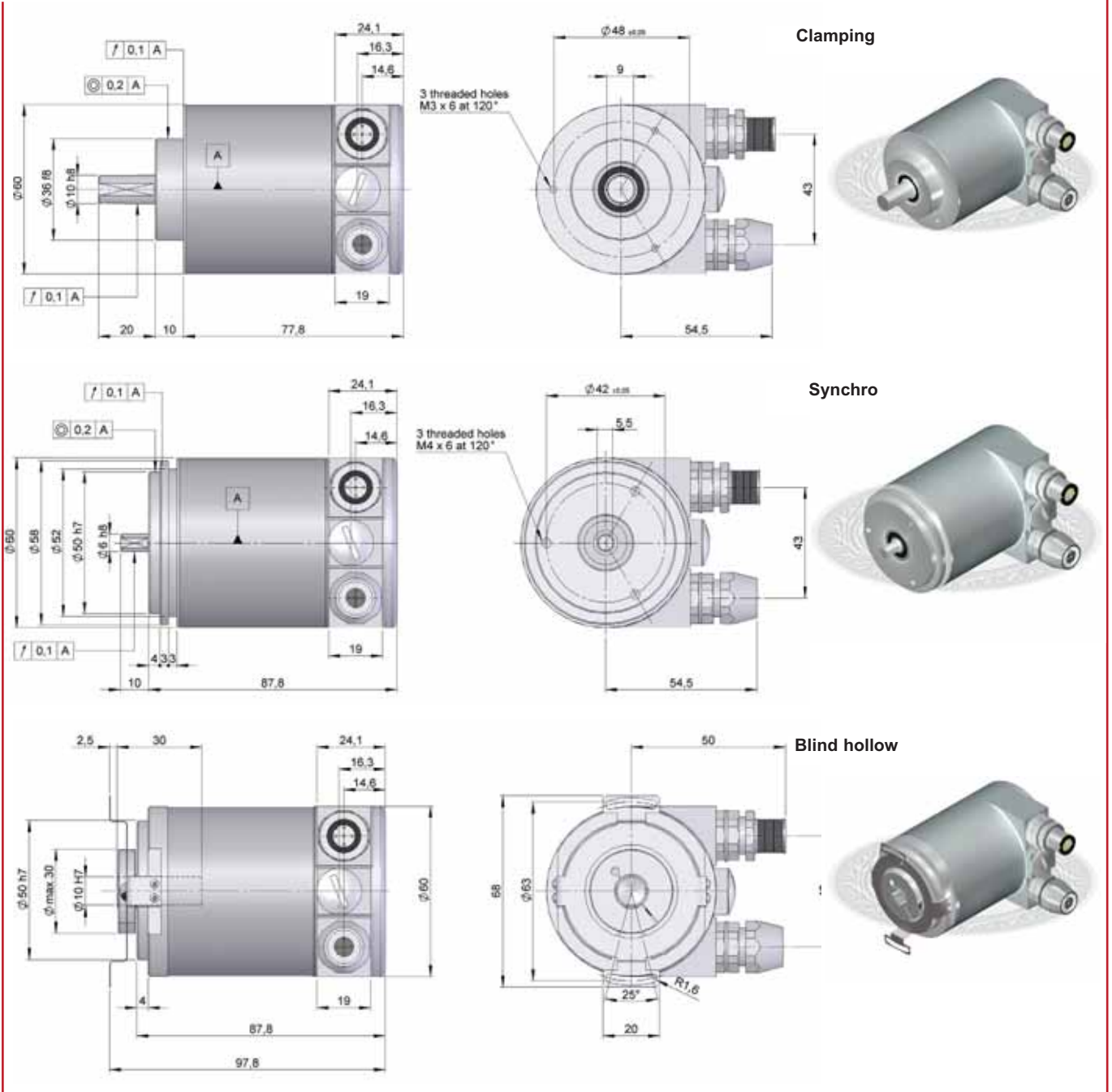
ST: Singleturn MT: Multiturn

**hohner**  
AUTOMATICOS S.L.



**MULTITURN ABSOLUT ENCODER**

- Devicenet protocol for version 2.0
- Programmable up to 25 bits (8192 points per turn, 4096 turns)
- Protection class IP65 according DIN 40050
- Solid shaft (CM) and blind hollow shaft (HM)



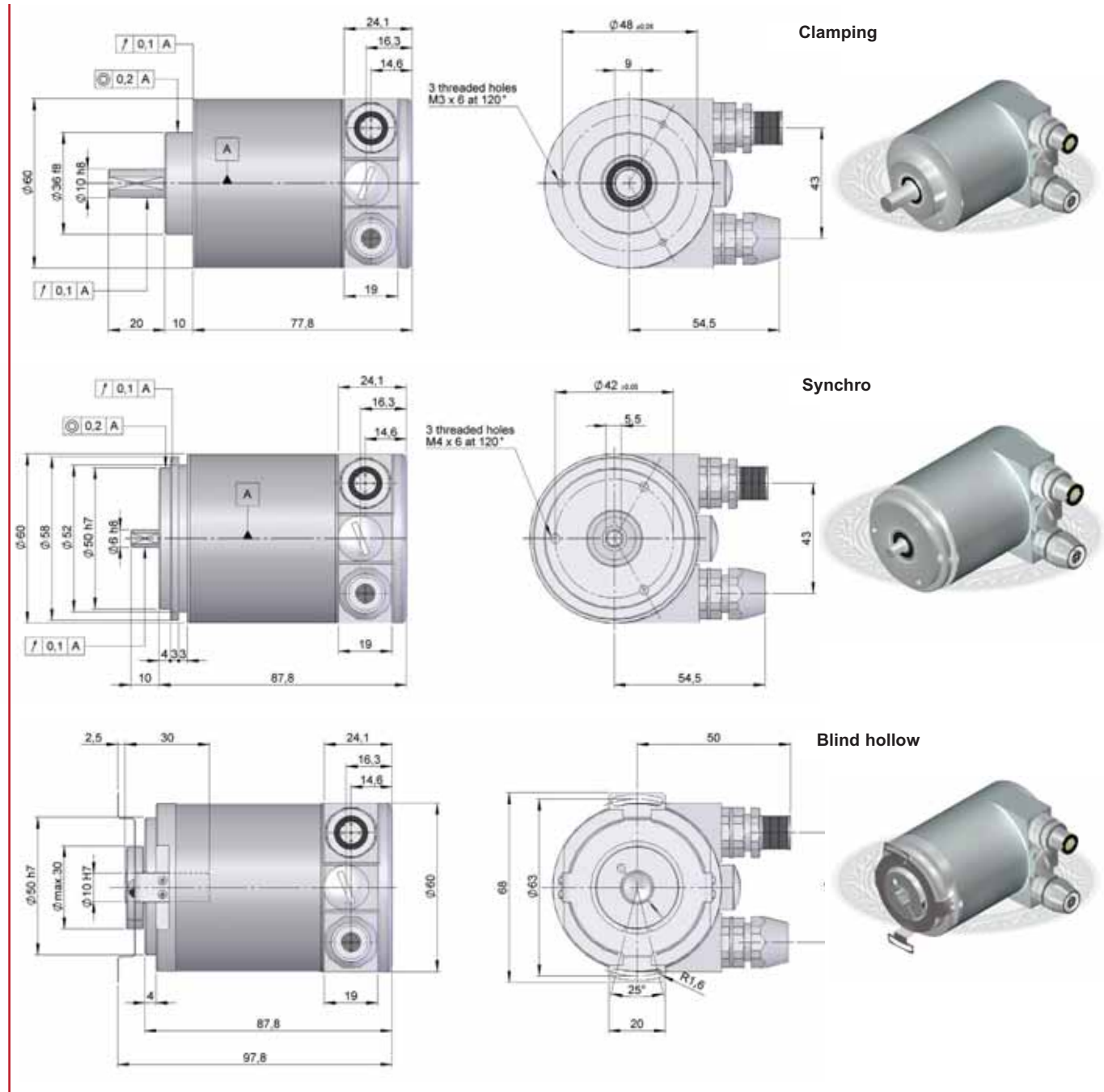
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| SERIE   | FLANGE                                       | SHAFT   | PROTOCOL     | CONNECTION       |
|---|--|---|--------------|------------------|
| <b>CM10-</b> Solid shaft<br><b>HM10-</b> Blind hollow shaft | 1- Clamping<br>2- Synchro<br>4- Blind hollow | 1- Solid 6 x 10 mm<br>2- Solid 10 x 20 mm<br>3- Blind hollow 10 mm<br>4- Blind hollow 12 mm | 1- DeviceNet | 2- Connector M12 |

**MULTITURN ABSOLUT ENCODER**

- Canopen protocol DSP 406 with additional function
- Programmable up to 25 bits (8192 points per turn, 4096 turns)
- Protection class IP65 according DIN 40050
- Solid shaft (CM) and blind hollow shaft (HM)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| SERIE | FLANGE | SHAFT | PROTOCOL | CONNECTION |
|-------|--------|-------|----------|------------|
|-------|--------|-------|----------|------------|

CM10- Solid shaft  
HM10- Blind hollow shaft

1- Clamping  
2- Synchro  
4- Blind hollow

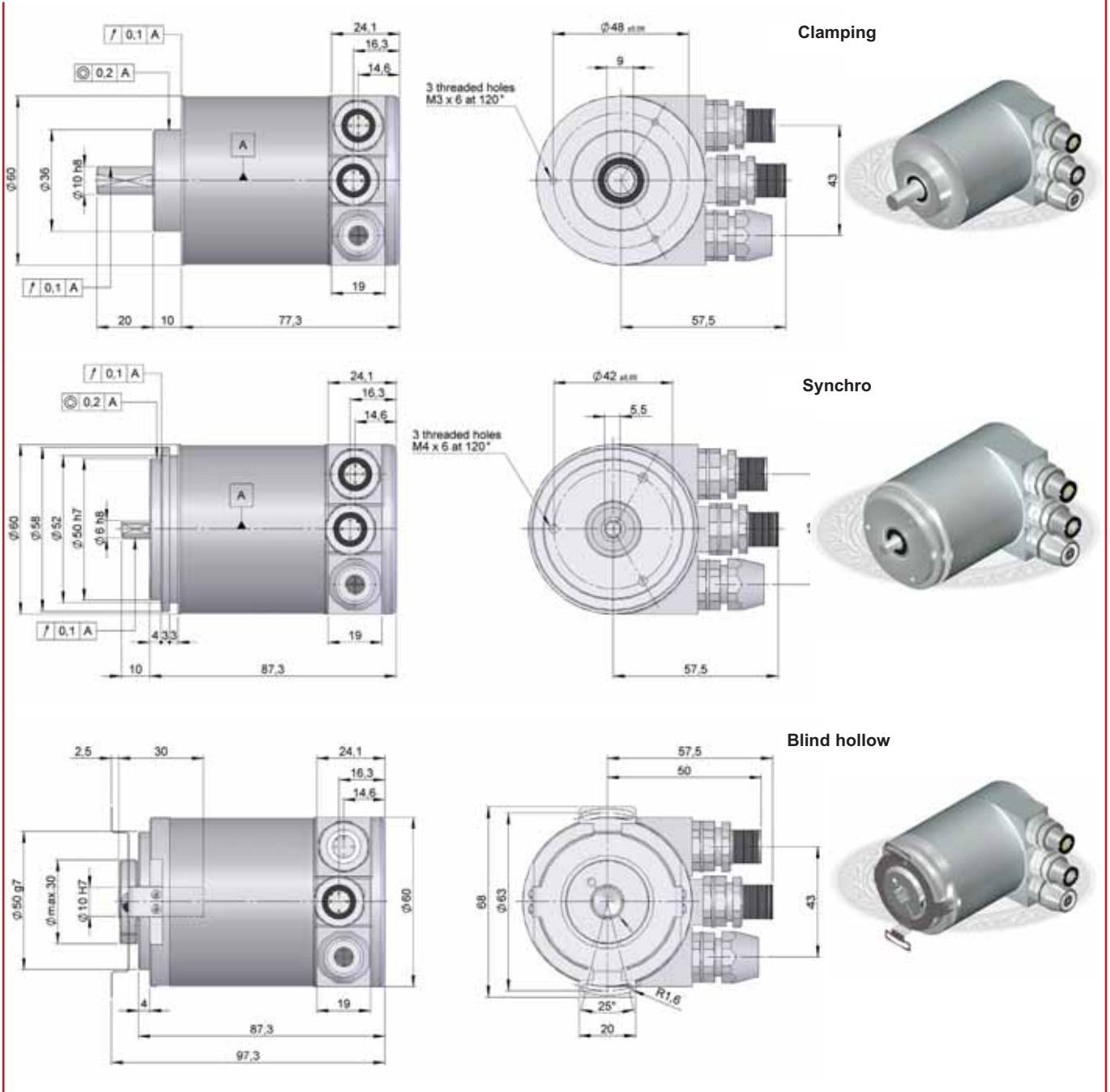
1- Solid 6 x 10 mm  
2- Solid 10 x 20 mm  
3- Blind hollow 10 mm  
4- Blind hollow 12 mm

2- CANOpen

2- Conector M12

**MULTITURN ABSOLUT ENCODER**

- Profibus DP protocol
- Programmable up to 25 bits (8192 points per turn, 4096 turns)
- Protection class IP65 according DIN 40050
- Solid shaft (CM) and blind hollow shaft (HM)



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| SERIE   | FLANGE                                       | SHAFT   | PROTOCOL       | CONNECTION                          |
|---|--|---|----------------|-------------------------------------|
| <b>CM10-</b> Solid shaft<br><b>HM10-</b> Blind hollow shaft | 1- Clamping<br>2- Synchro<br>4- Blind hollow | 1- Solid 6 x 10 mm<br>2- Solid 10 x 20 mm<br>3- Blind hollow 10 mm<br>4- Blind hollow 12 mm | 3- Profibus-DP | 1- Terminal box<br>2- Connector M12 |

# CONNECTION

## DEVICENET AND CANOPEN CONNECTION



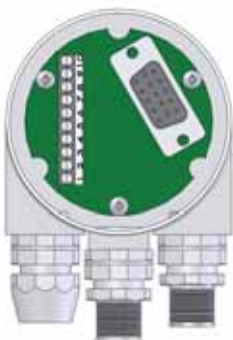
| 90.9550 y 90.9551<br>M12 5p | Cable |          |
|-----------------------------|-------|----------|
| 1                           | Grey  | Screen   |
| 2                           | Red   | +Vcc     |
| 3                           | Black | -Vcc     |
| 4                           | White | CAN_High |
| 5                           | Blue  | CAN_Low  |

## PROFIBUS CONNECTION



| 90.9553<br>BUS OUT | 90.9552<br>BUS IN | 90.9554<br>POWER SUPPLY |
|--------------------|-------------------|-------------------------|
| 1 BUS_Vcc          | 1 -               | 1 +Vcc                  |
| 2 BUS A            | 2 BUS A           | 2 -                     |
| 3 BUS_Gnd          | 3 -               | 3 -Vcc                  |
| 4 BUS B            | 4 BUS B           | 4 -                     |
| 5 Screen           | 5 Screen          |                         |

## PROFIBUS CONNECTION TERMINAL BOX OUTPUT



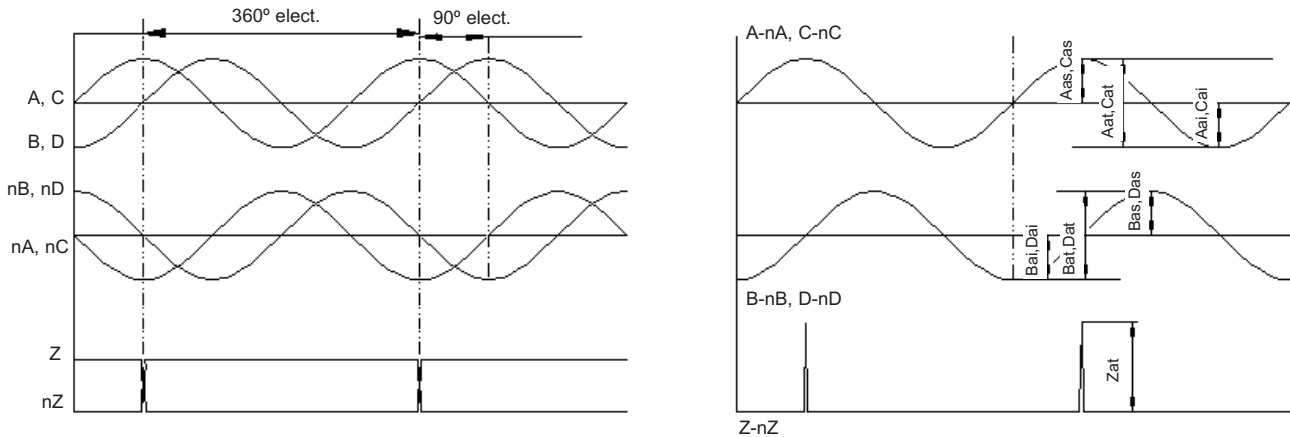
| Pin | Function                            |
|-----|-------------------------------------|
| 1   | Power supply +10..30 VDC            |
| 2   | Power supply GND                    |
| 3   | PROFIBUS GND                        |
| 4   | Input PROFIBUS B-Line (PROFIBUS_H)  |
| 5   | Input PROFIBUS A-Line (PROFIBUS_L)  |
| 6   | Output PROFIBUS A-Line (PROFIBUS_L) |
| 7   | Output PROFIBUS B-Line (PROFIBUS_H) |
| 8   | PROFIBUS GND                        |
| 9   | Power supply GND                    |
| 10  | Power supply +10..30 VDC            |

# GENERAL INFORMATION **SmarSens**

## INTRODUCTION

SmarSens is a range of Hohner encoders that give a single encoder the possibility of absolute and incremental signals. Its compact and robust design with numerous communication interfaces available make SmarSens a product that adapts to the real needs of the client. The implementation through an OptoASIC provides a high degree of optoelectronic integration. The range of SmarSens encoders is applicable to a great variety of applications such as wind turbines, elevators, etc.

## INCREMENTAL SIGNALS / ABSOLUT SIGNALS 1Vpp



|                                      | Amplitude Vpp | Offset / Asymmetry                                  | Amplitude ratio A/B | Phase A to B |
|--------------------------------------|---------------|---|---------------------|--------------|
| <b>A, nA, B, nB<br/>C, nC, D, nD</b> | 0,5±20%       | 2,5±10%   | -                   | -            |
| <b>A - nA</b>                        | 1±20%         | $ A_{as}-A_{ai} /(2*( A_{as} + A_{ai} ))\leq 0.065$ | 0.8 to 1.25         | 90°±10°      |
| <b>B - nB</b>                        | 1±20%         | $ B_{as}-B_{ai} /(2*( B_{as} + B_{ai} ))\leq 0.065$ |                     |              |
| <b>C - nC</b>                        | 1±20%         | $ C_{as}-C_{ai} /(2*( C_{as} + C_{ai} ))\leq 0.065$ |                     |              |
| <b>D - nD</b>                        | 1±20%         | $ D_{as}-D_{ai} /(2*( D_{as} + D_{ai} ))\leq 0.065$ |                     |              |
| <b>Z, nZ</b>                         | 0,5±20%       | 2,5±10%   |                     |              |
| <b>Z - nZ</b>                        | 1±20%         |   |                     |              |

A: Incremental cosine signal  
 B: Incremental sinus signal  
 C: Absolute cosine signal  
 D: Absolute sinus signal  
 Z: Index signal

Aas, Bas, Cas, Das: Channel A, B, C and D, upper peak voltage amplitude  
 Aai, Bai, Cai, Dai: Channel A, B, C and D, lower peak voltage amplitude  
 Aat, Bat, Cat, Dat: Channel A, B, C and D, peak to peak voltage amplitude

Sinusoidal outputs are a very useful system to make interpolations that give high resolution to the single turn part. There are incremental signals, A and B, the signal A (cosine) moves in front of B (sine) 90° degrees, and there are absolute signals, C and D, the signal C (cosine) moves in front of D (sine) 90° degrees. The median value of signals A, B, C, D, nA, nB, nC and nD, is 2.5 Vdc. The nA/nC signal is 180 degrees from A/COS\_inc, just nB/nSIN\_inc is to B/SIN\_inc, like nC/COS\_abs is to C/COS\_abs and D/SIN\_abs is to D/SIN\_abs. The peak to peak of the sinusoids is from 0.4 to 0.6 Vpp. These sine and cosine signals, in the control input, adapt the interpolate signals to 1 Vpp in the A-nA, B-nB, C-nC and D-nD.

## SSI INTERFACE

In many cases, the data transmitted from one system to another are exposed to magnetic fields and noise. When using a standard interface like the RS-422, the effects produced by these disruptions are reduced. The SSI "Synchronous Serial Interface" is an industrial output standard that only needs 4 lines to carry out data transmission. This transmission system for absolute encoders provides diverse advantages in comparison to the traditional parallel transmission and asynchronous serial methods:

- Inferior number of components.
- Easy wiring system.
- Data transmission between the encoder and the receiver are controlled by the receiver's clock signal.
- High transmission speeds based on distance and data block to be transmitted.

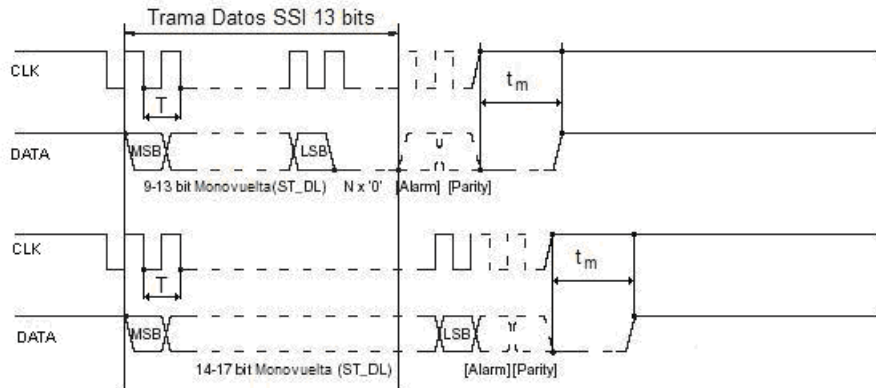
The SSI interface requires a Master (for example, a SSI data acquisition card) and a Slave (the encoder) for communication. The Master generates the CLK and their inverted signals, while the slave generates the DATA and their inverted signals. The communication is one-way. When in idle mode, CLK and DATA have the value "1" (high value). In the data acquisition mode, the Master generates a burst of pulses of the same period T and the Slave will respond with an information bit for each pulse also with a T duration. The CLK and DATA signals are synchronized. To start the transmission, the Master will set the CLK signal to "0" (low value) and then send the pulses. To end the block, the master will maintain during  $t_m$  seconds the CLK signal at "1" and then the SLO signal will also become "1". At this point, the Master can interrogate the Slave again. The bits sent during a burst of pulses by the Master are called a block. In the SSI, the standard size of the blocks is 13 or 25 bits, although other sizes are possible.



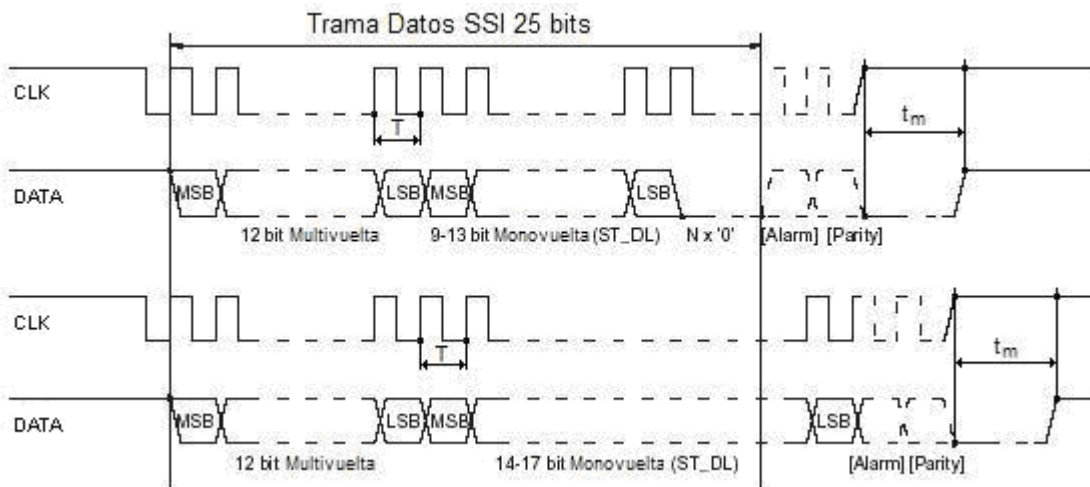
# GENERAL INFORMATION **SmarSens**

In the single-turn mode, the information is transmitted in SSI blocks of at least 13 standard bits. If the single-turn resolution is higher than 13 bits, the block will last  $n$  bits, with  $n$  being the number of single-turn resolution bits. In the serial delivery, the first bit of data transmitted deals with the most significant bit (MSB) of the block and the last one with the least significant bit (LSB). If the resolution is less than 13 bits, the remaining space up to the 13 bits is filled with zeros. In the SSI1 Figure, you can see the block sent when the resolution is lower than 13 bits and also when it is higher.

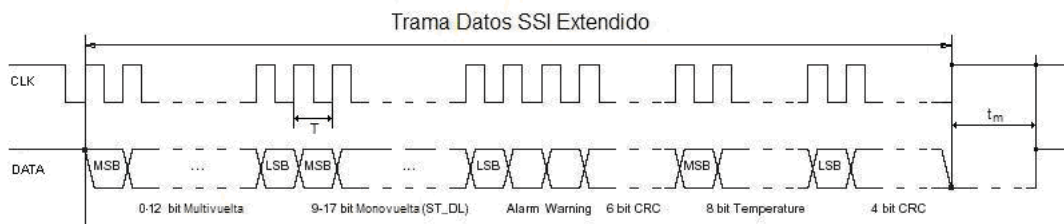
In all the SSI blocks, in single-turn, multi-turn, or extended modes, you can add the Alarm and Parity bits activating the relevant configuration bits. By default, these bits are not sent in the block.



In the multiturn mode, the information is transmitted in standard SSI blocks of 25 bits for singleturn resolutions of less than 14 bits. The 12 bits of the multiturn part are transmitted at the beginning, starting from the most significant bit to the least. Next, the singleturn part bits are transmitted, starting from the most significant bit of the block. If the resolution singleturn is inferior to 13 bits, the bits left over from the block will become zeros. If the singleturn resolution is higher than 13 bits, the size of the block will be  $25+(n-13)$  bits, where  $n$  is the number of singleturn resolution bits. In the SSI2 figure, you can see the case for a single-turn resolution equal to or less than 13 bits and the case for resolutions higher than 13 singleturn bits.



In the SSI extended mode, the length of block is variable, depending on the information sent. First, it transmits the data of the multiturn part, with a variable length of 0 (only single-turn) or 12 bits, from the most significant to the least significant bit. Next, the single-turn part also transmits from the most to the least significant bit. The length can vary depending on the resolution of the part single-turn, from 10 bits to 14 bits. Once transmitted, the least significant bit will send the Alarm and Warning bits. As a method to detect errors in the transmission, a 6 bit CRC will be generated, with the 43h polynomial, of the information processed up to that point (multiturn+singleturn+Alarm+Warning) that will be transmitted after the Warning bit. Next, it will send the information on the sensor temperature encapsulated in 8 bits, and lastly, it will calculate a CRC, with the 4 bits 13h polynomial, that will close the block to transmit, for the 8 bits of sensor temperature data. In the SSI3 figure, you can see the format of the extended SSI block.



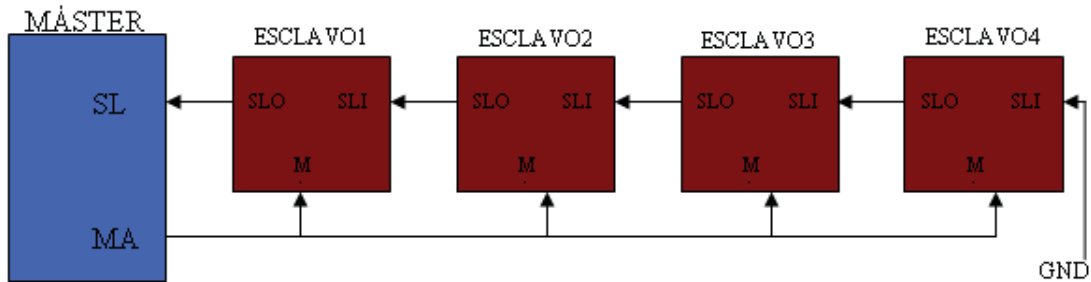
In all cases, the value of  $T$  should be from  $1\mu s$  to  $10\mu s$ , and  $t_m$  should be higher than  $40\mu s$ . To correctly operate, you should set up the encoder configuration record to allow SSI-BISS compatibility..



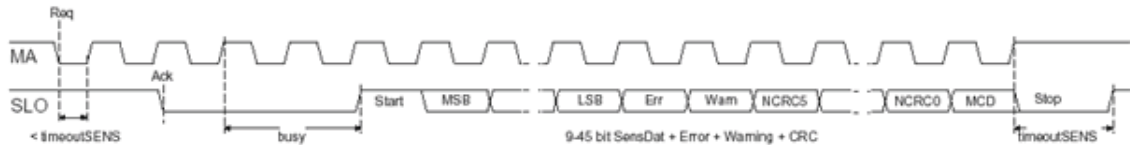
# GENERAL INFORMATION **SmarSens**

## BISS INTERFACE

This multipoint serial communication standard is open and simple to use. It is similar to the SSI but the control (or master) interacts with the sensors programming the different parameters for each sensor, as well as reading its different status record. For this reason, the BiSS "Bidirectional interface Serial Synchronous", unlike the SSI, is bidirectional. The communication can be from 17KHz to 4MHz frequencies under ideal conditions. For longer sensor-control distances, this frequency gradually diminishes. The maximum number of slaves for each master, like this encoder, that can be connected to a control is four. The BISS1 figure graphically shows the connection of four slaves with the master. The last slave of the chain has to have the SLI to GND input. Physically, this means that SLI+ should connect to GND and SLI- to 5V. When the encoders interact with other slaves that are not encoders, they must be located on the chain with the lowest identifiers, starting from one. The use of more than one slave with the master implies that the maximum work frequency of the encoder is divided by the number of slaves connected, due to the time that they take in transmitting data to other slaves.



The encoder data reading by the Master (MA) is always one-way, using PWM codification and following the BISS2 figure format. The Master starts the communication with start bit (start, lowering the signal from "1" to "0"), next, it waits for the encoder's answer, also called slave (SLO) that, before the synchronism signal or clock sent by the master, begins to send data after a start signal. The encoder starts to send data from the most to the least significant bit, and then sends the Error, Alarm and CRC bits of 6 0x43h polynomial generator bits. Lastly, it sends a data bit called a multi-block (MCD). The size of the block depends on the encoder's resolution. After each block, the encoder's position is given



The multi-cycle or multi-block bit does not have any purpose in a single block, but it does when in various blocks, and provides the information on the encoder's temperature.

This temperature is encoded into 8 bits and each bit is transmitted in a different data reading block of the encoder. Also, the entire multi-block cycle includes a start bit to indicate the MCD start, next the 8 bits, the 4 bit CRC with a 0x13h polynomial generator and lastly, a stop bit. Overall, the encoder's temperature reading takes up 16 blocks of data reading. In the BISS3 figure, you can see the details of this type of transmission.

