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ND001GB0803A

Edition 08-2003

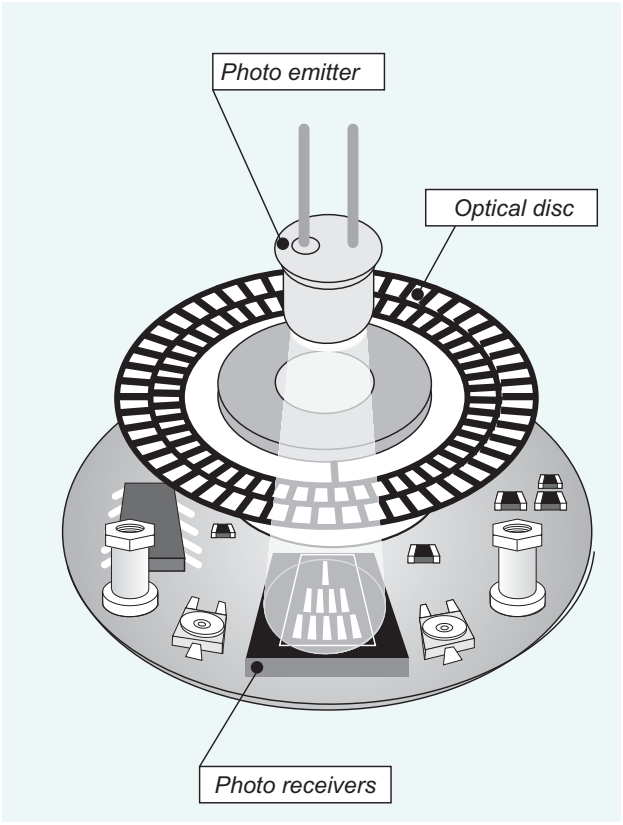
Eltra®

ISO 9001:2000

INCREMENTAL ENCODER
GENERAL DESCRIPTION

Functioning Principle

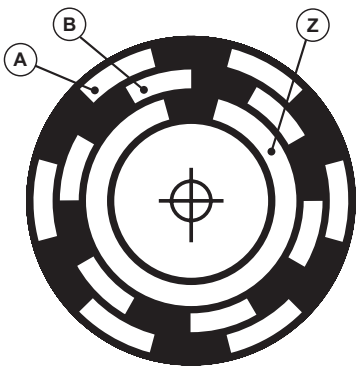
The encoder is a rotational transducer to convert an angular movement into a series of electrical digital impulses. These generated impulses can be used to control angular or linear movements, if they are associated with a rack or endless screws. The electrical signals during rotation can be elaborated by numerical controls (CNC), programmable logic controls (PLC), control systems, etc. The main applications of these transducers are as follows: machine tools, working of the material, robots, retroaction systems on motors, measurament and control apparatus. In ELTRA's encoders the angular movement trasduction is carried out on the photoelectric scanning principle. The reading system is based on the rotation of a radial graduated disc formed by opaque windows alternated with transparent ones. This system is all illuminated in perpendicular way by an infrared light source, so the light projects the disk image on the receivers surface, which are covered by a grating called collimator, having the same step as the disk. The receivers work trasducing the light variations occuring with the disk shifting, converting them into their correspondig electrical variations.



Electrical signal raised to generate the squared impulses without any disturbances must be electronically processed. The reading system is always carried out in differential mode comparing two different signals nearly identical, but out of phase for 180 electrical degrees to increase the quality and the stability of the output signals. The reading is made on the two signals difference, eliminating the disturbances defined "shifted common way" because they are overlapped in an equal way on every type of wave.

Incremental encoders

The incremental encoder gives usually two types of squared waves that are out of phase for 90 electrical degrees, which are usually called channel A and channel B. The reading of only a channel gives the information in relation to the speed of rotation, while through the acquisition of second channel the sense of the rotation is given on the basis of the states sequence produced by the two signals. A further signal called Z or zero channel is also available, which gives the position of absolute zero on the encoder shaft. This signal is a squared impulse with the phase and the width centered on A channel.



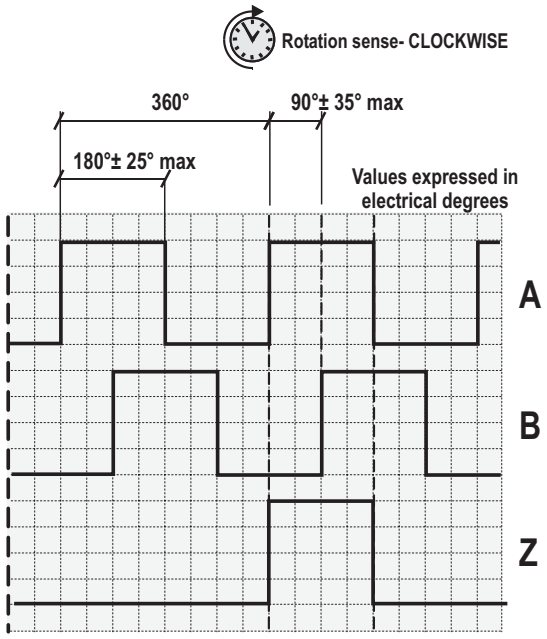
Example of incremental windows A, B and Z on the optical disc

The incremental encoder precision depends from mechanical and electrical factors among which, the error in the grating division, the disc eccentricity, the bearings eccentricity, the error introduced by the reading electronics and the innacurancy of optic. The unit of measurement, to define the encoder precision is the electronical degree, which determines the division of the impulse generated by the encoder, inf act 360 electrical degrees correspond to the mechanical rotation of the shaft which is necessary to carry out a complete cycle.

To know how many mechanical degrees corresponds to electric 360° you need to apply the following formula:

$$\text{Electrical } 360° = \frac{\text{Mechanic } 360°}{\text{n° pulse / turn}}$$

The error of encoder division is given from the maximum shifting shown in electrical degrees, of two consecutive surges. This error exists in any encoder and is due to the above mentioned factors.

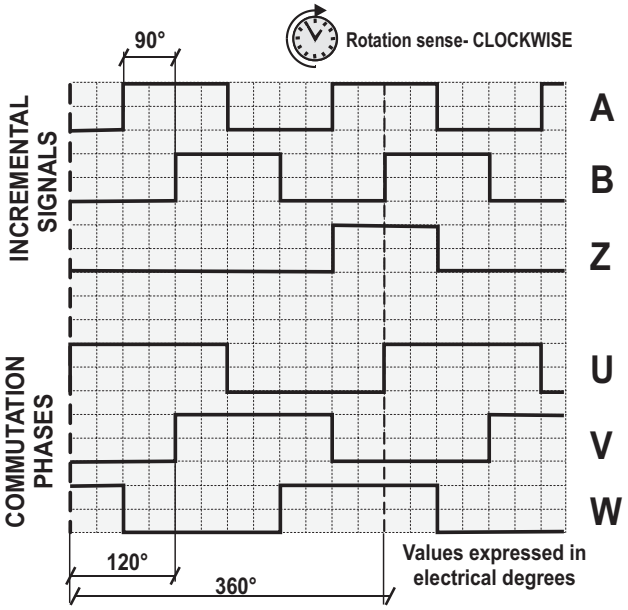


Graphic representation of the A, B and Z incremental signals .

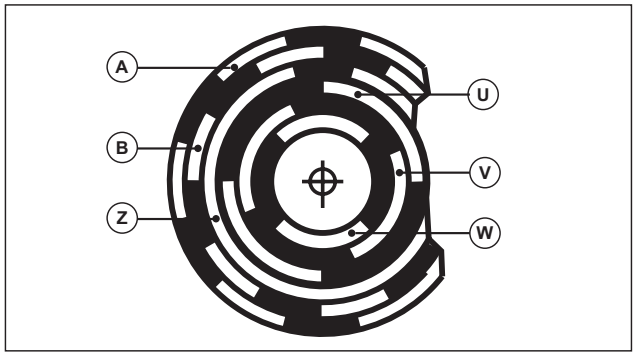
For Eltra encoders this error is included in electrical +/- 25° Max. (in whatever condition declared) which corresponds to a shifting +/- 7% from the nominal value. Regarding the shifting between the two channels shifted by electrical 90° nominally, it differs by electrical +/-35° max, corresponding to more or less the +/- 10%.

Incremental encoder with integrated commutation phases

More than the above mentioned traditional encoders there are also other ones making part of the same incremental family, but which integrates other electrical output signals. This is the case of the incremental encoders with integrated commutation signals which are usually used as retroaction on a motor. These supplementary signals carry out the simulation function for the hall phases generally present in the commutation motors (brushless type); they are usually made with magnetic sensors. In ELTRA's encoders these commutation signals are optically generated and they are present in the form of three square waves that are shifted by electrical 120°. These signals are needed to the convertor that will pilot the motor in order to generate the correct phase voltages or the currents to supply the rotation. These commutation impulses can be repeated many times within one mechanical rotation because they depend directly to the number of poles in the connected motor, so we have phases of commutation for motors of 4, 6, or more poles.



Graphic representation of A, B and Z incremental signals with commutation U,V and W.



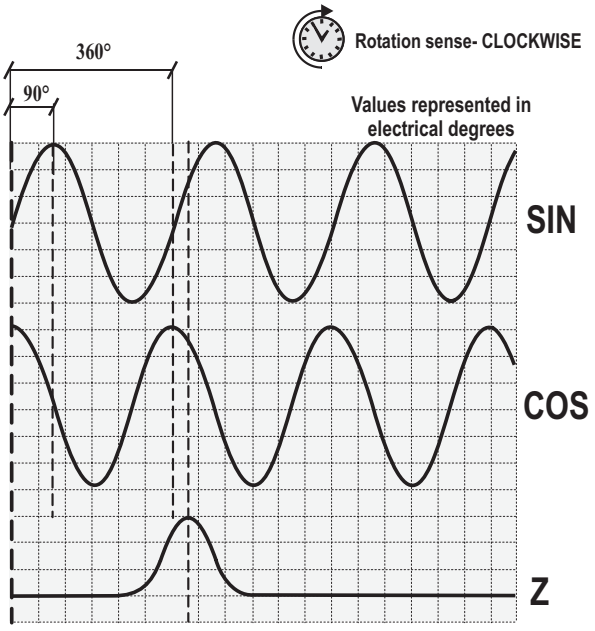
Sinusoidal Encoder

This encoder is part of the incremental family, with the main difference that the output signals are not digital but analogue of sinusoidal form. It is mainly created to satisfy the need in the motorized field as sensor of retroaction for the motor. This encoder is used when one wants to increase the dynamic performance in comparison to other traditional systems. To ensure good motor piloting performance the encoder retroaction must be able to supply a high number of impulses especially when the velocity rotation is low. The use of the traditional incremental encoder with high impulses becomes problematic from many points of view; it is also difficult transmitting and processing the digital signals when the motor rotates at high speeds (6000rpm); in this case, in fact, the band-width necessary to the servomotor to treat the signal (for example an encoder of 10.000 imp/turn), should easily surpass the MHz threshold. On the other hand, the use of analogue signals allows to limit drastically the above mentioned inconveniences and to simulate efficiently an encoder of high impulses. This happens thanks to the interpolation method of the sine and cosine analogue signals for the calculation of the rotation angle. It is easy to obtain a high multiplication of the base sinusoids by getting , for example, from 1024 sin/turn an encoder more than 100.000 imp/turn.

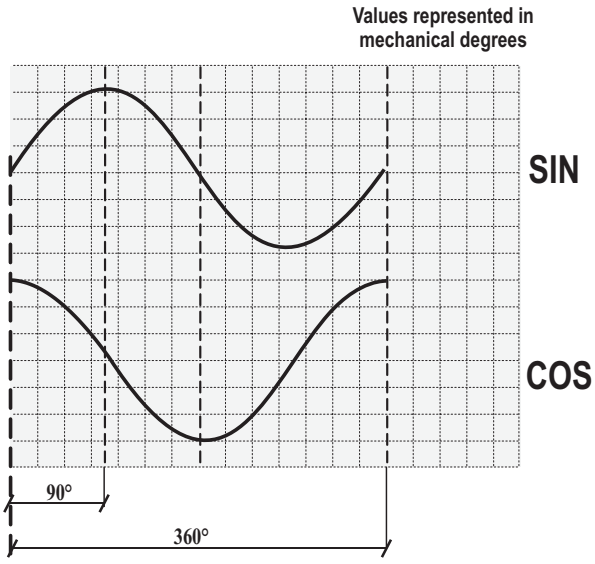
The band-width necessary for the reception of the signal is enough if it is little higher than 100 KHz. The output signals from the encoder are formed by two sinusoids out of phase for 90 electrical degrees, which we will call sine and cosine (2408 sin/turn MAX) and by the analogue zero signal that is centered between the two above mentioned channels. Other two sinusoidal signals are integrated with a period of 360 mechanical degrees (1sin/turn) that carry out the function of the commutation signals. The drawing below clarifies the typical configuration and the relative phase desplacement..The outputs with 1 imp/turn resolution are very useful as you can get the absolute angular position in the same way as a resolver. The zero signal is also analogue and presents a form that can assimilate a part of the sinusoid. This can be easily squared to supply an impulse of reference with a variable opening angle. The fundamental data to define the precision of this encoder are the linearity of the single sinusoid (of the 2048 on turn) and the maximum deviation of any angle rotation in comparison to the real mechanical position. The max linearity error of one of these incremental sinusoid is 10%. The error refered to encoder/turn depends, obviously, to the number sin/turn of the encoder, for example the calculation of the linearity error of an 2048 sin/turn will be:

$$E.lin = 0.1x \frac{360 \times 60 \times 60}{2048} \cong 63''$$

The error of the deviation of the angle measured in comparison to the real one is generally produced by the above mentioned factors and is maintained within 10', taking care of the quality of the bearings and the disc centering on the shaft.



Graphic representation of the sin, cos and Z sinusoidal signals.



Graphic representation of the sin and cos commutation signals

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ISO 9001:2000

EL30E / H / I
INCREMENTAL ENCODERS

Incremental encoders

Series of miniaturized encoders ø30 for application where the minimum size is required still maintainig excellent performance.
- Resolutions up to 1000 imp/turn with zero
- Different electronic configurations available with power supply up to 24 Vdc
- Max. output frequency up to100 Khz
- Output cable, eventual connector applied to the end of the cable
- Different flanges available
- Speed rotation up to 3000 rpm
- Protection up to IP54

Ordering codes

EL 30 E 50 Z 5 N 4 X 3 P A . XXX

In case of particular Customer variant seperate with a full stop

EL = incremental encoder

30 = body dimension

E = mod.EL30E
H = mod.EL30H
I = mod.EL30I
Type of flanges

from **1** to **1000** imp./turn
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5
8 ÷ 24
Encoder power supply (Vdc)

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

4 = ø4g6 EL30E
6 = ø6g6 EL30H / 30I
Shaft diameter

X = IP54
Protection

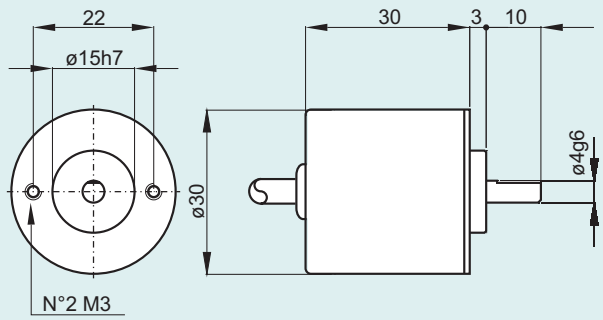
3 = 3000 max
R.P.M.

P = output cable (standard length 0.5 m)

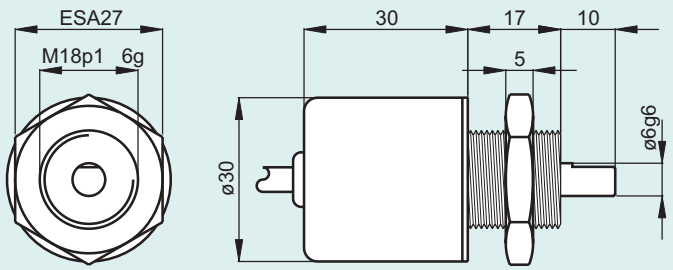
A = axial

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

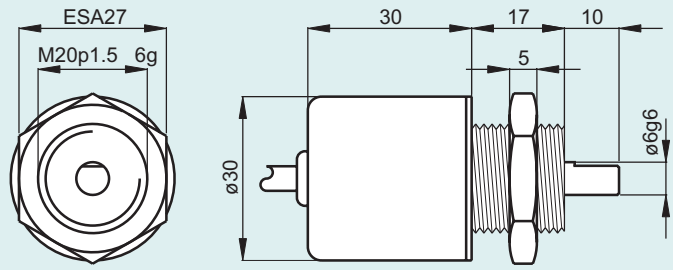
EL30E



EL30H



EL30I



Electronic Characteristics

Resolution	From 1 to 1000 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc
Current consumption without load	MAX 80 mA
Max commutable current	50 mA per channel 20 mA per channel LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz
Frequency calculation	$F = \frac{RPM \times Resolution}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø4 g6 EL30E ø6 g6 EL30H / I
Protection	IP54 - Standard
R.P.M. Max	3000 continuous
Max shaft load	5N (0.5 Kp) axial 5N (0.5 Kp) radial
Shock	50 G for 11 msec
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 bearings
Shaft material	Stainless steel AISI303
Body material	Aluminium D11S - UNI 9002/5
Container Material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	50 g

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EH38A / B / D
INCREMENTAL ENCODERS
EH SERIES

Incremental encoder EH series

Series of miniaturized encoders for general applications.
- Resolutions up to 1024 imp/turn
- Different electronic configurations available with power supply up to 24 Vdc
- Max output frequency up to 100 Khz
- Output cable, eventual connector applied to the end of the cable
- Different flanges available
- Speed rotation up to 3000 rpm
- Protection up to IP54

Ordering codes

In case of particular Customer variant seperate with a full stop

EH 38 A 500 Z 5 N 6 X 3 P R . XXX

EH = incremental encoder EH series

38 = body dimension

A = mod.EH38A
B = mod.EH38B
D = mod.EH38D
Type of flanges

from **40** to **1024** imp./turn — **Resolutions**
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = witht zero impulse
Zero impulse

5
8 ÷ 24
Encoder power supply (Vdc)

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

6 = ø6 mm — **Shaft diameter**

X = standard IP54 — **Protection**

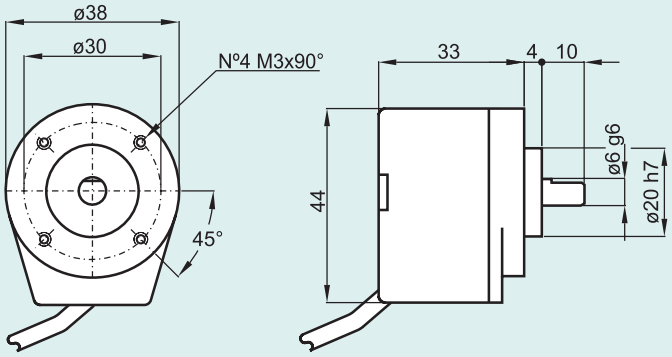
3 = 3000 max — **R.P.M.**

P = output cable (standard length 0.5 m)

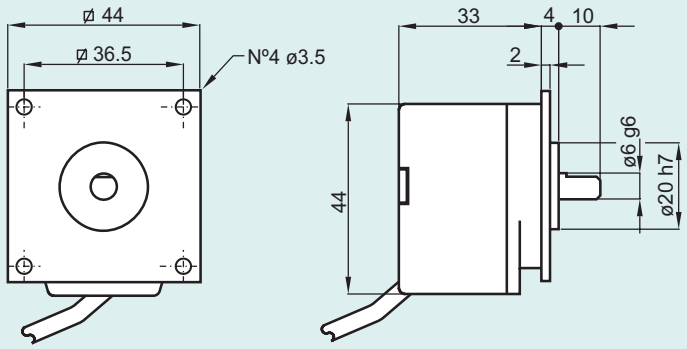
R = radial

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

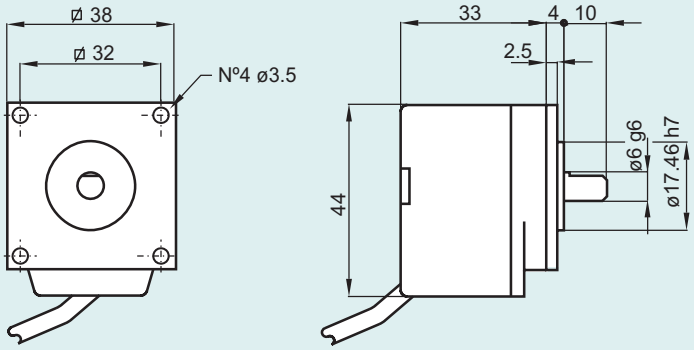
EH38A



EH38B



EH38D



Electronic Characteristics

Resolution	From 40 to 1024 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz
Frequency calculation	$F = \frac{RPM \times Resolution}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø6 g6
Protection	IP54 - Standard
R.P.M. Max	3000 continous
Max shaft load	5N (0.5 Kp) axial 5N (0.5 Kp) radial
Shock	50 G for 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 5076
Square flange material	Aluminium
Cover material	Special plastic reinforced with glass fibre
Operating temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	100 g

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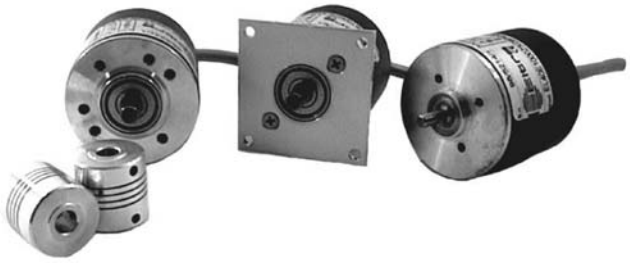
ISO 9001:2000

EH-EL40A / B / C / E
INCREMENTAL ENCODERS

Incremental encoders

Series of miniaturized encoders ø42 for general applications.
- Resolutions up to 2000 imp/turn with zero for EL series and up to 400 imp/turn for the EH series.
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdc for the EH series
- Max output frequency up to 100 KHz for the EL series and up to 40KHz for the EH series
- Output cable, eventual connector applied to the end of the cable
- Different flanges available
- Speed rotation up to 6000 rpm
- Protection IP65



Ordering codes

In case of particular Customer variant seperate with a full stop

EL 40 A 500 Z 5/28 N 6 X 6 P R . XXX

EL = incremental encoder EL series
EH = incremental encoder EH series

40 = body dimension

A = mod.EH-EL40A
B = mod.EH-EL40B
C = mod.EH-EL40C
E = mod.EH-EL40E
Type of flanges

from **1** to **2000** imp./turn EL series
from **50** to **400** imp./turn EH series
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse (only EL series)
Zero Impulse

5 ÷ 28 = power supply for the EL series
5 / 8 ÷ 24 = power supply for the EH series
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER (only the EL series)
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

4 = ø 4 mm EH-EL40E
6 = ø 6 mm EH-EL40A / B / C
Shaft diameter

X = standard IP54
S = optional IP65
Protection

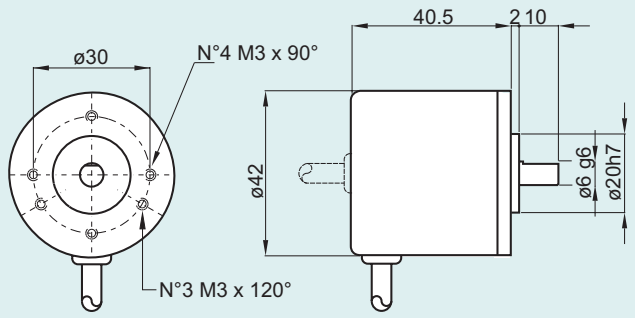
3 = 3000 EH-EL40C / E
6 = 6000 EL40A / B
R.P.M.

