ISO 9001:2000

MULTITURN ABSOLUTE ENCODER
EAM
PROFIBUS

Presentation

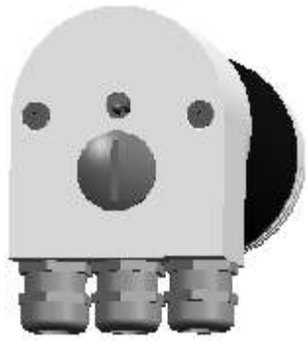
The Eltra multi-rotation Profibus encoder (Identification Number 0x0599) conforms to the standard Profibus DP described in the European Standard EN 50170 Volume 2 and in particular to the profile established for encoders "PROFIBUS Profile for Encoders, Order No. 3.062". The version with the Profibus DP interface keeps the same maximum resolution characteristics (8092 Pos/turn and 4096 revolutions) and efficiency characteristics of the stand-alone version, but adds the potential and flexibility typical of the Profibus DP network.
Via the Profibus DP network it is therefore possible to:
- Obtain the indication of the angular position from the encoder, during the *cyclical data exchange*
- Set the resolution on the turn and on the revolutions (during parameterizing)
- Change the predefined count increase direction (again during parameterizing)
- Perform the PRESET operation; in other words to set the encoder indication to a certain quota
- Read the operating diagnostic
- Have indications about the code supplied by the device.

On the device at a local it is also possible to:
- Display the ON/OFF status
- Display the device activity on the bus
- Give a RESET, in other words to set the current encoder code to 0
- Set the device address
- Insert the termination resistances on the bus, if needed
- Invert the count direction

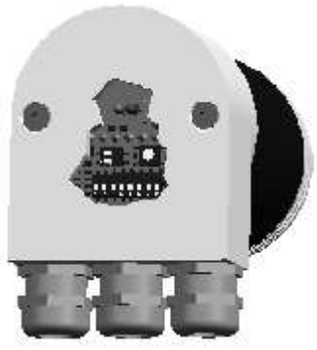
Device hardware installation

Installing the Eltra profibus encoder in a network requires the execution of the typical operations necessary for setting up any Profibus DP slave; the sequence of the steps can be summarised thus:
1 - *Commissioning* the slave on the master (see corresponding paragraph).
2 - Wiring the encoder into the Profibus network, with the insertion or not of terminations depending on the physical position the device occupies on the bus.
3 - Locally setting the address (which must be unique in the network and the same as the one chosen in point 1) for the slave.
4 - Preparing the master side application/s and setting up the Profibus network.

As we can see from the rear view of the encoder (see figure to the side) there is a led inspection window on the cover and a plug allowing access to the device local settings. The device operating status can be seen through the window by the two leds present. In particular, the green led signals power supply presence and must be permanently on, whilst the red led only goes out during the cyclical data exchange between the Profibus master that parameterized the encoder and the encoder itself.
In the cut-away alongside, we can see the RESET button, or better the button for zeroing the code of the two dip-switches for line termination and the eight dip-switches for choosing the device address only to be used with the encoder at a standstill.
In the particular configuration shown in the cited figure, the two line termination contacts are in the OFF status and do not therefore foresee bus termination on the encoder.
Of the eight dip-switches available only the first seven are used for the slave address, given that the maximum number of devices that can be inserted in a Profibus network is 126 elements. Also, we must consider that contact 1 is the LSB of the address code, whilst contact 7 is the MSB. The eighth switch on the other hand is used for code inversion.



REAR COVER VIEW



CUT-AWAY DRAWING

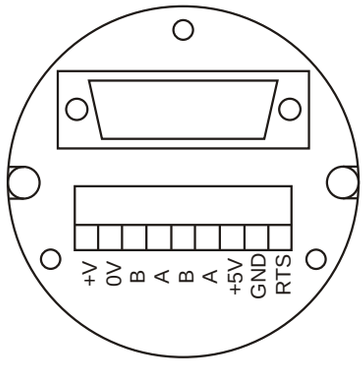
CONNECTION TO THE NETWORK.

Concerning encoder connection to the Profibus DP network, cable access inside the device is through three skintops (only two can be used if preferred).
Usually, one is used for connection to the bus, one for network continuity connection and the last, optional, for local encoder power supply (if this is not distributed via the network and the RS-485 twin wire connection).