## EXTERNALLY CONFIGURABLE PARAMETERS AND DIAGNOSIS LED (OPTIONAL)

Unscrewing the top of the rear cover, you will find the reset/preset button to position the absolute value of the encoder to a known value. In the case of a SSI encoder, pushing the button will update the position to 0 (Reset). In the case of a BiSS encoder, when we push the button, we can update the position to any previously programmed value (Preset).

You can also change the direction using the external nDIR input, that when we connected to the GND inverts the encoder's default rotation direction.

The diagnosis LED can also be reached by unscrewing the top. When the encoder and the communication with the master are working correctly, the LED is green. The led is red (in SSI mode) when the communication fails with the master, when the lamps stop working, when the communication fails with the multi-turn part or when the encoder exceeds the recommended work temperature values.

In the BiSS communication mode, the diagnosis LED is configurable with the 0x30h record (error mask) where we can choose what are/is the error/s that we are interested in detecting.

When there is an error in the encoder (diagnosis LED is red), the 8 bit record with direction 0x68h specifies the reason for the error, according to the active bit. The table of errors is :

|             |  |
|-------------|--|
| <b>Bit7</b> | Operation temperate exceeded                     |
| <b>Bit6</b> | Error external system sent to NERRR              |
| <b>Bit5</b> | Error in the serial interface                    |
| <b>Bit4</b> | Invalid position or data conversion is not ready |
| <b>Bit3</b> | Configuration error EEPROM interface             |
| <b>Bit2</b> | Error in the pitch codification                  |
| <b>Bit1</b> | Error in the multi-turn part                     |
| <b>Bit0</b> | Failure in the LED power control                 |

The "Error in the pitch codification" usually causes problems with the disc (breakage, condensation or dirt) or mechanical overload (excess in the rotation speed).

The "Failure in the LED power control" originates when there are problems with heat, dirt, condensation or fatigue.








# INCREMENTAL AND ABSOLUT ENCODERS

## SmarSens

- Absolut and incremental singleturn and multiturn encoder.
- SSI or BISS output absolut interface
- Incremental output signals 1Vpp (sin/cos)
- Solid or hollow shaft
- Absolut resolution up to 131072 position (17 bits) and incrementals up to 2048 sin/cos.
- Radial or axial connection, cable or industrial connector output



### OVERVIEW

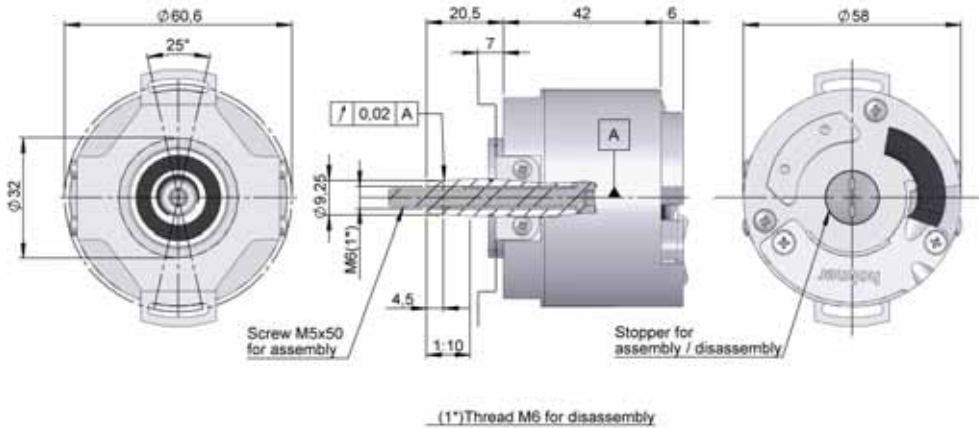
|                   | Conic shaft   | Solid shaft  | Blind hollow shaft  | Hollow shaft   |
|-------------------|---|--|---|--|
| Singleturn        | SMRS 64<br>    | SMRS 10<br> | SMRS 19<br> | SMRS 59<br> |
| Multiturn         |   | SMRM 10<br> | SMRM 19<br> |  |
| Singleturn sincos | SMRS 64S<br> |  |   |  |

### TECHNICAL SPECIFICATION

|   |                                       |
|---|---------------------------------------|
| Housing   | Aluminium.                            |
| Shaft   | Stainless steel.                      |
| Bearings  | Ballraces.                            |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.               |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.                             |
| Protection against dust and splashes according to DIN 40050 | IP65 or IP54.                         |
| Rotor inertia moment  | 30 gcm <sup>2</sup> .                 |
| Starting torque 20°C (68°F)                                 | Max. 2 Ncm.                           |
| Maximum load permitted on axial shaft                       | 40 N.                                 |
| Maximum load permitted on radial shaft                      | 60 N.                                 |
| Weight (singleturn/multiturn)                               | 350/500gr.                            |
| Operating temperature range                                 | -10°C a +70°C.                        |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz). |
| Shock   | 1000 m/s <sup>2</sup> (6ms).          |
| Consumption max. (singleturn/multiturn)                     | 90mA / 180mA.                         |
| Power supply  | 10..30Vdc / 5Vdc.                     |
| Absolut interface   | SSI / BISS.                           |
| Electrical output (absolut)                                 | RS 422.                               |
| Absolut max. frequency (SSI/BISS)                           | 1.5MHz SSI / 4MHz BISS.               |
| Linearity   | ±1/2 LSB.                             |
| Absolut singleturn resolution                               | 10, 12, 13, 14 or 17 bits.            |
| Absolut multiturn resolution                                | 12 bits.                              |
| Incremental electrical output                               | Sin/Cos, 1Vpp.                        |
| Incremental singleturn resolution                           | 2048 ppv.                             |
| Incremental max.frequency (at.3dB)                          | 200KHz.                               |
| Available codes (absolut)                                   | Binary, Gray or configurable.         |
| Direction   | External controlled.                  |
| nReset/nPreset  | By pushbutton.                        |
| Diagnosis led   | Green = ok, Red = alarm.              |
| Radial or axial connection                                  | Cable (2m) or industrial connector.   |

**SINGLETURN ABSOLUT ENCODER**

- Singleturn resolution up to 17 bits
- Protection class IP54 according to DIN 40050
- External diameter 58 mm
- Conic shaft 1:10



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

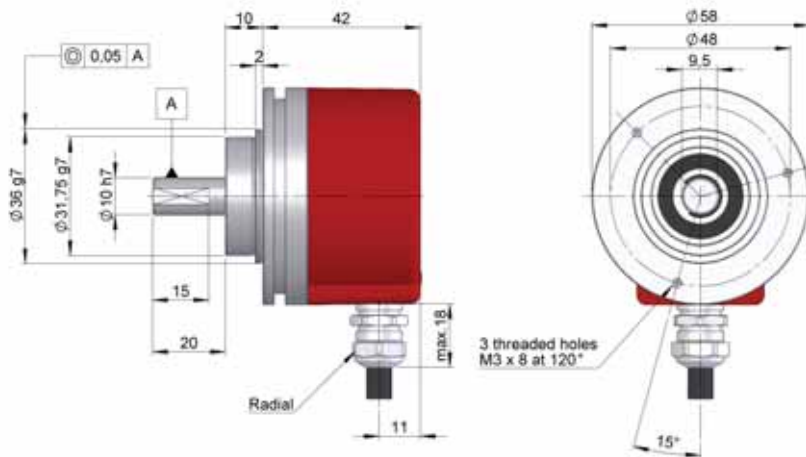
| TYPE          | SHAFT   | ANTIROTATION SYSTEM     | CONNECTION    | AXIAL RADIAL       | INTERFACE  | CODE   | IP           | POWER SUPPLY       | PARAMETERS CONFIG.                    | ABSOLUTE RESOLUTION  | SPECIAL CUSTOMER |
|---------------|---|-------------------------|---------------|--------------------|--|--|--------------|--------------------|---------------------------------------|--|------------------|
| ● ●<br>SMRS64 | ●<br>1- Flexible flange<br>↓<br>1- Conic 1:10 | ●<br>1- Flexible flange | ●<br>1- Cable | ●<br>0- Helicoidal | ●<br>↓<br>1- SSI<br>2- SSI + SinCos 1Vss<br>3- BISS<br>4- BISS + SinCos 1Vss | ●<br>1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- BISS** | ●<br>1- IP54 | ●<br>↓<br>2- 5 Vdc | ●<br>S- Direction<br>L- Diagnosis led | ● ●<br>10- 1024<br>12- 4096<br>13- 8192<br>14- 16384<br>17- 131072 | ● ●              |

Incremental resolution 2048 SinCos.

\*\* Protocol BISS can configurate code, direction and resolution by BUS.

**SINGLETURN ABSOLUT ENCODER**

- Singleturn resolution up to 17 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

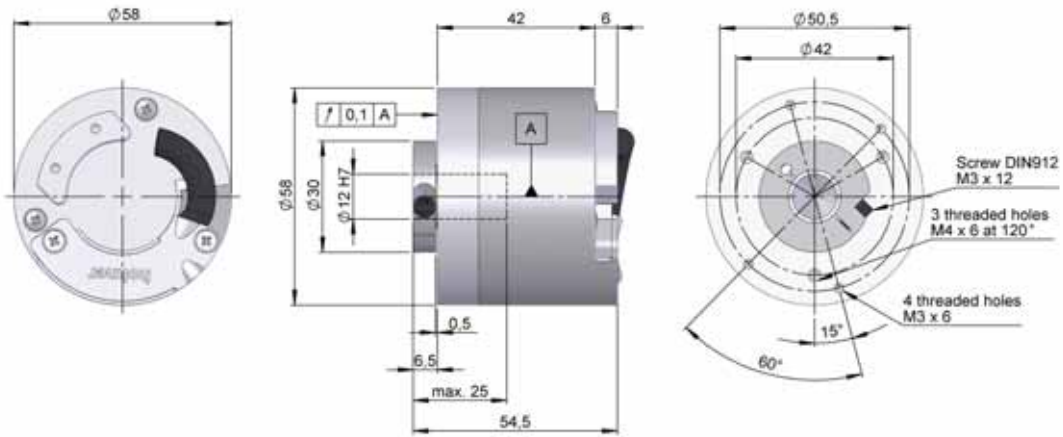
| TIPO           | SHAFT                        | FLANGE   | CONNECTION                                | AXIAL RADIAL               | INTERFACE  | CODE   | IP           | POWER SUPPLY                    | CONFIG. PARAMETERS | ABSOLUT RESOLUTION   | SPECIAL CUSTOMER |
|----------------|------------------------------|--|---|----------------------------|--|--|--------------|---------------------------------|--------------------|--|------------------|
| ● ●<br>SMRS 10 | ●<br>1- Ø 6 mm<br>2- Ø 10 mm | ●<br>1- Without flange<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | ●<br>1- Cable<br>3- 90.9512<br>7- 90.9517 | ●<br>1- Axial<br>2- Radial | ●<br>1- SSI<br>2- SSI + SinCos 1Vss<br>3- BISS<br>4- BSS + SinCos 1Vss | ●<br>1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- BISS** | ●<br>1- IP65 | ●<br>1- 10...30 Vdc<br>2- 5 Vdc | ●<br>S- Direction  | ● ● ● ● ●<br>10- 1024<br>12- 4096<br>13- 8192<br>14- 16384<br>17- 131072 | ● ● ●            |

Incremental resolution 2048 SinCos.

\*\* Protocol BISS can configurate code, direction and resolution by BUS.

**SINGLETURN ABSOLUT ENCODER**

- Singleturn resolution up to 17 bits
- Protection class IP54 according to DIN 40050
- External diameter 58 mm
- Blind hollow shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

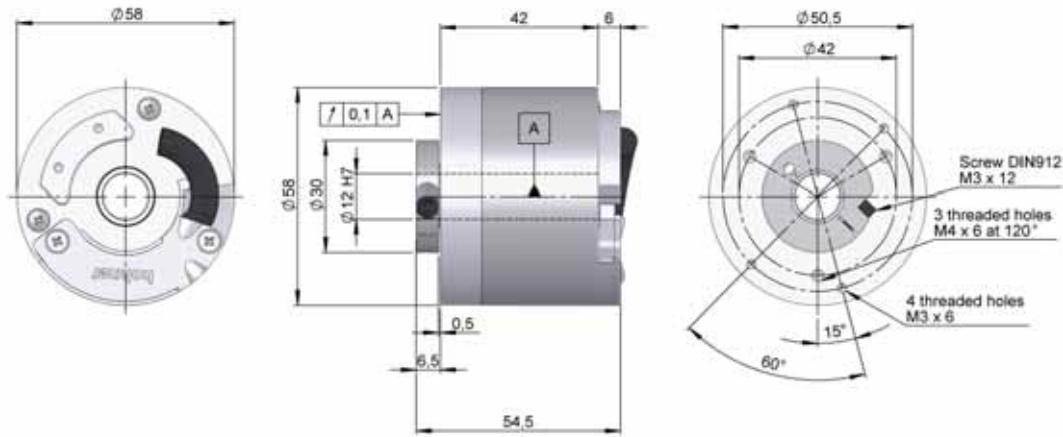
| TYPE             | SERIE | SHAFT                    | FLANGE  | CONNEC-TION            | AXIAL RADIAL | INTERFACE  | CODE  | IP      | POWER SUPPLY               | CONFIG. PARAMETERS | RESOLUTON   | SPECIAL CUSTOMER |
|------------------|-------|--------------------------|---------|------------------------|--------------|--|---|---------|----------------------------|--------------------|---|------------------|
| ● ●              | 19    | ●                        | ●       | ●                      | ●            | ●  | ●   | ●       | ●                          | ●                  | ● ● ● ●   | ● ●              |
| SMRS- Singleturn |       | 3- Ø 12 mm<br>4- Ø 10 mm | 1- None | 0- Helical<br>1- Cable |              | 1- SSI<br>2- SSI + SinCos 1Vss<br>3- BISS<br>4- BISS + SinCos 1Vss | 1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- BISS** | 1- IP54 | 1- 10...30 Vdc<br>2- 5 VDC | S- Direction       | 10- 1024<br>12- 4096<br>13- 8192<br>14- 16384<br>17- 131072 |                  |

Incremental resolution 2048 SinCos.

\*\* Protocol BISS can configurate code, direction and resolution by BUS.

**SINGLETURN ABSOLUT ENCODER**

- Singleturn resolution up to 17 bits
- Protection class IP54 according to DIN 40050
- External diameter 58 mm
- Hollow shaft



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE             | SERIE | HOLLOW SHAFT             | FLANGE  | CONNECTION | AXIAL RADIAL | INTERFACE  | CODE  | IP      | POWER SUPPLY               | RESOLUTION  | SPECIAL CUSTOMER |
|------------------|-------|--------------------------|---------|------------|--------------|--|---|---------|----------------------------|---|------------------|
| ● ●              | 59    | ●                        | ●       | ●          | ●            | ●  | ●   | ●       | ●                          | ● ●   | ● ●              |
| SMRS- Singleturn |       | 3- Ø 12 mm<br>4- Ø 10 mm | 1- None | 1- Cable   | 0- Helical   | 1- SSI<br>2- SSI + SinCos 1Vss<br>3- BISS<br>4- BISS + SinCos 1Vss | 1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- BISS** | 1- IP54 | 1- 10...30 Vdc<br>2- 5 Vdc | 10- 1024<br>12- 4096<br>13- 8192<br>14- 16384<br>17- 131072 |                  |

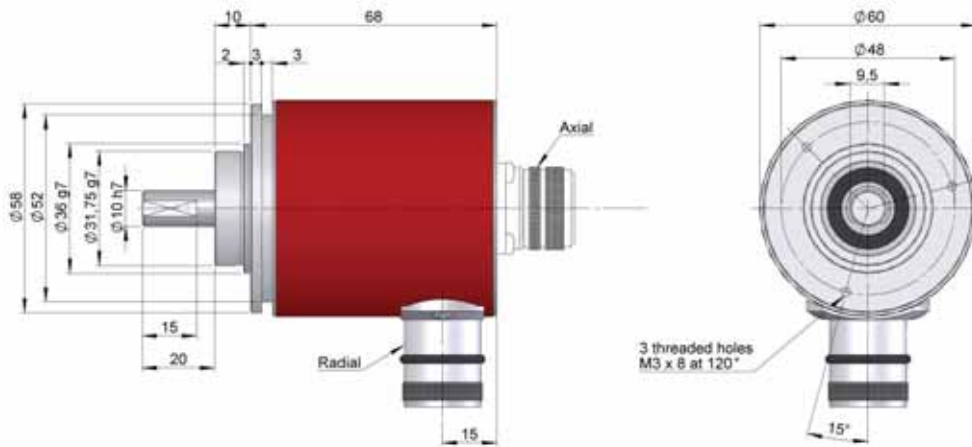
Incremental resolution 2048 SinCos.

\*\* Protocol BISS can configurate code, direction and resolution by BUS.



**MULTITURN ABSOLUT ENCODER**

- Multiturn resolution up to 26 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Solid shaft



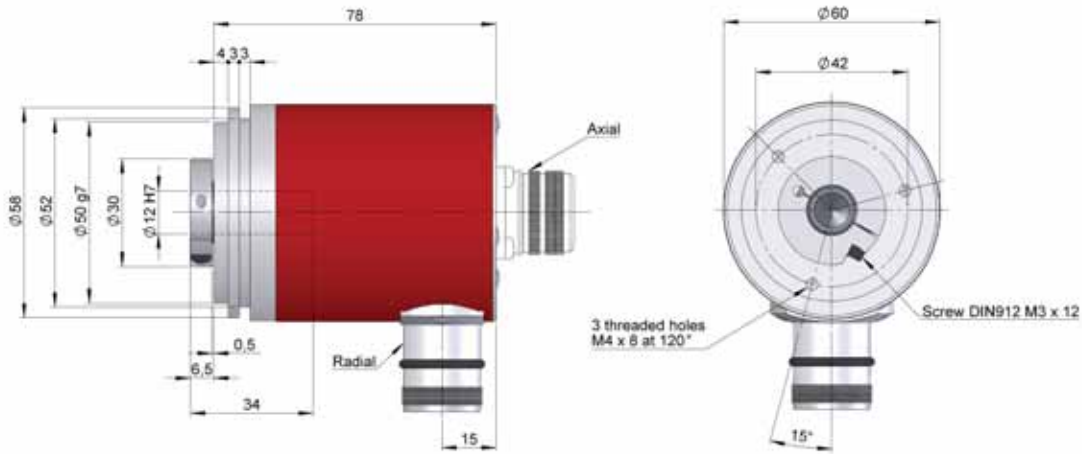
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE                         | SERIE | SHAFT                 | FLANGE   | CONNECTIO<br>N                       | AXIAL<br>RADIAL       | INTERFACE  | CODE  | IP      | POWER<br>SUPPLY<br>OUTPUT  | SINGLETURN / MULTITURN<br>RESOLUTION                         | SPECIAL<br>CUSTOMER |
|------------------------------|-------|-----------------------|--|--------------------------------------|-----------------------|--|---|---------|----------------------------|--|---------------------|
| ● ● ● 10<br>SMRM - Multiturn |       | ●                     | ●  | ●                                    | ●                     | ●  | ●   | ●       | ●                          | ● ● ● ● ●  | ● ● ●               |
|                              |       | 1- Ø10 mm<br>2- Ø6 mm | 1-None<br>2- 90.1002<br>3- 90.1003<br>4- 90.1004<br>5- 90.1005<br>6- 90.1006 | 1- Cable<br>3- 90.9512<br>7- 90.9517 | 1- Axial<br>2- Radial | 1- SSI<br>2- SSI + SinCos 1Vss<br>3- BiSS<br>4- BiSS + SinCos 1Vss | 1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- BiSS** | 1- IP65 | 1- 10...30 Vdc<br>2- 5 VDC | 1212- 4096 / 4096<br>1312- 8192 / 4096<br>1412- 16384 / 4096 |                     |

**MULTITURN ABSOLUT ENCODER**

- Multiturn resolution up to 26 bits
- Protection class IP65 according to DIN 40050
- External diameter 58 mm
- Blind hollow shaft



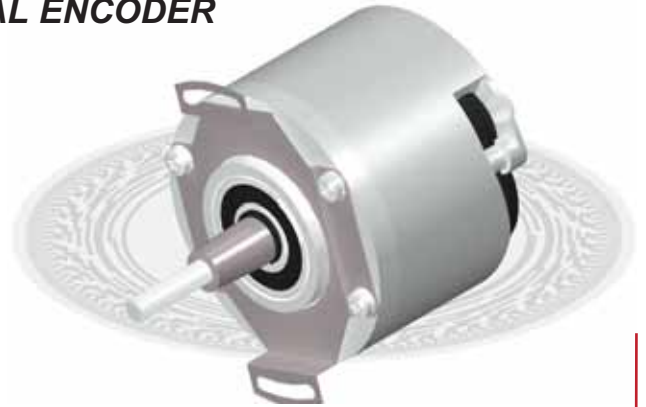
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE             | SERIE | SHAFT                    | FLANGE  | CONNEC-TION                          | AXIAL RADIAL          | INTERFACE  | CODE  | IP      | POWER SUPPLY OUTPUT        | SINGLETURN / MULTITURN RESOLUTION                            | SPECIAL CUSTOMER |
|------------------|-------|--------------------------|---------|--------------------------------------|-----------------------|--|---|---------|----------------------------|--|------------------|
| ● ● ●            | 19    | ●                        | ●       | ●                                    | ●                     | ●  | ●   | ●       | ●                          | ● ● ● ●  | ● ●              |
| SMRM - Multiturn |       | 3- Ø 12 mm<br>4- Ø 10 mm | 1- None | 1- Cable<br>3- 90.9512<br>7- 90.9517 | 1- Axial<br>2- Radial | 1- SSI<br>2- SSI + SinCos 1Vss<br>3- BISS<br>4- BISS + SinCos 1Vss | 1- Binary CW<br>2- Binary CCW<br>3- Gray CW<br>4- Gray CCW<br>5- BISS** | 1- IP65 | 1- 10...30 Vdc<br>2- 5 Vdc | 1212- 4096 / 4096<br>1312- 8192 / 4096<br>1412- 16384 / 4096 |                  |

**SINGLETURN ABSOLUT AND INCREMENTAL ENCODER**

- Incremental resolution 2048 SinCos
- Absolut resolution 1 SinCos
- Protection class IP54 according to DIN 40050
- External diameter 58 mm
- Conic shaft 1:10



Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

**ORDERING CODE**

| TYPE           | SHAFT                   | ANTIROTATION SYSTEM     | CONNECTION         | AXIAL RADIAL       | INTERFACE                | CODE | IP           | POWER SUPPLY       | INCREMENTAL RESOLUTION | SPECIAL CUSTOMER |
|----------------|-------------------------|-------------------------|--------------------|--------------------|--------------------------|------|--------------|--------------------|------------------------|------------------|
| ● ●<br>SMRS64S | ●<br>↓<br>1- Conic 1:10 | ●<br>1- Flexible flange | ●<br>↓<br>1- Cable | ●<br>0- Helicoidal | ●<br>↓<br>6- SinCos 1Vss | 0    | ●<br>1- IP54 | ●<br>↓<br>2- 5 Vdc | ● ●<br>2048            | ● ●              |

Absolut resolution : 1 SinCos

# CONNECTORS AND CONNECTION

## CONNECTION



|              | Cable 6x2x0.14<br>BISS | Cable 3x2x0.14+2x0.34<br>SSI | Connector<br>90.9512 BISS | Connector<br>90.9512 SSI | Connector<br>17 pin M23 |
|--------------|------------------------|------------------------------|---------------------------|--------------------------|-------------------------|
| GND          | Brown                  | Black                        | 1                         | 1                        | 10                      |
| Vcc          | White                  | Red                          | 8                         | 2                        | 7                       |
| SLO+ / DATA+ | Rose                   | Yellow                       | 2                         | 3                        | 14                      |
| SLO- / DATA- | Grey                   | Green                        | 7                         | 4                        | 17                      |
| MA+ / CLOCK+ | Yellow                 | Brown                        | 3                         | 5                        | 8                       |
| MA- / CLOCK- | Green                  | Blue                         | 6                         | 6                        | 9                       |
| SLI+         | -                      | -                            | -                         | -                        | 1                       |
| SLI-         | -                      | -                            | -                         | -                        | 4                       |
| nDIR         | Red-Blue               | Grey                         | 9                         | 9                        | 2                       |
| A/COS        | Red                    | -                            | 10                        | 10                       | 15                      |
| B/SIN        | Black                  | -                            | 4                         | 7                        | 12                      |
| nA/nCOS      | Blue                   | -                            | 12                        | 12                       | 16                      |
| nB/nSIN      | Violet                 | -                            | 5                         | 8                        | 13                      |
| Screen       | Screen                 | Screen                       | 11                        | 11                       | 11                      |

## CONNECTION SMRS64S



Cable 6x2x0.14

### POWER SUPPLY

|     |       |
|-----|-------|
| Gnd | White |
| Vcc | Brown |

### INCREMENTAL SIGNALS

|    |           |
|----|-----------|
| A+ | Green     |
| A- | Yellow    |
| B+ | Blue      |
| B- | Red       |
| Z+ | Grey-Rose |
| Z- | Red-Blue  |

### ABSOLUT SIGNALS

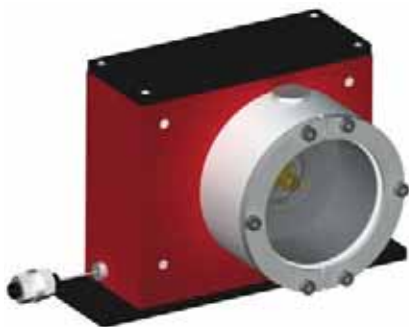
|    |        |
|----|--------|
| C+ | Grey   |
| C- | Rose   |
| D+ | Black  |
| D- | Violet |

■ Magnetic linear measuring



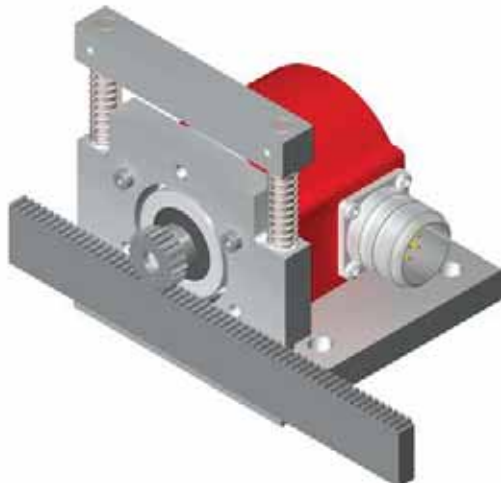
High accuracy  
contactless

■ Draw wire (enco-meter)



Easy mounting  
Good for telescope  
system

■ Rack and pinion system

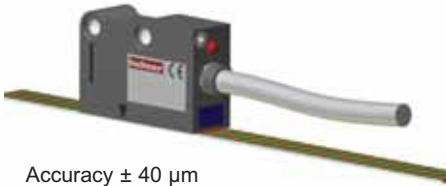
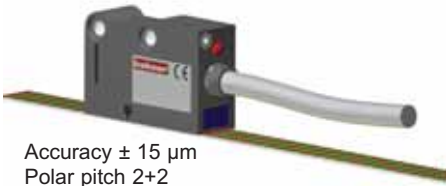
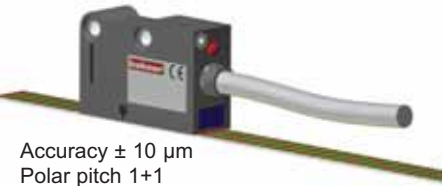


Sturdy, accurate  
and repeatability





# OVERVIEW **MAGNETIC SENSOR**

| MSL  | MSM   | MSH  |
|--|---|--|
|  <p>Accuracy <math>\pm 40 \mu\text{m}</math><br/>Polar pitch 5+5<br/>Resolution up to <math>5 \mu\text{m}</math><br/>IP67</p> |  <p>Accuracy <math>\pm 15 \mu\text{m}</math><br/>Polar pitch 2+2<br/>Resolution up to <math>1 \mu\text{m}</math><br/>IP67</p> |  <p>Accuracy <math>\pm 10 \mu\text{m}</math><br/>Polar pitch 1+1<br/>Resolution up to <math>0,5 \mu\text{m}</math><br/>IP67</p> |

## ■ General Information

Incremental magnetic sensors for linear measurement of the MS series allow non-contact, highly precise and real-time measurements. The measuring group is made up of two parts: a sensor that incorporates the electronic capture/an output driver and a polarized magnetic strip in a constant period.

Use is very simple. It consists in moving the sensor without making contact along the strip allowing lengths over 50 metres.

Series of MS magnetic sensors is made up of 3 models, depending on the precision required, with the possibility to incorporate reference signals externally or to the magnetic strip.

Sensor's high IP allows installation in most industrial applications and is ideal for outdoor use.

Range of MS sensors offers an economic and robust alternative to other lineal measurement systems.

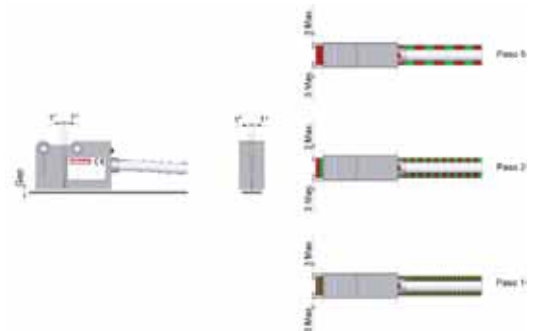
## ■ Sensor assembly

The sensor can be mounted in any position, keeping the active side, marked by arrows, toward the surface of magnetic strip. Once mounting is carried, place cables and move manually the sensor in the entire run, in order to ensure it can freely slide without any obstacle.

Check that aligning tolerances between sensor and magnetic strip are respected along the whole run. Each positioning error must be corrected.

Dimension of any brackets or supporting arms have to be conveniently calculated; it must be avoided any kind of their bending.

- Proceed to fix magnetic sensor using the M4 threaded holes.
- As an alternative you can use them as passing holes for TCEI M3x18 screws.



## ■ Fixing of magnetic band

Magnetic band can be fixed on any kind of non-magnetic surface.

For a better protection of magnetic band from shavings, liquid sprinklings, powder, etc. we suggest to always use the metal sheet cover PS, already equipped with a double-sided adhesive tape or the aluminium support AP.

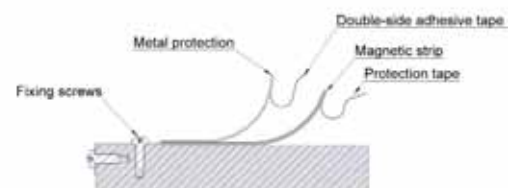
The best gluing temperature is between 20 and 30 °C; avoid making it when temperature is below 10°C.

In case of stocking magnetic strip MP200 at a lower temperature than the machine, it is advisable to wait for some hours before gluing. The adhesion of glued parts is completed after at least 48 hours.