P = standard output cable 0.5 m

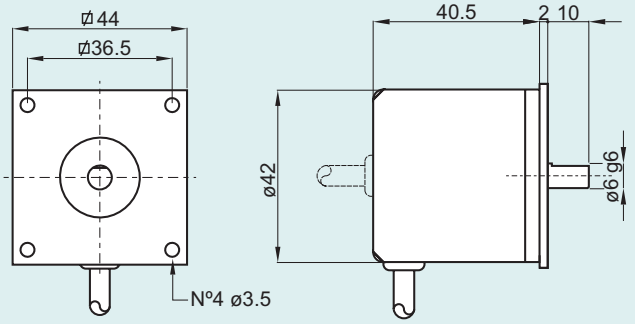
R = radial
A = axial

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

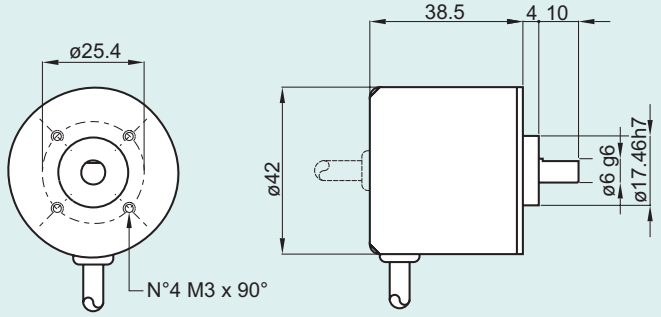
EH-EL40A



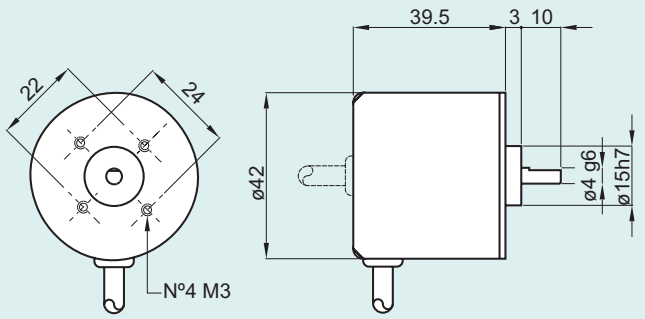
EH-EL40B



EH-EL40C



EH-EL40E



Electronic Characteristics EL Series

Resolutions	From 1 to 2000 impulses / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only with 5 / 8÷24 Vdc power supply
Current consumption without load	80 mA
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Electronic Characteristics EH Series

Resolutions	From 50 to 400 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only with 5 / 8÷24 Vdc power supply
Current consumption without load	50 mA bidiretional
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 40 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø4 g6 EH-EL40E ø6 g6 EH-EL40A / B / C
Protection	IP54 - Standard EH-EL40C / E IP65 - Optional EH-EL40A / B
R.P.M. Max	3000 continuous EH-EL40C / E 6000 continuous EL40A / B
Max shaft load	5N (0.5 Kp) axial 5N (0.5 Kp) radial
Shock	50 G for 11 msec
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft material	Stainless steel AISI303
Body material	AluminiumD11S - UNI 9002/5
Cover material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	100 g

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ISO 9001:2000

EH-EL40G / H / I
INCREMENTAL ENCODERS

Incremental encoders

Series of miniaturized encoders ø42 for generic applications.
- Resolutions up to 2000 imp/turn with zero for the EL series and up to 400 imp/turn for the EH series .
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdc for the EH series
- Max output frequency up to 100 KHz for the EL series and up to 40KHz for the EH series
- Output cable, eventual connector applied to the end of the cable
- Different flanges available
- Speed rotation up to 3000 rpm
- Protection up to IP54

Ordering Codes

In case of particular Customer variant separate with a full stop

EL 40 G 500 Z 5/28 N 6 X 3 P R . XXX

EL = incremental encoder EL series
EH = incremental encoder EH series

40 = body dimension

G = mod.EH-EL40G
H = mod.EH-EL40H
I = mod.EH-EL40I
Type of flanges

from **1** to **2000** imp./turn EL series
from **50** to **400** imp./turn EH series
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse (only EL series)
Zero impulse

5 ÷ 28 = power supply EL series
5 / 8 ÷ 24 = power supply EH series
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

6 = ø 6 mm EH-EL40G
6 = ø 6 mm EH-EL40H / I
Hole diameter
Shaft diameter

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER (only the EL series)
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

X = standard IP54
Protection

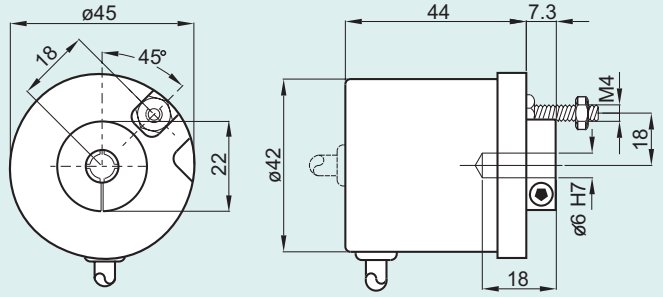
3 = 3000
R.P.M.

P = standard output cable 0.5 m

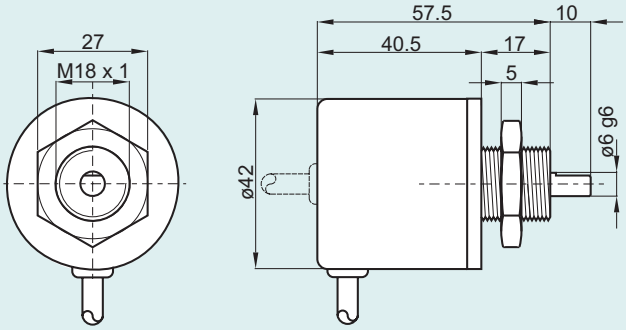
R = radial
A = axial

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

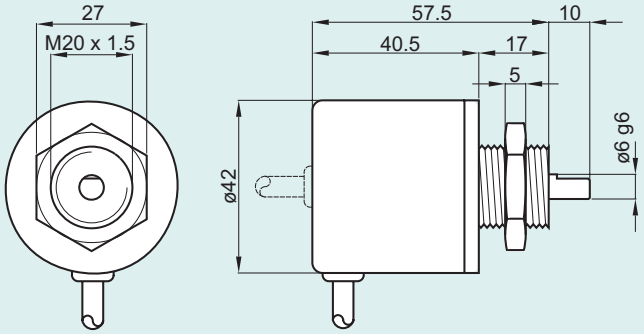
EH-EL40G



EH-EL40H



EH-EL40I



Electronic Characteristics EL series

Resolutions	from 1 to 2000 impules / turn
Power Supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc configuration
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Electronic Characteristics EH series

Resolutions	from 50 to 400 impulses / turn
Power Supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only with supply of 5 / 8÷24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 40 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft Diameter (mm)	ø6 g6 EH-EL40H / I
Hole diameter(mm)	ø6 h7 EH-EL40G
Protection	IP54 - Standard
R.P.M. Max	3000 continuous
Max shaft load	5N (0.5 Kp) axial 5N (0.5 Kp) radial
Shock	50 G for 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 D11S - UNI 9002/5
Cover material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	150 g

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ISO 9001:2000

EH-EL53A / B
INCREMENTAL ENCODERS

Incremental encoders

A series of encoders for the direct assembly on motors; the incorporated elastic joint allows the compensation of radial and axial slack.

- Resolutions up to 10000 imp/turn with zero for the EL series and up to 1024 imp/turn for the EH series
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdc for the EH series
- Max output frequency up to 300 KHz for the EL series and up to 100KHz for the EH series.
- Output : cable and connector
- Different flanges available
- Speed rotation up to 6000 rpm
- Protection up to IP64

Ordering codes

In case of particular Customer variant separate with a full stop

EL 53 A 1000 Z 5/28 N 6 X 6 M R . XXX

EL = incremental encoder EL series
EH = incremental encoder EH series

53 = body dimension

A = mod.EH-EL53A
B = mod.EH-EL53B
Type of flanges

from **1** to **10000** imp./turn EL series
from **40** to **1024** imp./turn EH series
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero Impulse

5 ÷ 28 = power supply for the EL series
5 / 8 ÷ 24 = power supply for the EH series
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

6 = ø 6 mm
8 = ø 8 mm
10 = ø 10 mm
Shaft diameter

X = standard IP54 EH53
standard IP64 EL53
Protection

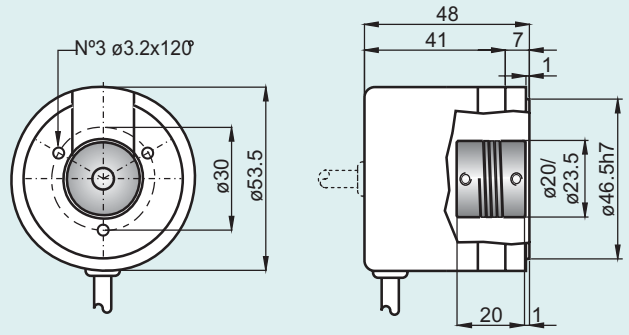
6 = 6000
R.P.M.

P = standard output cable 0.5 m series EH53
standard output cable 1.5 m series EL53
M = connector MS3106E 16S-1S or 18-1S only EL53
J = connector JMSP 1607 F or 1610 F only EI53

R = radial
A = axial

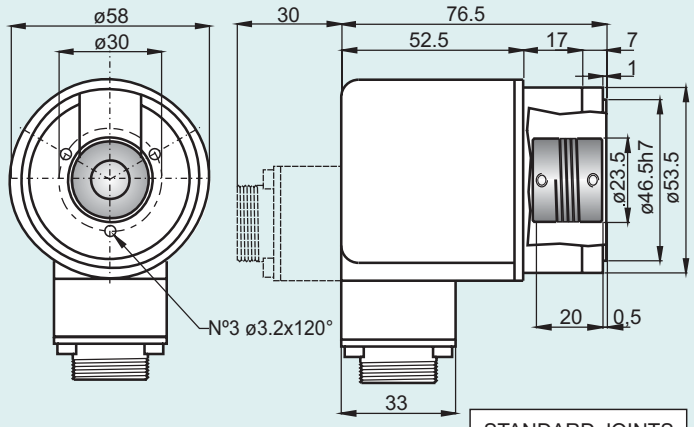
XXX = Special Customer variants indicated by a progressive number from 001 to 999

EH53A



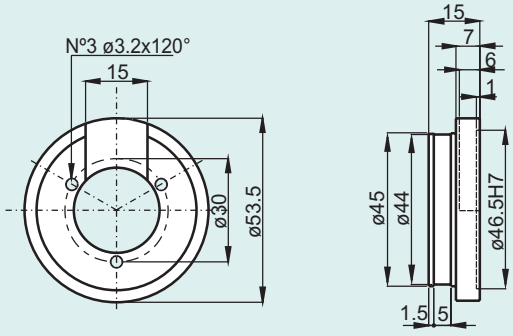
STANDARD JOINTS
G20A6
G23A6/8
G23A6/10

EL53A



STANDARD JOINTS
G23A10
G23A8/10
G23A6/10

EH-EL53B Flange version



Electronic Characteristics EL Series

Resolutions	From 1 to 10000 impulses / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only of power supply 5 / 8 ÷ 24 Vdc
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Electronic Characteristics EH Series

Resolutions	From 40 to 1024 impulses /turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only of power supply 5 / 8 ÷ 24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm.)	ø6 / 8 / 10 h7
Protection	EH53 : IP54 standard EL53 : IP64 standard
R.P.M. Max	6000 continuous
Shock	50 G for 11 msec (with flexible disc) 20 G for 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft material	Stainless steel AISI303
Body material	Alluminium D11S - UNI 9002/5
Cover material	Special plastic with glass fibre
Operating temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	EH53 : 150 g EL53 : 350 g

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ISO 9001:2000

EH-EL58B / C / H / T
INCREMENTAL ENCODERS

Incremental encoders

Standard series of encoders ø58 for industrial environments with excellent mechanical resistance; possibility of high radial and axial load on the shaft.They can be assembled with flanges or servo fasteners.

- Resolutions up to 10000 imp/turn with zero for the EL series and up to1024 imp/turn for the EH series
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdcfor the EH series
- Max output frequency up to 300 KHz for the EL series and up to 100KHz for the EH series
- Output : cable and connector
- Different flanges available
- Speed rotation up to 6000 rpm
- Protection up to IP66

Ordering codes

EL	58	B	1000	Z	5/28	P	6	X	6	M	R	.	XXX

In case of particular Customer variant separate with a full stop

EL = incremental encoder EL series
EH = incremental encoder EH series

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

58 = body dimension

R = radial
A = axial

B = mod.EH-EL58B
C = mod.EH-EL58C
H = mod.EH-EL58H
T = mod.EH-EL58T
Type of flanges

P = standard ouput cable 1.5 m
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F

from **1** to **10000** imp./turn EL series
from **40** to **1024** imp./turn EH series
Resolutions
N.B.:For impulse availabilty contact directly our offices

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

S = without zero impulse
Z = with zero impulse
Zero impulse

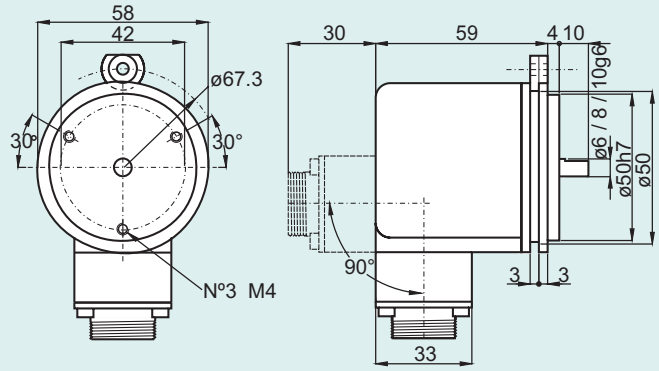
X = standard IP54
S = optional IP66
Protection

5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

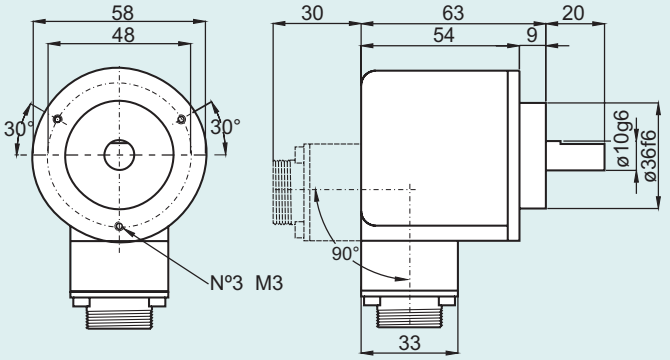
6 = ø 6 mm EH-EL58B / 58H
8 = ø 8 mm EH-EL58B / 58H / 58T
10 = ø 10 mm EH-EL58B / 58C / 58H / 58T
12 = ø 12 mm EH-EL58T
Shaft diameter

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

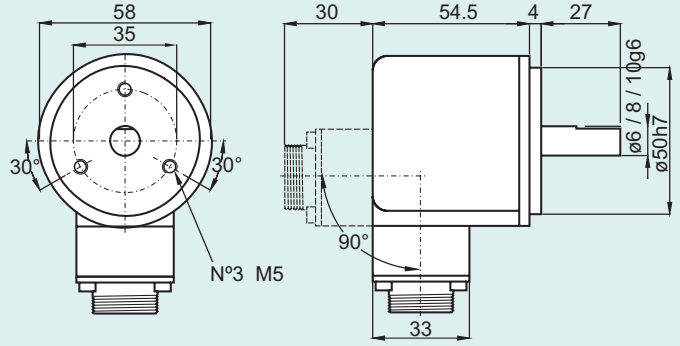
EL-EH58B



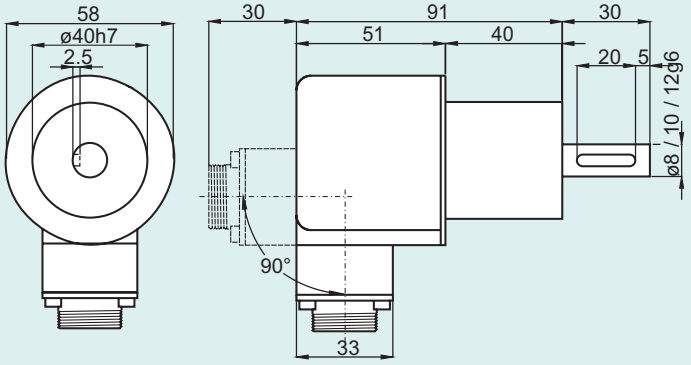
EL-EH58C



EL-EH58H



EL-EH58T



Electronic Characteristics EL series

Resolutions	from 1 to 10000 imp / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc power supply
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolutions}}{}$

Electronic Characteristics EH series

Resolutions	from 40 to 1024 imp / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc power supply
Current consumption without load	50 mA bidiretional 100 mA bidiretional with zero
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø6 / 8 / 10 g6 EH-EL58B / 58H ø10 g6 EH-EL 58C ø8 / 10 / 12 g6 EH-EL 58T
Protection	IP54 - Standard Ip66 - Optional
R.P.M. Max	6000 with IP54 3000 with Ip66
Max shaft load	200N (20 Kp) axial 10N (1 Kp) axial 200N (20 Kp) radial 20N (2 Kp) radial with ø6 mm shaft
Shock	50 G for 11 msec (with flexile disc) 20 G for 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 Ball bearings
Shaft material	Stainless steel AISI303
Body material	Aluminium UNI 5076
Cover material	Special plastic reinforced with glass fibre
Operating temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	310 g

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ISO 9001:2000

EH-EL63A / D / E
INCREMENTAL ENCODERS

Incremental encoders

Standard series of encoders ø63 for industrial environments with excellent mechanical resistance; possibility of high radial and axial load on the shaft.
They can be assembled with flange or servo-fasteners
- Resolutions up to 10000 imp/turn with zero for the EL series and up to 1024 imp/turn for the EH series
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdc for the EH series
- Max output frequency up to 300 KHz for the EL series and up to 100Khz for the EH series
- Output : cable and connector
- Different flanges available
- Speed rotation up to 6000 rpm
- Protection up to IP66

Ordering Codes

In the case of particular Customer variant separate with a full stop

EL 63 A 1000 Z 5/28 P 8 S 3 M R . XXX

EL = incremental encoder EL series
EH = incremental encoder EH series

63 = body dimension

A = mod.EH-EL63A
D = mod.EH-EL63D
E = mod.EH-EL63E
Type of flanges

from **1** to **10000** imp./turn EL series
from **40** to **1024** imp./turn EH series
Resolutions
N.B.:For impulse availabilty contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero Impulse

5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on the output configurations see the output on incremental connections card

8 = ø 8 mm
9 = ø 9.52 mm (3/8")
10 = ø 10 mm
Shaft diameter

X = standard IP54
S = optional IP66
Protection

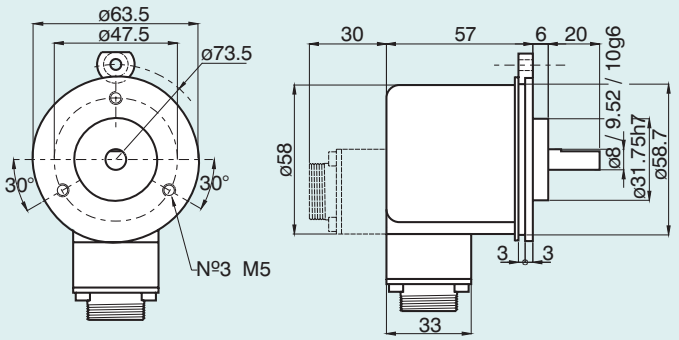
3 = 3000 with IP66
6 = 6000
R.P.M.