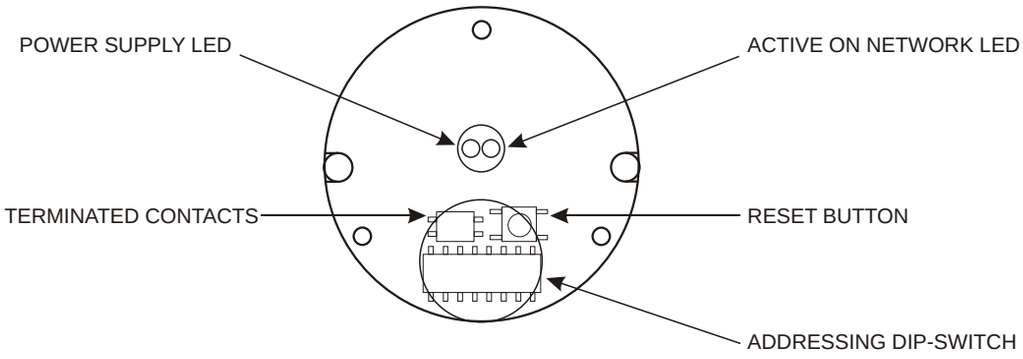
ACCESS TO THE TERMINAL BLOCK

To access the terminal block, unscrew the two screws on the rear plug and release the rear case from the main one by sliding it out from the sunken connector. Now connect the cables following the serigraphy on the connector, summarised in the following table:

+V	SUPPLY VOLTAGE
0V	GROUND
B	PROFIBUS DP LINE OUT (RED)
A	PROFIBUS DP LINE OUT (GREEN)
B	PROFIBUS DP LINE IN (RED)
A	PROFIBUS DP LINE IN (GREEN)
+5V	DC ISOLATED
GND	DC ISOLATED
RTS	REQUEST TO SEND



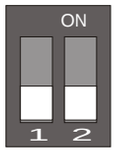
N.B.: To parameterize and configure the slave onto the Profibus DP master (*Commissioning* operation) it is necessary to use the **"Exx_0599.gsd "** file supplied with the encoder and in any case available at the following site:**www.eltra.it**.



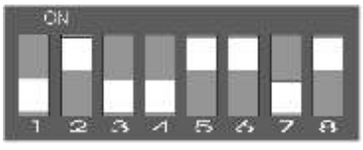
SETTING THE DIP-SWITCHES

Below, we give examples of profibus line closing and device setting, plus the standard position of the address dip-switches.

STANDARD SETTING



STANDARD SETTING



In this example a device address has been set equal to 1001101 from bit 2 to bit 8, corresponding to hexadecimal 77, whilst the first (1) bit corresponds to code inversion, which in this case is active.

LINE CLOSING

LINE CLOSING

NETWORK CHARACTERISTICS:

The physical means usually adopted when constructing a DP/FMS network is cable type A, which must have the following characteristics:

Parameter	Cable type A
Characteristic impedance in Ω	135 … 165 at a frequency of (3...20 Mhz)
Operating capacity (pF/m)	< 30
Loop resistance (Ω/km)	<=110
Core diameter (mm)	>0.64 *)
Core cross-section (mm^2)	>0.34 *)

This cable permits optimum network utilisation. In other words, it is possible to reach the maximum permitted communication speed of 12 Mbaud. There are however the following limitations to the maximum physical dimensions of a bus segment:

Baud rate (kbit/s)	9.6	19.2	93.75	187.5	500	1500	12000
Range/Segment	1200 m	1200 m	1200 m	1000 m	400 m	200 m	100 m

Finally, we recall the physical and topographical characteristics of a profibus network:

Maximum number of stations participating in the exchange of user data	DP: 126 (address from 0..125) FMS: 127 (address from 0..126)
Maximum number of stations per segment including repeaters	32
Available data transfer rates in kbit/s	9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000, 12000
Max. number of segments in series	According to EN 50170, a maximum of 4 repeaters are allowed between any two stations. Dependent on the repeater type and manufacturer, more than 4 repeaters are allowed in some cases. Refer to the manufacturer's technical specification for details.