Make the gluing of magnetic strip as follows:

- Clean carefully the fixing surface from oil, fat or any kind of dirt, using trace-free solvents.
- Raise up few centimetre of adhesive protection and place magnetic strip, lightly pushing on the initial adhesive zone.
- Proceed with the placing of the strip, removing progressively the adhesive protection and making a uniform pressure. If possible, use a small manual roller.
- Proceed as above to glue the stainless steel cover tape on the magnetic strip, after an accurate cleaning of the surface.
- Use the exceeding part of cover tape for mechanical fixing and "earth" connection of the structure by means of screws TC M3x8.

In order for the system to be more precise, the magnetic strip should be 80 mm (40 mm on each side) longer than the maximum travel of the machine:  $L = \text{effective travel} + 80 \text{ mm}$ . The tape should be centred along the limit switch.



# LINEAR MEASURING MAGNETIC SYSTEM

## Electrical connections

Sensor is set up with a Line-Driver output. If the reading device cannot read complementary signals, it is necessary to isolate the unused wires one by one. It is important to note that the connection of the unused wires can damage the sensor and it does not guarantee its immunity from interferences.

Make connection when power supply is switched off, and also batteries (when present) are excluded.

Avoid allocating the cable next to any devices which may cause electromagnetic interferences (motors, solenoid valves, inverters).

If some interferences are detected, act on the source of disturb using EMC filters.

If cable extensions are needed, it is necessary to use shielded cables with a section at least 0.35 mm<sup>2</sup> for power supply and 0.14 mm<sup>2</sup> for signals.

Verify the correct connection and the continuity of the shield which has to be connected to an earthing node with very low impedance.

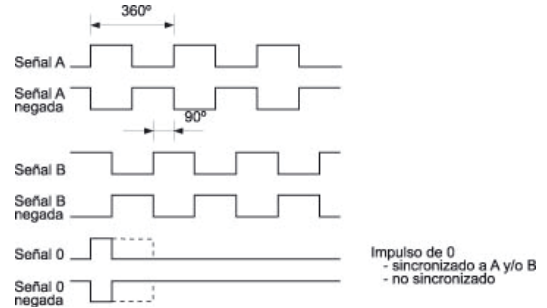
Sensor is supplied with a standard cable 2m long. longer lengths can be required.

To balance Line-Driver output, you have to use the following resistance:

- 5V RL=120Ω
- 12V RL=350Ω
- 24V RL=1000Ω

Respect the minimum cable's winding radius of 60mm.

For applications where the max speed reaches more than 1m/sec, the use of a "special cable", suitable to continuous movements, is indispensable.



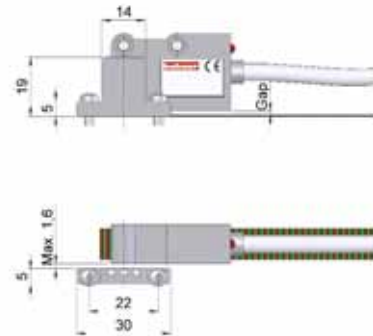
## Mounting external zero

The sensor allows the detection of external reference points as well as those included on the magnetic strip (special order). This gives the measurement system the position references necessary for most applications.

The external reference signal is received by installing a magnet (EC) or magnetizing the strip at the desired position(s).

For the installation of the external zero reference (magnet) proceed as follows:

- Both sensor and magnetic strip have to be previously fixed to the machine, in their final position.
- Place the magnet where you need the zero position and move it around 4 mm, until the index red led turns on.
- Place the base of the magnet parallelly to the magnetic strip, at a distance of about 1mm from the sensor. Make the notch, located on the upper part of the magnet, roughly correspond with the vertical one on the body of the sensor.
- Mark on the machine the position of M3 fixing holes of magnet.
- Drill the fixing holes and tighten the magnet by 2 TC M3x12 screws, keeping the active part (magnets) toward the sensor. The slots permit a displacement, parallelly to the magnetic strip, in order to get an accurate positioning of magnet.
- Make a working test in both ways of moving.



## Resistance to chemical agents and maintenance

### LOW-IMPACT AGENTS

Formic acid, lactic acid, formaldehyde 40%, gliceryne 93°C, hexane, iso-octane, linseed oil, cotton oil, soybean oil, mineral oil.

### MEDIUM-IMPACT AGENTS

Acetylene, acetone, acetic acid, oleic acid, stearic acid 70°C, seawater, ammonia, gasoline, ether isopropilic, petroleum, vapor.

### STRONG-IMPACT AGENTS

Nitric acid, benzene, dimethylbenzene, tetraethyl furan, nitrobenzene, solvent, toluene, carbon tetrachloride, turpentine, trichlorethylene.

The band and sensor do not need any particular maintenance. An accurate installation, conforming to mounting instructions, and a correct use are sufficient to get a qualitative stability.

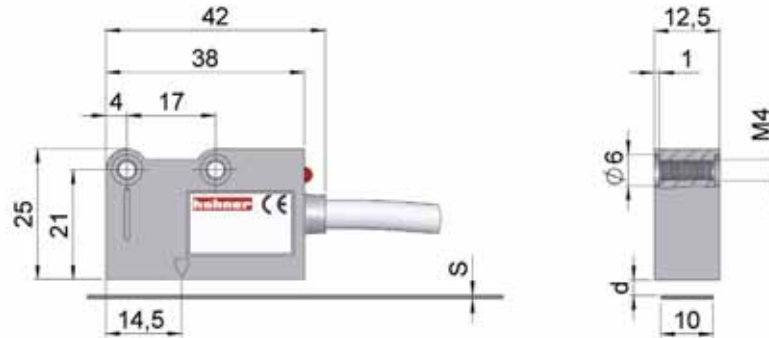
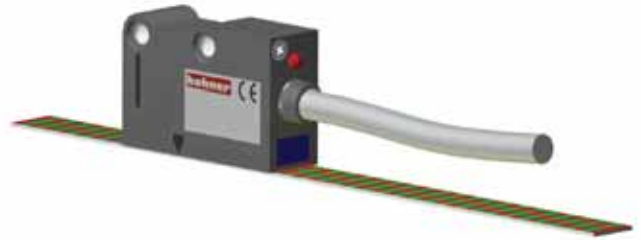
In case of malfunctioning please contact the manufacturer for repairing or changing of faulty components. Verify again all mounting tolerances whenever it happens something which can modify the correct alignment of the system.

In order not to compromise the precision of the strip, do not stress it mechanically. Strip has to be rolled always in the same way (active part toward outside), with a diameter not less than 260 mm.

# MAGNETIC SENSOR **MSH**

## LINEAR MEASURING MAGNETIC SENSOR

- Magnetic detection without contact
- Easy assembly
- Resolution up to 0,5  $\mu\text{m}$ .
- Accuracy  $\pm 10 \mu\text{m}$
- Polar pitch 1+1
- Protection class IP67
- Metallic housing
- External or integrated reference signal



Magnetic band CSH

| S (mm) | CSH       | CSH + PS* | CSH + AP* |
|--------|-----------|-----------|-----------|
|        | 1.3       | 1.6       | 2.1       |
| d(mm)  | 0,1 + 0,5 | -         | -         |

## SENSOR SPECIFICATIONS

|  |   |
|--|---|
| Resolution   | 0'5, 1, 5, 10 $\mu\text{m}$ .                   |
| Accuracy   | $\pm 10 \mu\text{m}$ .                          |
| Repeatability                                      | $\pm 1$ increment.                              |
| GAP, distance sensor/band (d) (see previous table) | 0,1 a 0,5 mm.                                   |
| Speed  | 0,6 m/s (MSH0,5) / 1,2 m/s (other resolutions). |
| Housing  | Metallic.                                       |
| Protection class                                   | IP67.   |
| Operating temperature                              | -10 .. 70° C.                                   |
| Storage temperature                                | -20° .. 80° C.                                  |
| Humidity   | 100% not condensed.                             |
| Vibration  | 300 m/s <sup>2</sup> (55 + 2000 Hz).            |
| Shock  | 1000 m/s <sup>2</sup> (11ms).                   |
| Weight   | 40g.  |
| Connection   | Cable 2 metres.                                 |

## ALIGNMENT AND SENSOR MOUNTING

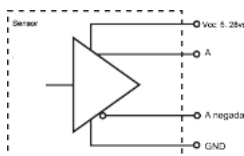
### ■ Sensor - Band



Dimensions in millimeters

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



#### Line Driver

|  |   |
|--|---|
| Power supply                           | 5..28v ±5%  |
| Load without charge                    | Max: 60 mA  |
| Load with charge                       | 140 mA MAX (Vdc= 5v y Z =120Ω)<br>115 mA MAX (Vdc=12v y Z =1,2kΩ)<br>90 mA MAX (Vdc=28v y Z =1,2kΩ) |
| Frecuency                              | 300 kHz   |
| Shortcircuit protection                | Yes   |
| Protection against polarity inversion  | Yes   |
| Channel A leads 90° electric channel B |   |

### CONNECTION



#### Cable 3x2x0,14+2x0,34

|               |          |
|---------------|----------|
| GND           | Blue     |
| Vcc           | Red      |
| A             | Green    |
| B             | White    |
| A inverted    | Orange   |
| B inverted    | Sky blue |
| 0 (reference) | Brown    |
| 0 inverted    | Yellow   |

## SENSOR ORDERING CODE

| SERIE                         | RESOLUTION  | POWER SUPPLY     | SPECIAL CUSTOMER |
|-------------------------------|---|------------------|------------------|
| <b>MSH</b><br>Polar pitch 1+1 | ●<br>0,5- 0,5 μm<br>1- 1 μm<br>5- 5 μm<br>10- 10 μm | ●<br>528- 5..28v | ● ●              |

## BAND SPECIFICATIONS

|   |  |
|---|--|
| Polar pitch                             | 1+1 mm.  |
| Accuracy at 20°C                        | ± 30 μm/metre.   |
| Width band                              | 10 mm.   |
| Thickness "S" (see table previous page) | 1,3 mm.  |
| Maximum length                          | 50 m.  |
| Thermal expansion                       | 10,5 x 10 <sup>-6</sup> °C <sup>-1</sup> . Tref: 20°C ± 0,1°C. |
| Bending radius                          | min. 130 mm.   |
| Operating temperature                   | -10 .. 70° C.  |
| Storage temperature                     | -20° .. 80° C.   |

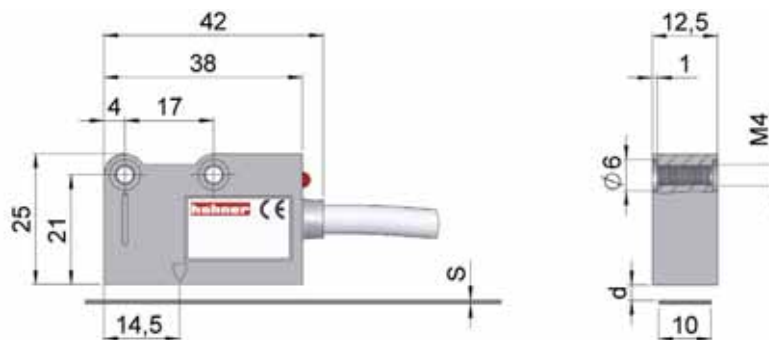
## BAND REFERENCE

| SERIE      | LENGTH (in mm) | SPECIAL CUSTOMER |
|------------|----------------|------------------|
| <b>CSH</b> | ● ● ● ●        | ● ●              |

# MAGNETIC SENSOR **MSM**

## LINEAR MEASURING MAGNETIC SENSOR

- Magnetic detection without contact
- Easy assembly
- Resolution up to 1 µm.
- Accuracy ± 15 µm
- Polar Pitch 2+2
- Protection class IP67
- Metallic housing
- External or integrated reference signal



Magnetic band with integrated zero CSMZ

| S (mm) | CSMZ       | CSMZ + PS | CSMZ + AP |
|--------|------------|-----------|-----------|
|        | 1,3        | 1,6       | 2,1       |
| d(mm)  | 0,35 + 0,9 | 0,7 MAX   | 0,2 MAX   |

Magnetic band CSM

| S (mm) | CSM     | CSM + PS* | CSM + AP* |
|--------|---------|-----------|-----------|
|        | 1,3     | 1,6       | 2,1       |
| d(mm)  | 0,3+1,5 | 1,2 MAX   | 0,7 MAX   |

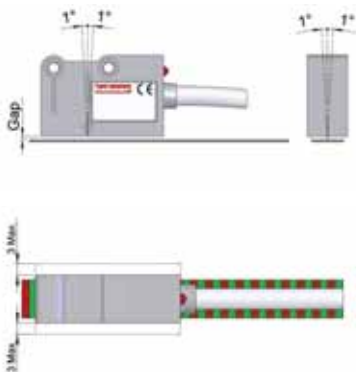
\* PS and AP see accessories section

## SENSOR SPECIFICATIONS

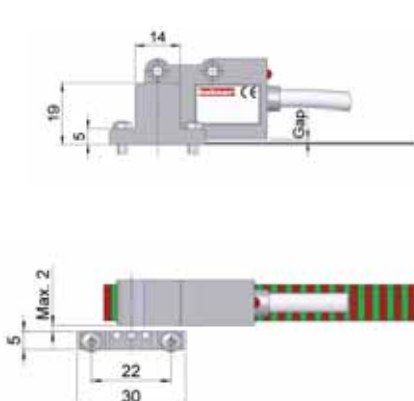
|  |  |
|--|--|
| Resolution   | 1, 5, 10, 25, 50, 100, 500 and 1000 µm.      |
| Accuracy   | ±15 µm.                                      |
| Repeatability                                      | ±1 increment.                                |
| GAP, distance sensor/band (d). See previous table) | 0,3 to 1,5 mm.                               |
| Speed  | 1,2 m/s (MSM1) / 12 m/s (other resolutions). |
| Housing  | Metallic.                                    |
| Protection class                                   | IP67.  |
| Operating temperature range                        | -10 .. 70° C.                                |
| Storage temperature range                          | -20° .. 80° C.                               |
| Humidity   | 100% not condensed.                          |
| Vibration  | 300 m/s <sup>2</sup> (55 + 2000 Hz).         |
| Shock  | 1000 m/s <sup>2</sup> (11ms).                |
| Weight   | 40g.   |
| Connection   | Cable 2 metres.                              |

## ALIGNMENT AND SENSOR MOUNTING

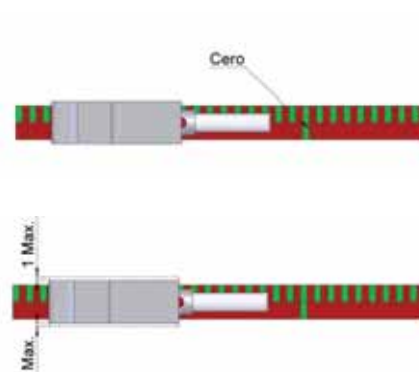
### ■ Sensor - Band



### ■ Sensor with external zero - Band



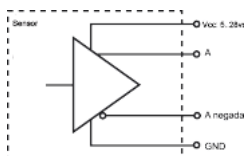
### ■ Sensor with integrated zero



Dimensions in millimeters

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



#### Line Driver

|  |   |
|--|---|
| Power supply                           | 5..28v ±5%  |
| Load without charge                    | Max: 60 mA  |
| Load with charge                       | 140 mA MAX (Vdc= 5v y Z =120Ω)<br>115 mA MAX (Vdc=12v y Z =1,2kΩ)<br>90 mA MAX (Vdc=28v y Z =1,2kΩ) |
| Frecuency                              | 300 kHz   |
| Shortcircuit protection                | Yes   |
| Protection against polarity inversion  | Yes   |
| Channel A leads 90° electric channel B |   |

### CONNECTION



#### Cable 3x2x0,14+2x0,34

|               |          |
|---------------|----------|
| GND           | Blue     |
| Vcc           | Red      |
| A             | Green    |
| B             | White    |
| A inverted    | Orange   |
| B inverted    | Sky blue |
| 0 (reference) | Brown    |
| 0 inverted    | Yellow   |

## SENSOR ORDERING CODE

| SERIE           | RESOLUTION  | ZERO                         | POWER SUPPLY | SPECIAL CUSTOMER |
|-----------------|---|------------------------------|--------------|------------------|
| <b>MSM</b>      | ●   | ●                            | ●            | ● ●              |
| Polar pitch 2+2 | 1- 1 μm<br>5- 5 μm<br>10- 10 μm<br>25- 25 μm<br>50- 50 μm<br>100- 100 μm<br>500- 500 μm<br>1000-1000 μm | E- External<br>Z- Integrated | 528- 5..28v  |                  |

## BAND SPECIFICATIONS

|  |  |
|--|--|
| Polar Pitch                                  | 2+2 mm.  |
| Accuracy to 20°C                             | ± 30 μm/metre.   |
| Width band                                   | 10 mm.   |
| Thickness band "S" (See table previous page) | 1,3mm.   |
| Maximum length                               | 50 m.  |
| Thermal expansion                            | 10,5 x 10 <sup>-6</sup> °C <sup>-1</sup> . Tref: 20°C ± 0,1°C. |
| Bending radius                               | min. 130 mm.   |
| Operating temperature                        | -10 .. 70° C.  |
| Storage temperature                          | -20° .. 80°.   |

## BAND ORDERING CODE

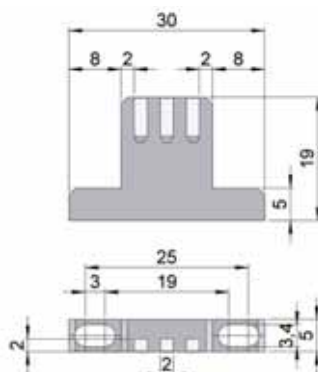
| SERIE      | ZERO                               | LENGHT (in mm) | ZERO POSITION (in mm) | SPECIAL CUSTOMER |
|------------|------------------------------------|----------------|-----------------------|------------------|
| <b>CSM</b> | ●                                  | ● ● ● ● ●      | ● ● ● ● ●             | ● ●              |
|            | - : Without zero<br>Z : Integrated |                |                       |                  |

## ACCESSORIES

### Cover for band protection : PS



### External zero : EC



### Aluminium support : AP

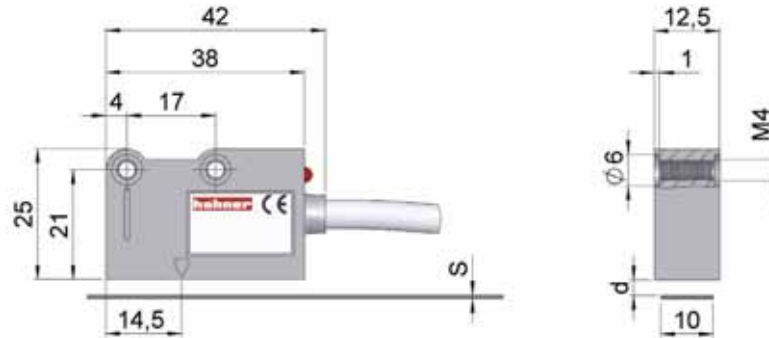




# MAGNETIC SENSOR **MSL**

## LINEAR MEASURING MAGNETIC SENSOR

- Magnetic detection without contact
- Easy assembly
- Resolution up to 5 µm.
- Accuracy ± 40 µm
- Polar Pitch 5+5
- Protection class IP67
- Metallic housing
- External or integrated reference signal



Magnetic band with integrated zero CSLZ

| S (mm) | CSLZ      | CSLZ + PS | CSLZ + AP |
|--------|-----------|-----------|-----------|
|        | 1.3       | 1.6       | 2.1       |
| d(mm)  | 0,3 + 3,0 | 2,7 MAX   | 2,2 MAX   |

Magnetic band CSL

| S (mm) | CSL     | CSL + PS* | CSL + AP* |
|--------|---------|-----------|-----------|
|        | 1.3     | 1.6       | 2.1       |
| d(mm)  | 0.3+3.5 | 3.2 MAX   | 2.7 MAX   |

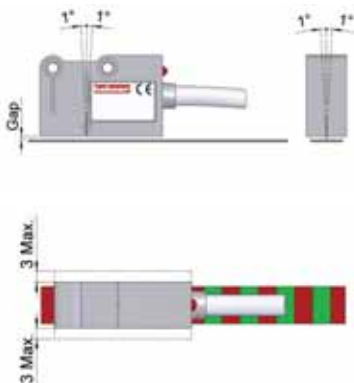
\* PS and AP see accessories section

## SENSOR SPECIFICATIONS

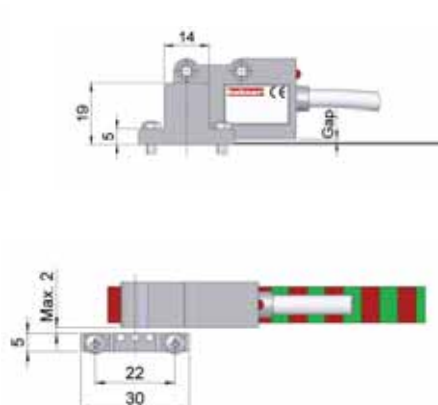
|   |  |
|---|--|
| Resolution  | 5, 10, 25, 50 and 100 µm.                  |
| Accuracy  | ±40 µm.                                    |
| Repeatability                                     | ±1 increment.                              |
| GAP, detection distances (d) (see previous table) | 0,3 to 3,5 mm.                             |
| Speed   | 6 m/s (MSL5) / 12 m/s (other resolutions). |
| Housing   | Metallic.                                  |
| Protection class                                  | IP67.                                      |
| Operating temperature                             | -10 .. 70° C.                              |
| Storage temperature                               | -20° .. 80° C.                             |
| Humidity  | 100% not condensed.                        |
| Vibration   | 300 m/s <sup>2</sup> (55 + 2000 Hz).       |
| Shock   | 1000 m/s <sup>2</sup> (11ms).              |
| Weight  | 40g.                                       |
| Connection  | Cable 2 metres.                            |

## ALIGNMENT AND SENSOR MOUNTING

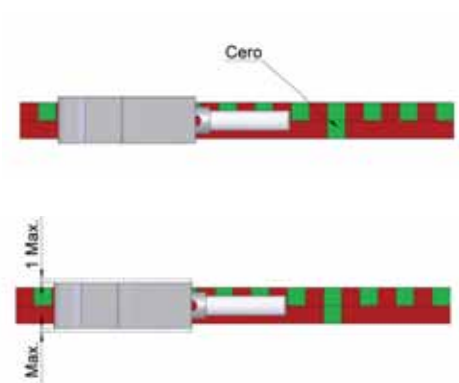
### ■ Sensor - Band



### ■ Sensor with external zero - Band



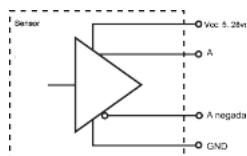
### ■ Sensor with integrated zero



Dimensions in millimeters

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



#### Line Driver

|  |   |
|--|---|
| Power supply                           | 5..28v ±5%  |
| Load without charge                    | Max: 60 mA  |
| Load with charge                       | 140 mA MAX (Vdc= 5v y Z =120Ω)<br>115 mA MAX (Vdc=12v y Z =1,2kΩ)<br>90 mA MAX (Vdc=28v y Z =1,2kΩ) |
| Frecuency                              | 300 kHz   |
| Shortcircuit protection                | Yes   |
| Protection against polarity inversion  | Yes   |
| Channel A leads 90° electric channel B |   |

### CONNECTION



#### Cable 3x2x0,14+2x0,34

|               |          |
|---------------|----------|
| GND           | Blue     |
| Vcc           | Red      |
| A             | Green    |
| B             | White    |
| A inverted    | Orange   |
| B inverted    | Sky blue |
| 0 (reference) | Brown    |
| 0 inverted    | Yellow   |

## SENSOR REFERENCE

| SERIE           | RESOLUTION  | ZERO                         | POWER SUPPLY | SPECIAL CUSTOMER |
|-----------------|---|------------------------------|--------------|------------------|
| <b>MSL</b>      | ●   | ●                            | ●            | ● ●              |
| Polar pitch 5+5 | 5- 5 μm<br>10- 10 μm<br>25- 25 μm<br>50- 50 μm<br>100- 100 μm | E- External<br>Z- Integrated | 528- 5..28v  |                  |

## BAND SPECIFICATIONS

|   |  |
|---|--|
| Polar pitch                                 | 5+5 mm.  |
| Accuracy at 20°C                            | ± 30 μm/metro.   |
| Width band                                  | 10 mm.   |
| Thickness band "S" (see table previous pag) | 1,3 mm.  |
| Maximum length                              | 50 m.  |
| Thermal expansion                           | 10,5 x 10 <sup>-6</sup> °C <sup>-1</sup> . Tref: 20°C ± 0,1°C. |
| Bending radius                              | min.130 mm.  |
| Operating temperature                       | -10 .. 70° C.  |
| Storage temperature                         | -20° .. 80° C.   |

## BAND SPECIFICATIONS

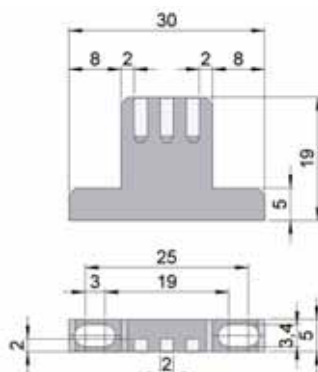
| SERIE      | ZERO                               | LENGHT (in mm) | ZERO POSITION (in mm) | SPECIAL CUSTOMER |
|------------|------------------------------------|----------------|-----------------------|------------------|
| <b>CSL</b> | ●                                  | ● ● ● ● ●      | ● ● ● ● ●             | ● ●              |
|            | - : Without zero<br>Z : Integrated |                |                       |                  |

## ACCESSORIES

### Cover for band protection : PS



### External zero: EC



### Aluminium support : AP



# ENCO-METER

## EXTENDIBLE CABLE MEASUREMENT SYSTEM

ENCO-METER systems allow for a simple, fast and economic way, the adaptation of rotating sensor devices (encoders, and potentiometers etc.) of linear distance measurements of up to 10 metres for machines with slow movement, without any sharp acceleration and with an average number of maneuvers. They consist of a stainless steel micro-cable that has to be connected to the machine's mobile element at its free end. Inside the unit, the other end of the cable is wound on to a precision drum with a leaf spring to maintain it under constant tension. The drum shaft can drive any type of rotating sensor.



### Output devices

On request, we can supply the ENCO-METER already coupled to an electronic output device that could be an incremental or absolute encoder or a potentiometer. If it is required to obtain a determined resolution "r" (mm per pulse) in the case of using an absolute or incremental encoder, the number of encoder pulses will be:

$$n = \frac{D}{r} \quad (D \text{ is ENCO-METER travel in mm})$$

Using a potentiometer, an output "r" ratio (in  $\Omega$  per mm) is obtained in accordance with:

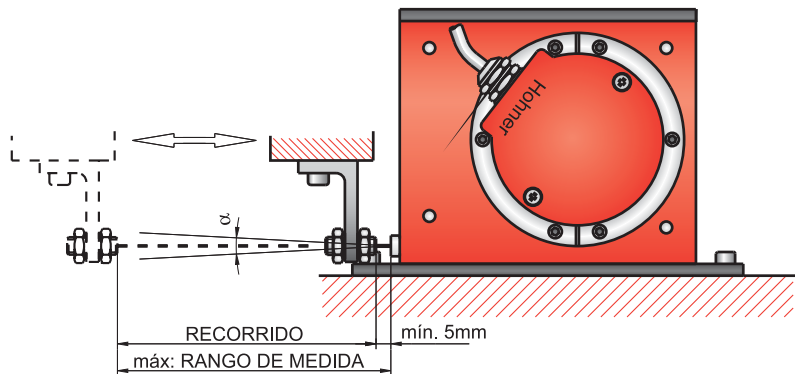
$$r = \frac{R}{D \times n} \quad (R \text{ is the rated resistance and } n \text{ is the maximum number of turns})$$

As standard, we have potentiometers of  $R=10K\Omega$  and  $n=10$  turns available in stock. It must be taken into consideration that the mechanical travel of the potentiometer may limit the ENCO-METER measurement range.

### Installation

ENCO-METER units are secured to a flat machine surface by means of three or four M14 screws. Any installation position is possible. The cable must be correctly

aligned ( $\alpha < 2^\circ$ ) and under no circumstances must it exceed the measurement range.



## TECHNICAL SPECIFICATIONS

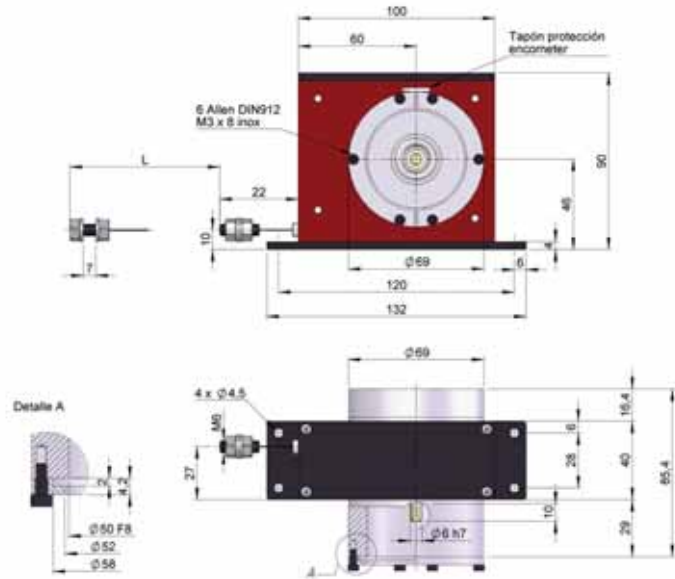
| Model  | EM4   | EM8                          |                              |
|--|---|------------------------------|------------------------------|
| Reference                                    | 90.1404   | 90.1808                      | 90.1810                      |
| Travel                                       | 200 mm $\pm$ 0,06 / per turn                                      | 250 mm $\pm$ 0,06 / per turn | 300 mm $\pm$ 0,06 / per turn |
| Cable <sup>(1)</sup>                         | $\varnothing$ 0,61 AISI316 stainless steel (structure 19 x 7 + 0) |                              |                              |
| Measurement range, up to (mm)                | 4000  | 8000                         | 10000                        |
| Maximum cable extension (mm)                 | 4010  | 8010                         | 10010                        |
| Minimum cable static tension                 | 3 N   | 6 N                          | 6 N                          |
| Maximum cable static tension                 | 8,9 N   | 13N                          | 13 N                         |
| Maximum extension acceleration               | 35 m/s <sup>2</sup>   | 30 m/s <sup>2</sup>          | 25 m/s <sup>2</sup>          |
| Maximum recovery acceleration <sup>(2)</sup> | 10 m/s <sup>2</sup>   | 12 m/s <sup>2</sup>          | 12 m/s <sup>2</sup>          |
| Maximum speed                                | 1 m/s   | 0,75 m/s                     | 0,75 m/s                     |
| Protection against dust and splashes         | IP51 according to DIN 40050                                       |                              |                              |

(1) Other types of cables are possible on special order

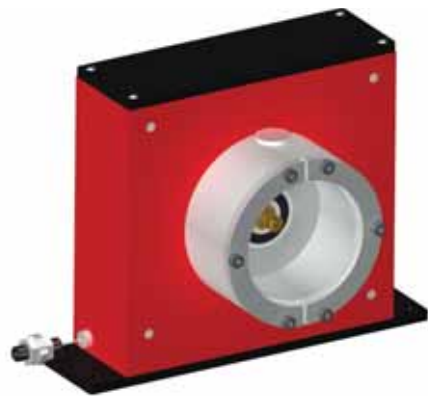
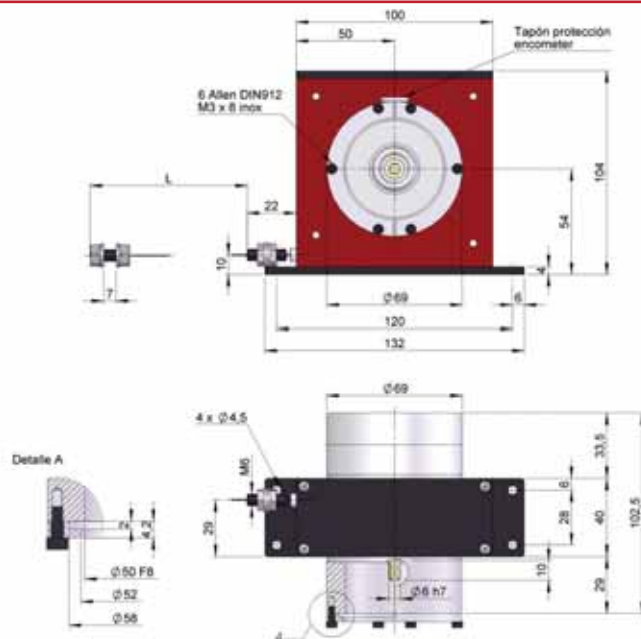
(2) We can supply EM4s with double drive torque, permitting the recovery acceleration to be doubled.