P = standard output cable 1.5 m
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F

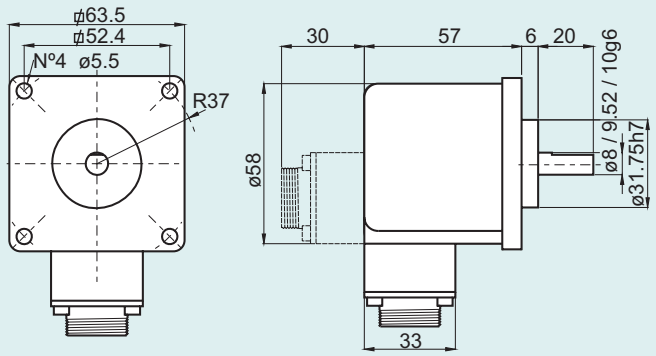
R = radial
A = axial

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

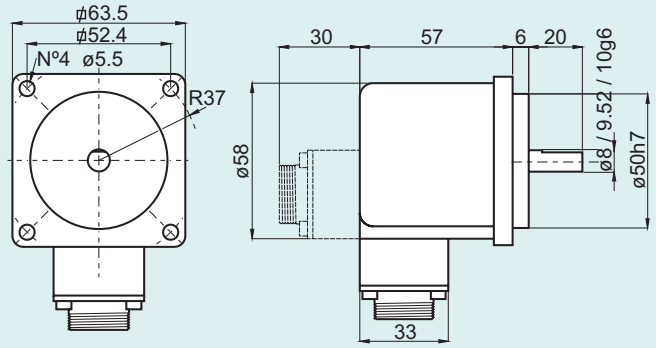
EH-EL63A



EH-EL63D



EH-EL63E



Electronic Characteristics EL series

Resolution	from 1 to 10000 imp / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc power supply
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Electronic Characteristics EH series

Resolutions	From 40 to 1024 imp / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc power supply
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft diameter	ø6 - ø9.52 (3/8") - ø10 g6
Protection	IP54 standard IP66 optional
R.P.M. Max	6000 with IP54 3000 with IP66
Shock	50 G for 11 msec (with flexile disc) 20 G for 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft material	Stainless steel AISI303
Body material	Alluminium UNI 5076
Cover material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	350 g

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EH-EL63F / G / P
INCREMENTAL ENCODERS

Incremental encoders

Standard series of encoders ø63 for industrial environments with excellent mechanical resistance; possibility of high radial and axial load on the shaft. They can be assembled with flanges or servo fasteners.

- Resolutions up to 10000 imp/turn with zero for the EL series and up to1024 imp/turn for the EH series
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdc for the EH series
- Max output frequency up to 300 KHz for the EL series and up to 100 KHz for the EH series
- Output : cable and connector
- Different flanges available
- Speed rotation up to 6000 Rpm
- Protection up to IP66 for encoder mod.G

Ordering Codes

EL	63	G	B	1000	Z	5/28	N	8	X	3	M	R	.	XXX

In case of particular Customer variant separate by a full stop

EL = incremental encoder EL series
EH = incremental encoder EH series

63 = body dimension

F = mod.EH-EL63F
G = mod.EH-EL63G
P = mod.EH-EL63P
Type of flanges

N.B.: AVAILABLE ONLY WITH THE FOLLOWING EXECUTIONS
B = encoder depressed with metal ring
C = encoder depressed with back fixage (only for EL63P series)
N.B.:only executable with output cable

dfrom **1** to **10000** imp./turn EL63F/Gseries
from **1** to **2048** imp./turn EL63 series
from **40** to **1024** imp./turn EH63F/G series
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply
Encoder power supply (Vdc)
N.B.: LINE DRIVER only available with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on the output configurations see the output incremental connections card

8 = ø 8 mm
10 = ø 10 mm
12 = ø 12 mm
14 = ø 14 mm
15 = ø 15 mm
Shaft diameter

X = standard IP54
S = IP66 for model G
Protection

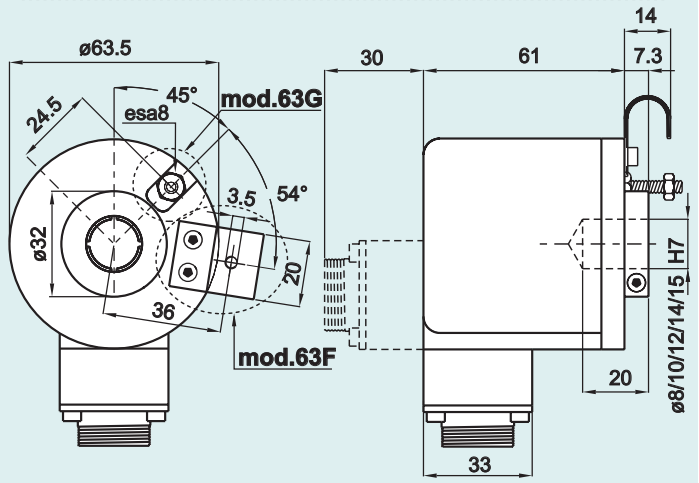
3 = 3000 continuous
R.P.M.

P = standard output cable 1.5 m
M = connector MS3106E 16S-1S or 18-1S
J = connectorJMSP 1607 F or 1610 F

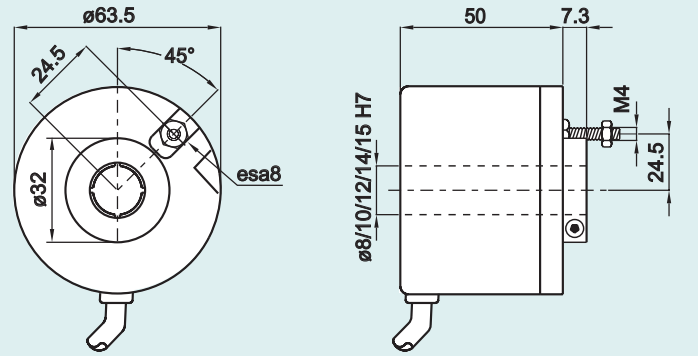
R = radial
A = axial

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

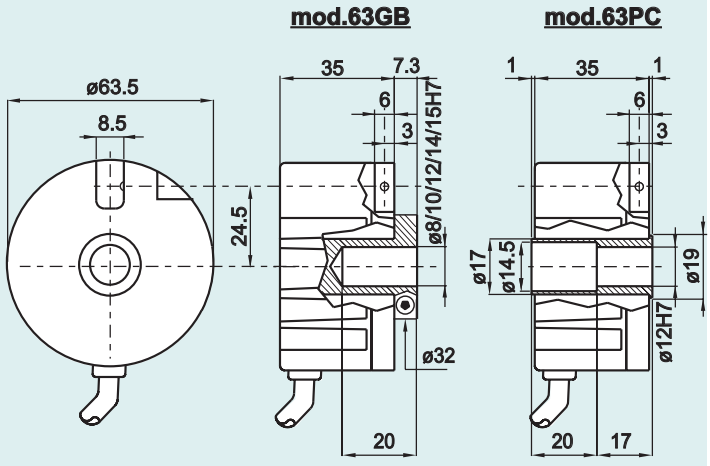
EH-EL63F / 63G



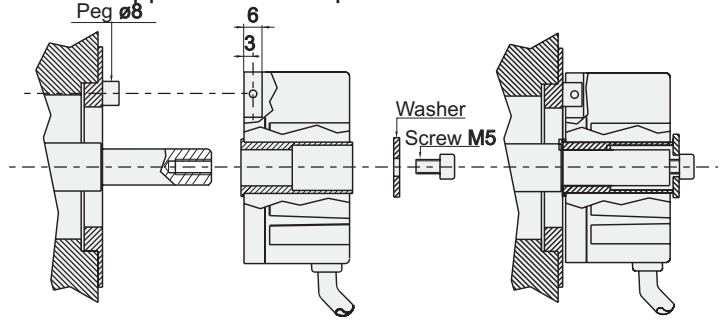
EH-EL63P



EH-EL63 GB / PC in excecution



Application example EL63PC



Electronic Characteristics EL series

Resolutions	from 1 to 10000 impulses/turn for EL63F/G from 1 to 2048 impulses/turn for EL63P
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc power supply
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Electronic Characteristics EH series

Resolutions	from 40 to 1024 impulses/turn for EH63F/G
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only 5 / 8÷24 Vdc power supply
Current consumption without load	50 mA per channel 20 mA per channel with LINE DRIVER
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø8 - ø10 - ø12 - ø14 - ø15 H7
Protection	Standard IP54 IP66 for mod.G
R.P.M. Max	3000 continuous
Shock	50 G per 11 msec (with flexible disc) 20 G per 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft Material	Stainless steel AISI303
Body Material	Aluminium NI 5076
Cover Material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	350 g

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EH-EL72A / B
INCREMENTAL ENCODERS

Incremental encoders

Standard series for industrial environments with excellent mechanical resistance; possibility of high radial and axial load on the shaft. They can be assembled with flanges or servo fasteners. Studied for the direct assembly on motors or tachimeter generators where the incorporeted elastic joint allows the compensation of radial and axial slack on the shaft of the motor.

- Resolutions up to 10000 imp/turn with zero for the EL series and up to 1024 imp/turn for the EH series
- Different electronic configurations available with power supply up to 28 Vdc for the EL series and up to 24 Vdc for the EH series
- Output : cable and connector
- Different flanges available
- Max output frequency up to 300 KHz for the EL series and up to 100 Khz for the EH series
- Speed rotation of up to 6000 rpm
- Protection up to Ip66

Ordering codes

In case of particular Customer variant seperate with a full stop

EL 72 1 A 1000 Z 5/28 N 10 X 6 M R . XXX

EL = incremental encoder EL series
EH = incremental encoder EH series

72 = body dimension

1 = ø 63.5 mm
2 = ø 65 mm
3 = ø 57 mm
4 = ø 60 mm
Fixing holes diameter

A = mod.EH-EL72A
B = mod.EH-EL72B
Type of flanges

da **1** a **10000** imp./turns EL series
da **40** a **1024** imp./turn EH series
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on output configurations see the output incremental connections card

6 = ø 6 mm
8 = ø 8 mm
10 = ø 10 mm
Shaft diameter

X = standard IP54
S = optional IP66
Protection

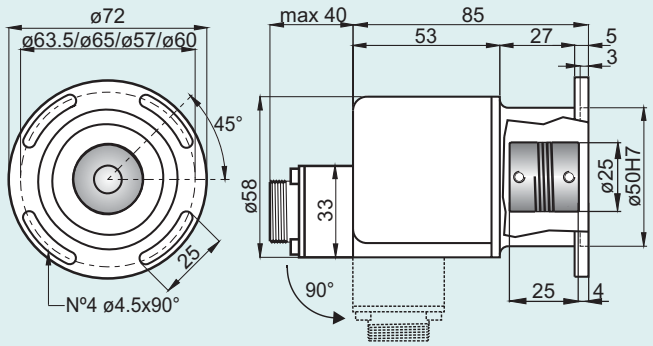
3 = 3000 with IP66
6 = 6000
R.P.M.

P = standard output cable 1.5 m
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F

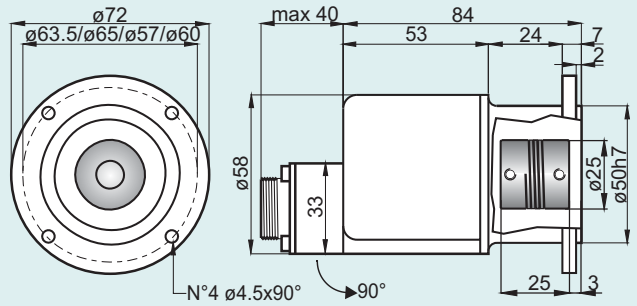
XXX = Particular Customer variants indicated by a progressive number from 001 to 999

R = radial
A = axial

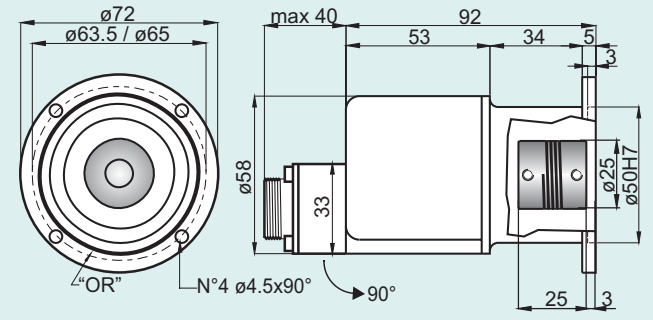
EH-EL72 mod. A



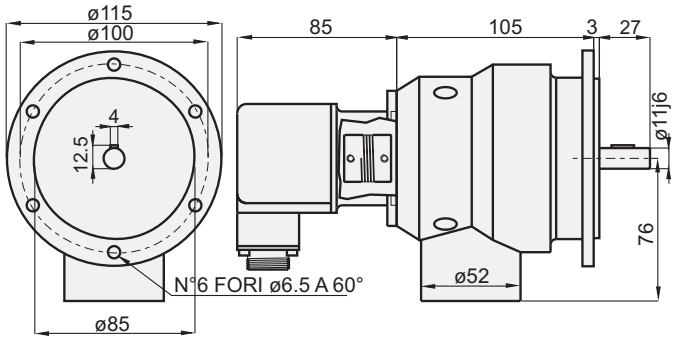
EH-EL72 mod.B



EH-EL72 mod. A IP66 version



Application on tachimeter generator
AVAILABLE TACHIMETER A) 20V-1000 turn/min
B) 60V-1000 turn/min



Electronic Characteristics EL Series

Resolution	From 1 to10000 impulses / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only with 5 / 8÷24 Vdc power supply
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Electronic Characteristics EH Series

Resolution	From 40 to 1024 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only with 5 / 8÷24 Vdc power supply
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max commutable current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø6 / 8 / 10 h7
Protection	IP54 standard IP66
R.P.M. Max	6000 continuous 3000 with IP66
Shock	50 G per 11 msec (with flexible disc) 20 G per 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft material	Stainless steel AISI303
Body material	Aluminium - UNI5076
Cover material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	400 g
Accessories	Precision elastic joints G25A6/10 G25A8/10 G25A10

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Eltra®

ISO 9001:2000

EH-EL90A-R / 115A-R
INCREMENTAL ENCODERS

Incremental encoders

Encoder series for grave environments with excellent mechanical resistance.
The 90 model has the possibility of mechanical assembly using flanges or servo-fastener; the 115 model has the compatible attachment with tachimeter generator type REO-444.

- Resolutions up to 10000 imp/turn with zero for EL series and up to 1024 imp/turn for the EH series
- Different electronic configurations available with power supply up to 28 Vdc for EL series and up to 24 Vdc for EH series
- Max output frequency up to 300 KHz for the EL series and up to 100 KHz for the EH series
- Output : cable and connector
- Different flanges available
- Speed rotation up to 6000 rpm
- Protection up to IP66 for mod.90A

Ordering codes

In case of particular Customer variant seperate with a full stop

EL 90 A 1000 Z 5/28 N 1000 Z 5/28 N 10 X 6 M R . XXX

EL = incremental encoder EL series
EH = incremental encoder EH series

90 = body dimension
115 = body dimension

A = mod.EH-EL90A / 115A
R = mod.EH-EL90R / 115R with centrifugal relays
Type of flanges

from **1** to **10000** imp./turn EL series
from **40** to **1024** imp./turn EH series
Resolutions
N.B:. For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on output configurations see the output incremental connections card

Particular Customer variants indicated by a progressive numberfrom 001 to 999

R = radial
A = axial

P = standard output cable 1.5 m
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F

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

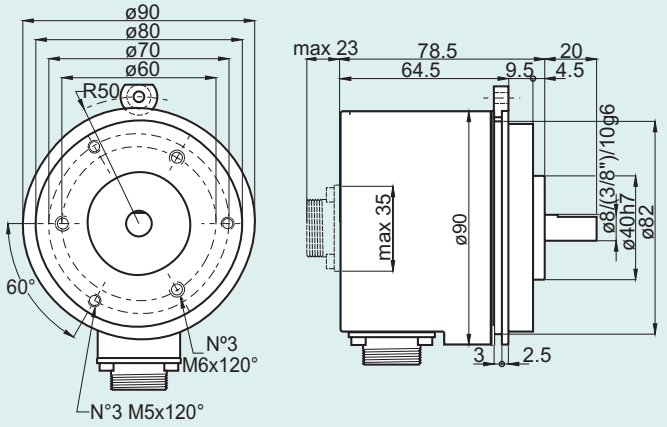
X = standard IP54
S = optional IP66 for mod. 90A
Protection

8 = ø 8 mm	EH-EL90	
9 = ø 9.52 mm (3/8")	EH-EL90	**Shaft diameter**
10 = ø 10 mm	EH-EL90 / 115	
11 = ø 11 mm	EH-EL115	

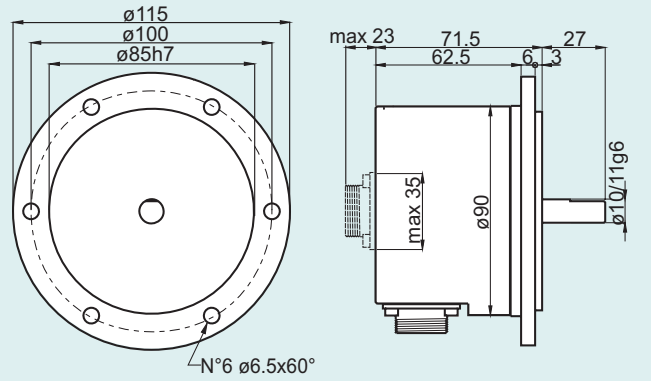
Electronic output configuration
Encoder power supplyr (Vdc)
Zero Impulse
Resolutions

N.B.: TO BE INDICATED ONLY IN THE MODELS OF DOUBLE ELECTRONICS
(For further information contact our offices)

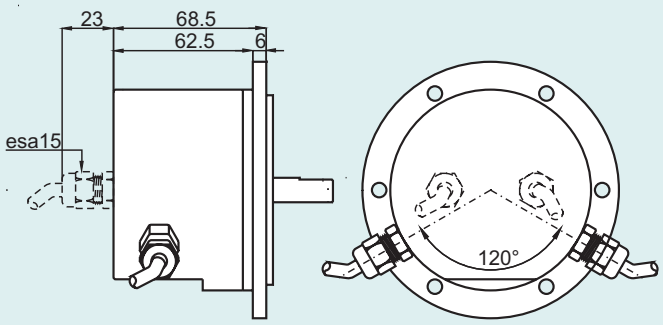
EH-EL90A



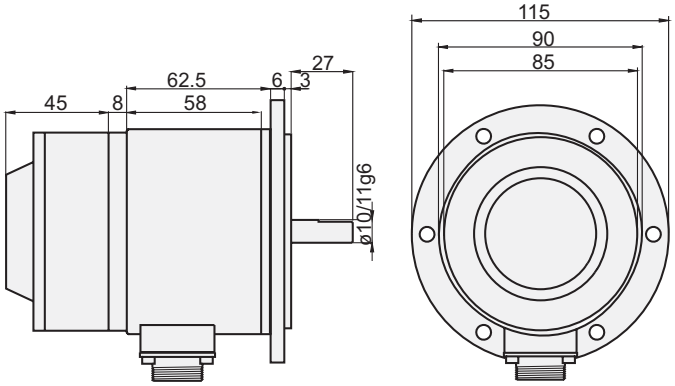
EH-EL115A



90A/115A with double electronics



Clearances 90R/115R for the application of the centrifugal relay



Electronic Characteristics EL series

Resolutions	From 1 to 10000 impulses / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only with power supply 5 / 8÷24 Vdc
Current consumption without load	80 mA
Max output curren	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Electronic Characteristics EH series

Resolutions	From 40 to 1024 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER sonly with power supply 5 / 8÷24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max commutable current	50 mA per channel 20 mA per channel withLINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø8 /ø9.52(3/8") /ø 10g6 EH-EL90 ø10/ø11g6 EH-EL115
Protection	IP54 Standard IP66 Optional per mod. 90A
R.P.M. Max	6000 continuous 3000 with IP66
Max shaft load	200 N (20 Kp) axial 200 N (20Kp) radial
Shock	50 G per 11 msec (with flexible disc) 20 G per 11 msec (with glass disc)
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
Cover Material	Painted Aluminium
Operating temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	750 g

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EX80A / D
FLAMEPROOF ENCODERS

Flameproof encoders

Flameproof encoders for applications within explosive and dangerous areas
- Resolutions up to10000 imp/turn with zero
- Different electronic configurations available with a power supply up to 28 Vdc
- Max output frequency up to 300 KHz
- Output cable
- Different flanges available
- Speed rotation up to 3000 rpm
- Protection up to IP64

Ordering Codes

In case of particular Customer variant seperate with a full stop

EX 80 A 1000 Z 5/28 P 10 X 3 P R . XXX

EX = Flameproof encoder by EExd IIC T6 standard

80 = body dimension

A = mod.EX80A
D = mod.EX80D
Type of Flanges

from **1** to **10000** imp./turn **Resolutions**
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5 ÷ 28 = power supply **Encoder powers supply (Vdc)**
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on output configurations see the output incremental connections card.