Ordering codes for multiturn absolute encoder

PROFIBUS

In case of a particular Customer variant separate by a full stop

EAM 63 A 4096 / 4096 B 12/28 F X X 10 X 3 P3 R . XXX

EAM = multiturn absolute encoder

58 = body dimension
63 = body dimension
90 = body dimension
115 = body dimension

A = mod.EAM63 / 90 / 115
B = mod.EAM58
C = mod.EAM58
D = mod.EAM63
E = mod.EAM63
F = mod.EAM63
G = mod.EAM63
Type of flanges

2 / 4 / 8 / 16 / 32 / 64 / 128 / 256 / 512 / 1024 / 2048 / 4096 **Turns**

2 / 4 / 8 / 16 / 32 / 64 / 128 / 256 / 512 / 1024 / 2048 / 4096 / 8192 **Resolutions**
N.B.: For impulse availability contact our offices

B = Binary **Code**

12 ÷ 28 **Encoder power supply (Vdc)**

F = PROFIBUS **Electronics output configuration**
N.B.: For the optionals on the output configurations contact our offices

X = not to utilize **Options**

X = not to utilize **Logics**

6 = ø 6g6 mm -- 58B
8 = ø 8g6 mm -- 58B -- 63A / D / E -- 90A
9 = ø 9.52g6 mm -- 63A / D / E -- 90A **Shaft diameter**
10 = ø 10g6 mm -- 58B / C -- 63A / D / E -- 90A -- 115A
11 = ø 11g6 mm -- 115A

8 = ø 8H7 mm
9 = ø 9H7 mm
10 = ø 10H7 mm
12 = ø 12H7 mm
14 = ø 14H7 mm
15 = ø 15H7 mm
Hole diameter only for mod.63F / G

XXX = Special Customer variants indicated by a progressive number from 001 to 999

R = radial

P2 = two skintop
P3 = three skintop

3 = 3000 with IP66
6 = 6000
R.P.M.

X = IP54
S = optional IP66 excluding EA63F/G --EAM115
Protection

Enviromental Characteristics

Protection	IP54 IP66 optional --58B/C --63A/D/E --90A
Operating Temperature	0° ÷ +60°C
Storage Temperature	-15° ÷ +70°C

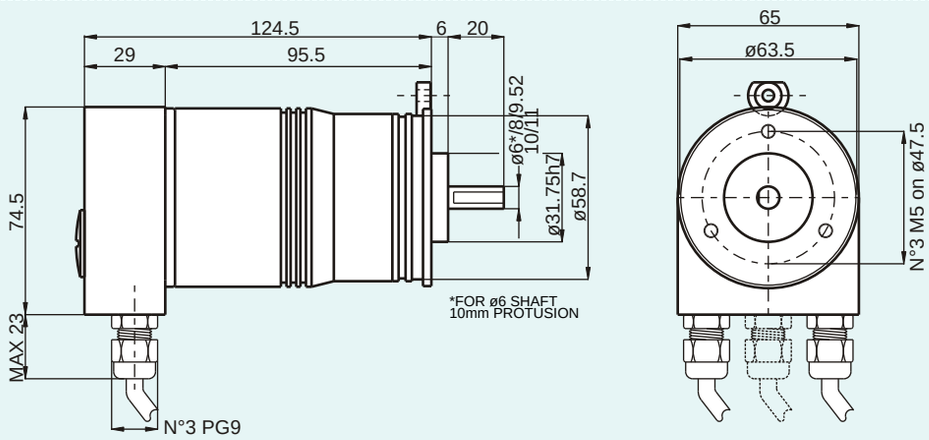
Electronic Characteristics

Turns	2 / 4 / 8 / 16 / 32 / 64 / 128 / 256 / 512 / 1024 / 2048 / 4096
Resolutions	2 / 4 / 8 / 16 / 32 / 64 / 128 / 256 / 512 / 1024 / 2048 / 4096 / 8192
Power supply	12 ÷ 28 Vdc
Current consumption without load	300 mA
Electronic of Bus	LINE DRIVER (RS485)
Max output frequency	100 KHz output code $F = \frac{\text{RPM x Resolution}}{60}$
Accuracy	+/- ½ LSB
Bus Max Frequency	12 Mbaud