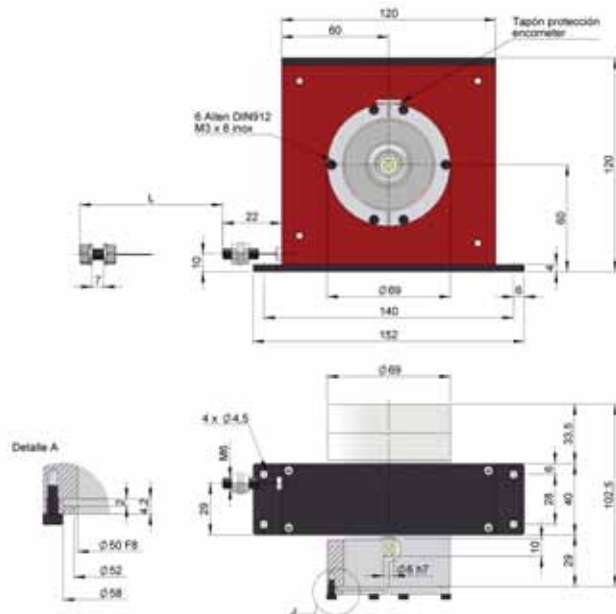
**EM4**



**EM8**



**EM10**

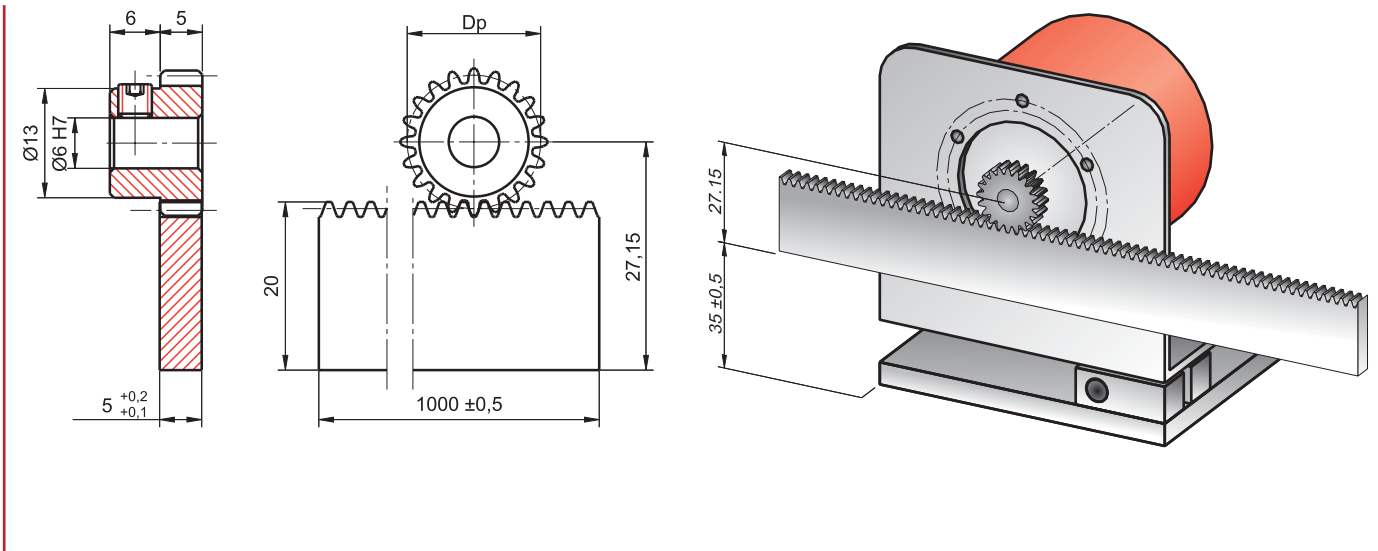


# PINION AND RACK

## PINION AND RACK SYSTEM

This system consists of a modular, straight tooth pinion and a special rack with a modified pitch that achieves an exact movement of 50mm per turn of the pinion, something that is not possible with conventional racks. If

the pinion is secured directly to the encoder shaft, then a flexible support angle should be employed so that the bearings are not excessively loaded.



## TECHNICAL SPECIFICATIONS

|                     | PINION   | RACK                 |
|---------------------|--|----------------------|
| Model               | 90.9307  | 90.9306              |
| Reference           | Treated steel  | steel                |
| Material            | $m = DP32 (0,79375)$   | $m = 0,79577$        |
| Module <sup>1</sup> | $Z = 20$   | $p = 2,5 \text{ mm}$ |
| Teeth               | There is the possibility of joining several sections<br>TRAVEL or CONTOUR 1 turn = 50 mm |                      |
| Pitch               |  |                      |

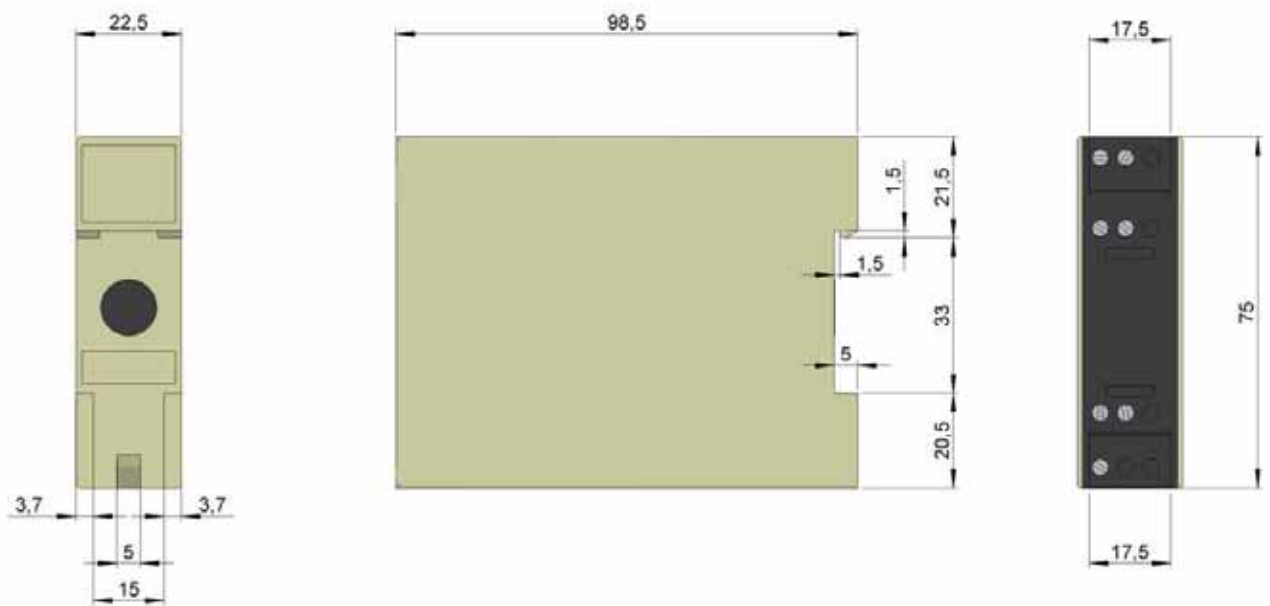




# ELECTRONIC DISCRIMINATOR 90.8600

## ELECTRONIC DISCRIMINATOR FOR ENCODERS

- A/B signal discriminator
- Opto-isolated Push-Pull (HTL) Inputs
- Outputs Push-pull (HTL)
- Low consumption 70mA (without load)
- Power supply 10..24v
- Protection class IP 20
- Rapid assembly on a DIN rail



### MECHANICAL SPECIFICATIONS

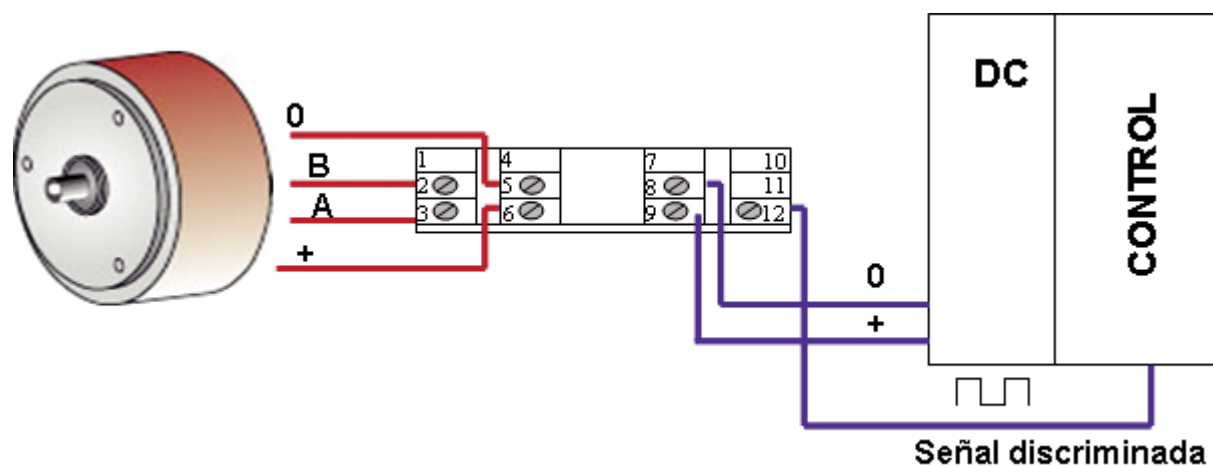
|   |  |
|---|--|
| Input channels  | A/B                                      |
| Input signal type   | Push-Pull                                |
| Input signal level  | 10..24v                                  |
| Frecuency   | 200 Khz                                  |
| Passive filter  | 250 Khz                                  |
| Phase displacement of input signal                          | 90° ±25%                                 |
| Output channels   | A/B/direction                            |
| Output signal type  | Push-pull                                |
| Output signal level   | 10..24v                                  |
| Intensity of the outgoing load                              | 30 mA per channel                        |
| Power supply  | 10..24v                                  |
| Intern consumption  | 70 mA without load                       |
| Power supply encoder output                                 | 10..24v                                  |
| Connection type   | Pitch of the connection strip screw 5,08 |
| Max.conductor sections                                      | Max 2,5 mm <sup>2</sup>                  |
| Protection against dust and splashes according to DIN 40050 | IP 20                                    |
| Relative humidity   | 85%                                      |
| Operating temperature range                                 | -10°..+70°C                              |
| Assembly  | DIN Rail in 50022                        |
| Weigth  | 100 gr                                   |
| Housing   | Grey polycarbonate UL94                  |

## MODULE DESCRIPTION

This digital discriminator takes advantage of the two encoder A and B channels, in order to refuse the possible noise or rebounds of the encoder. According to the direction in which the encoder turns, the discriminator captures one of the two signals (A or B), which will be the main signal and the other one will be the validation

signal. In this manner, there will always be a margin of 90 degrees in order to absorb and eliminate all of the rebounds and noises that may appear on the main signal. In this manner, if the encoder turns in one direction, the output signal will be A, and if it turns in the other direction, the output signal will be B.

## CONNECTION DIAGRAM



**PIN 1:** NC

**PIN 2:** Input channel B encoder

**PIN 3:** Input channel A encoder

**PIN 4:** NC

**PIN 5:** 0 V Encoder

**PIN 6:** Power supply encoder +V

**PIN 7:** NC

**PIN 8:** 0 V

**PIN 9:** Power supply encoder +V

**PIN 10:** NC

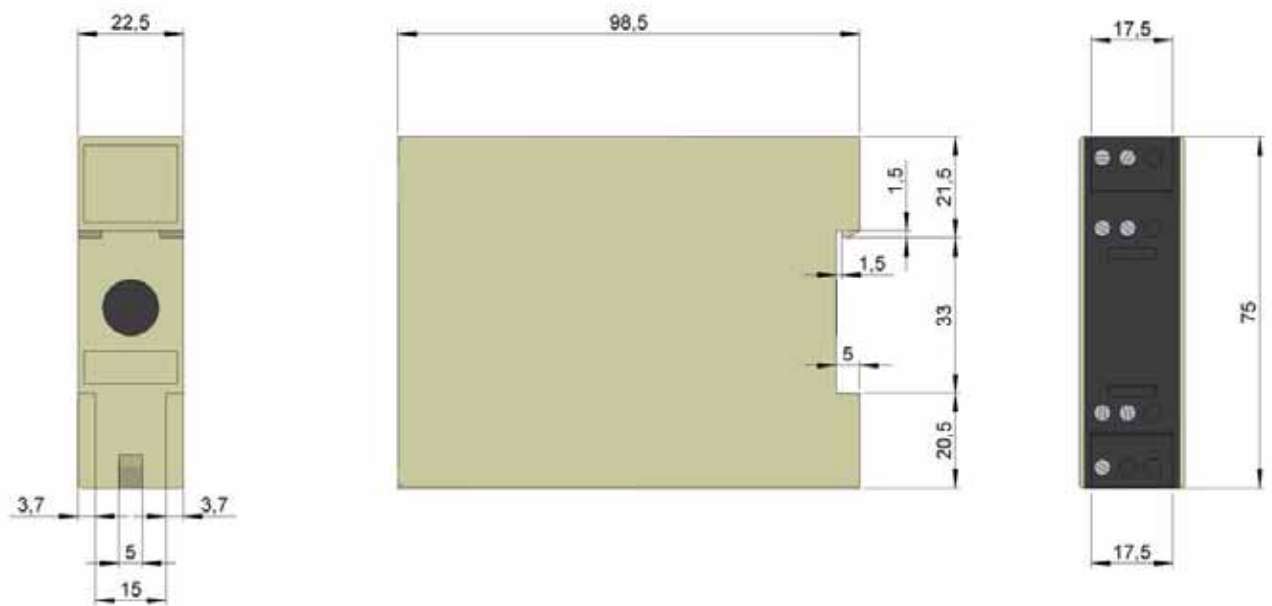
**PIN 11:** NCr

**PIN 12:** Anti-dither output signal

# DIRECTION DETECTOR MODULE 90.8601

## DIRECTION DETECTOR MODULE FOR ENCONDERS

- Rotational direction discriminator
- Input A and B Push-pull (HTL) opto-isolated
- Output A, B and direction Push-pull (HTL)
- Low consumption 70mA (without load)
- Power supply 10..24v
- Protection class IP 20
- Rapid assembly on a DIN rail



### MECHANICAL SPECIFICATIONS

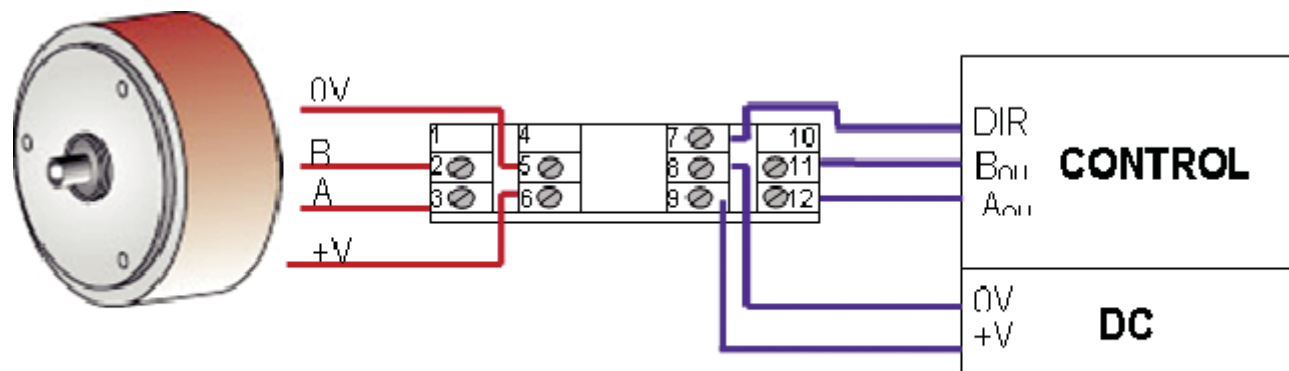
|                                      |  |
|--------------------------------------|--|
| Input channels                       | A/B                                      |
| Input signal type                    | Push-Pull                                |
| Input signal level                   | 10..24v                                  |
| Frecuency                            | 200 Khz                                  |
| Passive filter                       | 250 Khz                                  |
| Phase displacement of input signal   | 90° ±25%                                 |
| Output channels                      | A/B/direction                            |
| Output signal type                   | Push-pull                                |
| Output signal level                  | 10..24v                                  |
| Output load intensity                | 30 mA per channel                        |
| Power supply                         | 10..24v                                  |
| Intern consumption                   | 70 mA without load                       |
| Encoder power supply output          | 10..24v                                  |
| Connection type                      | Pitch of the connection strip screw 5,08 |
| Max.conductor sections               | Max 2,5 mm <sup>2</sup>                  |
| Protection against dust and splashes | IP 20                                    |
| Relative humidity                    | 85%                                      |
| Operating temperature range          | -10°..+70°C                              |
| Assembly                             | DIN Rail in 50022                        |
| Weight                               | 100 gr                                   |
| Housing                              | Grey polycarbonate UL94                  |

## MODULE DESCRIPTION

Especially designed module for applications where automatic up/down inputs are lacking. The digital direction detector takes advantage of the two channels of encoder A and B for generating a DIR output signal. According to the direction in which the encoder turns, channel A will advance by 90° to B or vice versa. In the first case, the DIR output will be a 0. In the second case,

where channel B advances on channel A, the DIR output will be a 1. Apart from the DIR output, the A and B input signals are digitalised and regenerated at the Aout and Bout respectively. The output driver for the three signals (Aout, Bout and DIR) is a 10-24V Push-Pull.

## CONNECTION DIAGRAM



**PIN 1:** NC  
**PIN 2:** Input channel B encoder  
**PIN 3:** Input channel A encoder  
**PIN 4:** NC  
**PIN 5:** 0 V Encoder  
**PIN 6:** Power supply encoder +V

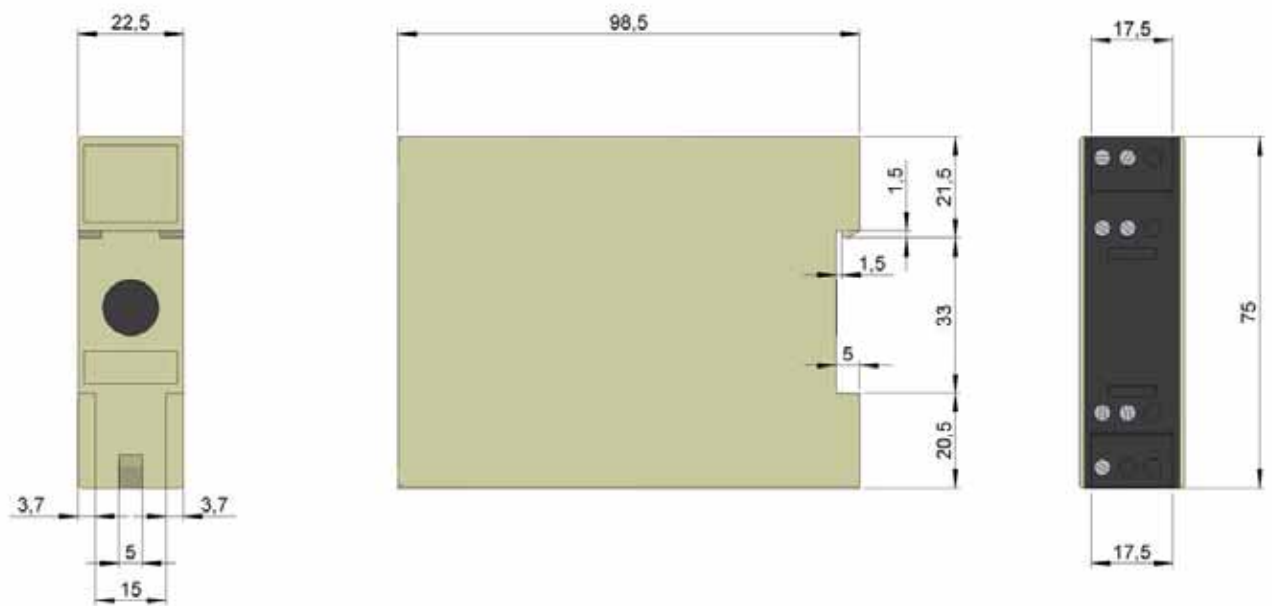
**PIN 7:** Output DIR  
**PIN 8:** 0 V  
**PIN 9:** Power supply encoder +V  
**PIN 10:** NC  
**PIN 11:** Output Bout  
**PIN 12:** Output Aout

# DIFFERENTIAL SIGNALS CONVERTOR

# 90.8602

## DIFFERENTIAL SIGNALS CONVERTOR FOR ENCODERS

- A/B Differential signals convertor
- A/A and B/B differential Push-Pull Input
- A/B Push-Pull Output
- Low consumption 70mA (without load)
- Power supply 10..24v
- Protection class IP 20
- Rapid assembly on a DIN Rail



## MECHANICAL SPECIFICATIONS

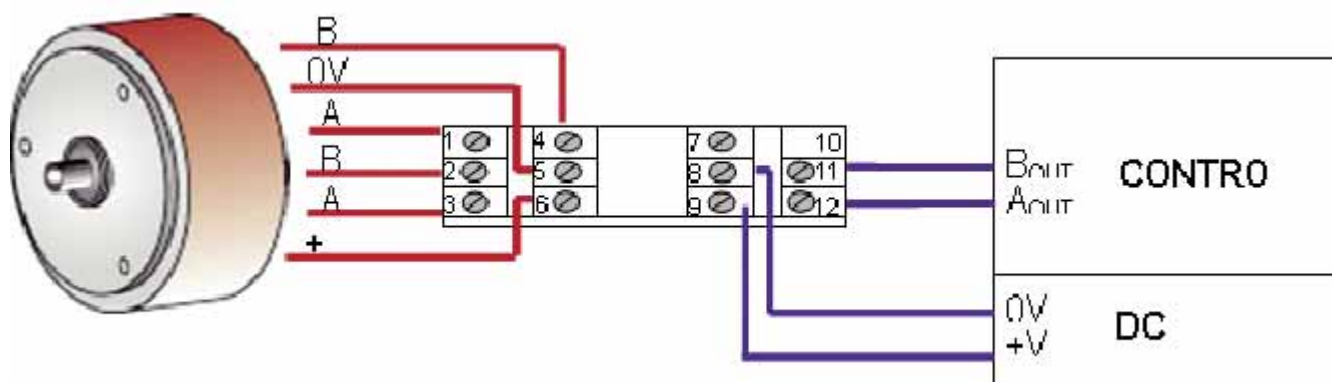
|                                      |  |
|--------------------------------------|--|
| Input channels                       | Differential A/B                         |
| Input signal type                    | Differential Push-Pull                   |
| Input signal level                   | 10..24v                                  |
| Frecuency                            | 200 Khz                                  |
| Passive filter                       | 250 Khz                                  |
| Input signal phase displacement      | 90° ±25%                                 |
| Output channels                      | A/B/direction                            |
| Output signal type                   | Push-pull                                |
| Output signal level                  | 10..24v                                  |
| Output load intensity                | 30 mA per channel                        |
| Power supply                         | 10..24v                                  |
| Intern consumption                   | 70 mA sin cargo                          |
| Encoder power supply output          | 10..24v                                  |
| Connection type                      | Pitch of the connection strip screw 5,08 |
| Max.conductor sections               | Max 2,5 mm <sup>2</sup>                  |
| Protection against dust and splashes | IP 20                                    |
| Relative humidity                    | 85%                                      |
| Operating temperature range          | -10°..+70°C                              |
| Assembly                             | DIN Rail in 50022                        |
| Weight                               | 100 gr                                   |
| Housing                              | Grey polycarbonate UL94                  |

## MODULE DESCRIPTION

This converter takes advantage of the differential signals referring to each channel (A/An yB/Bn) of the encoder for generating two outputs, A and B. Each one of these outputs will be the result of the A-An and B-Bn operation respectively, modifying the negative levels to 0 volts. Furthermore, the inputs have a 259 KHz filter for high fre-

quencies in order to absorb noise. The output driver for the two signals (Aout, Bout) is a 10-24V Push-Pull. This system is very useful when you want to have quality signals (A,B) in environments with high electromagnetic interference and wiring distances, but at the same time you want to save on control inputs.

## CONNECTION DIAGRAM



**PIN 1:** Input channel An encoder  
**PIN 2:** Input channel B encoder  
**PIN 3:** Input channel A encoder  
**PIN 4:** Input channel An encoder  
**PIN 5:** 0 V Encoder  
**PIN 6:** Power supply encoder +V

**PIN 7:** NC  
**PIN 8:** 0 V  
**PIN 9:** Power supply encoder +V(10/24 Vdc)  
**PIN 10:** NC  
**PIN 11:** Output signal Bout  
**PIN 12:** Output signal Aout



# OVERVIEW ACCESSORIES

Flexible couplings



Flanges



Support angles



Measuring wheels



Mounting bells



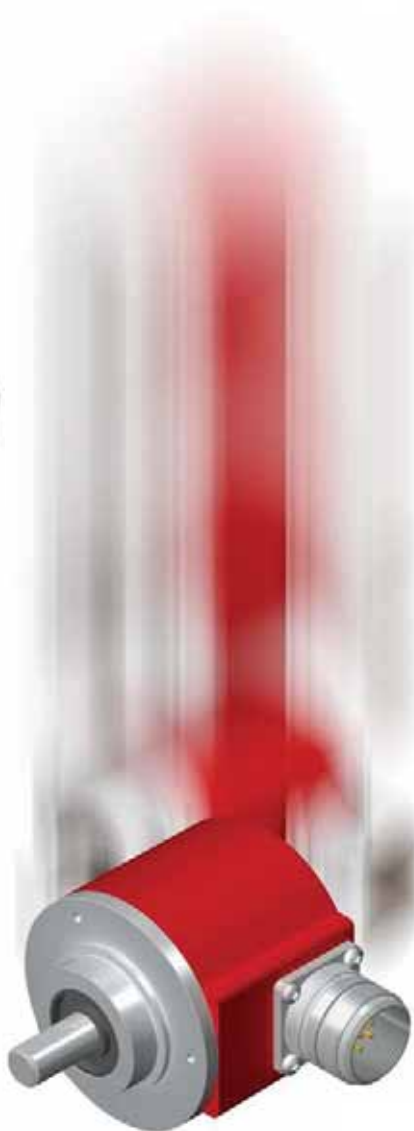
Antirotation systems



Pre-assembled cables



Connectors





# FLEXIBLE COUPLINGS

## ■ Coupling importance

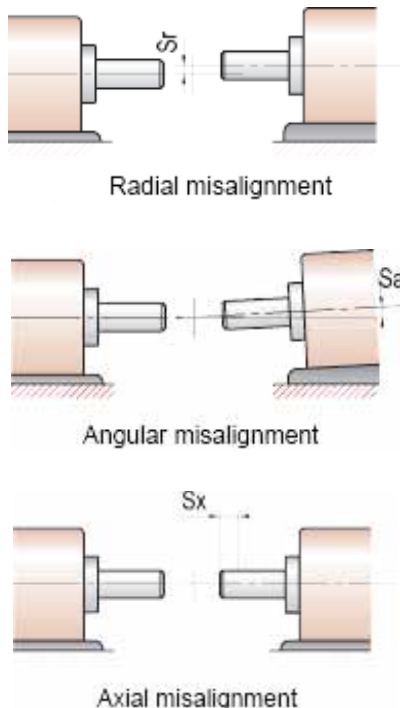
A large number of mechanical installations involve the problem of transmitting movement between the machine shafts. The coupling is the simplest manner of achieving this transmission since it works by joining the two ends of these shafts, thus transmitting rotation from one to the other. Not only does correct equipment operation depend on good resolution of the transmission problem, but also the useful lifetime of the encoders or coupled machines.

## ■ Selection

Coupling selection must be a compromise between factors, such as cost, available installation space, the required duration and transmission performance, which must satisfy requirements, such as:

## ■ Absorption of shaft misalignment and loads

Due to dimensional errors inherent in all mechanical installations, the shafts to be installed will maintain certain positional differences or "misalignment" between the two and this will hinder the transmission of movement. This misalignment may be axial, radial or angular.



In all cases, the employed coupling system must be able to absorb such misalignment and prevent any negative effects of loads on shafts, bearings, supports and frames. Misalignment can also cause fatigue or wear in the coupling and therefore, during selection, the rotation speed must be taken into account, reducing as much as possible the maximum acceptable misalignment figures that are given in the tables for each model.



## ■ For transmission

This is not important for measurement systems. For power drives, it should be verified that the torque to be transmitted is less than the rated torque given in the performance tables, with greater margins in accordance with the expected misalignment.

## ■ Kinematic precision

In measurement systems and high-precision drives, it is important that the coupling does not cause any positional phase differences between the shafts.

All models in the ENCO-FLEX range are free from torsional play and only the OLDHAM may acquire a certain amount of free play after a time working with significant radial misalignment (and this can be corrected by replacing the disc). If the load torque or inertia in the driven shaft is significant, phase differences may be produced due to the torsional elasticity in the coupling. In such cases, the use of models that are not very rigid, such as the SPRING-FLEX or POLY-FLEX, should be avoided.

## ■ Rotation speed

The OLDHAM-FLEX and SPRING-FLEX models are not suitable for high-speed shafts, especially if there is significant misalignment. For the rest of the couplings, it must be taken into account that their useful lifetime depends on fatigue and hence the speed at which they operate.

## ■ Securing to shafts

Couplings can be supplied with fixing setscrews (two at  $90^\circ$ ) or with a built-in clamp-flange.

Clamp securing has the advantage of not producing any marks on the shafts, thus they are better able to withstand sharp inversions and vibration. Setscrews are more economic and allow larger diameters to be employed for the same coupling. The inconvenience of setscrews is that they can produce flaw on the shafts. Moreover, they can loosen due to vibration, but this can be avoided by using a semi-permanent adhesive.