10 = ø 10 mm **Shaft Diameter**

X = Standard IP64 **Protection**

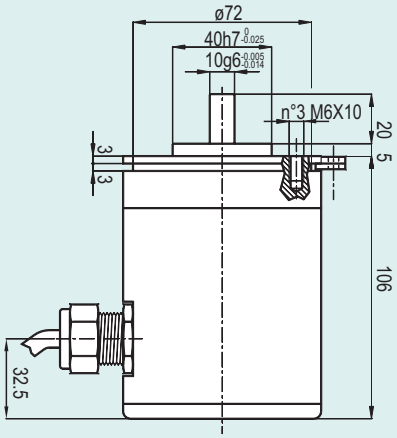
3 = 3000 **R.P.M.**

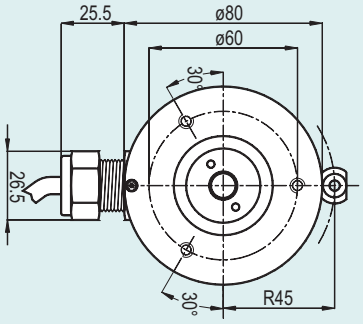
P = standard output cable 1.5 m
G = threaded union ½" Gas

R = radial

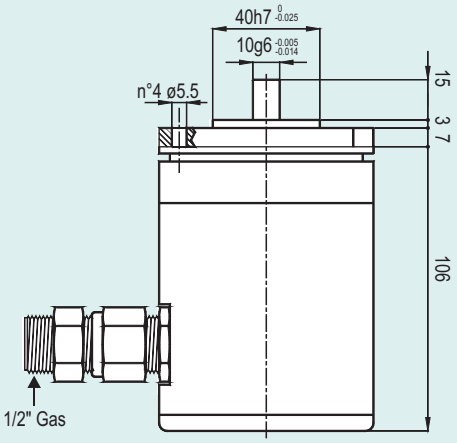
XXX = Particular customer variants indicated by a progressive number from 001 to 999

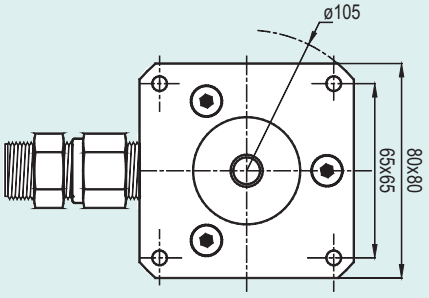
EX80A





EX80D





Electronic Characteristics

Resolutions	From 1 to 10000 impulses / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only with 5 / 8 ÷ 24 Vdc power supply
Current consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft Diameter (mm)	ø10 g6 $\left(^{-0.005}_{-0.014}\right)$
R.P.M. Max	3000 continuous
Shock	50 G per 11 msec (with flexible disc) 20 G per 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Max shaft load	200 N (20 Kp) axial 200 N (20 Kp) radial
Bearings life	10^9 revolutions
Bearings	n°2 Ball bearings
Shaft material	Stainless steel AISI303
Body Material	AluminiumD11S - UNI 9002/5
Operating temnperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	1200 g

Flameproof encoders at EExdIIC T6 standard

EN 50.014 / EN 50.018
CESI certified number: EX-97.D.015

EExd IIC T6

EEx: Electrical system for explosive and dangerous areas.

d: Anti explosion box.

II: Electrical system which can operate in dangerous areas except for the mines where "grisou" gas is present.

C: Type of protection based on the special interstice designed to have the maximum security on the flameproof encoder (MESG) C= maximum security

T6: Maximum encoder surface temperature 85°C.

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EC34
SERIES OF ENCODERS FOR RACKS

Encoders for racks

Encoders for racks with automatic recovery of slack. This type of encoder was made to simplify the linear measurements instead of incremental linear system and to overcome the problematics of measurements over long distances. The encoder, closed within a robust aluminium body is produced with a preload system which allows the automatic recovery of slack between pinion and rack.
- Resolutions up to 2000 imp/turn with zero
- Different electronic configurations available with power supply up to 24 Vdc
- Max output frequency up to 100 Khz
- Output : cable and connector

Ordering Codes

In case of particular Customer variant seperate with a full stop

EC34 A 100 Z 5 N 10 M . XXX

EC34 = encoder for racks

A = mod. EC34A — **Type of flange**

from **1** to **2000** imp./turn — **Resolutions**

N.B.: For impulse availablity contact directly our offices

S = without zero impulse
Z = with zero impulse — **Zero Impulse**

5
8 ÷ 24 — **Encoder power supply (Vdc)**

N.B.: LINE DRIVER available only with 5 Vdc or 8÷24 Vdc power supply

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

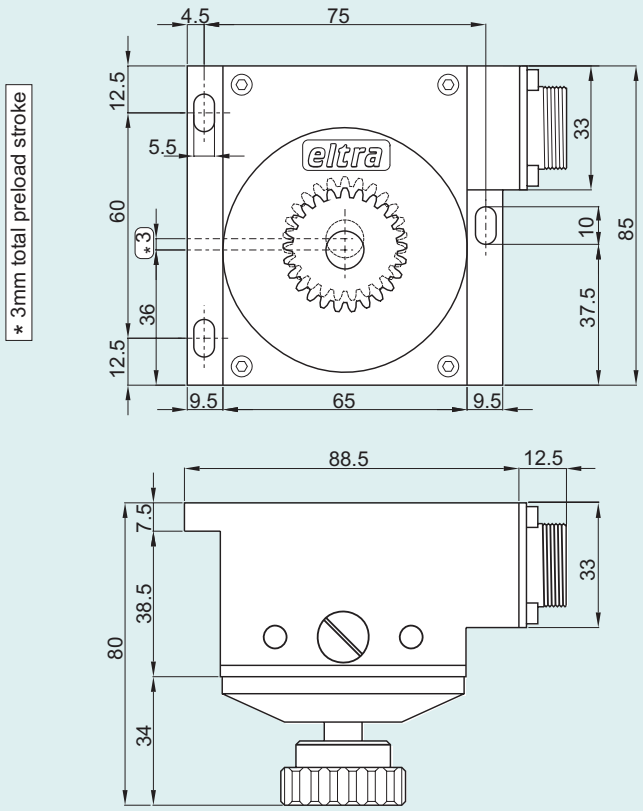
P = standard cable length 1.5m
M = connector MS3106E 16S-1S or 18-1S
J = connectorJMSP 1607 F or 1610 F

10 = ø 10 mm — **Shaft diameter**

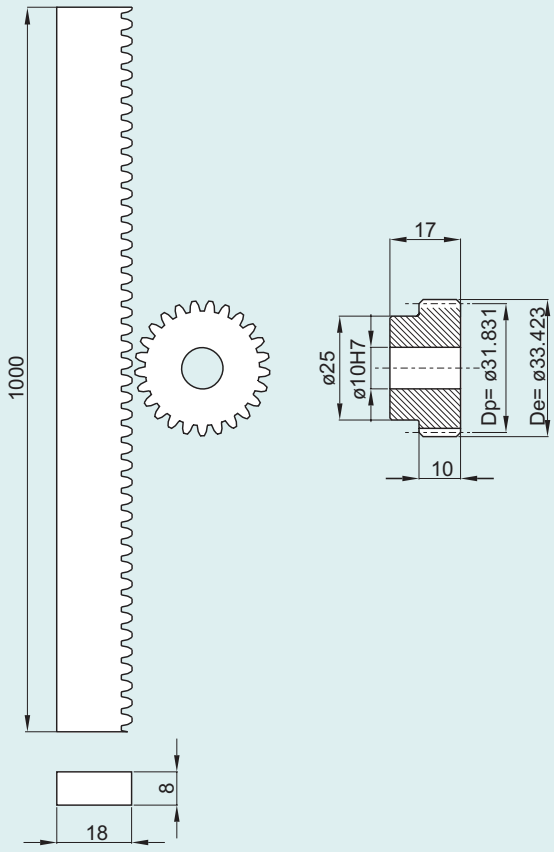
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER — **Electronic output configuration**

N.B.: For the optionals on output configurations see the output incremental connections card

EC34A



Rack and Spur Gear Tooth to Tooth:p=2.5 / z=40 / m=0.796



Electronic Characteristics

Resolutions	From 1 to 2000 impulses / turn
Power Supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only with 5/ 8 ÷ 24 Vd cpower supply
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max output current	50 mA per channel 20 mA per channelLINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz
Frequency calculation	$F = \frac{\text{RPM x Resolution}}{60}$

Mechanical Characteristics

Shaft Diameter(mm)	ø10 g6
Protection	IP64 - Standard
R.P.M. Max	3000 continuous
Max shaft load	200 N (20 Kp) axial 200 N (20 Kp) radial
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
Cover Material	Oven painted aluminum with Epoxidic Powders
Material of rack and spur gear	Steel
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	700 g

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ISO 9001:2000

RH200A / B / C
RH-RM500A / B / C
Metric wheels series

Metric wheels

Eltra metric wheels were studied for the industrial application, where the linear movement read are required (eg. continuous cutting machines of sheet metal, of wood, of textiles, of glass, etc). These wheels were studied to have a very precise reading and a high resistance to the stress which is typical of these machines. The body, entirely in aluminum, is assembled using an oscillating arm which is pivoted on the axial compact autolubrificant box which assure a long period of operation without any maintenance.The weight of the metric wheel maintains constantly the adherence with the material to be measured allowing the length and the speed to be read.
The external surface of the wheel can be in aluminium with crossed knurl or in special anti-oil and anti-slip rubber.

Ordering codes

In case of particular Customer variant seperate with a full stop

RH 200 A 500 Z 5 N 8 X 3 P R . XXX

RH = support RH200 - 500
RM = support RM500

200 = wheel linear develop 200 mm
500 = wheel linear develop 500 mm

A = smooth
B = knurled
C = rubberized
Type of wheel

from **1** to **10000** imp./turn RM500 series
from **40** to **1024** imp./turn RH200 / 500 series
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5 ÷ 28 = power supply RM500 series **Encoder powers supply (Vdc)**
5 / 8 ÷ 24 = power supply RH200 / 500 series
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration
N.B.: For the optionals on output configurations see the output incremental connection card

8 = ø 8 mm RH200
10 = ø 10 mm RH - RM500
Shaft diameter

X = standard IP54 RH200
standard IP64 RH - RM500
S = optional IP66
Protection

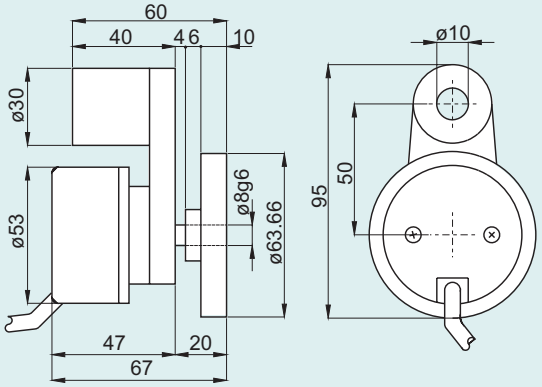
3 = 3000
R.P.M.

P = standard output cable 0.5 m for RH200
standard output cable 1.5 m for RH-RM500
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F
N.B.: Connectors M and J are available only for the metric wheels series RH-RM500

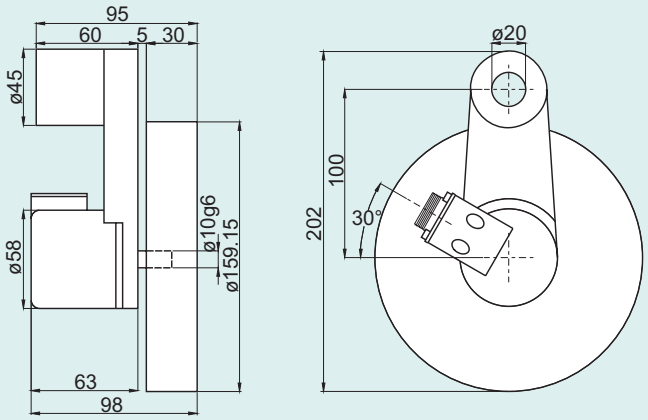
R = radial
A = axial

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

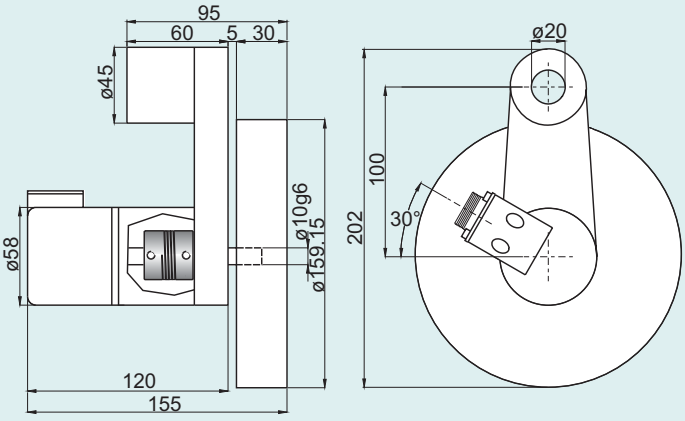
RH200



RH500



RM500



Electronic Characteristics RM500 Series

Resolutions	from 1 to 10000 impulses / turn
Power supply	5 ÷ 28 Vdc N.B.: LINE DRIVER only with 5 / 8 ÷ 24 Vdc power supply
Consumption without load	80 mA
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 300 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Electronic Characteristics RH200 Series

Resolutions	from 40 to 1024 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc N.B.: LINE DRIVER only with 5 / 8 ÷ 24 Vdc power supply
Consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø8 g6 RH200 ø10 g6 RH - RM500
Protections	IP54 standard for RH200 IP64 for RH-RM500 IP66
R.P.M. Max	3000 continuous
Shock	50 G per 11 msec (with flexable disc) 20 G per 11 msec (with glass disc)
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	N°2 ball bearings + n°2 ball bearings on the support for RM500
Shaft material	Stainless steel AISI303
Body material	Aluminium UNI5076
Support material	Aluminium UNI 9002/5 painted
Wheel material	Aluminium UNI 9002/5 per Sv.200 Aluminum UNI 3051 per Sv.500
Operating temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight of encoder + support	~ 250g RH200 ~ 1000g RM500
Wheel weight	~ 100g per Sv.200 ~ 800g per Sv.500

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ER A
INCREMENTAL LINEAR SYSTEM SERIES

Incremental Linear System

Incremental linear system.
- Working stroke up to 500 mm
- Available with or without zero in the central, left or right position
- Different electronic configurations a vailable with power supply up to 24 Vdc
- Output cable, eventual connector applied to the end of the cable
- Resolution 0.2mm

Ordering codes

In case of particular Customer variant seperate with a full stop

ER A 100 D 5 N 6 P . XXX

ER = incremental linear system

A = mod. ER A — **Type of fixing**

from **100** to **500 =** working stroke (mm)

S = without zero index
C = central zero index
D = right zero index (system in close position)
Z = left zero index (system in open position)

5
8 ÷ 24 — **Power supply (Vdc)**

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

P = special cable gland type IPON IP67 standard cable legth 1.5 m

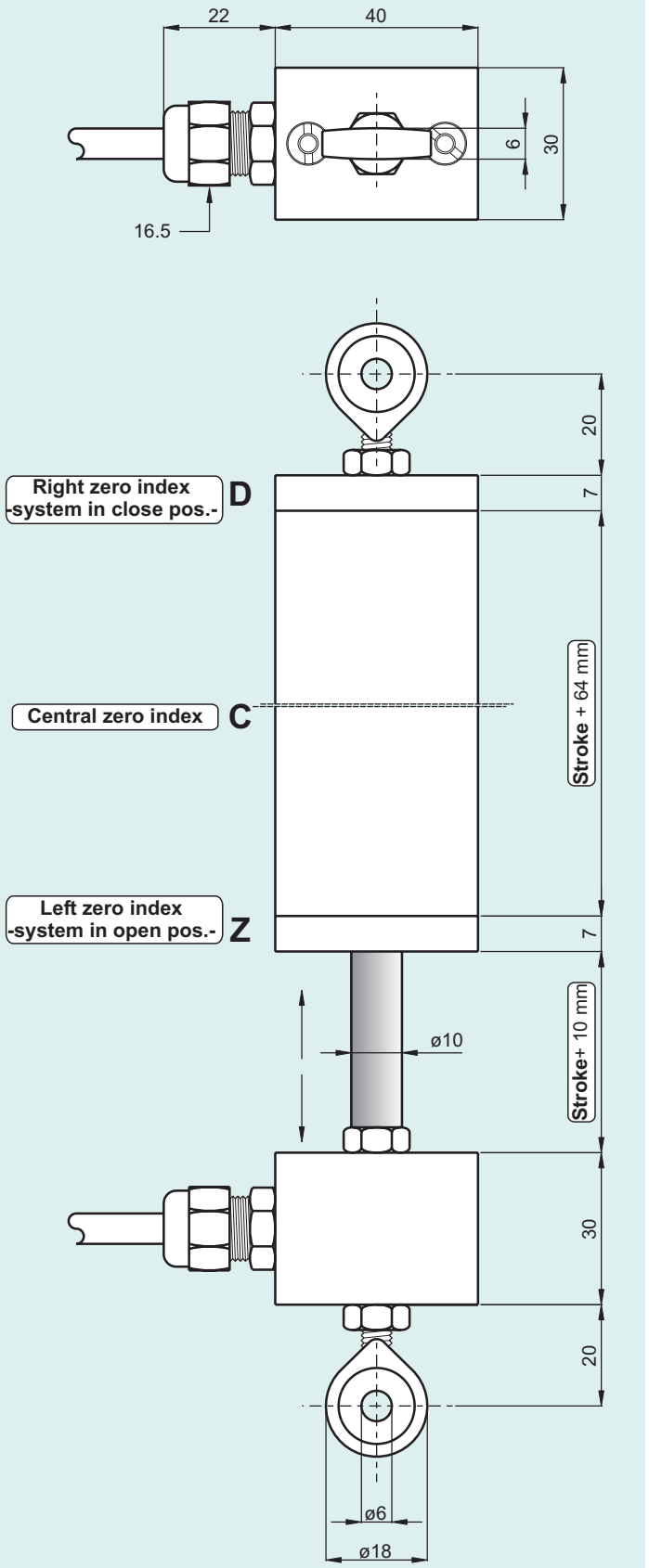
6 = ø 6 mm — **Diameter assembling hole**

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER

Electronic output configuration

N.B.: For the optionals on output configurations see the output incremental connections card

ERA



Electronic Characteristics

Line to line	0.2 mm
Resolution	0.05 mm
Power supply	5 Vdc / 8 ÷ 24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER

Mechanical Characteristics

Working stroke (mm)	From 100 to 500
Protection	IP64 - Standard
Max traverse speed	60 m/min.
Shock	50 G per 11 msec
Vibrations	10G 10 ÷ 2000 Hz
Shaft Material	Stainless steel AISI303
Cover Material	Aluminium UNI 6362 painted
Fixing	n°2 rod heads with hole ø6
Operating temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	From 400g to 1000g

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EV A / B
ELECTRONIC HAND WHEEL SERIES

Electronic hand-wheel

Series of electronic hand wheels studied for the positioning on the numerical control machines with manual drive.

- Resolutions up to10000 imp/turn with zero
- Different electronic configurations available with power supply up to 28 Vdc
- Max output frequency up to 100 KHz
- Output : cable and connector
- Various flanges available

Ordering Codes

EV A 100 Z 5 L 10 M R . XXX

In case of particular Customer variant seperate with a full stop

EV = electronic hand wheels

A = mod. EV A
B = mod. EV B
Type of flange

from **1** to **10000** imp./turn
Resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse
Zero impulse

5
8 ÷ 28
Encoder power supply (Vdc)
N.B.: LINE DRIVER available with 5 Vdc or 8 ÷24 Vdc power supply

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configurations
N.B.: For the optionals on output configurations see the output incremental connections card

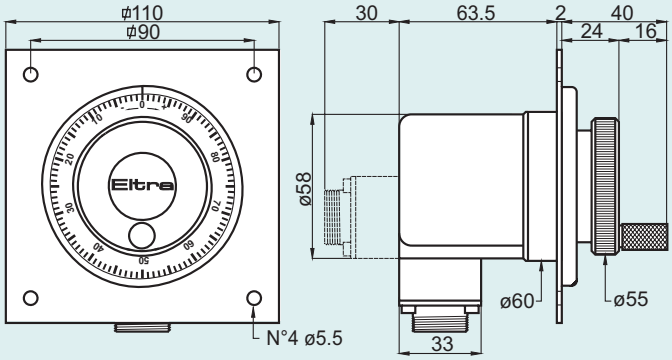
10 = ø 10 mm
Shaft diameter

P = standard cable length 1.5 m
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F

A = axial
R = radial

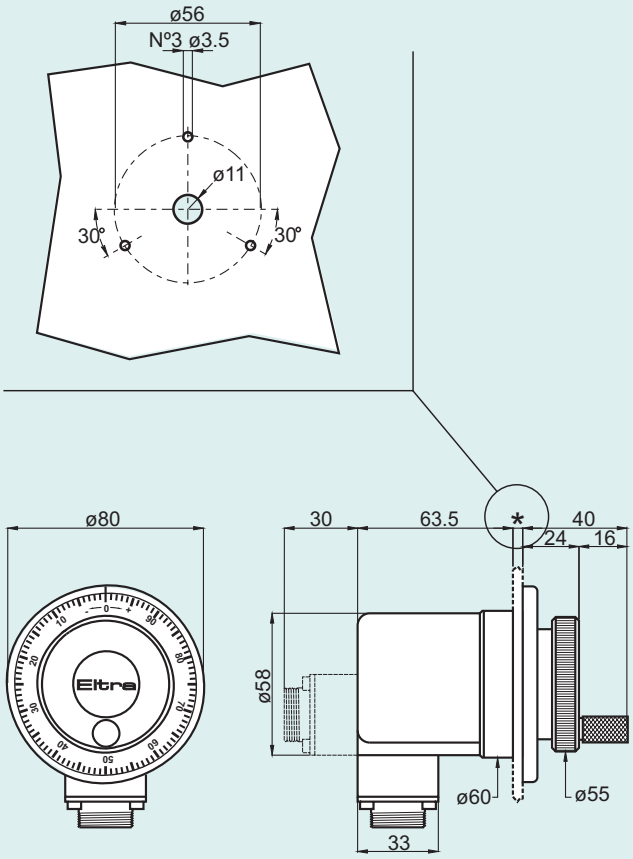
XXX = Particular Customer variants indicated by a progressive number from 001 to 999