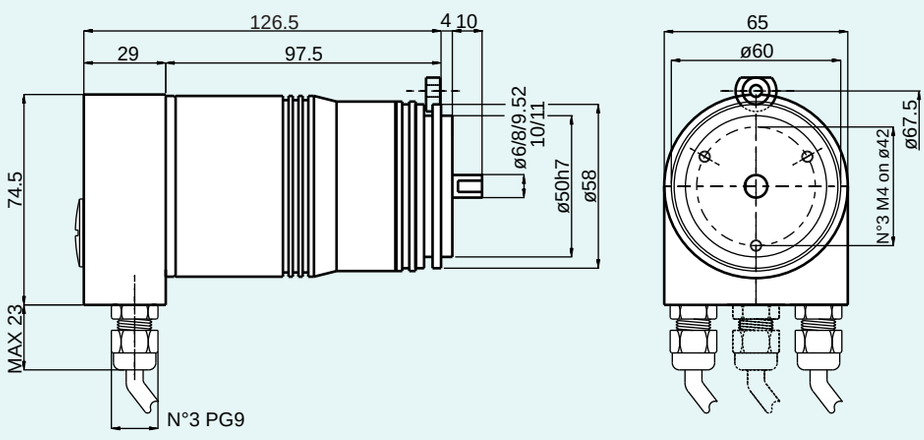
Mechanical Characteristics

Shaft diameters (mm)	ø6 g6 -- 58B ø8 g6 -- 58B -- 63A/D/E -- 90A ø9.52(3/8") g6 -- 63A/D/E -- 90A ø10 g6 -- 58B/C -- 63A/D/E -- 90A -- 115A ø11 g6 -- 115A
Hole diameters (mm)	ø8 H7 --63F/G ø9 H7 --63F/G ø10 H7 --63F/G ø12 H7 --63F/G ø14 H7 --63F/G ø15 H7 --63F/G
R.P.M. Max	6000 continuos 3000 continuos for --63G/F 3000 with Ip66
Shock	50 G per 11 msec
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft material	Stainless steel AISI303
Body material	Aluminium -UNI 9002/5- (D11S)
Cover material	Aluminium alloy 6060
Flange material	Aluminium -UNI 9002/5- (D11S)
Weight	~ 800 g --58B/C--63A/D/E/F/G ~ 1000 g --90A--115A