# COUPLING ALU-FLEX

## ALUMINIUM GROOVED FLEXIBLE COUPLINGS

- Without free-plays. They do not produce any speed variations in the transmission
- High torsional rigidity
- Available with setscrews and built-in clamps
- Resistant to oils and chemical products
- Mechanical protection against excessive torque



ALU-FLEX are single flexible couplings in a single piece, machined from hardened aluminium alloy.

They are suitable for transmissions that require moderate torque and when shaft misalignment is not very large. They act as mechanical fuses to excessive torques.

These couplings are suitable for measurement and control systems, together with reduced torque drives. They permit transmission of very precise kinematic movement, without free-play and with low torsional elasticity. They are recommended for auxiliary machines, tachometric generators potentiometers and encoders etc. The coupling will absorb errors in alignment and shaft installation.

## TECHNICAL SPECIFICATIONS

| Type     | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Torsion<br>spring<br>stiffness<br>Ncm/rad | Radial<br>spring<br>stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|----------|---------------|---------------------------|---------------------|--------------------------------|-------------|--------------|---|---------------------------------------|--------------|-----------------------------|
|          |               |                           |                     | Angular<br>degree              | Axial<br>mm | Radial<br>mm |   |                                       |              |                             |
| AFP 6508 | 2             | 8                         | 8.000               | ±2                             | ±0,15       | ±0,1         | 0,55                                      | 24                                    | 0,5          | 0,02                        |
| AFP 1015 | 15            | 15                        | 8.000               | ±2                             | ±0,2        | ±0,15        | 2,2                                       | 22                                    | 2,4          | 0,34                        |
| AFP 1218 | 25            | 35                        | 8.000               | ±2,5                           | ±0,25       | ±0,15        | 2,8                                       | 28                                    | 4            | 0,83                        |
| AFP 1622 | 40            | 50                        | 8.000               | ±3                             | ±0,3        | ±0,2         | 5   | 34                                    | 9,5          | 3,2                         |
| AFP 1922 | 60            | 50                        | 8.000               | ±3,5                           | ±0,4        | ±0,25        | 9   | 40                                    | 13           | 6,7                         |
| AFP 2524 | 100           | 120                       | 8.000               | ±4                             | ±0,5        | ±0,3         | 20  | 60                                    | 26           | 22,2                        |
| AFP 2532 | 100           | 120                       | 8.000               | ±4                             | ±0,5        | ±0,3         | 18  | 50                                    | 35           | 30                          |
| AFP 3030 | 150           | 120                       | 8.000               | ±4                             | ±0,5        | ±0,3         | 21  | 60                                    | 45           | 57                          |
| AFP 3038 | 150           | 120                       | 8.000               | ±4                             | ±0,5        | ±0,3         | 21  | 60                                    | 60           | 76                          |
| AFA 1421 | 50            | 50                        | 6.000               | ±3                             | ±0,25       | ±0,2         | 4,5                                       | 22                                    | 6,5          | 1,9                         |
| AFA 1625 | 60            | 50                        | 6.000               | ±3,5                           | ±0,3        | ±0,2         | 5,5                                       | 30                                    | 10           | 3,8                         |
| AFA 1928 | 80            | 80                        | 6.000               | ±4                             | ±0,4        | ±0,25        | 8   | 36                                    | 16           | 8,7                         |
| AFA 2532 | 120           | 100                       | 6.000               | ±4                             | ±0,5        | ±0,35        | 16  | 45                                    | 34           | 29                          |
| AFA 3038 | 150           | 100                       | 6.000               | ±0,4                           | ±0,5        | ±0,35        | 19  | 60                                    | 58           | 76                          |

**TYPE AFP 6508**

Ø int. d1/d2  
01/01  
01/02  
02/02

Ordering code example: AFP 6508 02/02

**TYPE AFP 1015**

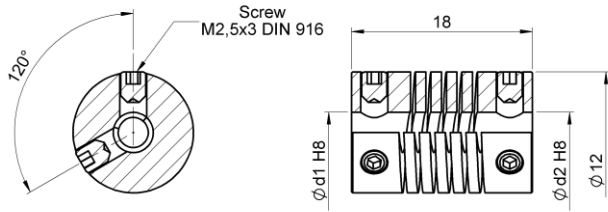
Ø int. d1/d2  
02/02  
02/03  
02/04  
02/05  
03/03  
03/05

Ordering code example: AFP 1015 02/02



TYPE AFP 1218

| Ø int. d1/d2 |
|--------------|
| 02/04        |
| 03/03        |
| 03/04        |
| 04/04        |

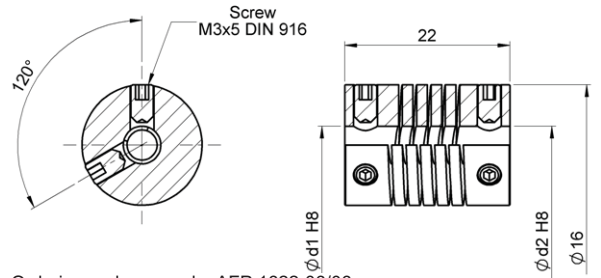


Ordering code example: AFP 1218 04/04



TYPE AFP 1622

| Ø int. d1/d2 |
|--------------|
| 03/03        |
| 04/04        |
| 04/05        |
| 05/05        |
| 06/06        |

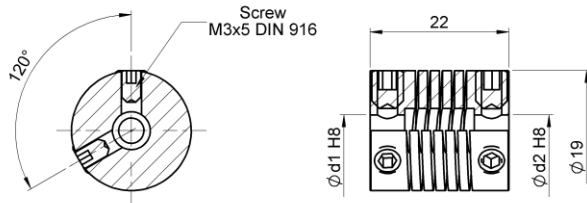


Ordering code example: AFP 1622 06/06



TYPE AFP 1922

| Ø int. d1/d2 |
|--------------|
| 04/06        |
| 05/05        |
| 06/06        |

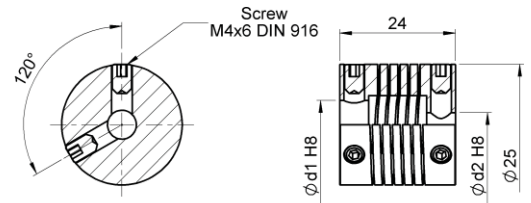


Ordering code example: AFP 1922 06/06



TYPE AFP 2524

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/08        |
| 06/10        |
| 08/08        |
| 10/10        |
| 12/12        |

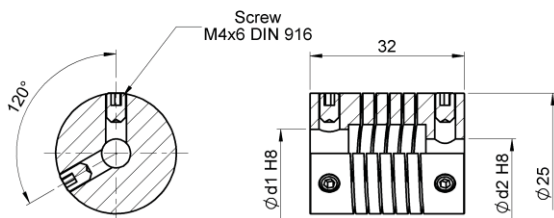


Ordering code example: AFP 2524 06/06



TYPE AFP 2532

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/08        |
| 08/08        |
| 08/10        |
| 10/10        |
| 10/12        |
| 10/10        |

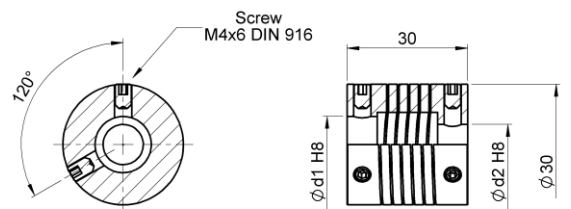


Ordering code example: AFP 2532 10/10



TYPE AFP 3030

| Ø int. d1/d2 |
|--------------|
| 10/10        |
| 10/12        |
| 10/14        |

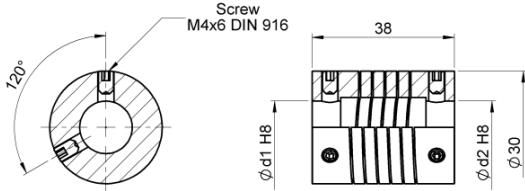


Ordering code example: AFP 3030 10/10



TYPE AFP 3038

- Ø int. d1/d2
- 10/10
- 12/12
- 14/14

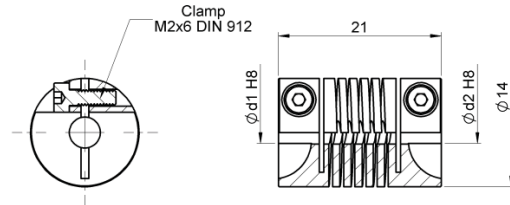


Ordering code example: AFP 3038 12/12



TYPE AFA 1421

- Ø int. d1/d2
- 02/02
- 02/03
- 03/03
- 03/04
- 04/04

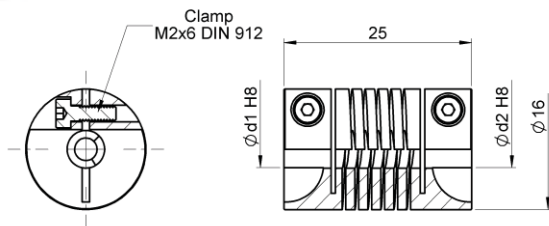


Ordering code example: AFA 1421 04/04



TYPE AFA 1625

- Ø int. d1/d2
- 03/03
- 03/05
- 04/04
- 05/05

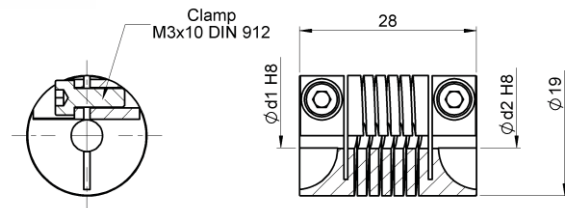


Ordering code example: AFA 1625 05/05



TYPE AFA 1928

- Ø int. d1/d2
- 04/04
- 04/06
- 05/05
- 05/06
- 06/06

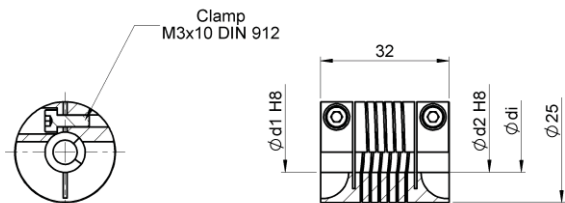


Ordering code example: AFA 1928 06/06



TYPE AFA 2532

- Ø int. d1/d2
- 06/06
- 06/08
- 06/10
- 08/08
- 08/10
- 10/10
- 10/12

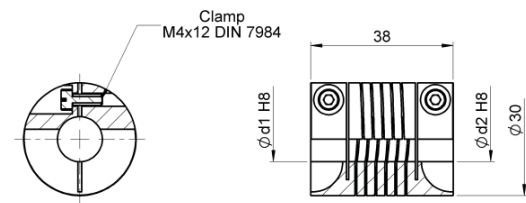


Ordering code example: AFA 2532 10/10



TYPE AFA 3038

- Ø int. d1/d2
- 10/10
- 12/12
- 14/14



Ordering code example: AFA 3038 12/12



# COUPLING POLY-FLEX

## ACETAL GROOVED FLEXIBLE COUPLINGS

- Absorption of significant angular and radial deviations
- Low inertia
- Free of speed variations in the transmission
- Torsional vibration attenuation
- Electric and thermal insulation between the shafts
- Mechanical protection against excessive torque



POLY-FLEX are flexible couplings manufactured in polyamide and reinforced with fibreglass. Reduced size for applications that do not require high torque and where there is significant shaft misalignment. The material provides excellent resistance to fatigue, which makes it very suitable for high-speed couplings. It absorbs torsional vibration and insulates the shafts both electrically and thermally, acting, where necessary, as a mechanical fuse.

The tightening of the setscrews has been reinforced by incorporating an aluminium fitting.

These couplings are suitable for measurement systems and machines that do not offer high resistant torque values. They are recommended for tachometric generators potentiometers and encoders, etc.

POLY-FLEX couplings can be used in the temperature range of -30° to 85°.

## TECHNICAL SPECIFICATIONS

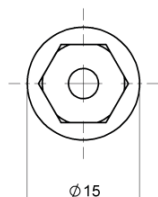
| Type     | Torque<br>Ncm | Clamping torque<br>Ncm | Max. speed<br>r.p.m. | Admissible max.misalignment |          |           | Torsion spring stiffness<br>Ncm/rad | Radial spring stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|----------|---------------|------------------------|----------------------|-----------------------------|----------|-----------|-------------------------------------|---------------------------------|--------------|-----------------------------|
|          |               |                        |                      | Angular degree              | Axial mm | Radial mm |                                     |                                 |              |                             |
| PFP 1520 | 20            | 70                     | 12.000               | ±2,5                        | ±0,2     | ±0,3      | 12                                  | 45                              | 6            | 2                           |
| PFP 2224 | 80            | 150                    | 10.000               | ±3                          | ±0,2     | ±0,3      | 38                                  | 115                             | 10           | 7                           |



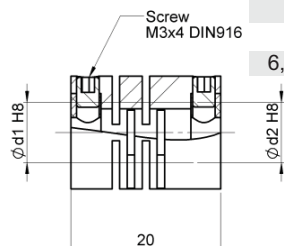
TYPE PFP 1520

Ø int. d1/d2

- 03/03
- 03/05
- 03/06
- 04/04
- 04/05
- 04/06
- 05/05
- 05/06
- 06/06
- 6,35/6,35



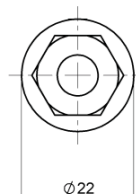
Ordering code example: PFP 1520 06/06



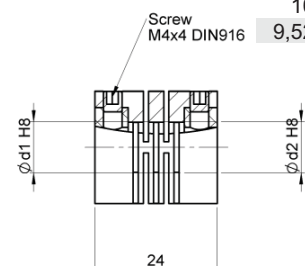
TYPE PFP 2224

Ø int. d1/d2

- 04/04
- 06/06
- 06/08
- 06/10
- 6,35/6,35
- 08/10
- 10/10
- 9,52/9,52



Ordering code example: PFP 2224 08/08



# COUPLING **SPRING-FLEX**

## FLEXIBLE COUPLING SPRINGS

- Absorption of significant misalignment
- Elimination of loads due to shaft misalignment
- Free of wear and fatigue
- Vibration absorption
- High torsional elasticity
- Protection against sudden acceleration in transmission



SPRING-FLEX couplings are based on the use of a helicoid spring as an elastic transmission element. These springs are constructed from stainless steel with a plane section. Spring ends are designed to prevent its rotation.


The result is a highly elastic coupling that enables very misaligned shafts to be coupled without the reactions on the bearings being excessively high. The coupling maintains its properties in both direc-

tions of rotations.

They are suitable for measurement systems and machines that do not offer a very high load torque and where the alignment of the shafts is not too tight or can cause variations (heat expansion, vibration and movements etc).

## TECHNICAL SPECIFICATIONS

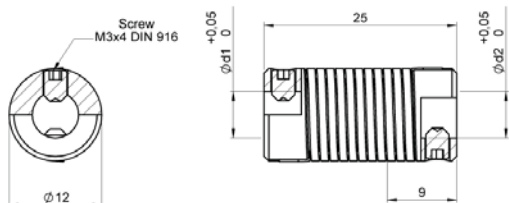
| Type            | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.<br>speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Torsion<br>spring<br>stiffness<br>Ncm/rad | Radial<br>spring<br>stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|-----------------|---------------|---------------------------|-------------------------|--------------------------------|-------------|--------------|---|---------------------------------------|--------------|-----------------------------|
|                 |               |                           |                         | Angular<br>degree              | Axial<br>mm | Radial<br>mm |   |                                       |              |                             |
| <b>SFP 1225</b> | 30            | 70                        | 8.000                   | ±5                             | ±0,5        | ±0,5         | 40  | 60                                    | 14           | 2,8                         |
| <b>SFP 1635</b> | 100           | 150                       | 3.000                   | ±5                             | ±1          | ±1           | 50  | 70                                    | 28           | 10                          |
| <b>SFP 2650</b> | 300           | 300                       | 3.000                   | ±5                             | ±1          | ±1,5         | 40  | 60                                    | 100          | 95                          |




**TYPE SFP 1225**

Ø int. d1/d2

- 03/03
- 03/04
- 03/05
- 04/04
- 04/05
- 04/06
- 05/05
- 06/06



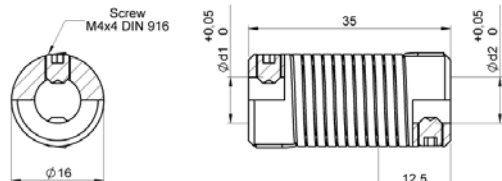
Ordering code example: SFP 1225 06/06




**TYPE SFP 1635**

Ø int. d1/d2

- 04/04
- 04/05
- 04/06
- 05/05
- 05/06
- 06/06
- 06/08
- 08/08



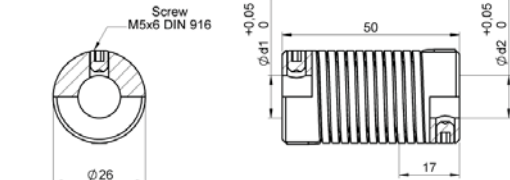
Ordering code example: SFP 1635 08/08



**TYPE SFP 2650**

Ø int. d1/d2

- 06/06
- 06/08
- 06/10
- 08/08
- 08/10
- 10/10
- 10/12
- 12/12



Ordering code example: SFP 2650 10/12

# COUPLING BELLOW-FLEX

## FLEXIBLE METAL BELLOWS COUPLINGS

- High absorption of misalignments
- Elimination of loads on the shafts due to misalignment
- No wear and tear or fatigue
- No cinematic errors in transmission
- High torsional stiffness



BELLOW-FLEX couplings are based on the use of flexible metal bellows that can transmit the moment of rotation while compensating for errors of alignment without hardly any distortion due to torsional elasticity.

The characteristics of the BELLOW-FLEX produce speed transmission of great precision, including high torque and speeds, which

recommend them for servo-actions, precision machinery, installation of control and measurement, etc.

The number of convolutions in the bellow has been chosen in the search for a compromise between the transmittable torque and the admissible misalignments.

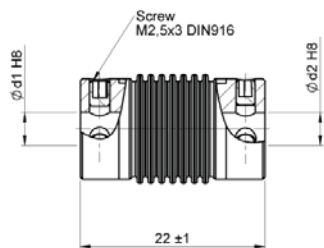
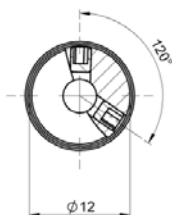
### TECHNICAL SPECIFICATIONS

| Type     | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Torsion<br>spring<br>stiffness<br>Ncm/rad | Radial<br>spring<br>stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|----------|---------------|---------------------------|---------------------|--------------------------------|-------------|--------------|---|---------------------------------------|--------------|-----------------------------|
|          |               |                           |                     | Angular<br>degree              | Axial<br>mm | Radial<br>mm |   |                                       |              |                             |
| BFP 1222 | 15            | 50                        | 10.000              | ±2,5                           | ±0,4        | ±0,2         | 45  | 30                                    | 8            | 1,8                         |
| BFP 1520 | 15            | 15                        | 10.000              | ±3                             | ±0,4        | ±0,2         | 90  | 40                                    | 6            | 2                           |
| BFP 1525 | 40            | 40                        | 10.000              | ±4                             | ±0,5        | ±0,3         | 70  | 15                                    | 7            | 2,3                         |
| BFP 2029 | 80            | 150                       | 10.000              | ±4                             | ±0,4        | ±0,25        | 150                                       | 25                                    | 15           | 8                           |
| BFP 2035 | 80            | 150                       | 10.000              | ±4                             | ±0,5        | ±0,3         | 140                                       | 10                                    | 16           | 9                           |
| BFA 1622 | 40            | 50                        | 10.000              | ±3                             | ±0,4        | ±0,2         | 90  | 40                                    | 6            | 2,1                         |
| BFA 1627 | 40            | 50                        | 10.000              | ±4                             | ±0,5        | ±0,3         | 70  | 15                                    | 7            | 2,6                         |
| BFA 2129 | 80            | 100                       | 10.000              | ±4                             | ±0,4        | ±0,25        | 150                                       | 25                                    | 15           | 9                           |
| BFA 2135 | 80            | 100                       | 10.000              | ±4                             | ±0,5        | ±0,3         | 140                                       | 10                                    | 16           | 9,5                         |
| BFA 2435 | 80            | 100                       | 10.000              | ±4                             | ±0,5        | ±0,3         | 140                                       | 10                                    | 18           | 10,8                        |
| BFP 1223 | 13            | 79                        | 10.000              | ±15                            | ±2,29       | ±0,54        | 28  | 4,2                                   | 10           | 1,85                        |
| BFP 1730 | 39            | 132                       | 10.000              | ±14                            | ±3,09       | ±0,72        | 80  | 5,8                                   | 10           | 3,81                        |
| BFP 2533 | 328           | 132                       | 10.000              | ±8                             | ±2,77       | ±0,46        | 462                                       | 38,1                                  | 19,5         | 16,1                        |
| BFA 1733 | 39            | 35                        | 10.000              | ±14                            | ±3,09       | ±0,72        | 80  | 5,8                                   | 11,5         | 4,89                        |
| BFA 2537 | 328           | 66                        | 10.000              | ±8                             | ±2,77       | ±0,46        | 462                                       | 38,1                                  | 28,5         | 25,4                        |



TYPE BFP 1222

- Ø int. d1/d2
- 03/03
  - 04/04
  - 04/06
  - 05/05
  - 06/06

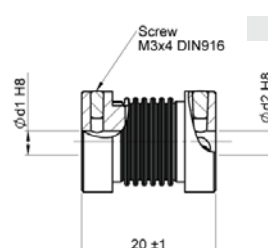
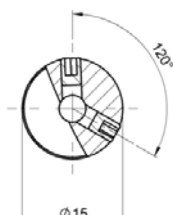


Ordering code example: BFP 1222 06/06



TYPE BFP 1520

- Ø int. d1/d2
- 03/03
  - 03/05
  - 03/06
  - 04/04
  - 04/05
  - 04/06
  - 05/05
  - 06/06

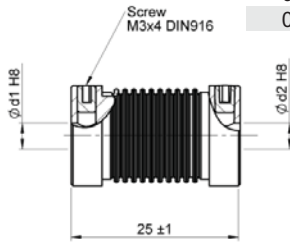
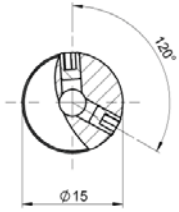


Ordering code example: BFP 1520 04/04



### TYPE BFP 1525

| Ø int. d1/d2 |
|--------------|
| 03/03        |
| 03/05        |
| 03/06        |
| 04/04        |
| 04/05        |
| 04/06        |
| 05/05        |
| 06/06        |

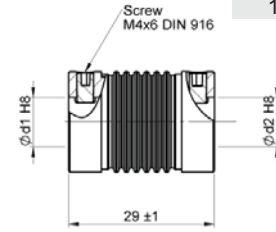
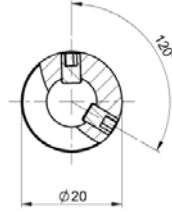


Ordering code example: BFP 1525 03/03



### TYPE BFP 2029

| Ø int. d1/d2 |
|--------------|
| 04/04        |
| 04/06        |
| 06/06        |
| 06/10        |
| 08/08        |
| 10/10        |
| 10/12        |
| 12/12        |

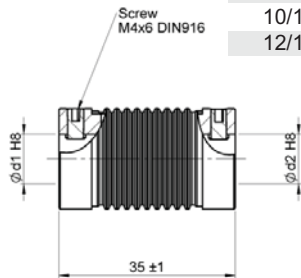
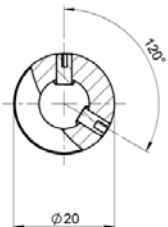


Ordering code example: BFP 2029 06/06



### TYPE BFP 2035

| Ø int. d1/d2 |
|--------------|
| 04/04        |
| 04/06        |
| 06/06        |
| 06/10        |
| 08/08        |
| 10/10        |
| 10/12        |
| 12/12        |

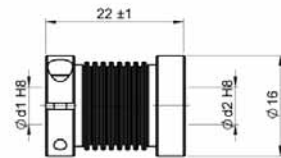
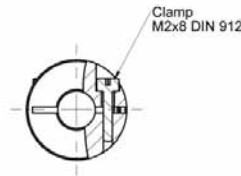


Ordering code example: BFP 2035 10/12



### TYPE BFA 1622

| Ø int. d1/d2 |
|--------------|
| 03/03        |
| 03/05        |
| 03/06        |
| 04/04        |
| 04/05        |
| 04/06        |
| 05/05        |
| 06/06        |

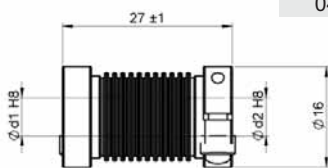
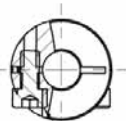


Ordering code example: BFA 1622 06/06



### TYPE BFA 1627

| Ø int. d1/d2 |
|--------------|
| 03/03        |
| 03/05        |
| 03/06        |
| 04/04        |
| 04/05        |
| 04/06        |
| 05/05        |
| 04/06        |

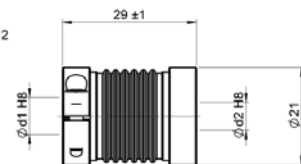
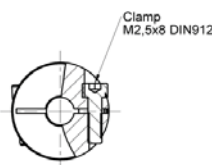


Ordering code example: BFA 1627 06/06



### TYPE BFA 2129

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/10        |
| 08/08        |
| 10/10        |

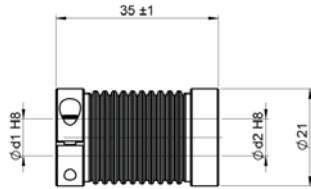
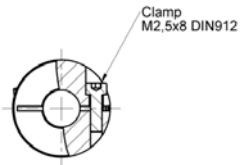


Ordering code example: BFA 2129 10/10



TYPE BFA 2135

- Ø int. d1/d2
- 06/06
- 06/10
- 08/08
- 10/10

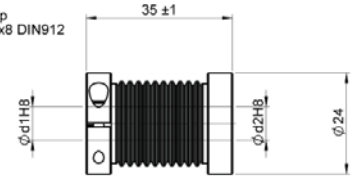
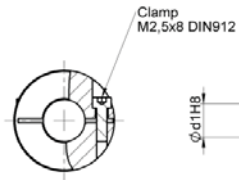


Ordering code example: BFA 2135 12/12



TYPE BFA 2435

- Ø int. d1/d2
- 06/12
- 10/12
- 12/12

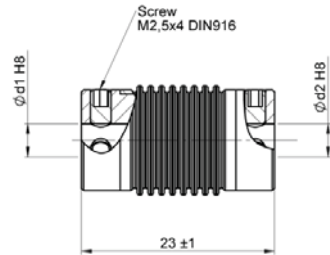
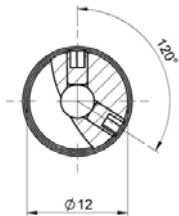


Ordering code example: BFA 2435 12/12



TYPE BFP 1223

- Ø int. d1/d2
- 02/02
- 02/03
- 03/03
- 04/04
- 04/06
- 06/06

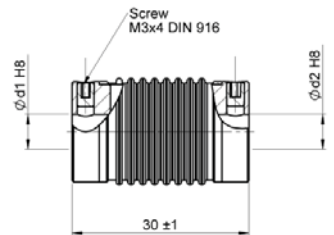
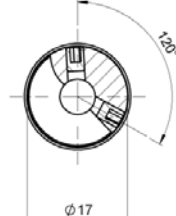


Ordering code example: BFP 1223 04/06



TYPE BFP 1730

- Ø int. d1/d2
- 04/04
- 04/06
- 06/06
- 06/10
- 08/08
- 10/10

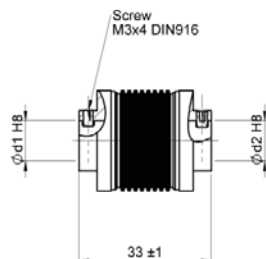
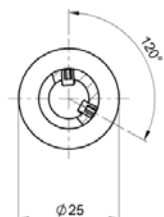


Ordering code example: BFP 1730 06/10



TYPE BFP 2533

- Ø int. d1/d2
- 06/06
- 06/10
- 06/12
- 08/08
- 10/10
- 12/12

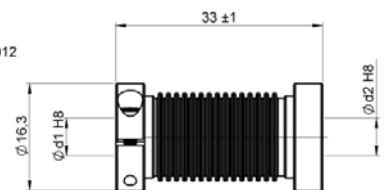
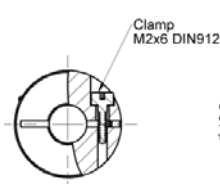


Ordering code example: BFP 2533 10/10



TYPE BFA 1733

- Ø int. d1/d2
- 03/03
- 04/04
- 04/06
- 06/06



Ordering code example: BFA 1733 04/06



**TYPE BFA 2537**

**Ø int. d1/d2**

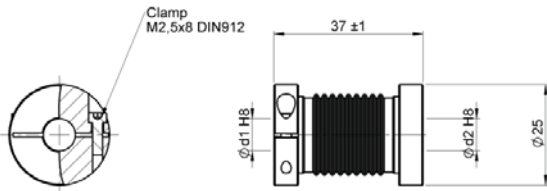
06/06

06/10

08/08

10/10

12/12



Ejemplo de referencia: BFA 2537 08/08



# COUPLING LAMI-FLEX

## FLEXIBLE SHEET COUPLINGS

- Suitable for high speed
- High flexibility
- No cinematic errors in transmission
- High torsional rigidity



The LAMI-FLEX couplings are based on the use of some flexible steel or plastic membranes that pivot on the coupling, thus proportioning it a very good flexibility. The characteristics of LAMI-FLEX result in a transmission of great pre-

cision movement.

They are suitable for high rotation speeds, such as robots, machine-tools, turbines, dynamometers ...