EVA



EVB

HOLES ON THE MOUNTING PLATE



Electronic Characteristics

Resolution	From 1 to 10000 impulses / turn
Power supply	5 Vdc / 8 ÷ 28 Vdc N.B.: LINE DRIVER only with 5 / 8 ÷ 24 Vdc power supply
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max output current	50 mA per channel 20 mA per channel with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz
Frequency calculation	$F = \frac{\text{RPM x resolution}}{60}$

Mechanical Characteristic

Shaft diameter (mm)	ø10 g6
Protection	IP64 - Standard
Mechanical lines per turn	100
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 D11S - UNI 9002/5
Cover material	Special plastic reinforced with glass fibre
Operating Temperature	0° ÷ +60°C
Storage temperature	-25° ÷ +70°C
Weight	450 g

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ISO 9001:2000

EF 36K

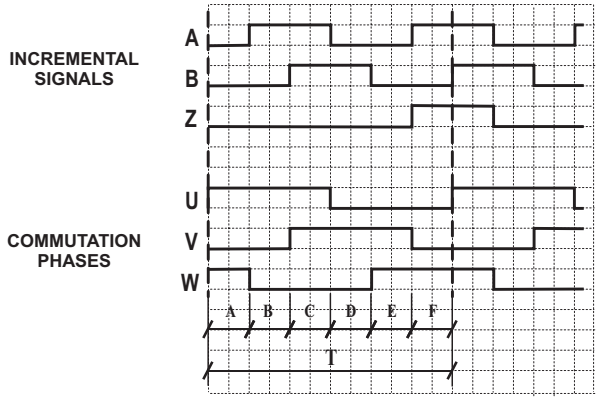
incremental encoder + commutation phases

Encoder incrementali Linea Motori

The encoders of the "36" series are applied in retroaction systems on AC servomotors; they integrate more than a traditional incremental encoder, the optic generation of "Hall effect phases".
The main characteristics are:

- Interchangeability with the Size 15, saving time and money, as it necessary to have only one predisposition for the retromotor
- Easy mechanical assembly
- Contained dimensions
- Wide range of resolutions available

Signal configurations



N° POLES	A / B / C / D / E / F	T
4	30° ± 1.5°	180°
6	20° ± 1.5°	120°
8	15° ± 1.5°	90°

General electronic characteristics

Resolution (imp./turn)	from 1 to 1024
Source and Sink current	15 mA per channel with Line Driver 30 mA per channel with other electronics
Max output frequency	MAX 150KHz $F = \frac{\text{R.P.M.} \times \text{Resolution}}{60}$

"EF" Electronic characteristics

Power supply	5Vdc ± 5%
Electronics for incremental phases	LINE DRIVER
Electronics for Hall effect phases	LINE DRIVER/ NPN OPEN COLLECTOR
Current consumption without load	150 mA

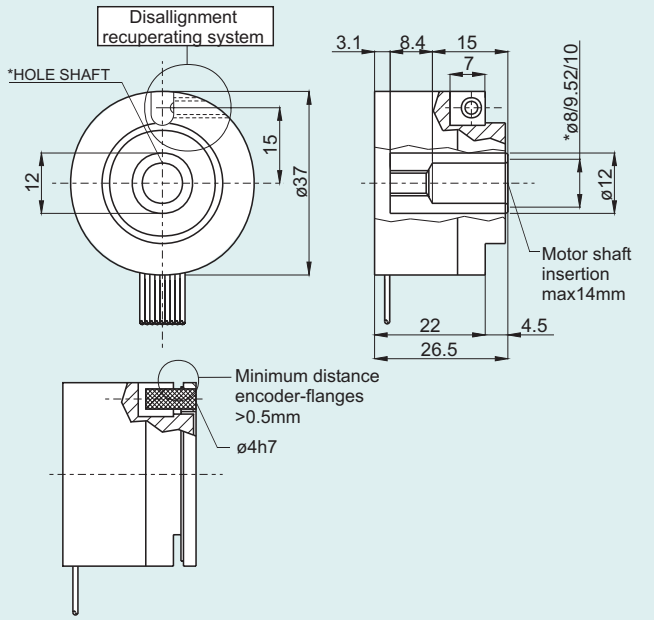
Mechanical Characteristics

Hole diameter	ø8 / ø9.52 / ø10 H7
R.P.M.	6000 MAX
Shock **Vibrations**	50 G per 11 msec 5G 10 ÷ 500 Hz
Bearings	n° 2 ball bearings
Shaft material **Body material** **Cover material**	Stainless Steel Aluminium Aluminium
Weight	50 g
Protection	IP40
Operating temp. **Storage temp.**	-10° ÷ + 85°C -25° ÷ + 85°C
Accessories	Flange for fixage on the predisposed motors "Resolver" size 15

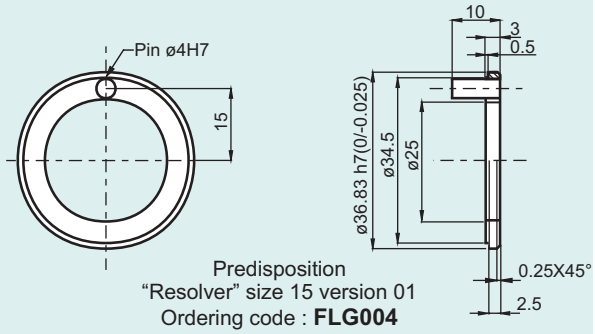
Cable colour

COLOUR	FUNCTION	EF
RED	+Vdc	●
BLACK	0 Volt	●
GREEN	A	●
YELLOW	B	●
BLUE	Z	●
BROWN	$\overline{A}$	●
ORANGE	$\overline{B}$	●
WHITE	$\overline{Z}$	●
GREY	U	●
VIOLET	V	●
GREY/ PINK	W	●
RED / BLUE	$\overline{U}$	●
WHITE / GREEN	$\overline{V}$	●
BROWN / GREEN	$\overline{W}$	●

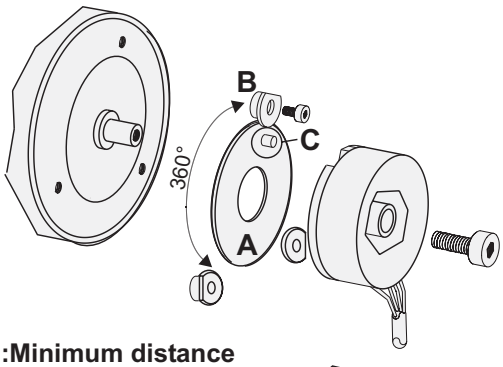
EF36 K



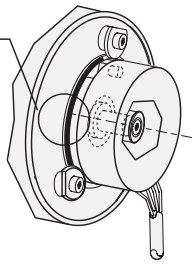
Accessories: Flange for the fixing on the motor



Predisposition
"Resolver" size 15 version 01
Ordering code : **FLG004**



N.B.:Minimum distance encoder-flange >0.5mm !!



HOW TO INSTALL THE ENCODER

1) Insert the flanges (A) on the motor.
2) Tighten the appropriate servo fasteners (B), without blocking them.
3) Insert the encoder on the motor shaft with the system of disallineament recuperation corresponding to the pegs (C). The minimum encoder-flange distance must be bigger than 0.5mm.
4) Block it using the screw of the encoder on the motor axle.
5) Turn for phasing.
6) As final operation fix the servo fasteners (B).
7) Check that the system to recuperate the disallignment works correctly.

Ordering Code

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

EF 36 K 4 L 512 Z 5 L 8 X 3 PR . XXX

- **EF** = incremental encoder + commutation phases
- **36** = body dimension
- **K** = blind hole with hind fixing
- **4** = n° 4 poles
  6 = n° 6 poles
  8 = n° 8 poles
  — **N°poles of the motor**
- **C** = NPN OPEN COLLECTOR
  L = LINE DRIVER
  — **Electronic for phase commutation**
- from **1** to **1024** imp./turn — **Incremental encoder resolution**
  N.B.: For impulse availability contact directly our offices
- **S** = without zero impulse
  Z = with zero impulse
- **5 =** 5 Vdc — **Power supply**
- **L =** LINE DRIVER — **Electronics for EF mod.**
  For the optionals on the output configurations see the incremental output connections card.
- **8** = ø8H7 mm
  9,5 = ø9.52H7 mm
  10 = ø10H7 mm
  — **Shaft hole diameter**
- **X** = protection Ip40
- **3** = 3000 R.P.M.
  6 = 6000 R.P.M. max
- **PR** = standard radial output cable 0.3 m
- **XXX=** Special Customer variants indicated by a number from 001 to 999

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ISO 9001:2000

EL/EF/EW48C-P

Incremental Encoders + commutation phases

Encoder EL/EF/EW48 C-P series

The encoders of the "48" series are applied in systems of retroaction on AC servomotors; they integrate, more than a traditional incremental encoder, the optic generation of " Hall effect phases". The main characteristics are :

- contained dimensions
- high temperatures resistance
- wide range of resolutions available
- easy assembly

Serie EL

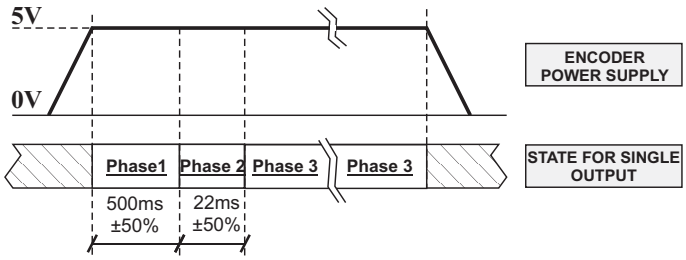
Base version with incremental encoder.
Availability of various electronic output configurations

Serie EF

Optic generation of the "commutation phases" integrated to the base version. The signals transmission happens in a parallel way.

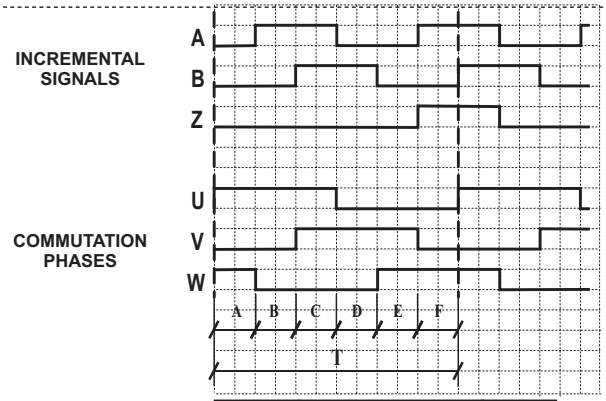
Serie EW

Special version of the EF series with a simplification in the wiring, obtained through the sequential transmission of the incremental phases and those of commutation as in the graph below.



phase 1: HIGH "HZ" IMPEDANCE PHASE
phase2: COMMUTATION TRANSMISSION PHASES
phase3: CONTINUOUS FUNCTIONING INCREMENTAL PHASES

Signal configurations



N° POLES	A / B / C / D / E / F	T
4	30° ± 1.5°	180°
6	20° ± 1.5°	120°
8	15° ± 1.5°	90°

General electronic characteristics

Resolutions (imp./turn)	From 1 to 2048
Source and Sink current	15 mA per channel with Line Driver 30 mA per channel with other electronics
Max output frequency	MAX 150KHz $F = \frac{\text{R.P.M.} \times \text{Resolution}}{60}$

"EL"electronic characteristics

Power supply	5 Vdc / 8÷24 Vdc
Electronics Available	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Current consumption without load	100 mA per EL48

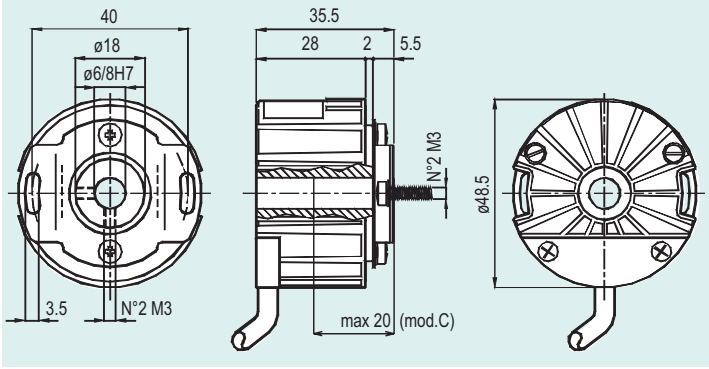
"EF/EW" electronic characteristics

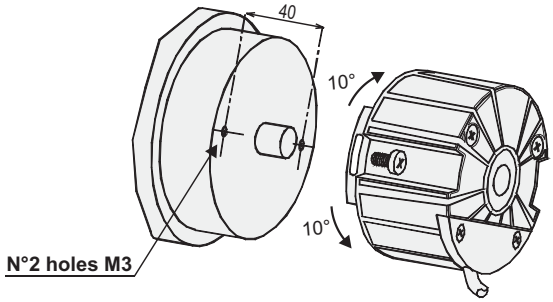
Power supply	5Vdc ± 5%
Electronics for incremental phases	LINE DRIVER
Electronics for effect Hall phase	LINE DRIVER/ NPN OPEN COLLECTOR(only for EF)
Current consumption without load	150 mA per EF/EW48

Cable colour

COLOUR	FUNCTION	EL	EF	EW
RED	+Vdc	●	●	●
BLACK	0 Volt	●	●	●
GREEN	A	●	●	●
YELLOW	B	●	●	●
BLUE	Z	●	●	●
BROWN	$\overline{A}$	●	●	●
ORANGE	$\overline{B}$	●	●	●
WHITE	$\overline{Z}$	●	●	●
GREY	U		●	
VIOLET	V		●	
GREY/ PINK	W		●	
RED/ BLUE	$\overline{U}$		●	
WHITE/ GREEN	$\overline{V}$		●	
BROWN/ GREEN	$\overline{W}$		●	

EL / EF / EW 48 mod. C-P





Maximum rotation for the zero phase = 20°

Mechanical Characteristics

Hole diameter	ø6 / ø8H7
Protection	IP40
R.P.M.	6000 MAX
Shock	50 G per 11 msec
Vibrations	5G 10 ÷ 500 Hz
Bearings	nº 2 ball bearings
Shaft material	Brass OT58 UNI 5705-65
Body material	Aluminium D11S - UNI9002/5
Cover material	Special plastic reinforced with glass fibre
Operating temperature	-10° ÷ + 85°C
Storage temperature	-25° ÷ + 85°C
Weight	100 g

Ordering code

In case of particular Customer variant separate by a full stop

EF 48 C 6 L 2000 Z 5 L 6 X 6 PR . XXX

EL = incremental encoder
EF = incremental encoder + commutation phases
EW = incremental encoder + commutation phases "LESS WIRED" version transmission phases with less wires

48 = body dimension

C = with blind hole
P = with passing hole with frontal fixage

TO BE INDICATED ONLY FOR EF / EW MODELS

4 = n° 4 poles
6 = n° 6 poles
8 = n° 8 poles
N° poles of the motor

C = NPN OPEN COLLECTOR (not available for EW)
L = LINE DRIVER
Electronic for phases commutation

from **1** to **2048** imp./turn
Incremental encoder resolutions
N.B.: For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse

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

PR = radial output cable (standard length 0.3 m)

6 = 6000 R.P.M. max

X = Protection IP40

6 = ø6 mm
8 = ø8 mm
Shaft hole diameter

L = LINE DRIVER
Electronics for EF / EW mod.

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronics for EL mod.

N.B.: For the optionals on the output configurations see the incremental output connections card

5 = 5 Vdc
Power supply for EF / EW mod.

5 = 5 Vdc
8 ÷ 24 = from 8 to 24 Vdc
Power supply for EL mod.

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ISO 9001:2000

EL / EF 49C-P

EL incremental encoders / EF incremental encoders + commutation phases

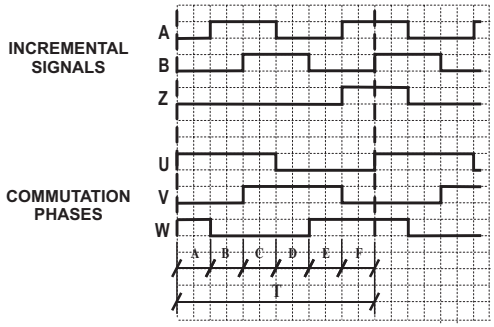
Incremental encoders for motor

The encoders of the "49"series are applied on systems of retroaction on AC servomotors; they integrate more than a traditional incremental encoder, the optic generation of " Hall effect phases".
The main characteristics are :
- Interchangeability with the Size 19 resolver, saving time and money, as it is necessary to have only one predisposition for the retromotor
- Easy mechanical assembly
- Simplificati on of the wiring through the use of a connector kit
- Contained dimensions
- High temperatures resistance
- Wide range of resolutions available

Serie EL
Base version with incremental encoder
Availability of various electronic output configurations.

Serie EF
Optic generation of the "commutation phases" integrated to the base version.
The transmission of signals happens in a parallel way.

Signal configurations



N° POLES	A / B / C / D / E / F	T
4	30° ± 1.5°	180°
6	20° ± 1.5°	120°
8	15° ± 1.5°	90°

Cable colour

COLOUR	FUNCTION	EL	EF
RED	+Vdc	●	●
BLACK	0 Volt	●	●
GREEN	A	●	●
YELLOW	B	●	●
BLUE	Z	●	●
BROWN	$\overline{A}$	●	●
ORANGE	$\overline{B}$	●	●
WHITE	$\overline{Z}$	●	●
GRAY	U		●
VIOLET	V		●
GRAY/ PINK	W		●
RED / BLUE	$\overline{U}$		●
WHITE / GREEN	$\overline{V}$		●
BROWN / GREEN	$\overline{W}$		●

General electronic characteristics

Resolution imp./turn	From 1 to 2048
Source and Sink current	15 mA per channel with Line Driver 30 mA per channel with other electronics
Max output frequency	MAX 150KHz $F = \frac{\text{R.P.M. x Resolution}}{60}$

"EL" Electronic characteristics

Power Supply	5 Vdc / 8÷24 Vdc
Available Electronics	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Current consumption without load	100 mA

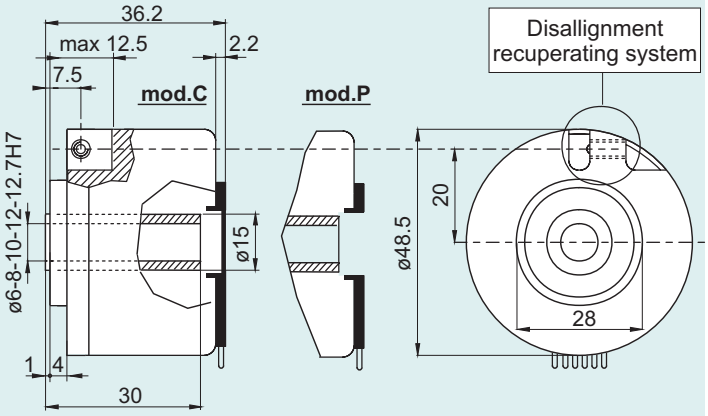
"EF" Electronic characteristics

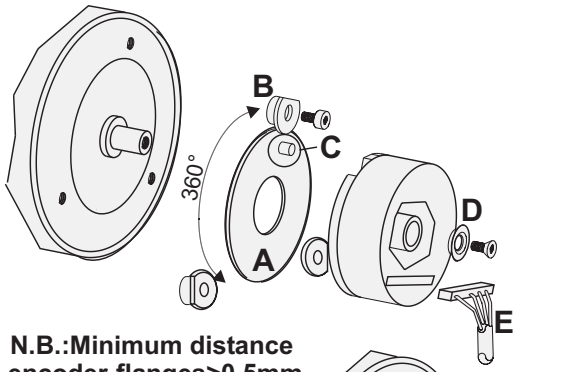
Power supply	5Vdc ± 5%
Electronics for incremental phases	LINE DRIVER
Electronics for Hall effect phases	LINE DRIVER/ NPN OPEN COLLECTOR
Current consumption without load	150 mA

Mechanical Characteristics

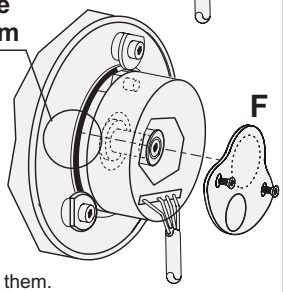
Hole diameter	ø6 / ø8 / ø10 / ø12/ø12.7(1/2") H7
R.P.M.	6000 MAX
Shock **Vibrations**	50 G per 11 msec 5G 10 ÷ 500 Hz
Bearings	nº 2 ball bearings
Shaft material **body material** **cover material**	Stainless Steel Aluminium Fe
Weight	100 g
Protection	IP40
Operating temp. **Storage temp.**	-10° ÷ + 85°C -25° ÷ + 85°C
Accessories	1) Set of 3 servo fasteners ordering code: 94080001 2) Flange for fixage on the predisposed motors "Resolver" size 19 version 01 and 14 (for dimensions see the back)

EL/EF49 C/P





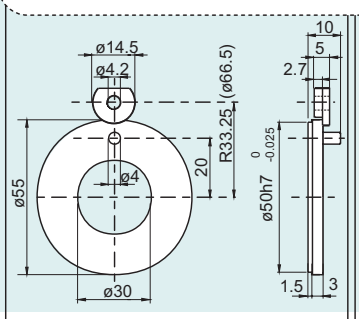
N.B.:Minimum distance encoder-flanges>0.5mm



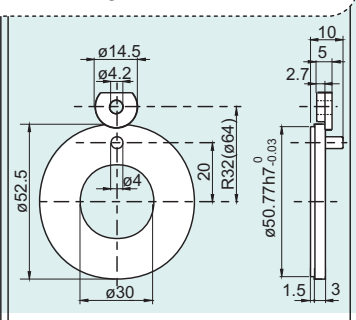
How to install the encoder

1) Insert the flanges (A) on the motor.
2) Tighten the appropriate servo fasteners (B), without blocking them.
3) Insert the encoder on the motor shaft with the system of disallineament recuperation corresponding to the pegs (C). The minimum encoder-flange distance must be bigger than 0.5mm.
4) Insert the washer posteriorly (D) and block it using the screw of the encoder on the motor axle.
5) Turn for phasing
6) As final operation fix the servo fasteners (B). Check that the system to recuperate the disallignment works correctly
7) Insert the connector (E) and position the plastic lid (F)corresponding to the holes and then screw them in.