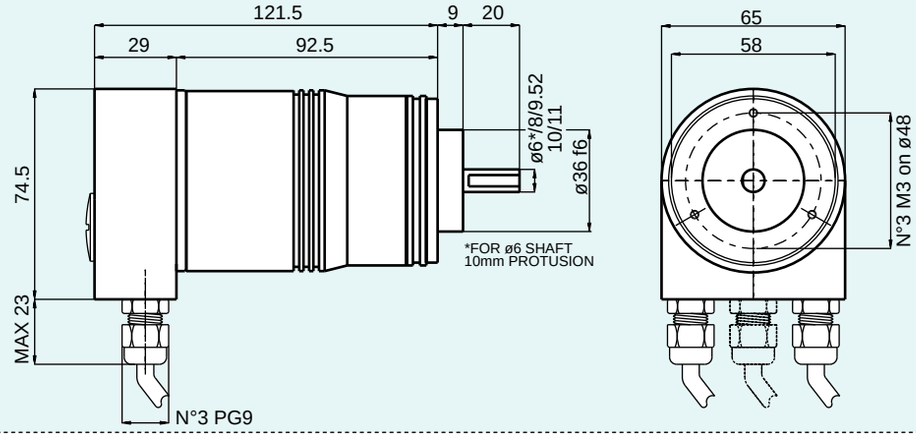
EAM63A



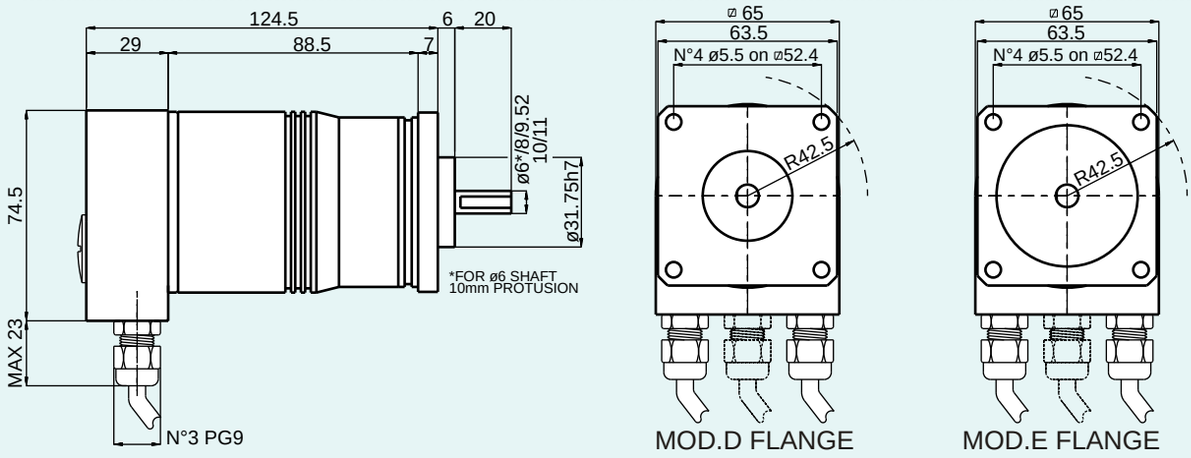
EAM58B



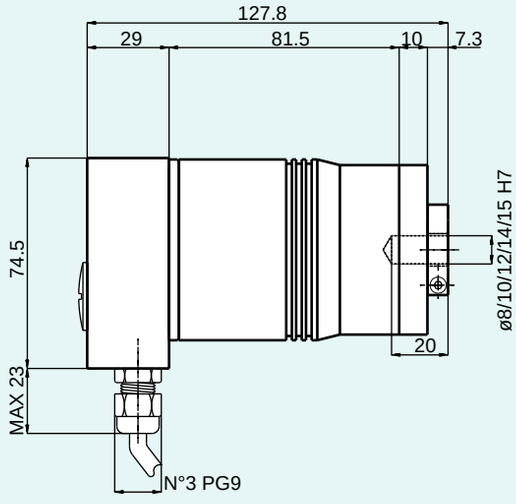
EAM58C

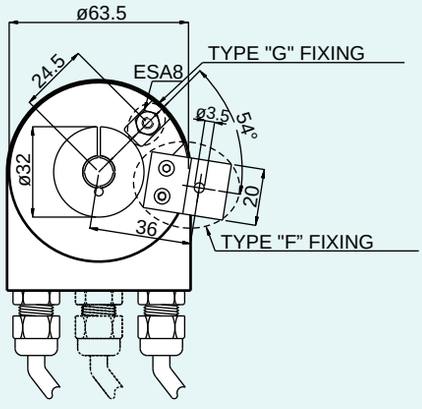


EAM63D - EAM63E

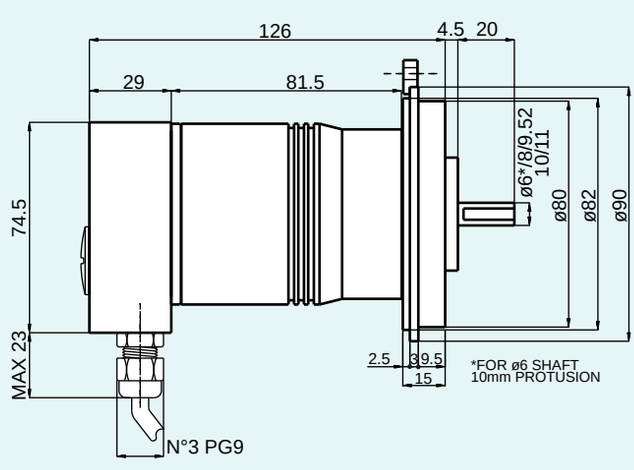


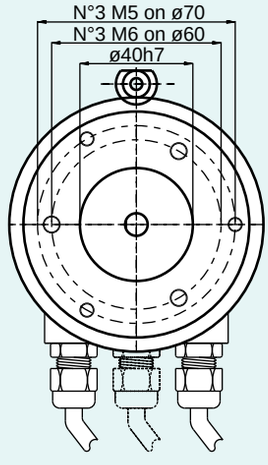
EAM63F - EAM63G



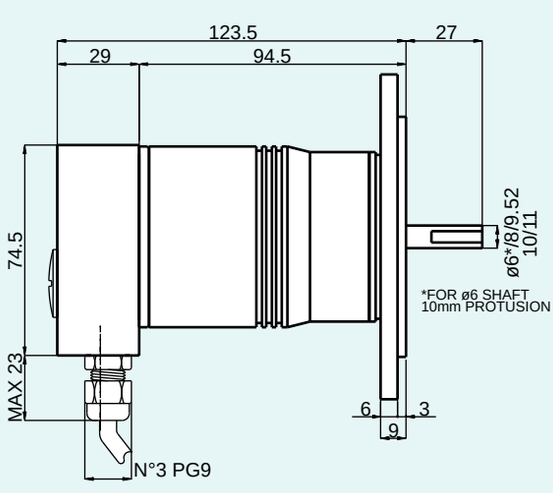


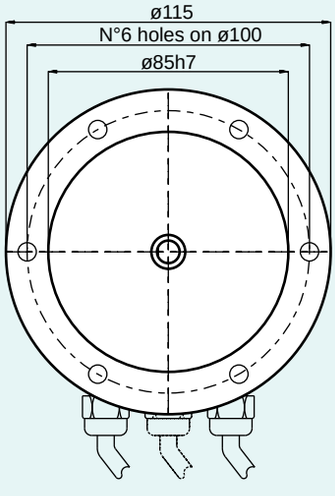
EAM90A





EAM115A





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