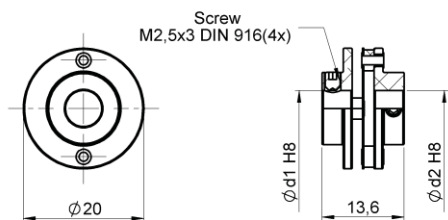
## TECHNICAL SPECIFICATIONS

| Type     | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Torsion<br>spring<br>stiffness<br>Ncm/rad | Radial<br>spring<br>stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|----------|---------------|---------------------------|---------------------|--------------------------------|-------------|--------------|---|---------------------------------------|--------------|-----------------------------|
|          |               |                           |                     | Angular<br>degree              | Axial<br>mm | Radial<br>mm |   |                                       |              |                             |
| LFP 2014 | 50            | 60                        | 10.000              | ±2,5                           | ±0,3        | -            | 100                                       | -                                     | 5            | 2,6                         |
| LFP 2016 | 50            | 60                        | 10.000              | ±3                             | ±0,4        | ±0,2         | 45  | 125                                   | 6            | 2,8                         |
| LFA 2213 | 20            | 20                        | 10.000              | ±2                             | ±0,3        | ±0,3         | 14  | 3                                     | 9,5          | 3,2                         |
| LFA 3019 | 80            | 80                        | 12.000              | ±3                             | ±0,4        | ±0,4         | 150                                       | 6                                     | 16           | 19                          |
| LFA 2519 | 40            | 65                        | 12.000              | ±2,5                           | ±0,4        | ±0,25        | 22  | 60                                    | 16           | 13,5                        |
| LFA 2525 | 40            | 65                        | 12.000              | ±2,5                           | ±0,4        | ±0,25        | 22  | 60                                    | 18           | 15                          |
| LFA 3022 | 60            | 80                        | 12.000              | ±2,5                           | ±0,4        | ±0,3         | 30  | 40                                    | 30           | 35                          |
| LFA 3027 | 60            | 80                        | 12.000              | ±2,5                           | ±0,4        | ±0,3         | 30  | 40                                    | 32           | 37                          |
| LFA 3850 | 200           | 60                        | 8.000               | ±2,5                           | ±0,8        | ±0,8         | 250                                       | -                                     | 60           | 135                         |
| LFA 3832 | 200           | 60                        | 8.000               | ±2,5                           | ±0,8        | ±0,3         | 250                                       | -                                     | 70           | 112                         |



TYPE LFP 2014

Ø int. d1/d2  
02/02  
02/04  
04/04  
06/06

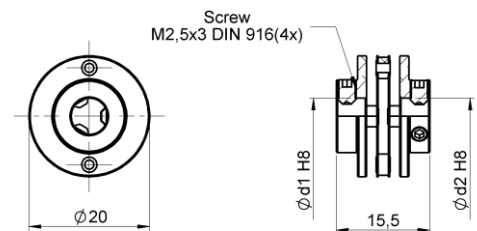


Ordering code example: LFP 2014 04/04



TYPE LFP 2016

Ø int. d1/d2  
02/02  
02/04  
04/04  
06/06

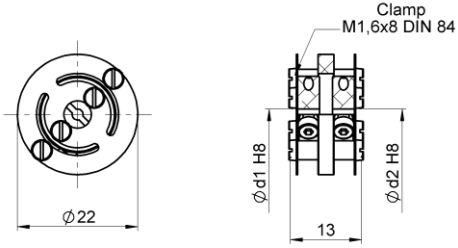


Ordering code example: LFP 2016 02/04



TYPE LFA 2213

| Ø int. d1/d2 |
|--------------|
| 02/02        |
| 02/04        |
| 04/04        |
| 06/06        |

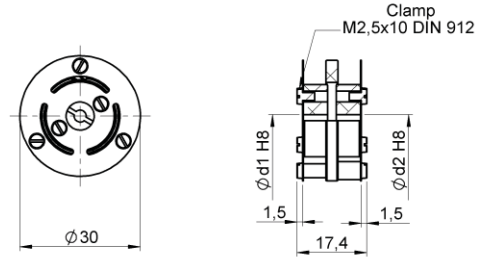


Ordering code example: LFA 2213 04/04



TYPE LFA 3019

| Ø int. d1/d2 |
|--------------|
| 03/03        |
| 04/04        |
| 05/06        |
| 06/06        |
| 06/08        |

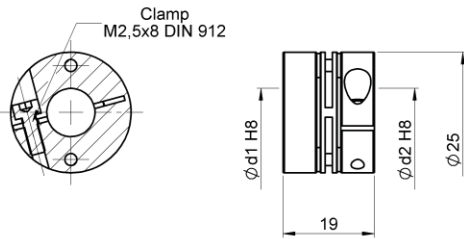


Ordering code example: LFA 3019 06/08



TYPE LFA 2519

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/10        |
| 08/08        |
| 10/10        |

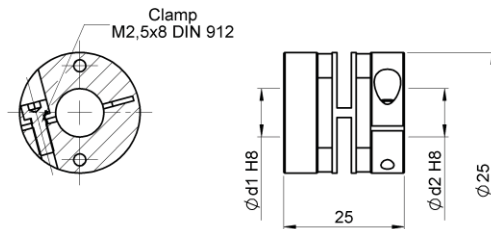


Ordering code example: LFA 2519 06/06



TYPE LFA 2525

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/10        |
| 08/08        |
| 10/10        |
| 10/12        |
| 12/12        |

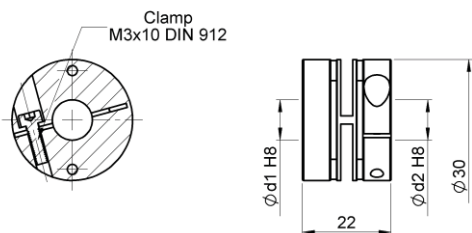


Ordering code example: LFA 2525 06/06



TYPE LFA 3022

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/10        |
| 10/10        |
| 10/12        |
| 12/12        |
| 14/14        |
| 16/16        |

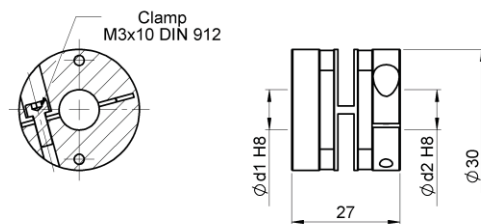


Ordering code example: LFA 3022 10/10



TYPE LFA 3027

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/10        |
| 10/10        |
| 10/12        |
| 12/12        |
| 14/14        |
| 16/16        |

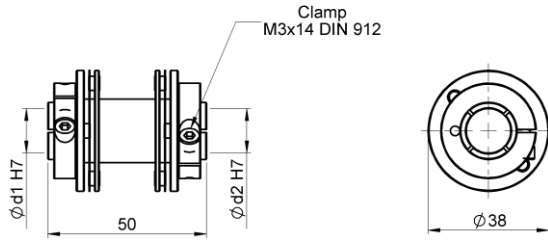


Ordering code example: LFA 3027 12/12



### MODELO LFA 3850

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 10/10        |
| 10/12        |
| 10/14        |
| 12/12        |
| 14/14        |

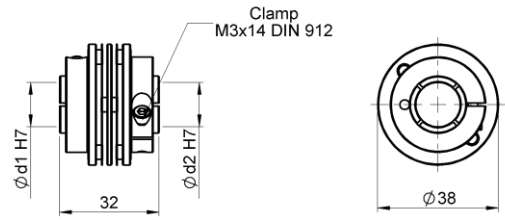


Ordering code example: LFA 3850 06/06



### MODELO LFA 3832

| Ø int. d1/d2 |
|--------------|
| 06/06        |
| 06/10        |
| 10/10        |
| 10/12        |
| 12/12        |
| 14/14        |



Ordering code example: LFA 3832 06/06

# COUPLING OLDHAM-FLEX

## LATERAL SLIPPAGE COUPLINGS

- High absorption capacity of radial misalignment
- They do not produce kinematic errors in transmission
- Elimination of loads on shaft
- Mechanical protection against excessive torque
- Replaceable disc



OLDHAM-FLEX couplings are based on the use of a disc that can move radially with respect to the two shafts, which permits the compensation of large misalignment errors between them.

The drums are machined from hardened aluminium alloy. The discs are manufactured from acetal with excellent mechanical properties and low friction coefficient.

Due to wear, the coupling may show free-play above 10 revolutions under normal misalignment conditions, which can be corrected by replacing the disc. Because the OLDHAM-FLEX couplings are fitted

with securing drums with drilled holes, the discs can be installed and replaced without any need to disassemble the machines in order to separate the shafts.

Radial misalignment does not produce any appreciable kinematic errors in transmission. However, angular misalignment can lead to small errors in a similar fashion to "Cardan" types of universal joints.

They are suitable for positioning shaft slow drives, spindles and valves, etc. They must never be employed with cantilever or paired shafts.

## TECHNICAL SPECIFICATIONS

| Type     | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Torsion<br>spring<br>stiffness<br>Ncm/rad | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|----------|---------------|---------------------------|---------------------|--------------------------------|-------------|--------------|---|--------------|-----------------------------|
|          |               |                           |                     | Angular<br>degree              | Axial<br>mm | Radial<br>mm |   |              |                             |
| OFP 1922 | 160           | 130                       | 2.500               | ±2                             | ±0,2        | ±2           | 11  | 15           | 68                          |
| OFP 2530 | 340           | 310                       | 2.500               | ±2                             | ±0,2        | ±2,8         | 23  | 30           | 254                         |
| OFP 3349 | 800           | 570                       | 2.500               | ±2                             | ±0,3        | ±3,5         | 32  | 90           | 1283                        |

**TYPE OFP 1922**

Ø int. d1/d2  
04/04  
06/06

Ø 19,7

22

8 6 8

Ø d1 H8

Ø d2 H8

Screw  
M3 x 6 DIN 916

Ordering code example: OFP 1922 06/06

**TYPE OFP 2530**

Ø int. d1/d2  
06/06  
06/10  
10/10

Ø 24,7

30

10 10 10

Ø d1 H8

Ø d2 H8

Screw  
M4 x 6 DIN 916

Ordering code example: OFP 2530 10/10

**TYPE OFP 3349**

Ø int. d1/d2  
10/10  
12/12

Ø 33,3

49

15 19 15

Ø d1 H8

Ø d2 H8

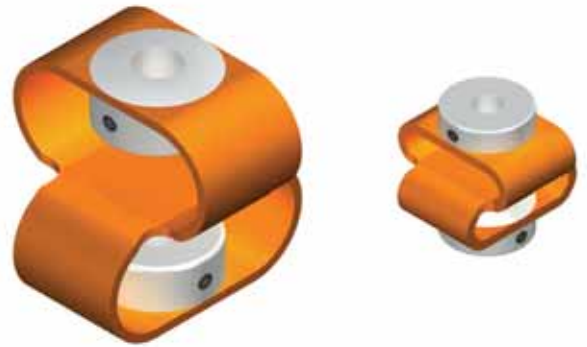
Screw  
M5 x 6 DIN 916

Ordering code example: OFP 3349 12/12

# COUPLING PAGU-FLEX

## FLEXIBLE ISOLATING COUPLING

- High precision for positioning applications
- Without wear or fatigue
- Vibration absorption
- Good torsional elasticity



Adjuntas to a great variety of uses, the PAGU-FLEX couplings have been designed flexibly in accordance with the existing agreements for the shaft, as well as with the different requirements of the specific application cases. In the standard versions, each one of the galvanised heads (C15K

material) has a cylindrical hole (H7 tolerance) and is fixed to the shaft through a stay bolt with a hexagonal head DIN 916. The internal heads are very useful in situations with little space or reduced access.

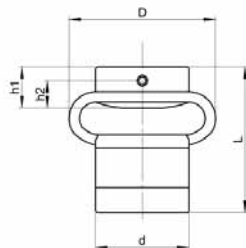
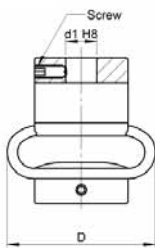
## TECHNICAL SPECIFICATIONS

| Type          | Torque | Clamping torque | Max. speed<br>r.p.m. | Admissible max. misalignment |          |           | Torsion spring stiffness<br>Ncm/rad | Radial spring stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|---------------|--------|-----------------|----------------------|------------------------------|----------|-----------|-------------------------------------|---------------------------------|--------------|-----------------------------|
|               | Ncm    | Ncm             |                      | Angular degree               | Axial mm | Radial mm |                                     |                                 |              |                             |
| <b>GFP 10</b> | 50     | 50              | 10.000               | 10                           | 9        | 2,6       | 320                                 | 11                              | 24           | 0,1                         |
| <b>GFP 20</b> | 180    | 120             | 10.000               | 15                           | 15       | 3,2       | 780                                 | 405                             | 77           | 0,91                        |
| <b>GFP 30</b> | 500    |                 | 10.000               | 15                           | 17       | 3,2       | 2100                                | 7,7                             | 119          | 1,87                        |
| <b>GFP 40</b> | 1000   |                 | 10.000               | 15                           | 22       | 3,2       | 2300                                | 21                              | 128          | 1,65                        |



TYPE GFP 10 06/06

Ø int. d1/d2  
06/06

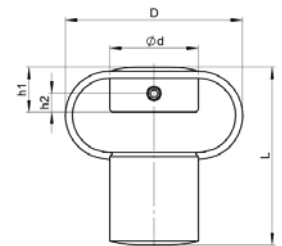
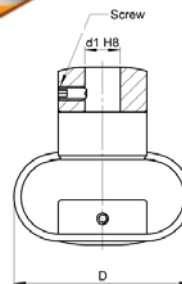


Ordering code example: GFP 10 06/06



TYPE GFP 20 10/10  
TYPE GFP 30 12/12  
TYPE GFP 40 14/14

Ø int. d1/d2  
10/10  
12/12  
14/14



Ordering code example: GFP 20 10/10

| Dimensions in mm                                     | Symbol | 10   | 20   | 30   | 40   |
|--|--------|------|------|------|------|
| Rotation diameter                                    | D      | 26.0 | 48.0 | 54.0 | 54.0 |
| Lenght in the idle mode                              | L      | 28.0 | 48.0 | 58.0 | 61.0 |
| Diameter of the head                                 | d      | 18.0 | 25.0 | 28.0 | 28.0 |
| Height of the head                                   | h1     | 7.9  | 12.7 | 15.9 | 15.9 |
| Height of the thread screw                           | h2     | 5.5  | 7.9  | 10.4 | 11.2 |
| Diameter of the standard drill hole                  | d1     | 6.0  | 10.0 | 12.0 | 14.0 |
| Maximum permitted diameter of the standar drill hole | d1     | 8.0  | 12.0 | 16.0 | 16.0 |
| Hexagonal screw DIN 916                              |        | M3   | M4   | M5   | M6   |

# COUPLING CROSS-FLEX

## SPIDER COUPLING

- Free of cinematic errors in transmission
- Replaceable disc
- Elevated torque transmission
- Admits few misalignments



The CROSS-FLEX couplings are based on the use of a central disc. They are recommended for applications with some of the torque transmissions and with little misalignments.

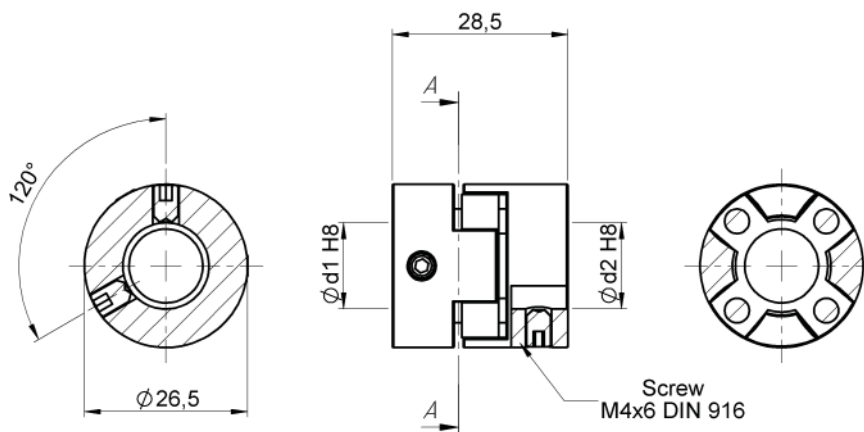
With the use of the CROSS-FLEX couplings, the angular misalignments may lead to small errors.

Radial misalignment does not produce any appreciable kinematic errors in transmission. Wear is minimum.

## TECHNICAL SPECIFICATIONS

| Type   | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Hardness<br>shore<br>hadness | Maxi<br>torsion<br>torgue<br>degree | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|--------|---------------|---------------------------|---------------------|--------------------------------|-------------|--------------|------------------------------|-------------------------------------|--------------|-----------------------------|
|        |               |                           |                     | Angular<br>degree              | Axial<br>mm | Radial<br>mm |                              |                                     |              |                             |
| CFP 80 | 800           | 300                       | 19.000              | ±1,3                           | ±1          | ±0,22        | 80 (blue)                    | 10                                  | 34           | 30                          |
| CFP 92 | 1500          | 300                       | 19.000              | ±1,3                           | ±1          | ±0,22        | 92 (white)                   | 10                                  | 34           | 30                          |
| CFP 98 | 2500          | 300                       | 19.000              | ±1,3                           | ±1          | ±0,22        | 98 (red)                     | 10                                  | 34           | 30                          |

TYPE CFP 80  
TYPE CFP 92  
TYPE CFP 98



Ø int. d1/d2

- 04/04
- 06/06
- 08/08
- 10/10
- 12/12
- 14/14

Ordering code example: CFP 98 06/06



# COUPLING UNION

## RIGID COUPLING

- High rigidity
- Free of cinematic errors in transmission
- Very little misalignment absorption
- Easy assembly, disassembly and adjustment



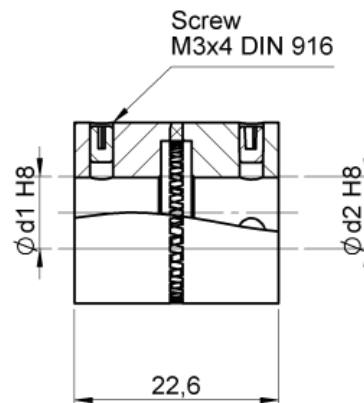
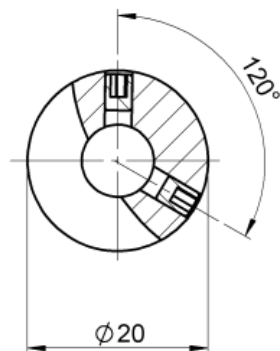
The UNION couplings are simple rigid couplings of two tooled steel pieces. They are apt for transmissions that require elevated torques and where there are no misalignments between the shafts.

In the case of these couplings, the angular misalignments may lead to small errors. They are suitable for positioning shaft slow drives.

## TECHNICAL SPECIFICATIONS

| Type     | Torque<br>Ncm | Clamping<br>torque<br>Ncm | Max.speed<br>r.p.m. | Admissible<br>max.misalignment |             |              | Module<br>mm | Radial<br>spring<br>stiffness<br>N/mm | Weight<br>gr | Inertia<br>gcm <sup>2</sup> |
|----------|---------------|---------------------------|---------------------|--------------------------------|-------------|--------------|--------------|---------------------------------------|--------------|-----------------------------|
|          |               |                           |                     | Angular<br>degree              | Axial<br>mm | Radial<br>mm |              |                                       |              |                             |
| UFP 2022 | 200           | 80                        | 8.000               | ±0,5                           | -           | -            | 0,7          | -                                     | 34           | 30                          |

TYPE UFP 2022



Ø int. d1/d2

06/06

06/08

06/10

08/08

10/10

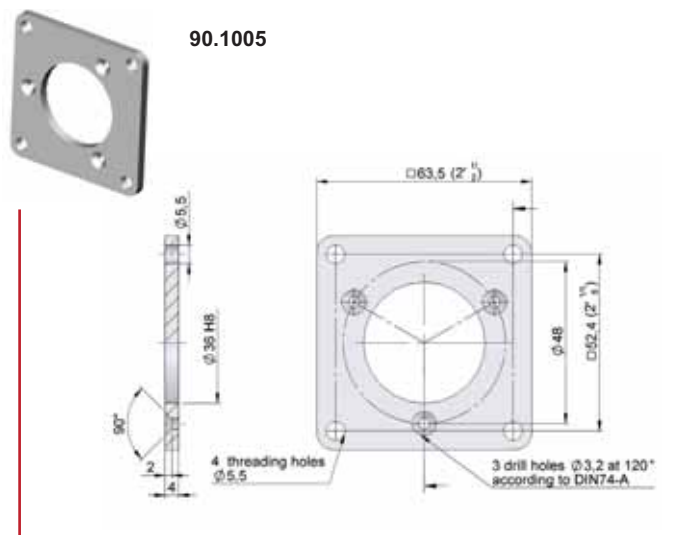
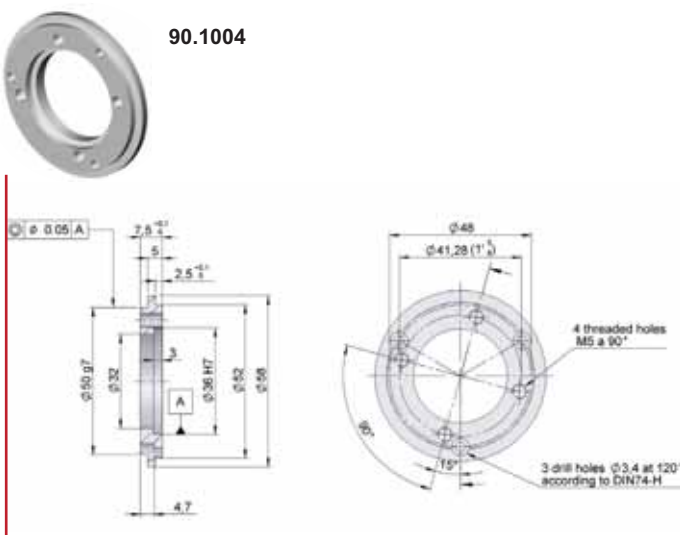
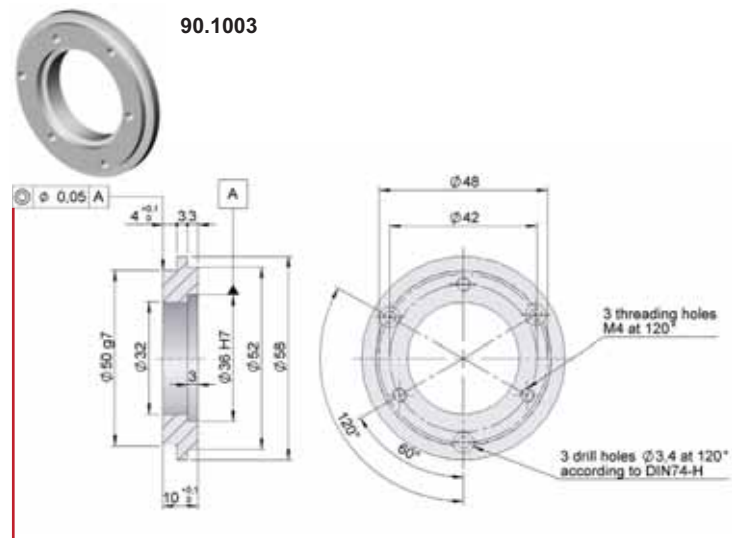
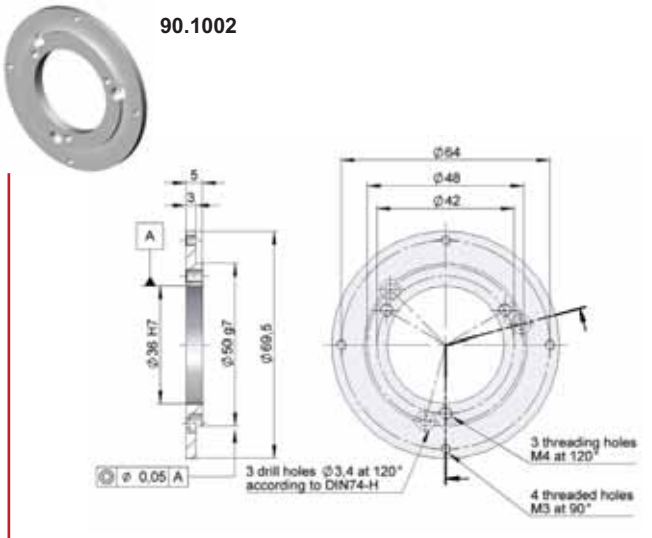
Ordering code example: UFP 2022 06/06



# COUPLING FLANGES

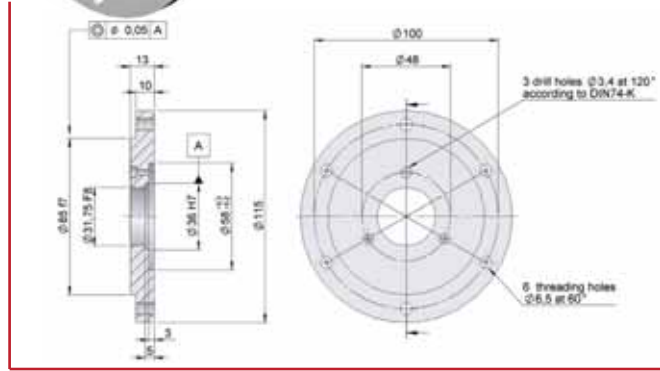
## STANDARD FLANGES

| Code    | Appropriate series    | Suitable securing screws                |
|---------|-----------------------|---|
| 90.1002 | 10, 20, 11 CM10, CS10 | 3 M3 x 6 DIN84, DIN85, DIN7985, DIN7984 |
| 90.1003 | 10, 20, 11 CM10, CS10 | 3 M3 x 8 DIN84, DIN85, DIN7985, DIN7984 |
| 90.1004 | 10, 20, 11 CM10, CS10 | 3 M3 x 6 DIN84, DIN85, DIN7985, DIN7984 |
| 90.1005 | 10, 20, 11 CM10, CS10 | 3 M3 x 10 DIN963, DIN965                |
| 90.1006 | 10, 20, 11 CM10, CS10 | 3 M3 x 10 DIN912                        |
| 90.1008 | 30, CS30              | 3 M6 x 10 DIN7991                       |
| 90.1015 | 10, 11                | 3 M3 x 10 DIN963, DIN965                |
| 90.1057 | 21, 36                | 3 M3 x 6 DIN963, DIN965                 |
| 90.1103 | 58                    | 1 M4 x 10 DIN912                        |
| 90.1105 | 58, 20                | 3 M3 x 10 DIN912                        |

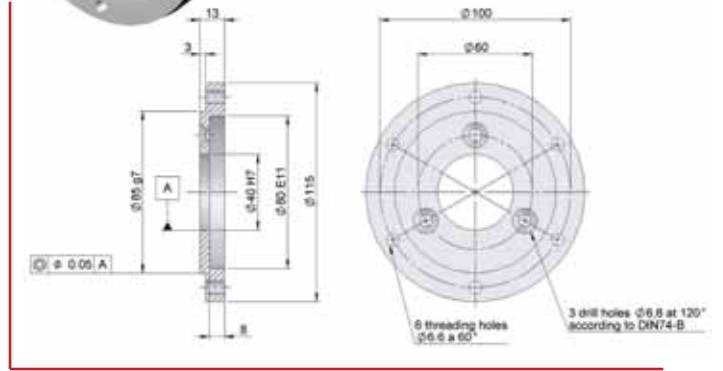




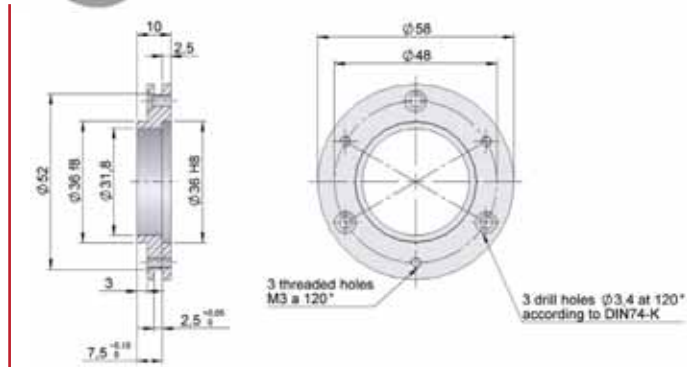
90.1006



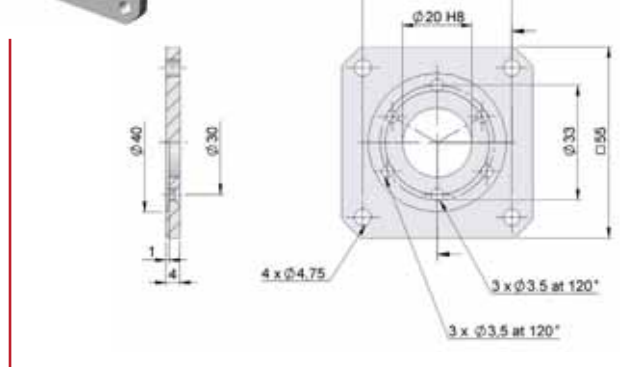
90.1008



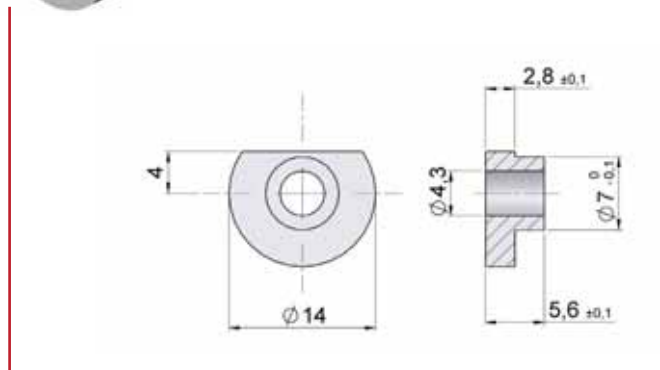
90.1015



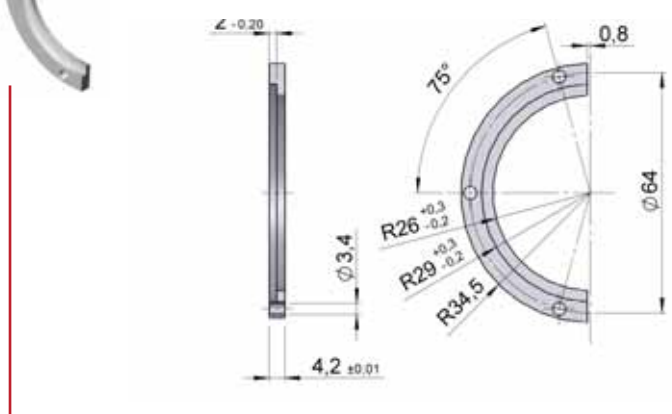
90.1057



90.1103



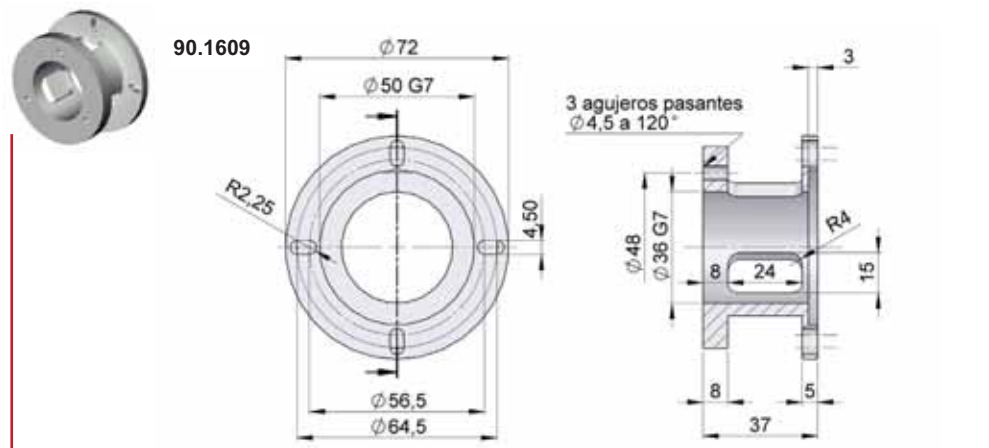
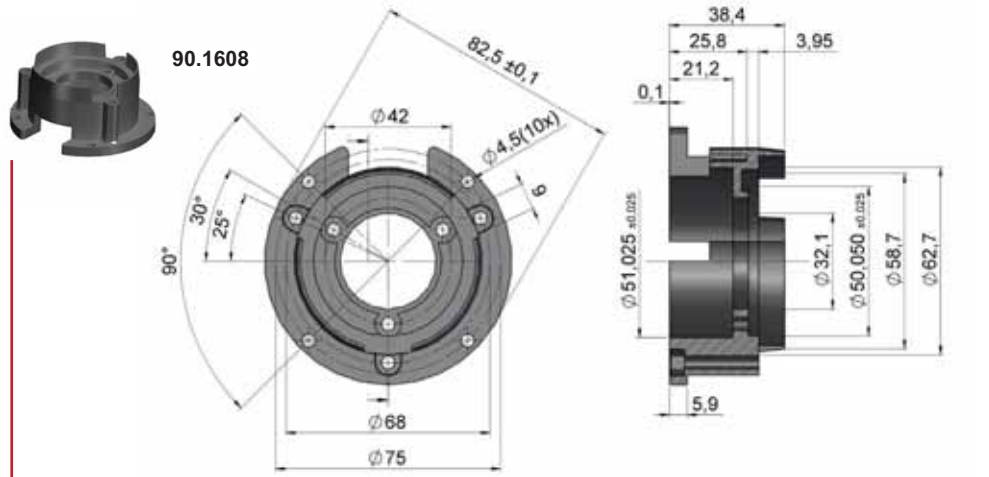
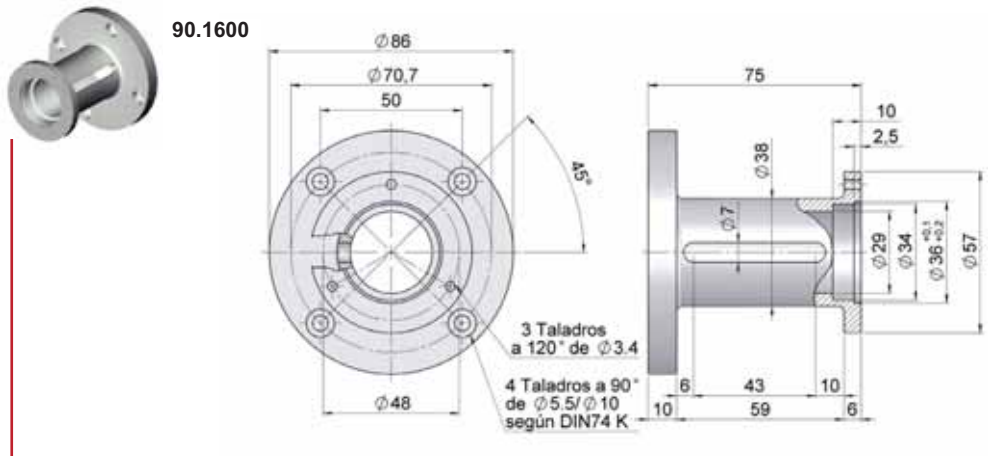
90.1105