Accessories: Flange for the fixing on the motors



Predisposition
"Resolver" size 19 version 01
Ordering code : **FLG000**



Predisposition
"Resolver" size 19 version 14
Ordering code : **FLG001**

Ordering Code

In case of particular Customer variant separate by a full stop

EF 49 C 6 L 2000 Z 5 L 8 X 6 LR . XXX

EL = incremental encoder
EF = incremental encoder + commutatinon phases

49 = body dimension

C = with blind hole
P = with through hole

N.B.:TO BE INDICATED ONLY FOR EF / EW MODELS

4 = n° 4 poles
6 = n° 6 poles
8 = n° 8 poles
N° poles of the motor

C = NPN OPEN COLLECTOR
L = LINE DRIVER
Electronic for phase commutation

from **1** to **2048** imp./turn
Incremental encoder resolutions
N.B.:For impulse availability contact directly our offices

S = without zero impulse
Z = with zero impulse

5 = 5 Vdc
Power supply for the. EF mod.

5 = 5 Vdc
8 ÷ 24 = from 8 to 24 Vdc
Power supply for the. EL mod.

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

LR = radial output cable + thickness of cable with standard length 0.3 m
Optional: thickness of wired cable length1.5 m
MA = radial output cable + thickness of cable with standard length 0.2 m with connector type M 19 poles

6 = 6000 R.P.M. max

X = Protection IP40

6 = ø6H7 mm
8 = ø8H7 mm
10 = ø10H7 mm
12 = ø12H7 mm
12.7 = ø12.7(1/2")H7 mm
Shaft hole diameter

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronics for EL mod.

L = LINE DRIVER
Electronics for EF mod.

For the optionals on the output configurations see the incremental output connections card

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ISO 9001:2000

EH-EF80C / P / K
INCREMENTAL ENCODERS

Incremental Encoders for Motors

The encoders of the "80" series are applied in retroaction systems on AC servomotors; they integrate, more than a traditional incremental encoder, the optic generation of "Hall effect phases".

The main characteristics are:

- contained dimensions
- high temperatures resistance
- wide range of resolutions available
- easy assembly

Serie EH

Base version with incremental encoder.

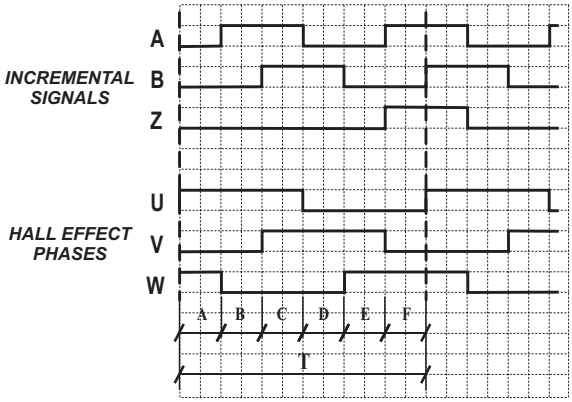
Availability of various electronic output configurations

Serie EF

Optic generation of the "Hall phases" Integrates to the base version

The transmission of signals happens in a parallel way.

Signal configurations



N° POLES	A / B / C / D / E / F	T
4	30° ± 1.5°	180°
6	20° ± 1.5°	120°
8	15° ± 1.5°	90°

General electronic characteristics

Resolutions (imp./turn)	from 200 to 2048 not electronically multiplied
Source and Sink current	15 mA per channel with Line Driver 40 mA per channel with other electronics
Max output frequency	100 KHz $F = \frac{\text{R.P.M. x Resolutions}}{60}$

"EH" Electronic characteristics

Power supply	5 / 8 ÷ 24 Vdc
Available Electronics	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Current consumption without load	100 mA

"EF" Electronic characteristics

Power supply	5Vdc ± 5%
Electronics for incremental phases	LINE DRIVER
Electronics for Hall effect phases	LINE DRIVER/ NPN OPEN COLLECTOR
Current consumption without load	200 mA

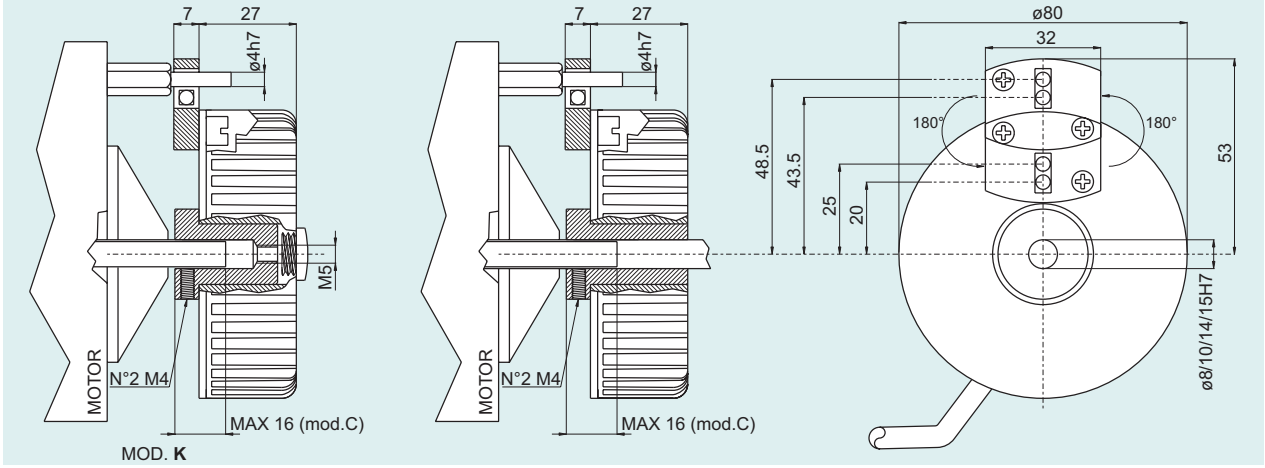
Cable colour

COLOUR	FUNCTION	EH	EF
RED	+Vdc	●	●
BLACK	0 Volt	●	●
GREEN	A	●	●
YELLOW	B	●	●
BLUE	Z	●	●
BROWN	$\overline{A}$	●	●
ORANGE	$\overline{B}$	●	●
WHITE	$\overline{Z}$	●	●
GRAY	U		●
VIOLET	V		●
GRAY/ PINK	W		●
RED / BLUE	$\overline{U}$		●
WHITE / GREEN	$\overline{V}$		●
BROWN / GREEN	$\overline{W}$		●

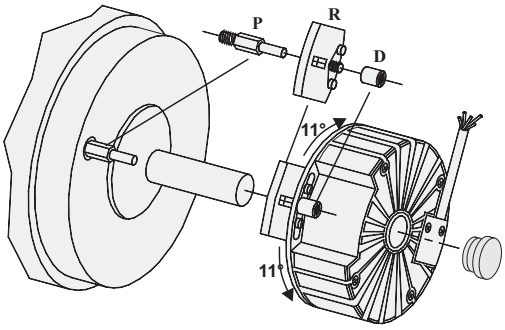
Mechanical Characteristics

Through hole diameter EH/EF80P (mm)	ø8 / ø10 / ø14 / 15H7
Blind hole diameter EH / EF80C (mm)	ø8 FG6 / ø10 G6 N.B.: In the case of.80Cmod ø 14 / ø 15 max insertion motor shaft16 mm
Protection	IP54 - Standard
R.P.M.	3000
Vibrations	10G 10 ÷ 2000 Hz
Bearings life	10^9 revolutions
Bearings	n°2 ball bearings
Shaft Material	Aluminium
Cover Material	Special plastic reinforced with fibre glass
Operating Temperature	-10° ÷ +85°C
Storage Temperature	-25° ÷ +85°C
Weight	250 g

EH-EF80C-P-K



1- Fix the antirotational pin.
2- Insert the Antirotating System for slack recuperation R in the relative encoder slot
3- Screw nut D
(In the case of zero timing, don't fix it)
4- Couple the encoder shaft with the motor shaft, ensuring that pin P is inserted in the Antirotating system
5- Fix the encoder shaft with the 2 M4 dowels
6- To time the zero position rotate the encoder (max 22°) then fix nut D.



Ordering Codes

In case of particular Customer variant separate by a full stop

EF 80 P 6 L 2000 Z 5 L 8 X 3 P R . XXX

EH = incremental encoder EH series
EF = incremental encoder EF series + HALL effect phases

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

80 = Body dimension

R = radial

C = with blind hole
P = with through hole
K = blind hole with hind fixing

P = output cable standard length 0.3 m

3 = 3000 **R.P.M.**

X = standard IP54 **Protection**

N.B.: TO BE INDICATED ONLY FOR EF / EW MODELS

4 = n° 4 poles
6 = n° 6 poles
8 = n° 8 poles
N° poles of the motor

8 = ø 8 mm for EH/EF80C
10 = ø 10 mm for EH/EF80C-EH/EF80P
14 = ø 14 mm for EH/EF80C-P
15 = ø 15 mm for EH/EF80C-P
Shaft hole diameter

C = NPN OPEN COLLECTOR
L = LINE DRIVER
Electronic for Hall effect phases

from **200** to **2048** imp./turn
Resolutions incremental encoder
N.B.: For impulse availability contact directly our offices

L = LINE DRIVER
Electronics for EF mod

S = without zero impulse
Z = witht zero impulse
Zero impulse

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronics output configuration

5= 5Vdc **Power supply of EF model**

5 / 8 ÷ 24= 5Vdc / da 8 a 24Vdc **Encoder power supply**

N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

N.B.: For the optionals on the output configurations see the incremental output connections card

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ISO 9001:2000

EH88P
INCREMENTAL ENCODERS

Ordering codes

In case of particular Customer variant separate by a full stop

EH 88 P 500 Z 5 L 50 X 3 P R . XXX

EH = incremental encoder EH series

88 = body dimension

P = with through hole

512 - 1024 imp./turn — **Resolutions**

N.B.: For available impulse contact directly our offices

S = without zero impulse
Z = with zero impulse — **Zero impulse**

5 = 5 Vdc
8 ÷ 24 = from 8 to 24 Vdc — **Encoder power supply(Vdc)**

P = PUSH PULL
L = LINE DRIVER — **Electronics output configuration**

N.B.: For the optionals on the output configurations see the output incremental connections card

25 = ø25 mm
30 = ø30 mm
35 = ø35 mm
38 = ø38 mm — **Shaft hole diameter**

X = standard IP54 — **Protection**

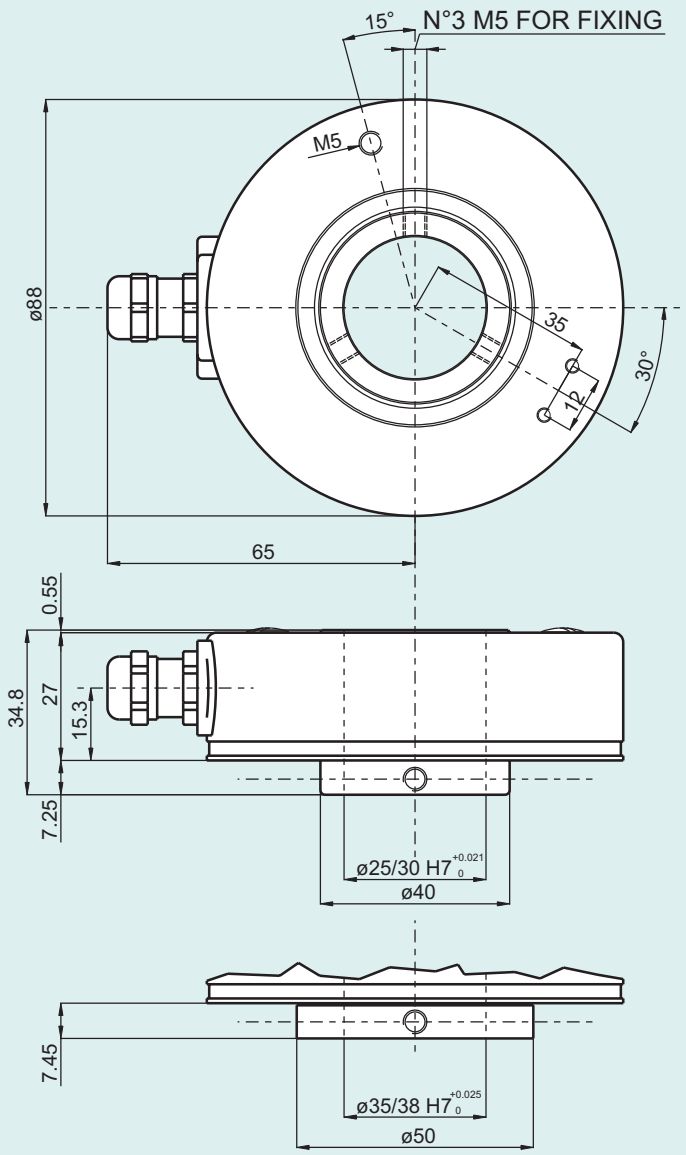
3 = 3000 max — **R.P.M.**

P = output cable (standard length 0.5 m)

R = radial

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

EH88



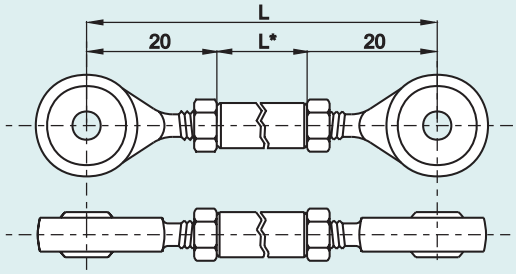
Electronic Characteristics

Resolutions	512 - 1024 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max output current	50 mA for channel 20 mA for channel with LINE DRIVER
Electronic output configuration	LINE DRIVER / PUSH PULL
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Mechanical characteristics

Shaft diameter (mm)	ø25H7 ø30H7 ø35H7 ø38H7
Protection	IP54 standard
R.P.M. Max	3000
Bearings	n°2 ball bearings
Shaft material	Stainless steel AISI303 for ø35 and ø38 Aluminium D11S UNI9002/5 per ø25 e ø30
Cover material	Aluminium
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	350 g

Accessories



Available length

L*= 30 mm	**Ordering code:** SN5A30
L*= 60 mm	**Ordering code:** SN5A60
L*= 90 mm	**Ordering code:** SN5A90

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ISO 9001:2000

EH120P
INCREMENTAL ENCODERS

Ordering codes

In case of particular Customer variant separate by a full stop

EH 120 P 500 Z 5 N 50 X 3 P R . XXX

EH = incremental encoder EH series

120 = body dimension

P = with through hole

1024 - 2048 imp./turn — **Resolutions**

N.B.: For available impulse contact directly our offices

S = without zero impulse
Z = with zero impulse — **Zero impulse**

5 = 5 Vdc
8 ÷ 24 = from 8 to 24 Vdc — **Encoder power supply(Vdc)**

P = PUSH PULL
L = LINE DRIVER — **Electronics output configuration**

N.B.: For the optionals on the output configurations see the output incremental connections card

40 = ø40 mm
50 = ø50 mm
60 = ø60mm — **Shaft hole diameter**

X = standard IP54 — **Protection**

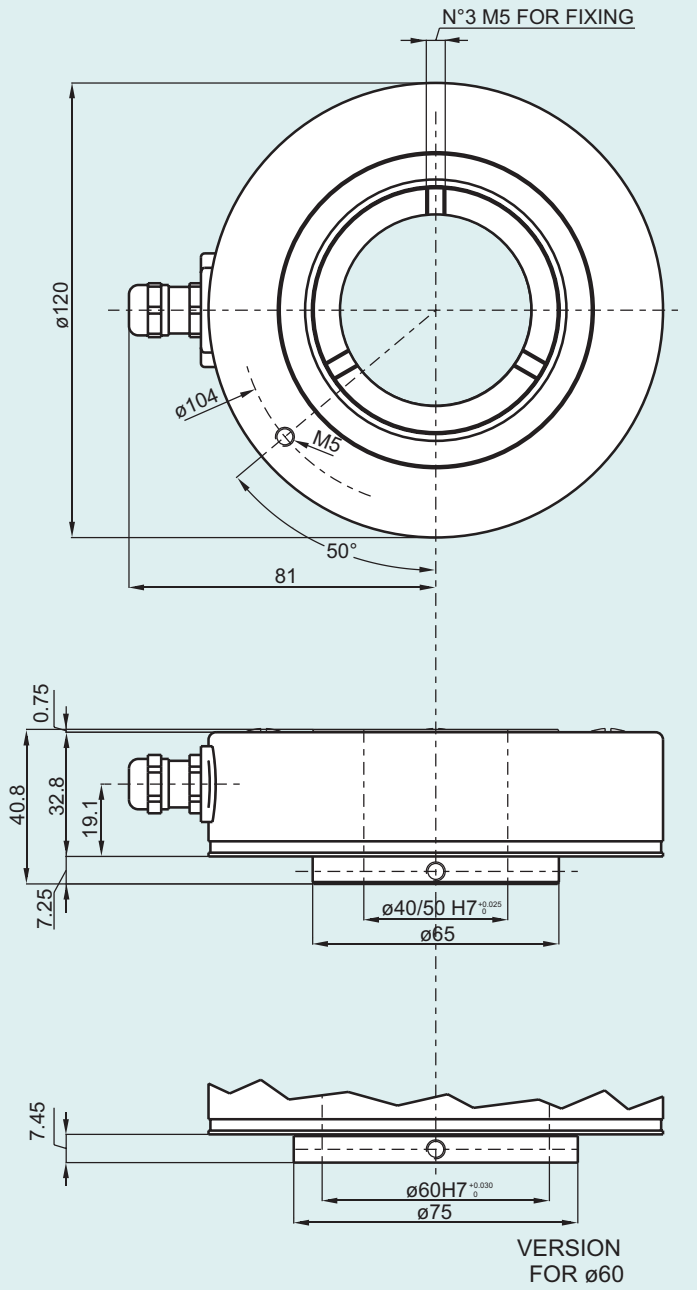
3 = 3000 max — **R.P.M.**

P = output cable (standard length 0.5 m)

R = radial

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

EH120



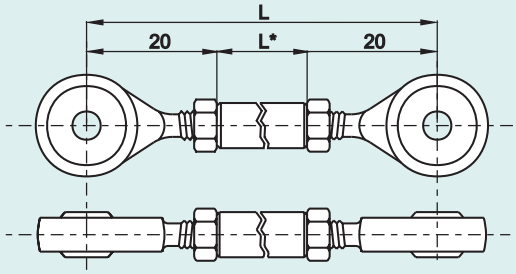
Electronic Characteristics

Resolutions	1024 - 2048 impulses / turn
Power supply	5 Vdc / 8 ÷ 24 Vdc
Current consumption without load	50 mA bidirectional 100 mA bidirectional with zero
Max output current	50 mA for channel 20 mA for channel with LINE DRIVER
Electronic output configuration	LINE DRIVER / PUSH PULL
Max output frequency	Max 100 KHz **F=** $\frac{\text{RPM x Resolutions}}{60}$

Mechanical characteristics

Shaft diameter (mm)	ø40 / 50 / 60 H7
Protection	IP54 standard
R.P.M. Max	3000
Bearings	n°2 ball bearings
Shaft material	Aluminium D11S UNI9002/5
Cover material	Aluminium
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	750 g

Accessori



Available length

L*= 30 mm	**Ordering code:** SN5A30
L*= 60 mm	**Ordering code:** SN5A60
L*= 90 mm	**Ordering code:** SN5A90

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FE
Cable Exstension Position Encoder

Ordering code

FE	2000	A	.	XXX

In the case of particular client variant separate by a full stop

FE = cable exstension position encoder

2000 = stroke 2000 mm
5000 = stroke 5000 mm
8000 = stroke 8000 mm
Stroke

A (standard) **Type of cable attachment**

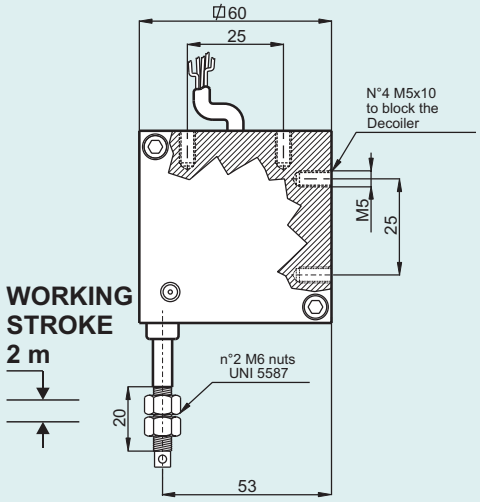
XXX = Particular customer variants indicated by a progressive number from 001 to 999

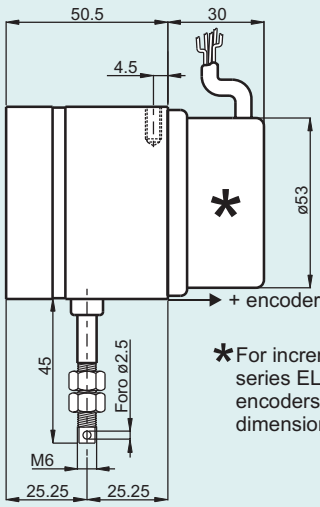
N.B.: The encoder that gets applicated to the cable exstension position encoder should be ordered seperately. The letter **F** should be placed before the standard ordering code.
Example:
1- encoder model EH30M, the ordering code will become : FEH30M300S8/24P6X6PR
2- encoder model EL53B, the ordering code will become : FEL53B1100S5/28P6X3MR
3- encoder model EAM53B, the ordering code will become : FEAM53B16/4096G8/28PPX6X3MER

Complete example of the ordering code:

FE2000A-FEH30M300S8/24P6X6PR

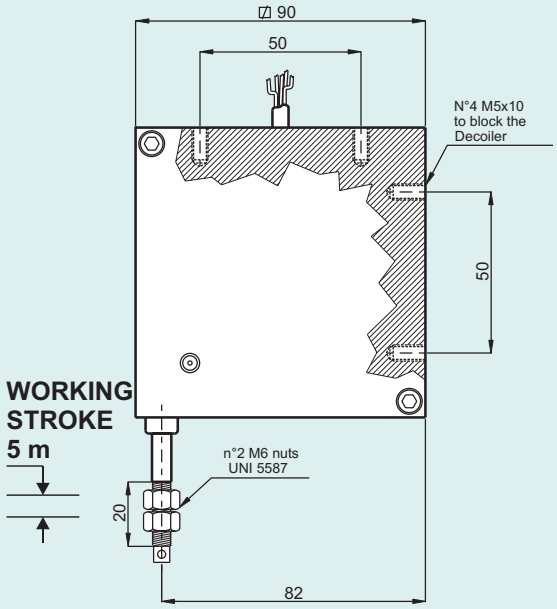
FE2000

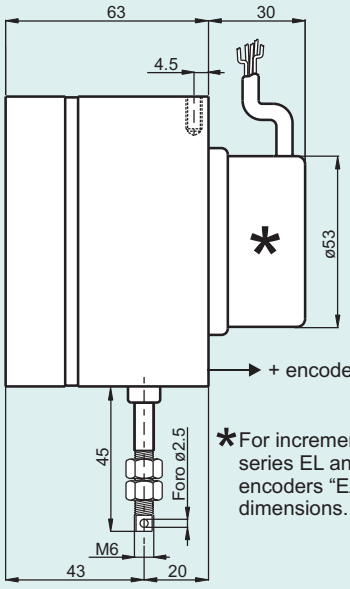




*For incremental encoder models series EL and multiturn absolute encoders “EAM” see the dimensions.

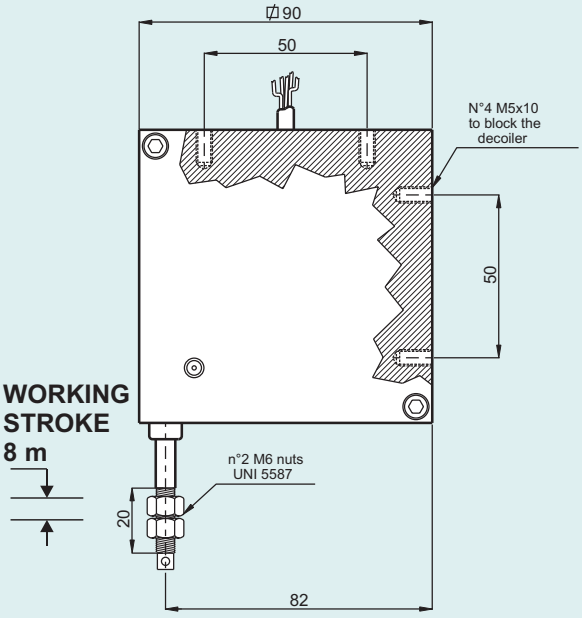
FE5000

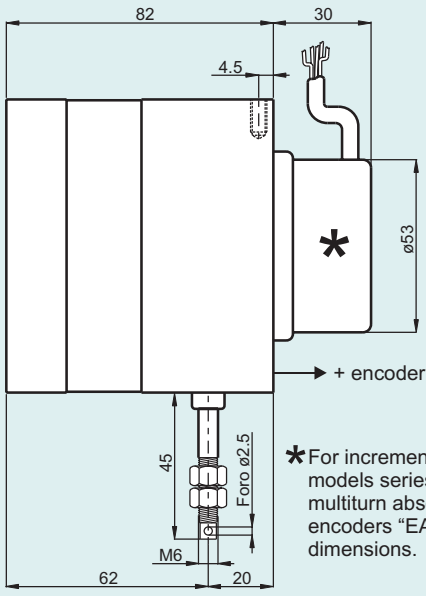




*For incremental encoder models series EL and multiturn absolute encoders “EAM” see the dimensions.

FE8000

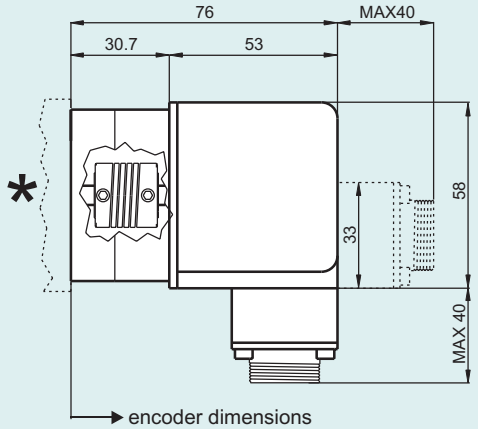




*For incremental encoder models series EL and multiturn absolute encoders “EAM” see the dimensions.

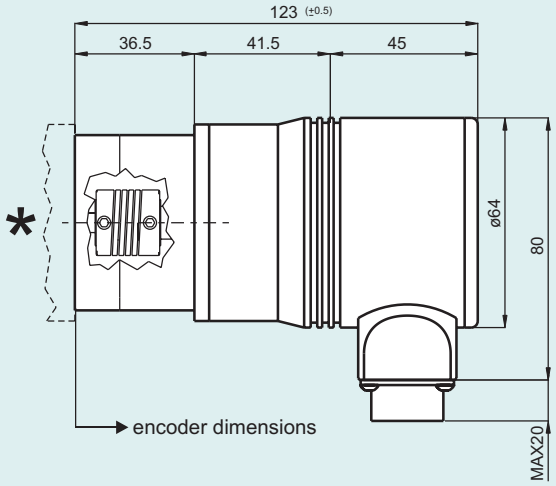
FEL53B

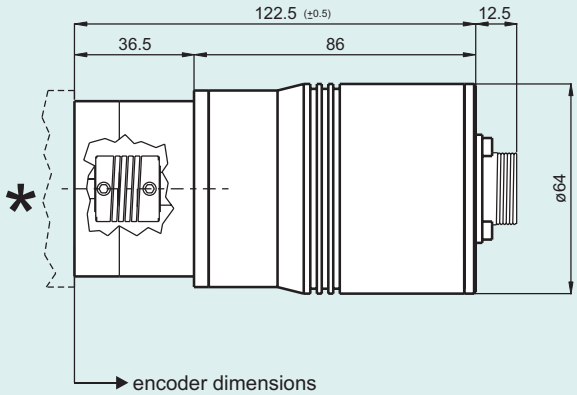
Application of incremental encoder at a high resolution or with a connector



FEAM53B

Application with multiturn absolute encoder





General resolution characteristics

Model	FE2000	FE5000	FE8000
One turn of coil (mm)	120	220	220
Application with incremental encoder			
Resolution	Impulses	Impulses	Impulses
1 mm	120	220	220
0,4 mm	300	550	550
0,1 mm	1200	2200	2200
For other resolutions contact our offices directly			
Application with multiturn absolute encoder			
Resolution turns	Impulses	Impulses	Impulses
1 mm	120	220	220
0,4 mm	300	550	550
0,1 mm	1200	2200	2200
N.B.: The resolutions split with output codes result being indipendent between resolutions and number of turn			
N° Turns	Turns	Turns	Turns
	32	32	64
For other resolutions contact our offices directly			

Mechanical Characteristics

Linearity	+/- 0,05% full-scale
Velocity Max.	50 m/min
Protection	IP54 standard For encoder protection see the concerning technical data-sheet
Vibrations	10G 10 ÷ 2000 Hz
Cover material	Aluminium
Wire material	Stainless steel
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	~ 500g -- FE2000 ~ 1100 g -- FE5000 ~ 1300 g -- FE8000

N.B.: For the characteristics of the encoders, refer to the technical cards of the following models:

- for EH30M see encoder EH38
- for EL53B see encoder EL53
- for EAM53B see encoder EAM58

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ETMA
Magnetic incremental linear sensor

ETMA1
Magnetic incremental linear sensor
- Resolution:
  0,1 mm (0,025 mm after 4 signal division)
- Zero impulse every 5 mm

ETMA2
Magnetic incremental linear sensor
- Resolution:
  0,04 mm (0,01 mm after 4 signal division)
- Zero impulse every 2 mm

Ordering codes for Magnetic incremental linear sensor

In case of particular Customer variant separate with a full stop

ETM A 1 Z 5 L S PR3 . XXX

ETM = Eltra magnetic incremental linear sensor

A = horizontal — **Type head**

1 = 0,1 mm (0,025 after 4 signal division)
2 = 0,04 mm (0,01 after 4 signal division) — **Resolution**

Z = with zero impulse every 5mm with ETMA1
with zero impulse every 2mm with ETMA2 — **Zero impulse**

5 = 5V
8 ÷ 24 = from 8V to 24V — **Sensor power supply (Vdc)**

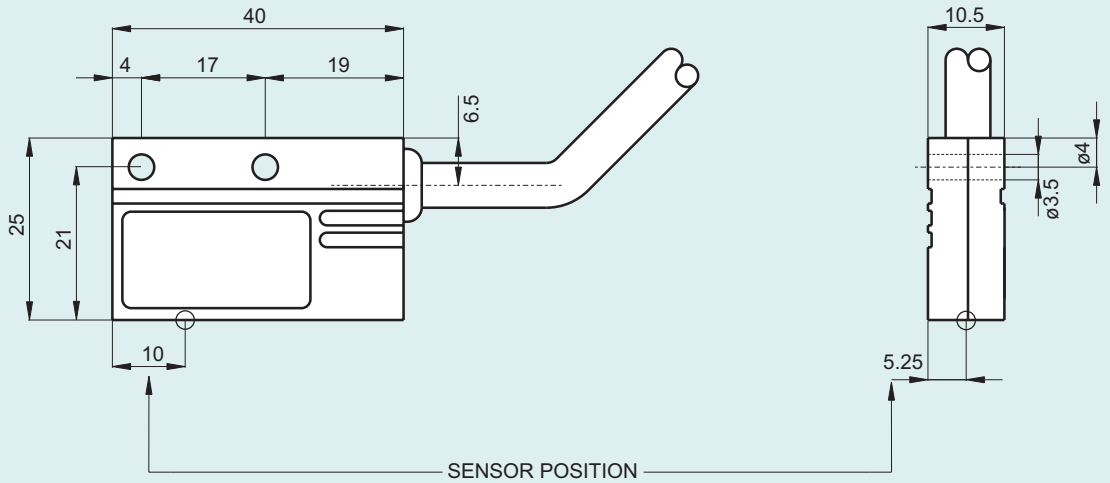
XXX = Particular Customer variants indicated by a progressive number from 001 to 999

3 = 3m (Standard)
6 = 6m
10 = 10m
20 = 20m — **Lenghts available**

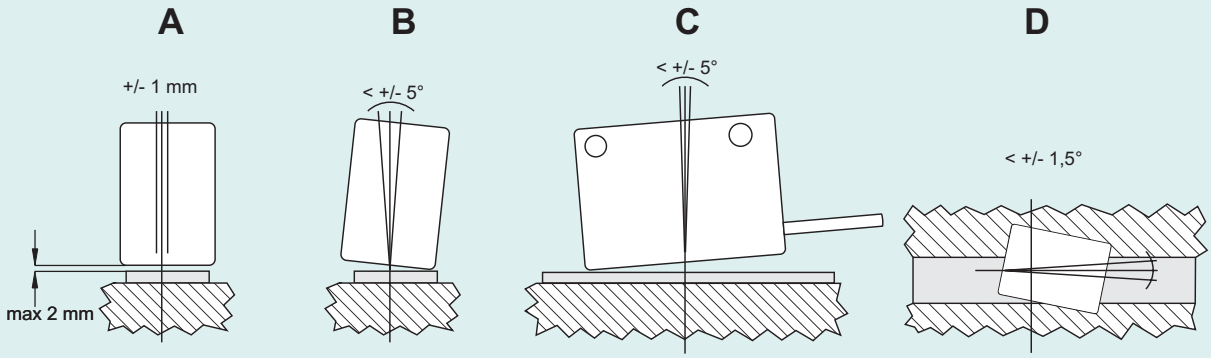
S = standard IP67 — **Protection**

P = PUSH PULL
L = LINE DRIVER — **Electronics**

ETM



Mechanical tolerances of the sensor



Electronic Characteristics

Resolution	0,1 mm (0,025 after 4 signal division) for ETMA1 0,04 mm (0,01 after 4 signal division) for ETMA2
Repeatability	+/- 0,025 mm
Electronic output configuration	LINE DRIVER / PUSH PULL
Power supply	5 Vdc 8 ÷ 24 Vdc
Zero impulse	with zero every 5 mm for ETMA1 with zero every 2 mm for ETMA2
Max Velocity	4 m/s
Max Frequency	40 Khz

Cable colour

COLOUR	FUNCTION
RED	+Vdc
BLACK	0 Volt
GREEN	A
YELLOW	B
BLUE	Z
BROWN	$\overline{A}$
ORANGE	$\overline{B}$
WHITE	$\overline{Z}$

Mechanical characteristics

IP Protection	IP67 - STANDARD
Shock	50 G for 11 msec
Vibrations	10G 10 ÷ 2000 Hz
Container Material	Aluminium
Fixing	n°2 hole ø3,5
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Max working distance	< 2 mm
Weight	150g

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EBM
Magnetic Tape

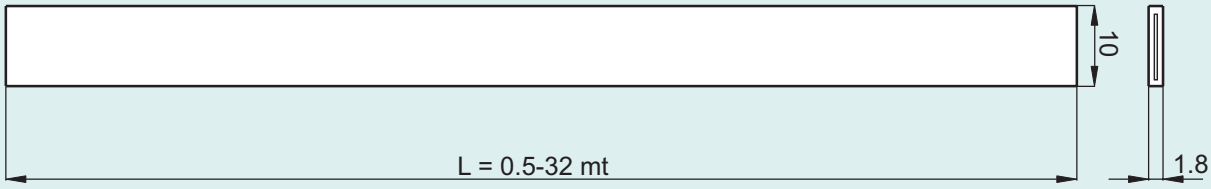
Ordering codes for magnetic tape

In case of particular Customer variant separate with a full stop

EBM A 1 - 10 . XXX

- **EBM =** Eltra magnetic tape
- **A =** type of magnetic tape
- **1 =** magnetic strip for resolution 0,1mm
  2 = magnetic strip for resolution 0,04mm
- **- =** separate with a hyphen
- **10** — **Lenght magnetic tape (m)**
  N.B.= Multiples of a metre
- **XXX =** Special Customer variants indicated by a progressive number from 0001 to 999

EBM



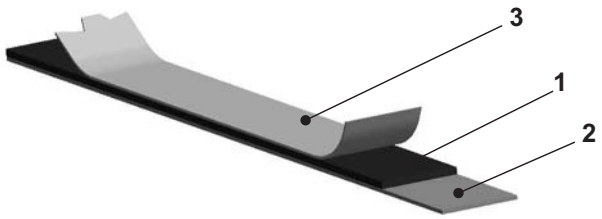
N.B.: It is possible to have different lengths only to order.

Technical Characteristics

Operating Temperature	0° ÷ +60°C
Accuracy at 20° C in mm	+/- (0,025 + 0,02 x L) L= lenght magnetic tape in m
Lenght expansion coefficient	**16 x 10^{-6} m (m x °C)**
Bend radius	Minimum 150 mm

Generality

As can be seen from the explicative drawing, the Eltra magnetic belt is composed essentially of three layers:
1 - A flexible magnetic belt made of plastic material.
2 - This is a magnetised steel belt with the characteristic of creating a shield against any external magnetic fields of a certain level; apart from this, as it is in contact (glued) to the upper plastic layer, it is essential for supplying the correct mechanical consistency to the magnetic belt.
3 - This last part of the belt is the least flexible part. It is in fact supplied separately (for transport and application reasons) and is glued to layer 1 by the user. This is a steel belt transparent to the magnetic flow, with the function of mechanically protecting the magnetic belt.



N.B.: To prevent damage from possible internal tensions in the magnetic belt, keep the band rolled up with the magnetic part facing outwards with a minimum internal diameter of 300 mm.

Measures to adopt when applying the magnetic tape

Pressure for fixing
The magnetic belt is adhesive and it is therefore important that the contact with the surface to be glued is optimum for correct application. For this to take place, good pressure must be applied uniformly to guarantee perfect adhesion between the surfaces.
Gluing temperature
For the adhesive to adhere in an optimum way, it is preferable for the temperature of the material in which the magnetic belt is placed to be between 20° C and 37° C. Maximum adhesion is obtained after 72 hours at a temperature of 21° C. We recommend against applying the magnetic belt if the temperature of the gluing surface is lower than 10° C.
Application materials
For the magnetic belts to adhere correctly, they must be placed in dry, smooth and clean places. The surfaces should be cleaned with a solution of alcohol and water at 50% or heptane. In the case of materials such as brass, copper etc. the surface must be protected to prevent possible oxidisation.

Chemical agents and the behaviour of the magnetic tape

Chemicals, showing no or only a small effect	Chemicals, showing small to medium effect	Chemicals, showing strong effects
Formic acid	Acetone	Benzene
Cotton seed oil	Acetylene	Lacquer solvent
Formaldehyde 40%	Ammonia	Nitrobenzene
Glycerol 93°C	Gasoline	Nitric acid 70%
N-hexane	Vapor	Red Nitric acid
Iso-octane	Acetic acid 20%	Nitric acid 37%, 93°C
Linseed raw oil	Kerosene	Turpentine
Lactic acid	Acetic acid 30%, glacial acid	Carbon tetrachloride
Mineral oil	Isopropyl ether	Tetrahydrofuran
Soybean oil	Oleic acid	Toluene
	Sea water	Trichlorethylene
	Stearic acid 70%	Dimethylbenzene

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EP A / B
POTENTIOMETERS

Potentiometer EP series

Encoders with output signal of potentiometric type. The potentiometer is in a robust cover and is supported by two bearings; it assures excellent life, speed and precision properties.

Ordering codes

EP A 103 / 10 P R . XXX

EP = eltra potentiometer

A = mod. EP A with shaft ø 10
B = mod. EP B with toothed shaft
Type of shaft

502 / 1 = 5 Kohm / 1 turn (mod.A)
502 / 3 = 5 Kohm / 3 turn (mod.B)
103 / 1 = 10 Kohm / 1 turn (mod.A)
103 / 3 = 10 Kohm / 3 turn (mod.B)
103 / 10 = 10 Kohm / 10 turn (mod.A)
Resistivity value per n° turns

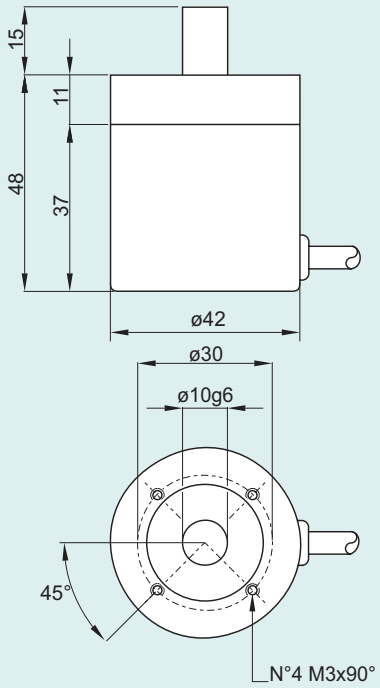
P = output cable (standard length 1.5m)

A = axial
R = radial

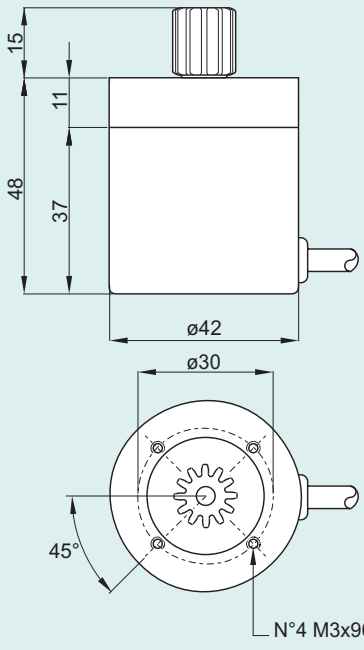
In the case of particular Customer variant - seperate with a full stop

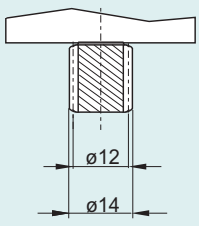
XXX = Particular Customer variants indicated by a progressive number from 001 to 999

EPA



EPB





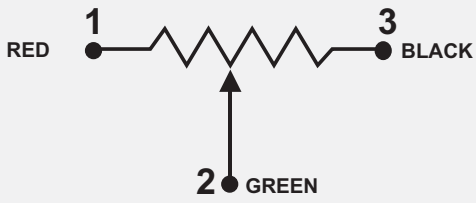
TOOTH CHARACTERISTICS

z=12
m=1
p=3.1415

General Characteristics

Type of potentiometers available	5 Kohm / 1 turn (mod.A) 5 Kohm / 3 turn (mod.B) 10 Kohm / 1 turn (mod.A) 10 Kohm / 3 turn (mod.B) 10 Kohm / 10 turn (mod.A)
Tolerance	± 5 %
Linearity	± 0.25 %
Power Rating (70°C)	model A : 2.0 watt model B : 1.0 watt
Number of maximum revolutions	300.000 for model B 1.000.000 for model A
Shock	50G per 11msec
Vibrations	15G 10÷2000Hz
Shaft Diameter (mm)	ø10 g6
Shaft material	Stainless steel AISI303
Toothed shaft characteristics	Z = 12 / m = 1 / p = 3.1415
Toothed shaft materail	Steel C45
Cover material	Special plastic reinforced with glass fibre
Body material	AluminiumUNI 9002/5
Bearings	n°2 ball bearings
Weight	150g

Colours and connections



Environmental Characteristics

Protection	IP54 Standard
Operating Temperature	0° ÷ +60° C
Storage temperature	-25° ÷ +70° C

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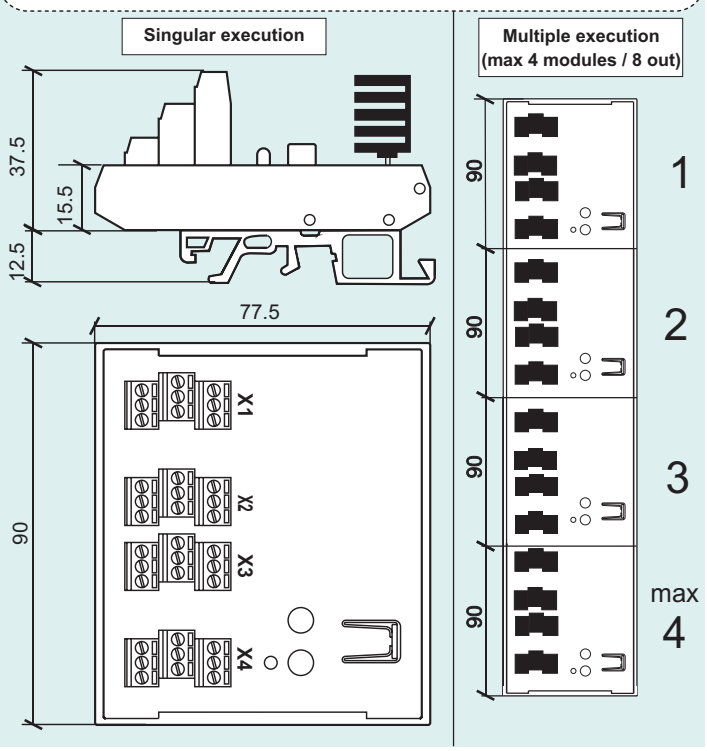
EMB
Signal splitting adapter

Electronic Characteristics

Working voltage for INPUTS and OUTPUTS	5 Vdc / 8÷24 Vdc
Current consumption without load	70 mA
Max output current per channel	20 mA for LINE DRIVER 40 mA PUSH PULL
Max input current per channel	10 mA
Max operating frequency	100 Khz
Current absorbed in maximum operating conditions (A)	$I_{max} = \frac{0{,}12\,(Vx1+Vx2+...Vxn+Vx4)}{Vx4}$ Where: Vx1 = input voltage x1 Vx2,...Vxn = output voltage X2,...Xn Vx4 =Voltage of power supply of the card
Operating temperature	0° ÷ +50°C
Fixing on frame	DIN 46277 / 3 (OMEGA) GUIDE DIN 46277 / 2 GUIDE

Sizes



The EMB board

This board is used when it is necessary to adapt the electronic characteristics of the encoder and controlling apparatus connected between them.