## COUPLING BELLS



| Code    | Appropriate series    | Suitable securing screws                |
|---------|-----------------------|---|
| 90.1600 | 10, 20, 11 CM10, CS10 | 3 M3 x 6 DIN84, DIN85, DIN7985, DIN7984 |
| 90.1608 | 10, 20, 11 CM10, CS10 | 3 M3 x 8 DIN84, DIN85, DIN7985, DIN7984 |
| 90.1609 | 10, 20, 11 CM10, CS10 | 3 M3 x 6 DIN84, DIN85, DIN7985, DIN7984 |



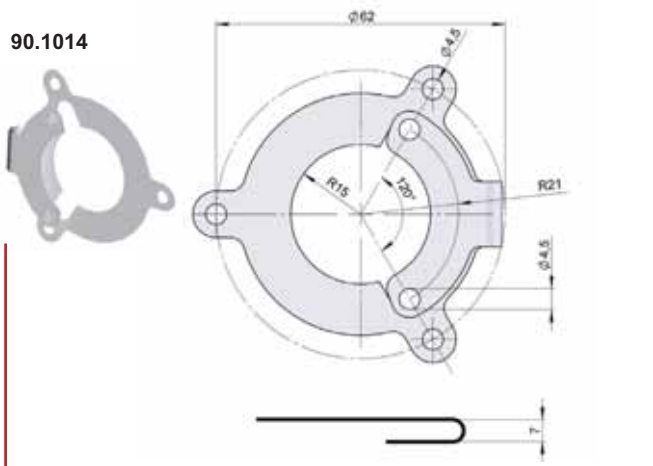
# FLEXIBLE ANTI-ROTATION SYSTEM



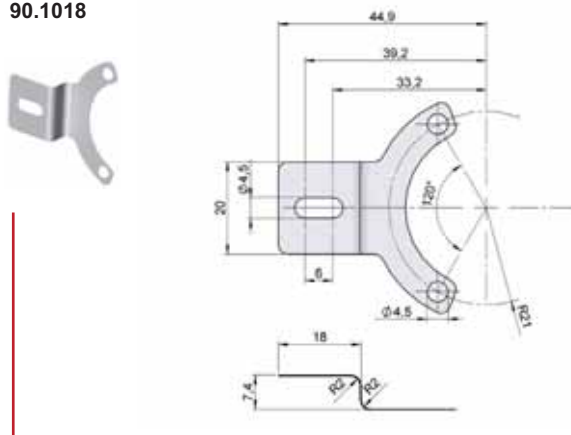
| Code    | Appropriate series | Fixation screws        |
|---------|--------------------|------------------------|
| 90.1014 | 19, 59             | 5 M4 x 6 DIN912, DIN84 |
| 90.1018 | 19, 59             | 3 M4 x 6 DIN912, DIN84 |
| 90.1020 | 19, 59             | 3 M4 x 6 DIN912, DIN84 |
| 90.1024 | 19, 59             | 3 M4 x 6 DIN912, DIN84 |
| 90.1025 | 77, 80             | 5 M4 x 6 DIN912, DIN84 |
| 90.1027 | 19, 59             | 6 M4 x 6 DIN912, DIN84 |

Flexible anti-rotation systems are manufactured in AISI301 polished stainless steel. Suitable for fixing hollow shaft encoders. Prevents overloading of the encoder bearings by absorbing jumps caused by shaft eccentricity.

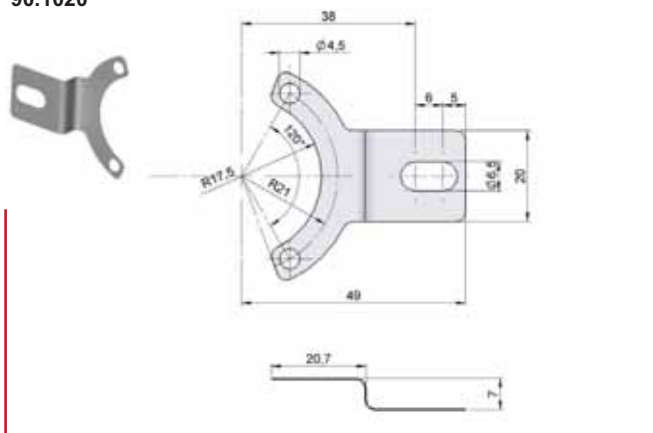
90.1014



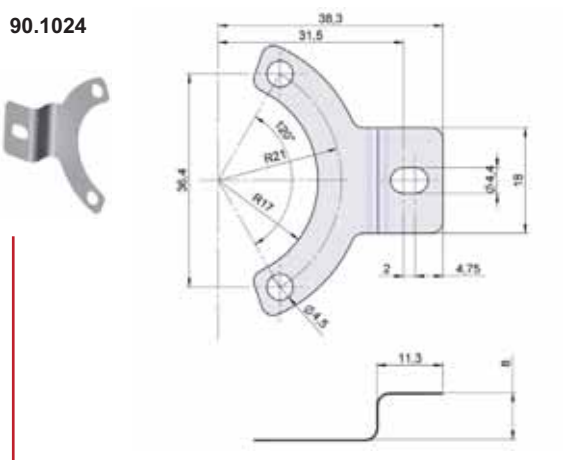
90.1018



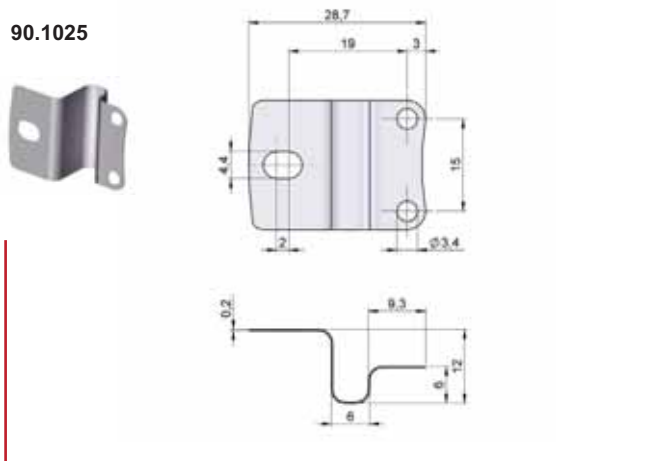
90.1020



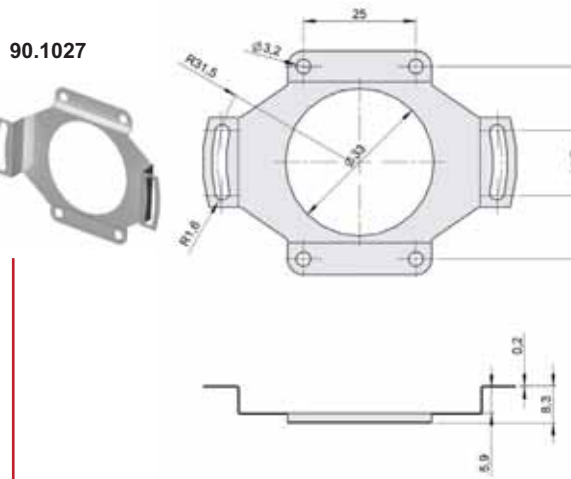
90.1024



90.1025



90.1027



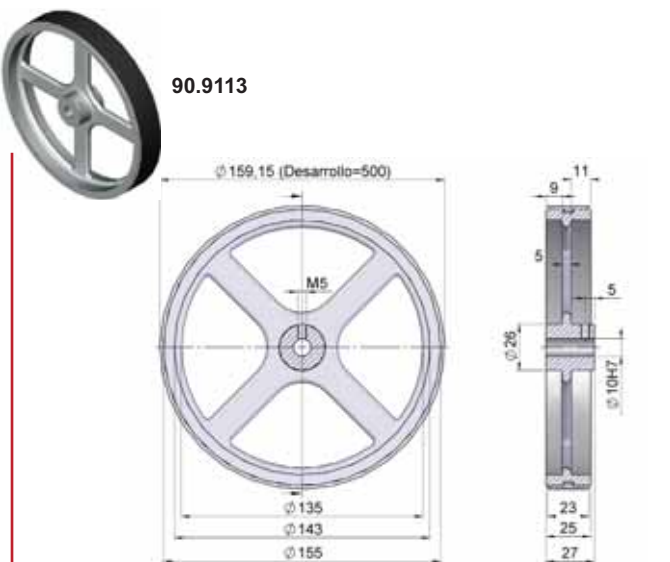
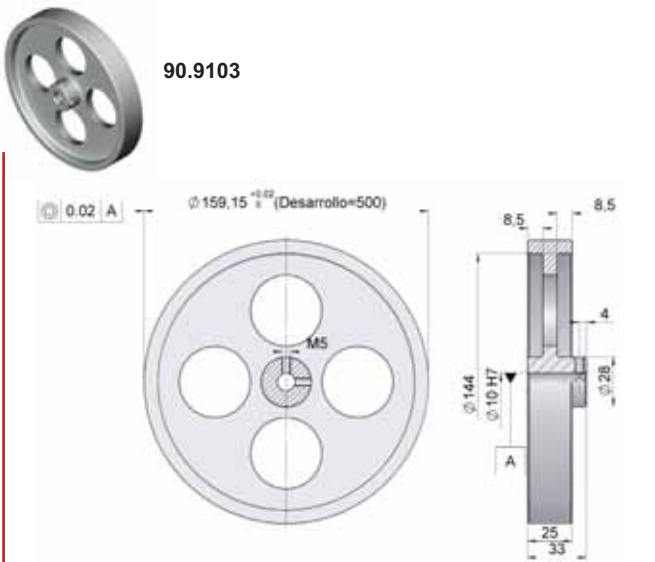
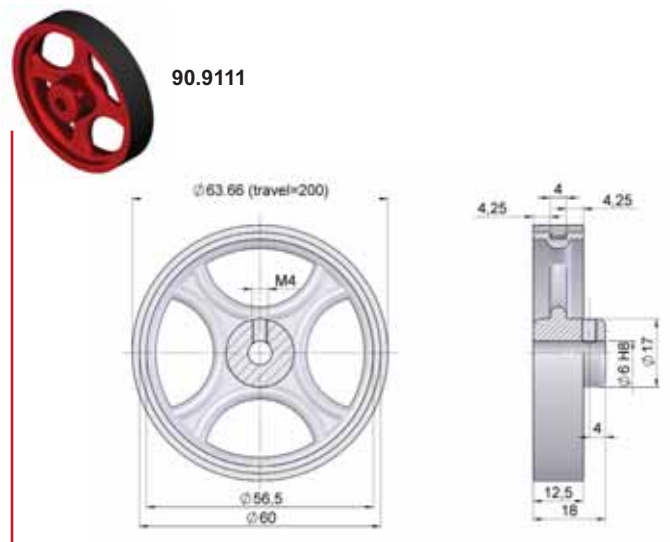
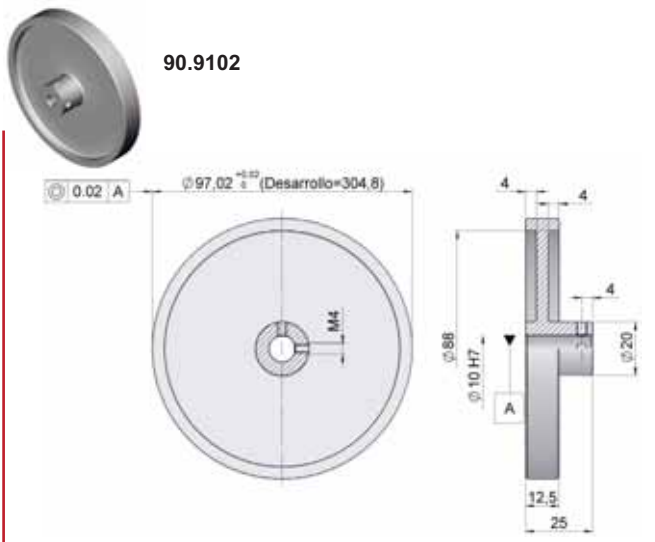
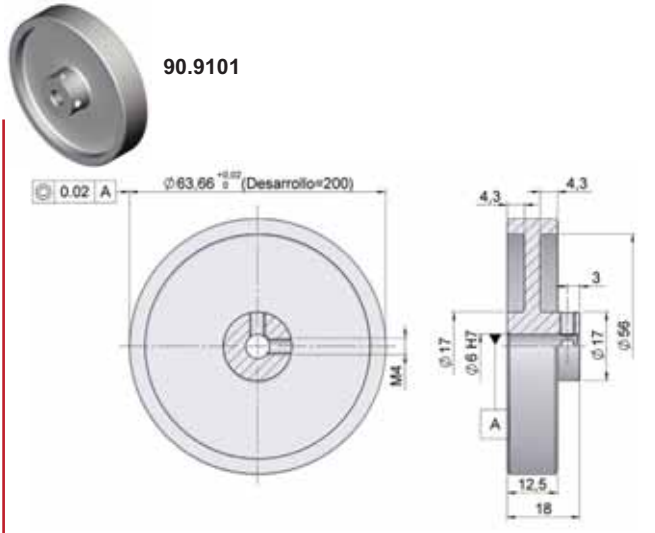




# MEASURING WHEELS

| Type        | Knurled aluminium |                |           | Rubber   |           |
|-------------|-------------------|----------------|-----------|----------|-----------|
| Reference   | 90.9101           | 90.9102        | 90.9103   | 90.9111  | 90.9113   |
| Travel (mm) | 200               | 1 foot 304,8mm | 500       | 200      | 500       |
| Diameter ØD | 63,66 mm          | 97,02 mm       | 159,15 mm | 63,66 mm | 159,15 mm |
| Shaft Ød    | 6 mm              | 10 mm          | 10 mm     | 6 mm     | 10 mm     |
| Width B     | 12 mm             | 12 mm          | 25 mm     | 12 mm    | 25 mm     |
| M (DIN916)  | M4 x 6            | M4 x 6         | M5 x 6    | M4 x 6   | M5 x 6    |

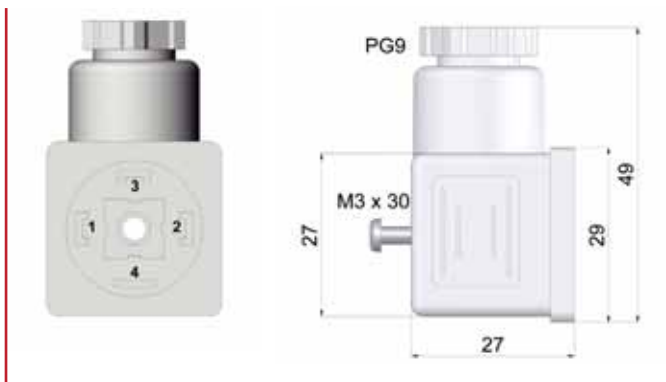
Other shaft diameter available. For example code for wheel 90.9113 with 6mm shaft: 90.9113.6



# CONNECTORS



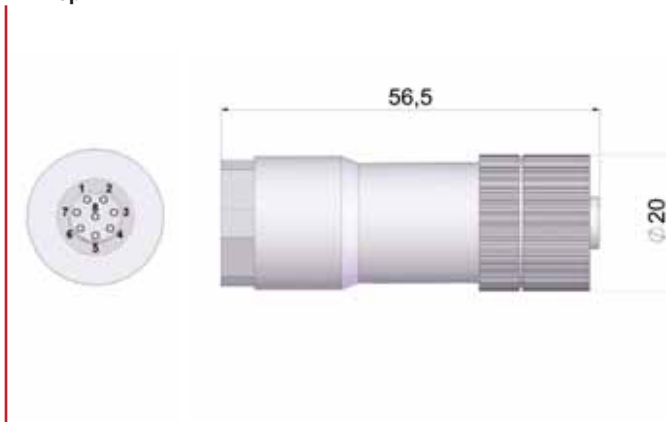
90.9504  
DIN 43650



90.9507  
Militar 7p.



90.95008  
M12 8p.



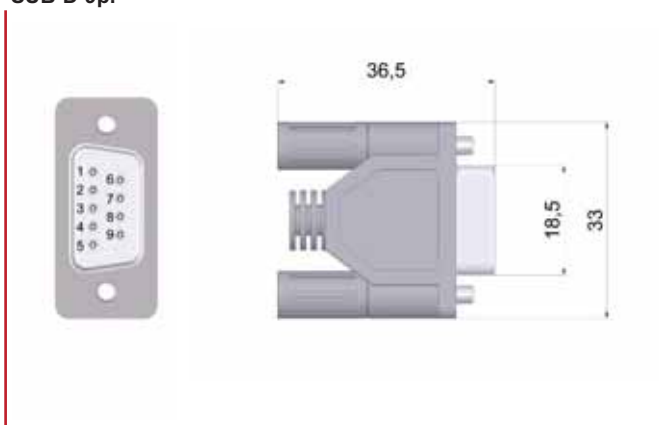
90.9510  
Militar 10p.



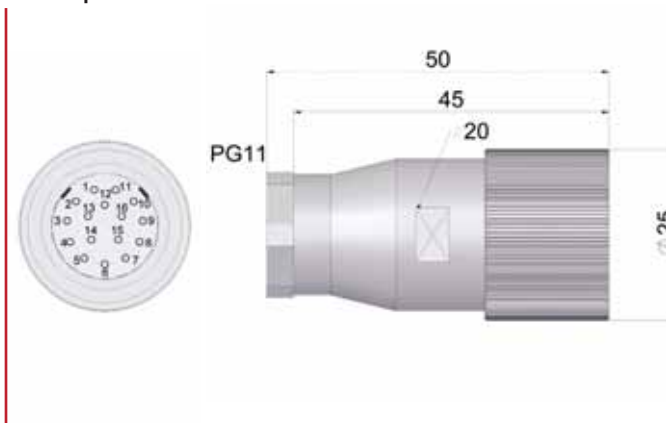
90.9512  
M23 12p.



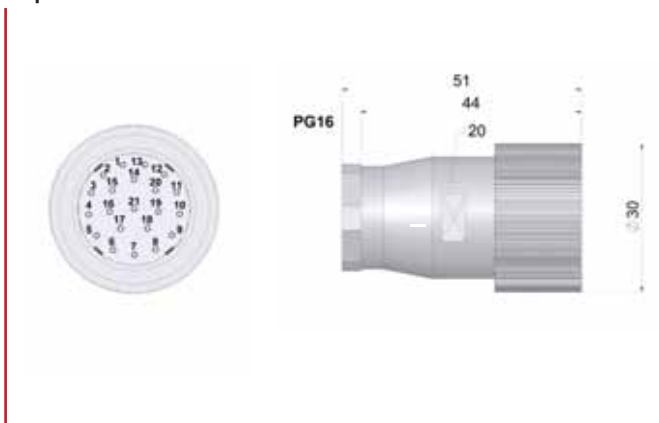
90.9589  
SUB-D 9p.



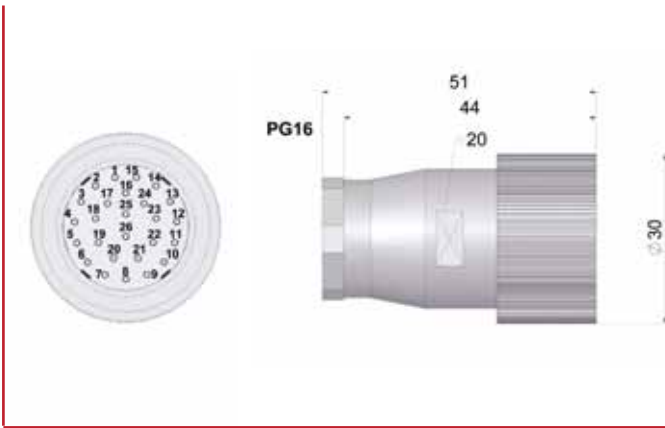
90.9516  
M23 16p.



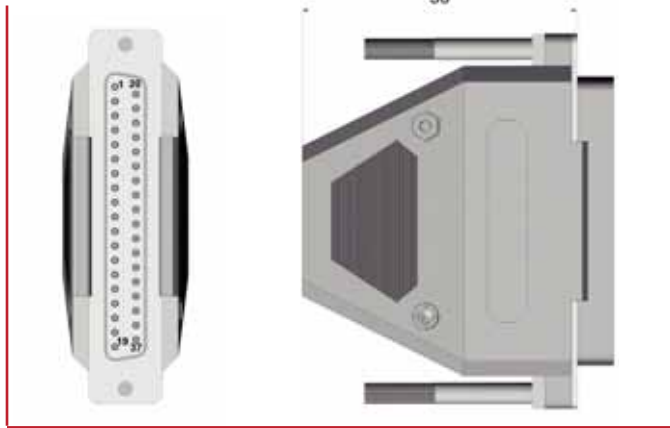
90.9521  
21p.



90.9526

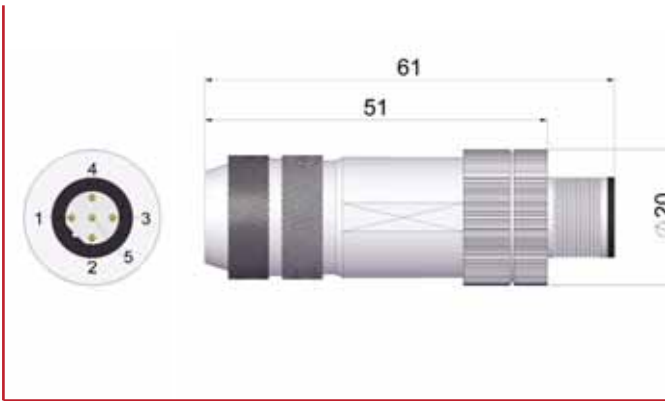


90.9537

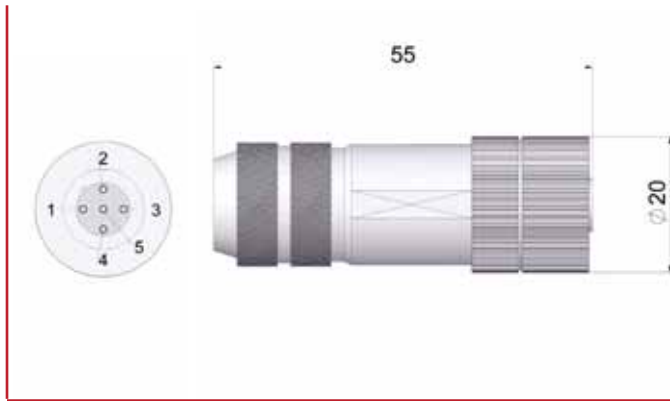


### PROFIBUS CONNECTORS

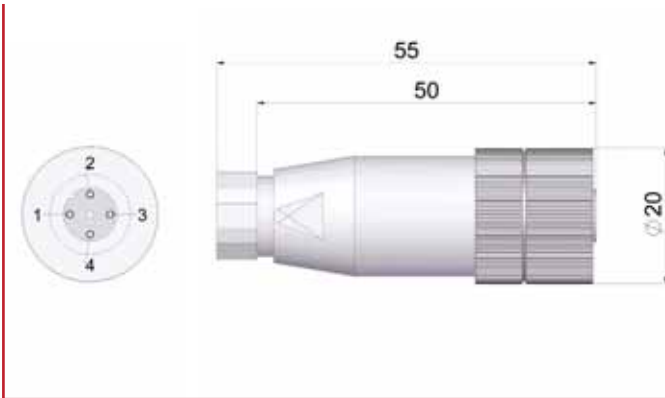
90.9552



90.9553

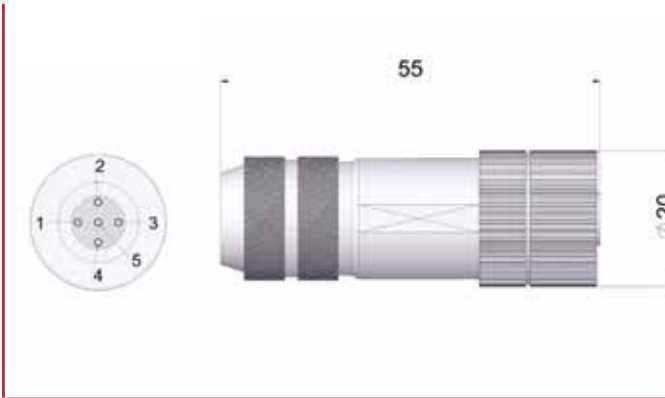


90.9554

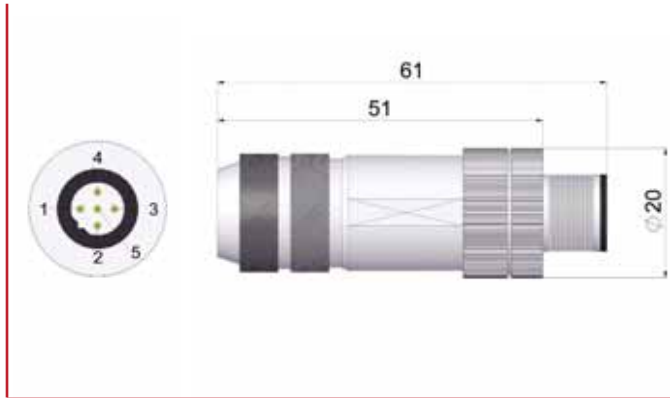


### DEVICENET/CANOPEN CONNECTORS

90.9550



90.9551



# PRE-ASSEMBLED CABLES

- Compatible with Hohner encoders
- Reduces the possibility of wiring errors
- Eliminates risks of short-circuits
- Saves on installation time



## Connector 90.9504



Composed of:  
Cable 5x0,14  
Female connector type DIN 43650 4p.

**REF: 89.001.01.000.XX**  
length

## Connector 90.9508



Composed of:  
Cable 3x2x0,14+2x0,34  
Female connector M12, 8p.

**REF: 89.003.02.000.XX**  
length

## Connector 90.9507



Composed of:  
Cable 5x0,14  
Female connector militar type 7p.

**REF: 89.002.01.000.XX**  
length

## Connector 90.9510



Composed of:  
Cable 3x2x0,14+2x0,34  
Female connector militar type 10p.

**REF: 89.004.02.000.XX**  
length

## Connector 90.9512



Composed of:  
Cable 3x2x0,14+2x0,34  
Female connector M23, 12p

**REF: 89.005.02.000.XX**  
length

Cable length available: 2, 4, 6, 8, 10, 20 and 30 metres



Special cable available.

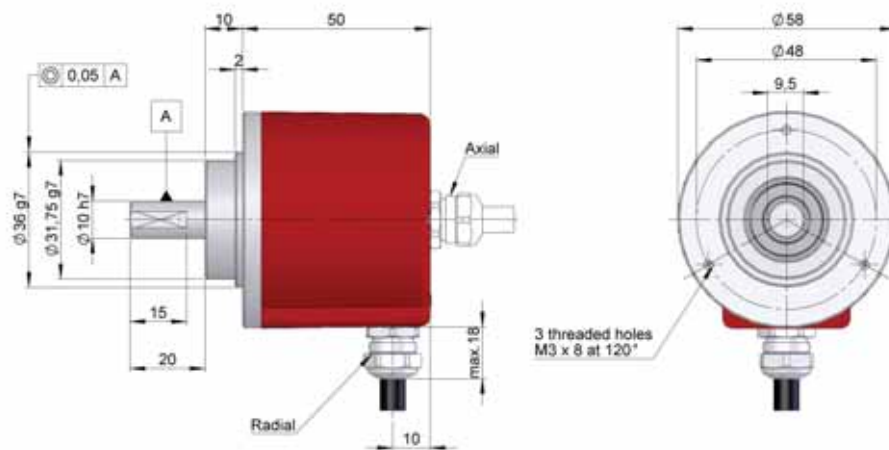




# POTENTIOMETER **POT10**

## SOLID SHAFT ANGULAR SENSOR FOR INDUSTRIAL APPLICATIONS

- External diameter 58 mm
- Shaft 6 or 10mm
- Protection class IP65 according to DIN 40050
- Measuring range 360°/3600°/7200°
- Current, voltage or resistance output
- Cable connection (any length of cable available) or industrial connector
- Measuring system using accuracy potentiometer



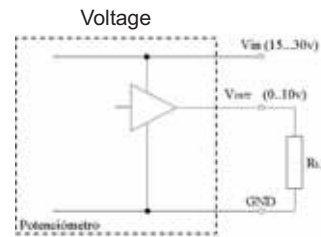
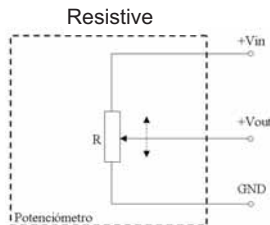
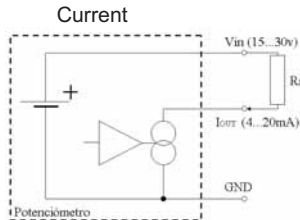
### MECHANICAL SPECIFICATIONS

|   |                        |
|---|------------------------|
| Housing                                 | Aluminium.             |
| Shaft                                   | Stainless steel.       |
| Bearings                                | Balls                  |
| Maximum load permitted on axial shaft   | 40 N.                  |
| Maximum load permitted on radial shaft  | 60 N.                  |
| Bearings lifetime                       | 1x10 10 rev.           |
| Starting torque                         | 2,0 Ncm.               |
| Output                                  | Potenciometer, analog. |
| Linearity                               | See table.             |
| Temperature range                       | -20°C..+85°C.          |
| Direction                               | Clockwise.             |
| Protection class according to DIN 40050 | IP65.                  |

## ELECTRICAL SPECIFICATIONS

|                     | 1 kΩ or 10 kΩ<br>1 turn | 1 kΩ or 10 kΩ<br>10 turns | 0..10v      | 4..20mA    |
|---------------------|-------------------------|---------------------------|-------------|------------|
| Voltage supply      | 30 Vdc max              | 30 Vdc max                | 15..30 Vdc  | 15..30 Vdc |
| Accuracy            | ± 15%                   | ± 5%                      | ± 0,3%      | ± 0,3%     |
| Linearity           | ± 2 %                   | ± 0,25 %                  |             |            |
| Thermal coefficient | ± 50ppm/C°              | ± 50ppm/C°                | ± 50 ppm/C° | ± 50ppm/C° |
| Load                | 1w max.                 | 2w max.                   | 5 kΩ min.   | 600 Ω máx. |

### OUTPUT



### CONNECTION

|       | Cable 5x0.14 | Connector M8 3pin |
|-------|--------------|-------------------|
| GND   | Yellow       | 1                 |
| V in  | White        | 3                 |
| I out | Brown        | 4                 |

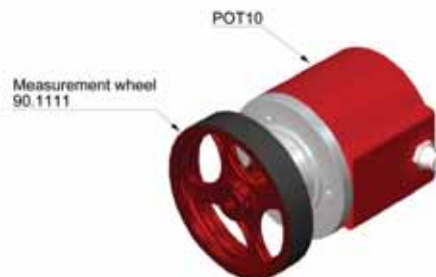
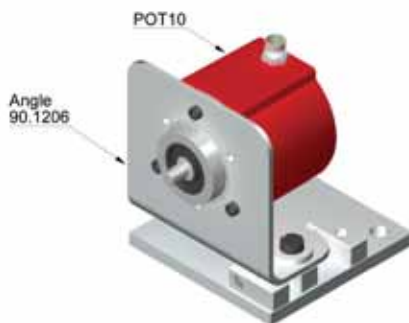
|      | Cable 5x0.14 | Connector M8 3pin |
|------|--------------|-------------------|
| GND  | Yellow       | 1                 |
| Vin  | White        | 3                 |
| Vout | Brown        | 4                 |

|      | Cable 5x0.14 | Connector M8 3pin |
|------|--------------|-------------------|
| GND  | Yellow       | 1                 |
| Vin  | White        | 3                 |
| Vout | Brown        | 4                 |

## ORDERING CODE

| SERIE | SHAFT                                | FLANGE       | CONNECTION   | ELECTRONIC OUTPUT                                   | MEASURING RANGE  |
|-------|--------------------------------------|--------------|--|---|--|
| POT10 | ●<br>1- Ø10 x 20 mm<br>2- Ø6 x 10 mm | ●<br>1- None | ●<br>1- Axial cable<br>2- Radial cable<br>3- Radial connector<br>M8 3p | ●<br>1- 1 kΩ<br>2- 10 kΩ<br>3- 0..10v<br>4- 4..20mA | ●<br>90° (1/4 turn)<br>180° (1/2 turn)<br>360° (1 turn)<br>1800° (5 turns)<br>3600° (10 turns)<br>7200° (20 turns) |

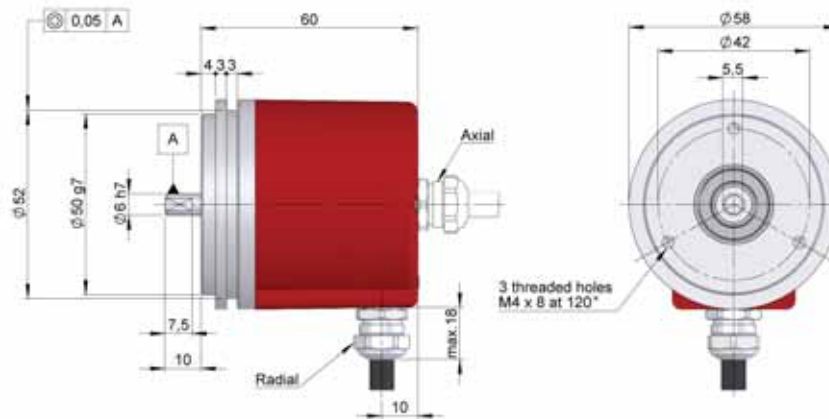
## ACCESSORIES



# POTENCIOMETER **POT58**

## SOLID SHAFT ANGULAR SENSOR FOR INDUSTRIAL APPLICATIONS

- External diameter 58 mm
- Shaft 6 or 10mm
- Protection class IP65 according to DIN 40050
- Measuring range 360°/3600°/7200°
- Current, voltage or resistance output
- Cable connection (any length of cable available) or industrial connector
- Measuring system using accuracy potentiometer



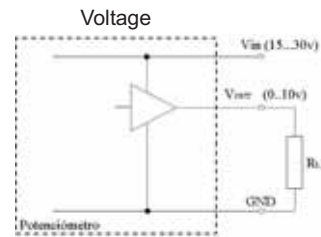
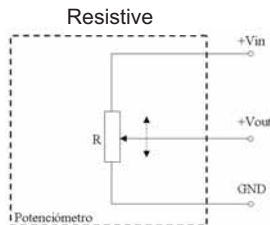
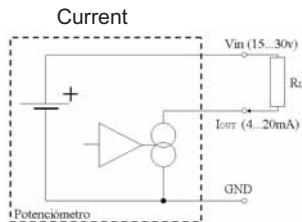
### MECHANICAL SPECIFICATIONS

|   |                        |
|---|------------------------|
| Housing                                 | Aluminium.             |
| Shaft                                   | Stainless steel.       |
| Bearings                                | Balls.                 |
| Maximum load permitted on axial shaft   | 40 N.                  |
| Maximum load permitted on radial shaft  | 60 N.                  |
| Bearings lifetime                       | 1x10 10 rev.           |
| Starting torque                         | 2,0 Ncm.               |
| Output                                  | Potenciometer, analog. |
| Linearity                               | See table.             |
| Temperature range                       | -20°C..+85°C.          |
| Direction                               | Clockwise.             |
| Protection class according to DIN 40050 | IP65.                  |

## ELECTRICAL SPECIFICATIONS

|                     | 1 k $\Omega$ or 10 k $\Omega$<br>1 turn | 1 k $\Omega$ or 10 k $\Omega$<br>10 turns | 0..10v                     | 4..20mA                    |
|---------------------|---|---|----------------------------|----------------------------|
| Voltage supply      | 30 Vdc max                              | 30 Vdc max                                | 15..30 Vdc                 | 15..30 Vdc                 |
| Accuracy            | $\pm 15\%$                              | $\pm 5\%$                                 | $\pm 0,3\%$                | $\pm 0,3\%$                |
| Linearity           | $\pm 2\%$                               | $\pm 0,25\%$                              |                            |                            |
| Thermal coefficient | $\pm 50\text{ppm/C}^\circ$              | $\pm 50\text{ppm/C}^\circ$                | $\pm 50\text{ppm/C}^\circ$ | $\pm 50\text{ppm/C}^\circ$ |
| Load                | 1w max.                                 | 2w max.                                   | 5 k $\Omega$ min.          | 600 $\Omega$ max.          |

### OUTPUT



### CONNECTION

|       | Cable 5x0.14 | Connector M8 3pin |
|-------|--------------|-------------------|
| GND   | Yellow       | 1                 |
| V in  | White        | 3                 |
| I out | Brown        | 4                 |

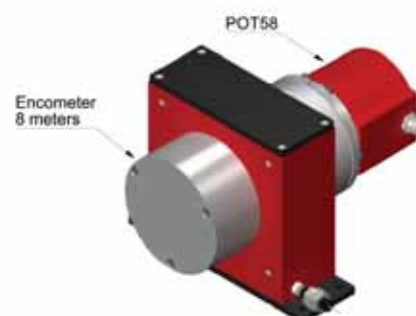
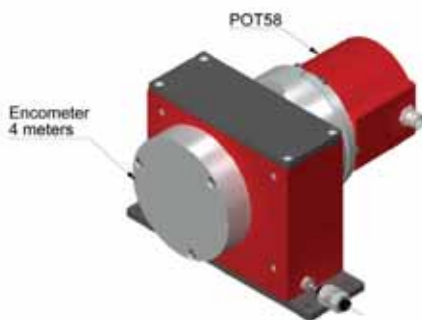
|      | Cable 5x0.14 | Connector M8 3pin |
|------|--------------|-------------------|
| GND  | Yellow       | 1                 |
| Vin  | White        | 3                 |
| Vout | Brown        | 4                 |

|      | Cable 5x0.14 | Connector M8 3pin |
|------|--------------|-------------------|
| GND  | Yellow       | 1                 |
| Vin  | White        | 3                 |
| Vout | Brown        | 4                 |

## ORDERING CODE

| SERIE | SHAFT                                | FLANGE       | CONNECTION  | ELECTRONIC OUTPUT   | MEASURING RANGE   |
|-------|--------------------------------------|--------------|---|---|---|
| POT58 | ●<br>1- Ø10 x 20 mm<br>2- Ø6 x 10 mm | ●<br>1- None | ●<br>1- Axial cable<br>2- Radial cable<br>3- Radial connector M8 3p | ●<br>1- 1 k $\Omega$<br>2- 10 k $\Omega$<br>3- 0..10v<br>4- 4..20mA | 90° (1/4 turn)<br>180° (1/2 turn)<br>360° (1 turn)<br>1800° (5 turns)<br>3600° (10 turns)<br>7200° (20 turns) |

## ACCESORIES



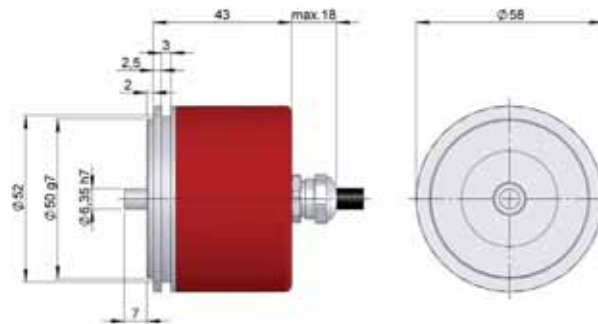
# POTENTIOMETER **POT20**

## SOLID SHAFT ANGULAR SENSOR FOR INDUSTRIAL APPLICATIONS

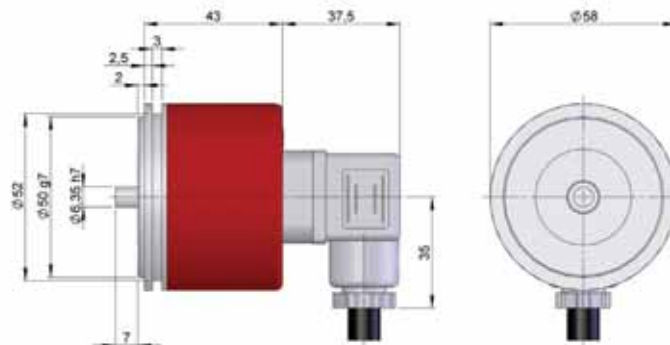
- External diameter 58 mm
- Shaft 6,35mm
- Measuring range 10 turns
- Output resistance 5k or 10k
- Cable connection (any length of cable available) or industrial connector
- Measuring system using accuracy potentiometer



Cable output



Connector output



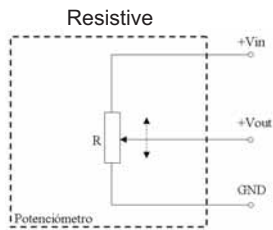
### MECHANICAL SPECIFICATIONS

|   |                      |
|---|----------------------|
| Housing                                 | Aluminium.           |
| Shaft                                   | Nickel plated brass. |
| Mechanical lifetime without charge      | 10 <sup>6</sup> rev. |
| Starting torque                         | Max. 1,0 Ncm.        |
| Output                                  | Resistive.           |
| Linearity                               | See table.           |
| Temperature range                       | -20°C..+85°C.        |
| Protection class according to DIN 40050 | IP54.                |

## ELECTRICAL SPECIFICATIONS

|                     | 5 kΩ<br>10 turns | 10 kΩ<br>10 turns |
|---------------------|------------------|-------------------|
| Voltage supply      | 30 Vdc max       | 30 Vdc max        |
| Output              | ± 5%             | ± 5%              |
| Resolution          | 0,025 %          | 0,02 %            |
| Thermal coefficient | ± 50ppm/C°       | ± 50ppm/C°        |
| Load                | 1w máx.          | 1w máx.           |
| Linearity           | ± 0,25%          | ± 0,25%           |

### OUTPUT



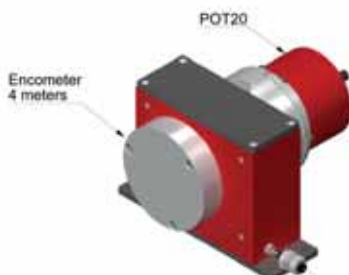
### CONNECTION

|      | Cable 5x0.14 | Connector 90.9504 |
|------|--------------|-------------------|
| GND  | Yellow       | 1                 |
| Vin  | White        | 2                 |
| Vout | Brown        | 3                 |

## ORDERING CODE

| SERIE | SHAFT            | FLANGE       | CONNECTION                              | ELECTRONIC OUTPUT        | MEASURING RANGE  |
|-------|------------------|--------------|---|--------------------------|------------------|
| POT20 | ●<br>1- Ø6,35 mm | ●<br>1- None | ●<br>1- Axial cable<br>2- Axial 90.9504 | ●<br>1- 5 kΩ<br>2- 10 kΩ | 3600° (10 turns) |

## ACCESORIES





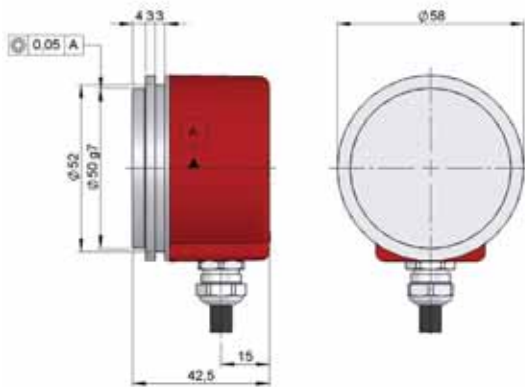
# INCLINOMETER **IN58**

## INCLINOMETER CAPACITIVE SENSOR OF ONE AXIS

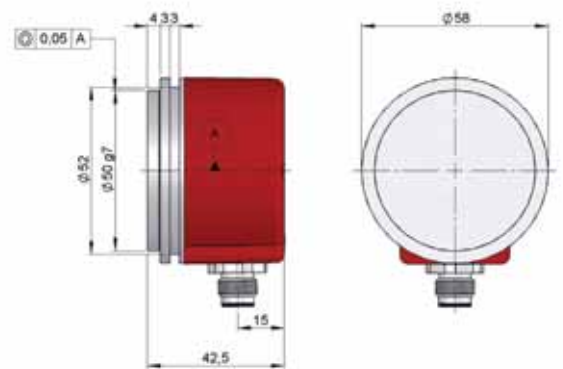
- Voltage and current analogue outputs
- External diameter 58mm
- Protection class IP68 according to DIN 40050
- Connector or cable connection



**Cable output**



**Connector output**



The series of Hohner inclinometers have measuring ranges of 10°, 30°, 90° and full rotating with the 360°. They incorporate the necessary electronics to condition the signal, allowing an analogue output proportional to the measured angle, very useful to connect directly to data acquisition equipments, PLCs, etc.

These inclinometers permit to measure, in an easy and effective way, tilt values without having to connect directly to the actuators. You can easily put almost anywhere, providing more flexibility in the design processes.

This compact and robust design of the sensor is designed to provide rapid installation and high accuracy, useful for a wide variety of applications.

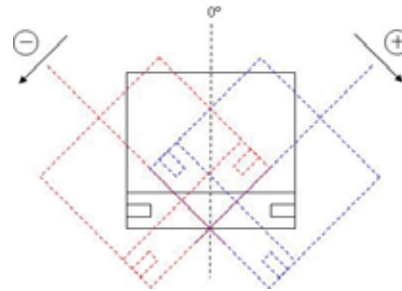
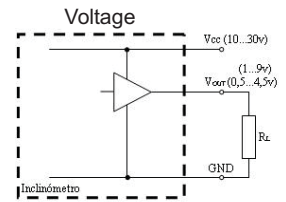
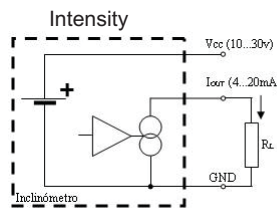
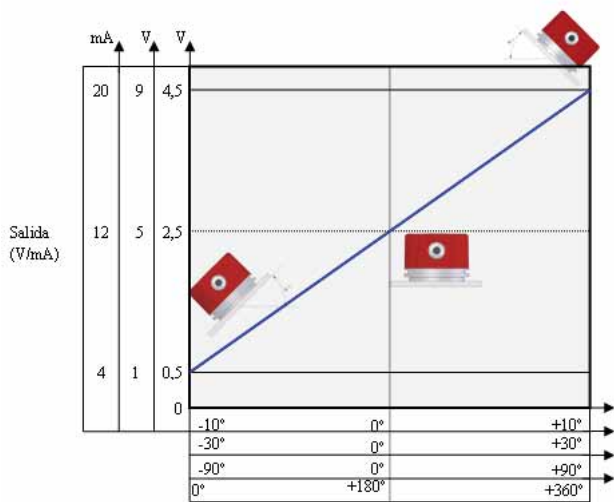
**Applications:**

- |                        |                                    |
|------------------------|------------------------------------|
| Robotic                | Solar panels                       |
| Cranes                 | Ships                              |
| Truck Containers       | Drainage bridges                   |
| Adjustable Platforms   | Factories automation               |
| Level controls         | Agricultural machines              |
| Safety Systems         | Dams                               |
| Positioning telescopes | Test of pieces and moving vehicles |
| Antenna Alignment      | Etc                                |

### TECHNICAL SPECIFICATIONS

|   |   |
|---|---|
| Housing                                 | Aluminium.  |
| Cover                                   | Metallic.   |
| Measurement range                       | ±10°, ±30°, ±90°, ±360°.                                  |
| Accuracy                                | Standard 2,5%fs Alta 0,5%fs.                              |
| Output                                  | Voltage 0,5v..4,5v or 1v..9v.<br>Current 4..20mA 3 wires. |
| Repetibility                            | ± 0,1%.   |
| Protection class according to DIN 40050 | IP68.   |
| Temperature range                       | -20° .. 85°C.   |
| Power supply                            | 11..30v.  |
| Consumption                             | Max 7mA.  |

## OUTPUT



## CONNECTION

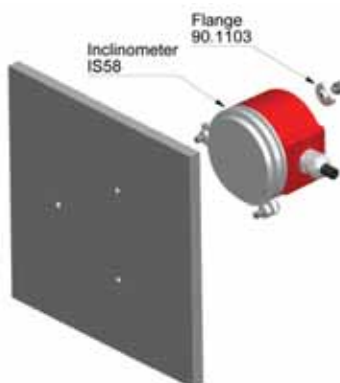


|        | Cable 5x0.14 | 90.9503<br>M8 3pin |
|--------|--------------|--------------------|
| Gnd    | Blue         | 1                  |
| Vcc    | Brown        | 3                  |
| Output | Black        | 4                  |

## ORDERING CODE

| SERIE | ANGLE                              | ACCURACY                    | CONNECTION  | ELECTRONIC OUTPUT                  |
|-------|------------------------------------|-----------------------------|---|------------------------------------|
| IN    | ●<br>1- 010°<br>2- 030°<br>3- 090° | ●<br>1- Standard<br>2- High | ●<br>1- Cable axial<br>2- Cable radial<br>3- 3p M8 axial<br>4- 3p M8 radial | ●<br>1- 0,5 .. 4,5 v<br>2- 4..20mA |

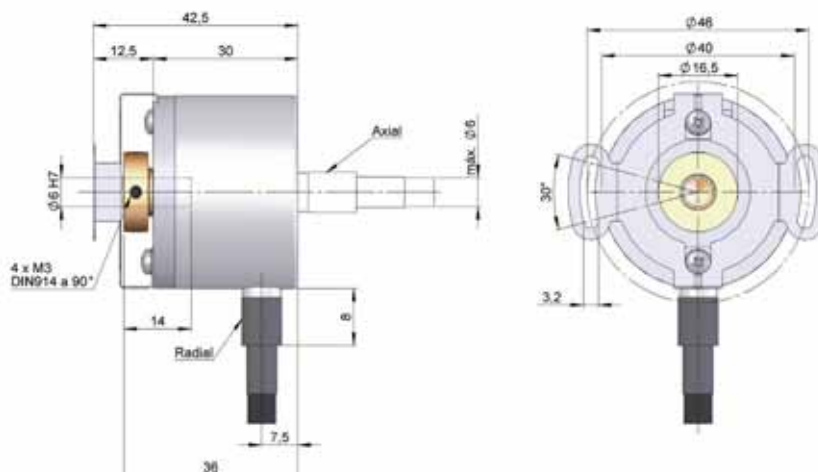
## ACCESORIES



# SERIE 22M

## MAGNETIC INCREMENTAL ENCODER SOLID HOLLOW SHAFT FOR INDUSTRIAL APPLICATIONS

- Contactless
- Angle 360°
- Resolution 16, 32 and 64 pulses per turn
- External diameter 40 mm
- Blind hollow shaft 6 mm
- Connection cable 1 metre
- Antirotation system through elastic flange



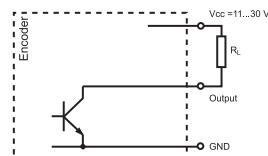
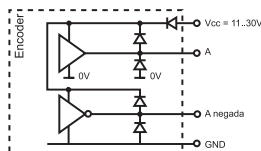
Previous mounting and installation of the encoder is recommended to read the section "TECHNICAL CONSIDERATIONS".

### MECHANICAL SPECIFICATIONS

|   |                                       |
|---|---------------------------------------|
| Housing   | Aluminium.                            |
| Shaft   | Brass / treated aluminium.            |
| Bearings  | Ballraces.                            |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.               |
| Body fixing   | Elastic flange.                       |
| Blind hollow shaft diameter                                 | 6 mm.                                 |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.                             |
| Protection against dust and splashes according to DIN 40050 | (rear side) IP67.                     |
| Rotor inertia moment  | 2 gcm <sup>2</sup> .                  |
| Starting torque at 20°C (68°F)                              | Max 0,5 Ncm.                          |
| Maximum load permitted on axial shaft                       | Max. 20 N.                            |
| Maximum load permitted on radial shaft                      | Max. 40 N.                            |
| Weight aprox.   | 0,1 Kg.                               |
| Operating temperature range                                 | -20°C to +80°C.                       |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz). |
| Shock   | 1000 m/s <sup>2</sup> (6ms).          |
| Maximum pulses per turn                                     | 16, 32 and 64.                        |
| Radial connection   | Cable 1 metre.                        |

## ELECTRICAL SPECIFICATIONS

### OUTPUT SIGNALS



|                                       | RS422<br>(TTL compatible)     | Push-Pull Differential        | NPN Open Collector        |
|---------------------------------------|-------------------------------|-------------------------------|---------------------------|
| Power supply                          | 5 V ±5%                       | 11...30 v                     | 11...30 v                 |
| Consumption                           | Typical: 70 mA<br>Max: 150 mA | Typical: 45 mA<br>Max: 150 mA | 40 mA                     |
| Max. load capability                  | ±20 mA                        | ±30 mA                        | 40 mA                     |
| Length of cable allowed               | 1200 m                        | 100 m                         | 50 m (to 24v )            |
| "Low" signal level                    | $V_{OL} < 0,5 V$              | $V_{OL} < 2.5 v$              | $V_{OL} < 0,4 V$ (to 24v) |
| "High" signal level                   | $V_{OH} > 2.5 V$              | $V_{OH} > V_{CC} - 3 v$       | $V_{OH} > 22 V$ (to 24v)  |
| Frequency                             | 300 kHz                       | 200 kHz                       | 100 kHz                   |
| Short circuit protection              | Yes                           | Yes                           | Not permanente            |
| Protection against polarity inversion | No                            | Yes                           | Yes                       |

### CONNECTION



Cable 3x2x0,14+2x0,34

|               |        |
|---------------|--------|
| GND           | Black  |
| Vcc           | Red    |
| A             | Yellow |
| B             | Green  |
| A inverted    | Brown  |
| B inverted    | Blue   |
| 0 (reference) | Grey   |
| 0 inverted    | Orange |

## ORDERING CODE

| SERIE | ANTIROTATION SYSTEM | OUTPUT SIGNALS                | CONNECTION                        | ELECTRONIC OUTPUT  | PULSES NUMBER | SPECIAL CUSTOMER |
|-------|---------------------|-------------------------------|-----------------------------------|--|---------------|------------------|
| 22M   | ●                   | ●                             | ●                                 | ●  | ●●●●●●●●      | ●●●●●●           |
|       | 1- Elastic flange   | 3- A+ B +0<br>7- AA + BB + 00 | 1- Axial cable<br>2- Radial cable | 0- NPN Open Collector 11..30v<br>1- Differential line driver. Push-Pull 11..30V<br>2- Standard RS422. 5V |               |                  |

For other output options, please consult: ramp 1...4V, Sawtooth 0...4V, pulse signal including direction and zero, UP signal, DOWN signal with zero, etc.

Other options: Additional cable length, other accessories available.

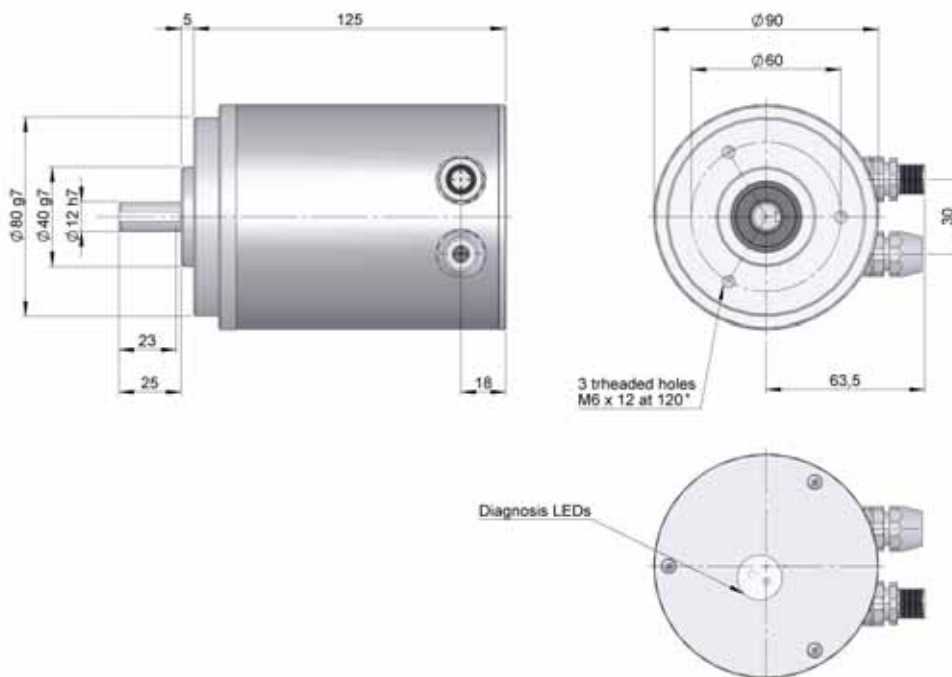
## ACCESSORIES



All the accessories available in the sections "SIGNAL CONDITIONERS" and "MOUNTING ACCESSORIES".

**MULTITURN ABSOLUT ENCODER**

- Devicenet protocol for version 2.0
- Programmable up to 25 bits (8192 points per turn, 4096 turns)
- Protection class IP67 according DIN 40050
- Solid shaft (CM) and blind hollow shaft (HM)



**DEVICENET**

DeviceNet is a digital communications network that connects and is useful as a communication network between industrial controllers and Input/Output devices. Each device is a node in the network and should be identified unmistakably. DeviceNet is a network in the form of “producer-consumer” with a token bus that is compatible with multiple hierarchies and message prioritizations. DeviceNet can be configured to operate in the “master-slave” mode using “point to point” messages. Device Net supports the capacity of having a power supply integrated in its bus, which allows reducing the connection points

The following functionalities are integrated in the Devicenet Hohner encoders:

- We can have up to 64 nodes (0..63). Each Node Number should be used one sole time in one network. During the initialization of the devices the Node Number micro switches are read by the firmware.
- Galvanic isolation with DC/DC

- A Bus termination resistance is available and can be selected by the micro switch
- Communication modes: polled, cyclic and cos.
- Communication velocity selectable through micro switches: 125 kBits/sec, 250 kBits/sec or 500 kBits/sec.

Configurable parameters:

- Rotation direction.
- Scaling factor  
Number of positions per turn and total resolution
- Preset.
- Diagnosis mode.

## TECHNICAL SPECIFICATIONS

|   |                                      |
|---|--------------------------------------|
| Housing   | Aluminium                            |
| Shaft   | Stainless steel                      |
| Bearings  | Ballraces                            |
| Bearings lifetime   | 1x10 <sup>10</sup> rev.              |
| Maximum number of revolutions permitted mechanically        | 6000 rpm.                            |
| Protection against dust and splashes according to DIN 40050 | IP67                                 |
| Rotor inertia moment  | 120 gcm <sup>2</sup>                 |
| Starting torque a 20°C (68°F)                               | Max. 5,0 Ncm                         |
| Maximum load permitted on axial shaft                       | 80 N.                                |
| Maximum load permitted on radial shaft                      | 100 N.                               |
| Weight aprox.   | 1,3 Kg                               |
| Operating temperature range                                 | -10°C a +70°C                        |
| Vibration   | 100 m/s <sup>2</sup> (10Hz...2000Hz) |
| Shock   | 1000 m/s <sup>2</sup> (6ms)          |
| Consumption max   | 150 mA (CM/HM)                       |
| Interface   | Devicenet                            |
| Max. points per turn  | 8192 positions (13 bits)             |
| Max. turns  | 4096 turns (12 bits)                 |
| Linearity   | ±1/2 LSB                             |
| Radial connection   | Connector M12                        |

## ORDERING CODE

| SERIE              | FLANGE            | SHAFT               | PROTOCOL     | CONNECTION       |
|--------------------|-------------------|---------------------|--------------|------------------|
| CM30I- Solid shaft | 1- Without flange | 1- Solid 12 x 25 mm | 1- DeviceNet | 2- Connector M12 |

### CONNECTION DEVICENET



90.9550 y 90.9551

M12 5p

|   |          |
|---|----------|
| 1 | Screen   |
| 2 | +Vcc     |
| 3 | -Vcc     |
| 4 | CAN_High |
| 5 | CAN_Low  |