The main functions of the EMB are the splitting of the input signals and the adaptation of the output stages.

It happens often, for example, that you have an encoder with an output of 5 Vdc and a control that accepts data only from 24 Vdc or the case in which the encoder has the same voltage of the control by a different electronics.

The possibilities offered by the EMB are many so the different solutions are checked at the confirmation of the order (see back the ordering code where the various options of the board are described).

It is important that on the board there may be present a maximum of two different voltages and that the board must be supplied only by the X4 connector, with the higher voltage of those present on the board. It is possible moreover to obtain a maximum of eight outputs, with a particular assembly of many boards situated on one a only support to reduce the wiring.

In this case in the ordering code they will be specified all the outputs. For a board with a 5 Vdc npn and eight output line drivers at 5Vdc, for example, the ordering code becomes **EMB5N5L5L5L5L5L5L5L.**

An example can clarify the typical application of such a board:

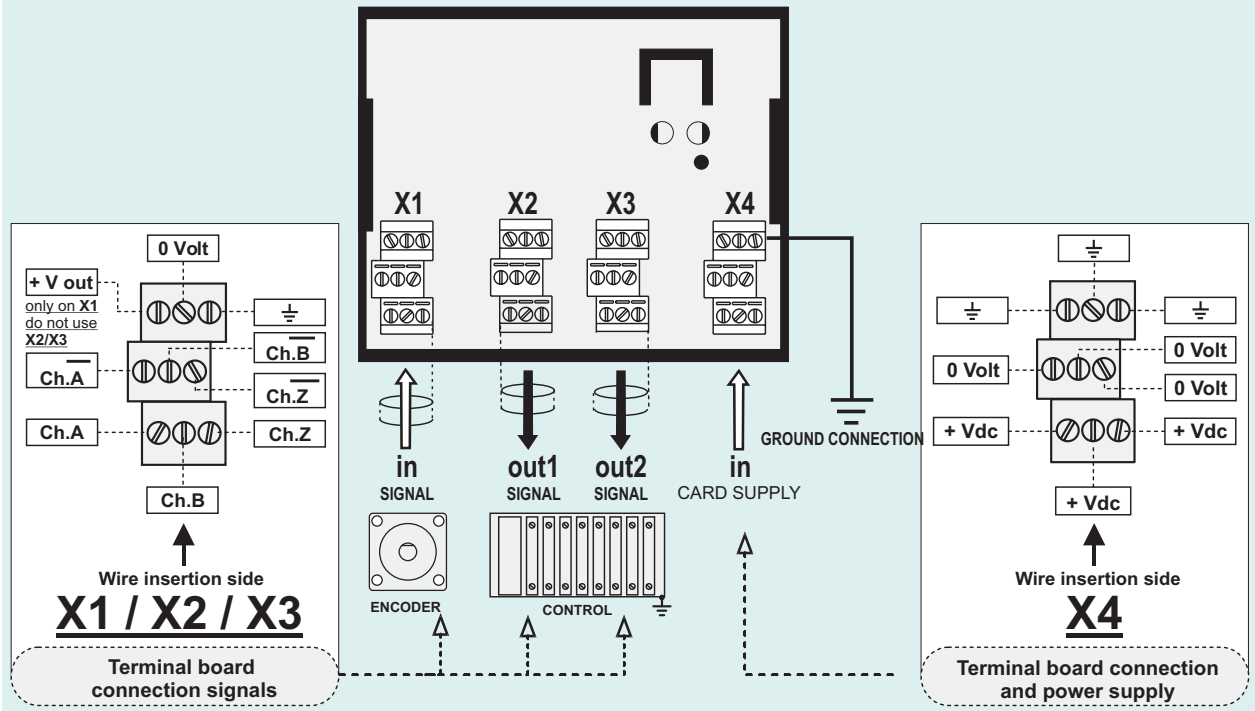
An encoder with 5Vdc line driver output must be linked at the same time to a control with the push-pull input of 24Vdc and to an instrument with line driver input at 5Vdc.

The board to be ordered will have this code :

EMB5L8/24P5L where EMB**5L** indicates the input at 5Vdc line driver on the X1 connector, EMB5L**8/24P** Indicates that the first output on the X2 connector has a push-pull electronic and is supplied with voltages from 8 to 24 Vdc, EMB5L8/24P**5L** indicates that the second output on the X3 connector has a 5Vdc line driver electronics.

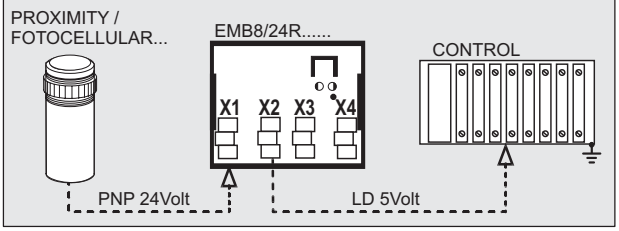
The power supply of this board will be of 24 Vdc to link on the X4 connector.

Working diagram and terminal board connection

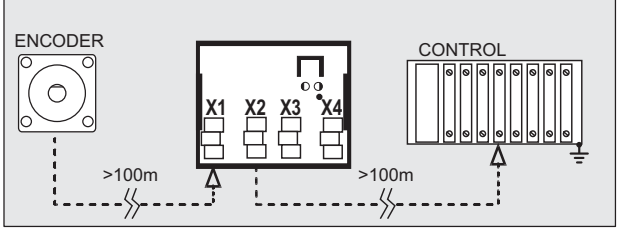


Examples of use

EMB ADAPTATION OF ELECTRONIC SIGNALS



EMB AS INTERMEDIATE AMPLIFIER OF SIGNAL



Ordering codes

EMB 5 L 8/24 P 8/24 P . XXX

(in: 5 L — out1: 8/24 P — out2 optional output: 8/24 P)

In case of particular Customer variant seperate with a full stop

EMB = Adapter signal splitter

XXX = Particular Customer variant indicated by a progressive number from 001 to 999

5
8 ÷ 24
Input power supply (Vdc) terminal board X1

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE-DRIVER
Electronics out2 terminal board X3

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE-DRIVER
R = PNP
Electronic inputs terminal board X1

5
8 ÷ 24
Power supply out2 (Vdc) terminal board X3

5
8 ÷ 24
Out1 Power supply (Vdc)terminal board X2

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE-DRIVER
Electronic out1 terminal boardX2

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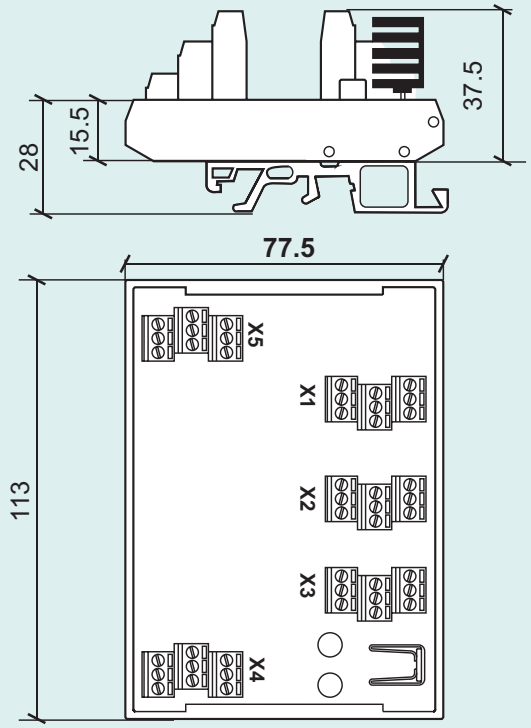
EMD
Encoder signal selector

Electronic Characteristics

Power supply	5 Vdc / 8÷24 Vdc
Current consumption without load	150 mA
Max output current per channel	20 mA per LINE DRIVER 40 mA PUSH PULL
Max input current per channel	10 mA
Max output frequency	100 Khz
Operating temperature	0° ÷ +40°C
Logic input levels in1 AND in2 (Vdc)	"0" = 5 ÷ 24 "1" = 0 ÷ 3
Clean contact characteristics	Vmax = 125 Vac / 60 Vdc Imax = 0.5A Vmin = 5 Vdc Imin = 1mA
Fix on frame	GUIDA DIN 46277 / 3 (OMEGA) GUIDA DIN 46277 / 2

Overall dimension



The EMD board

This board is used when it is necessary to carry out a selection function between a maximum of three inputs.
The EMD board accepts in input the signals coming from three encoders and supplies in output the signals of one of these electronically selected
The selection happens suppling opportunely inputs in1 and in2, according to the working diagram (see back side).
The electronic typologies of the output and of the encoders to be connected, must be included in the ones described in the ordering code, the only condition posed, is that the electronics of the encoders connected are the same. The EMD, moreover, supplies three clean contacts usually open that close themselves when the respective input is selected.
An example is needed to understand better the use of this board.
We must realize a reading through an instrument of the three encoders (or other sensors with compatible characteristics), in a sequential mode; we choose the encoders to commute making sure that they have the same electronics output, for example line-driver at 5 Vdc.
The instrument, instead, can acquire the data even with another electronics for example push-pull at 24 Vdc.
The EMD board will provide, in this case, to realize the commutation function of the connected encoders and to adapt the electronics of these with the one required from the instrument.
The ordering code will be:
EMD5L8/24P,
Where **5L**, indicates that the inputs are set for line-driver encoder at 5 Vdc, and **8/24P** indicates that the outputs is with push-pull electronics and with a power supply from 8 to 24 Vdc.
The board must be supplied with the highest voltage of those requested: in this case 8/24 Vdc. The commutation of the encoder happens through a command of logic type at the inputs called in1 and in2 on the Xn terminal board.
The logic level "1" is obtained connecting to the above-mentioned inputs a voltage included between +5 and +24 Vdc.
For the "0" level, instead, the voltage must be between 0 and +3 Vdc. The combination of the logic levels present on in1 and in2 configurates the terminal board of output in 4 different mode described in the tabel on the following page.

Working diagram and terminal connections board

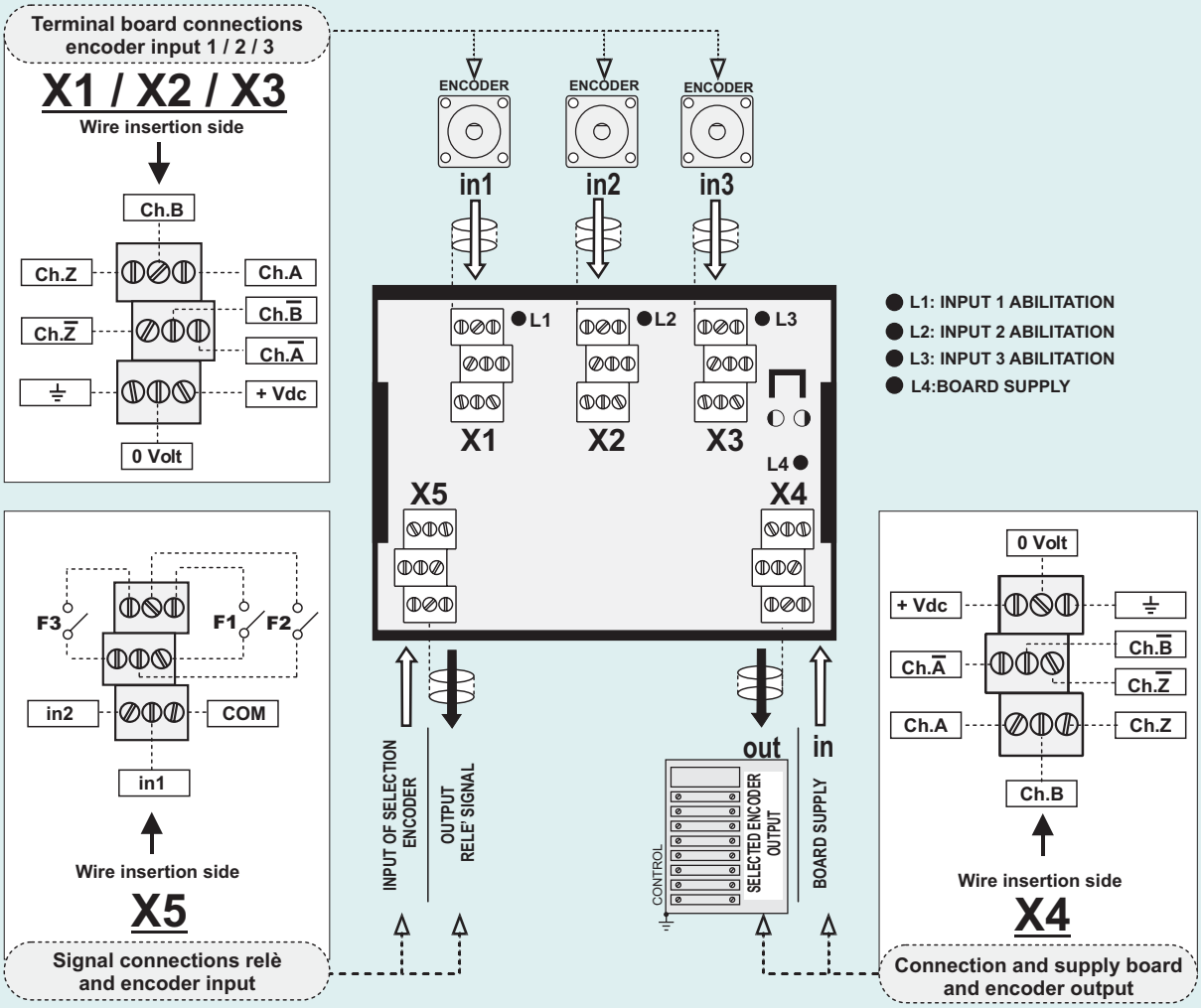
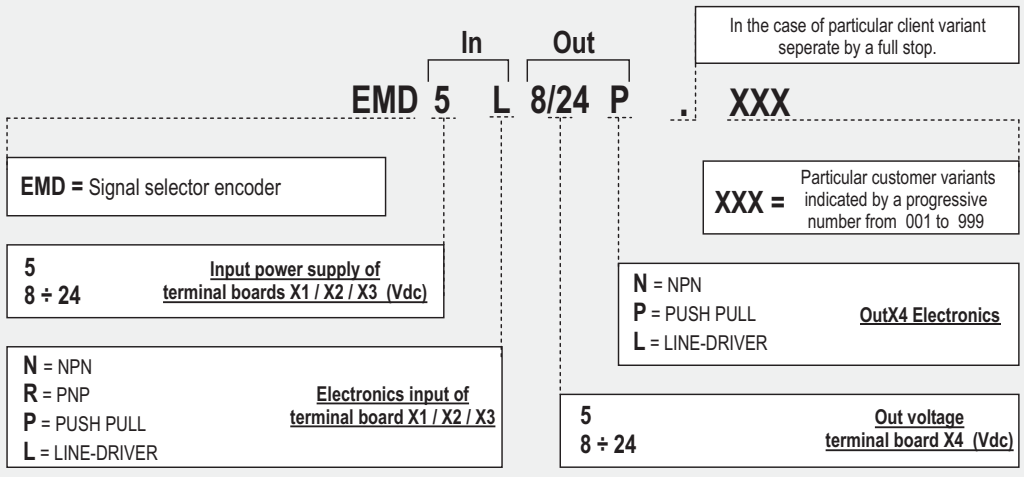


Table of logic status

The table indicates the output status on the X4 connector and on the clean contacts on X5, in order to the logics status present on in1 and in2 on the X5 terminal board

Logic status on X5		Encoder selected on X4			Contact selected on X5		
in1	in2	X1	X2	X3	F1	F2	F3
0	0	–	–	–	–	–	–
1	0	●	–	–	●	–	–
0	1	–	●	–	–	●	–
1	1	–	–	●	–	–	●

Ordering code



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ELASTIC PRECISION JOINTS

Elastic joints

The ELTRA elastic precision joints are essential elements for the transmission of the rotational motion to the encoder shaft. The joints are in aluminium alloy, (type D11S A.A.2011) and are composed by a cylindrical body, on which there is a helicoidal groove.
The main charachteristics are:
-Torsional rigidity.
-Capacity of supporting slight disadjustments of the shaft
-Capacity of absorbing small axial shift of the shaft
The ELTRA elastic joints have also a perfect balancing of the rotating body, they have not critical points subject to breakage and are completely frictionless. They transmit perfectly, moreover, the rotational motion, even if is present axial shafts, disadjustments or dissallignments of the shafts; these joints do not require any type of maintenance.
The internal drain permits the coupling with distance between the shafts from a minimum of 0.5 mm to maximum of 6.12 mm (See quota 'F').
NOTE: The elastic joint can be supplied with different coupling diameters between them, for example d1=8 mm, d2=10 mm.
In this case the identification code becomes G25 A 8/10 to place before the smallest hole diameter.

Ordering code

G 25 A 6 / 8

G = elastic precision joint

16
20
25
30
— Joint dimension (see table)

A = shaft fixing with dowel

6 = ø 6
8 = ø 8
9 = ø 9.52 (3/8")
10 = ø 10
— ø hole"d1"

6 = ø 6
8 = ø 8
9 = ø 9.52 (3/8")
10 = ø 10
— ø hole"d2"
N.B.: Do not indicate in the case of d1=d2

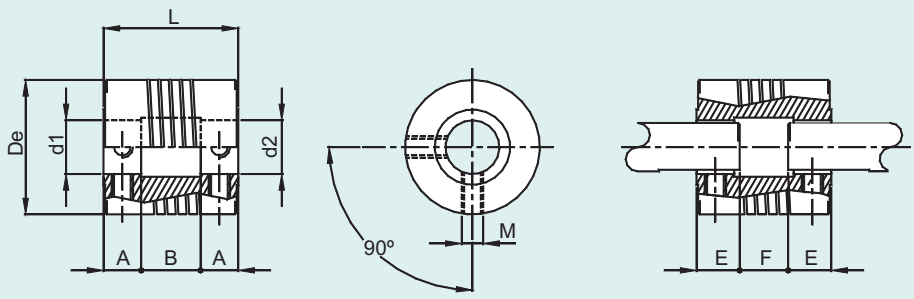
Construction data and characteristics

Standard joints	De	L	d1 = d2	A	B	M	E	F	Twisting moment	Type of material
G 20 A 6	ø20	20 $^{+0.1}_{-0.1}$	ø6H7 $^{+0.012}_{0}$	6	8	M3	7	6	0,25 Nm	Aluminium
G 25 A 8	ø25	25 $^{+0.1}_{-0.1}$	ø8H7 $^{+0.015}_{0}$	7	11	M4	8	9	0,4 Nm	
G 25 A 9	ø25	25 $^{+0.1}_{-0.1}$	ø9.52H7 $^{+0.015}_{0}$	7	11	M4	8	9	0,4 Nm	
G 25 A 10	ø25	25 $^{+0.1}_{-0.1}$	ø10H7 $^{+0.015}_{0}$	7	11	M4	8	9	0,4 Nm	
G 30 A 10	ø25	30 $^{+0.1}_{-0.1}$	ø10H7 $^{+0.015}_{0}$	8	14	M4	9	12	0,4 Nm	

NOTE: OUR TECHNICIAN IS AT YOUR DISPOSAL FOR ANY REQUEST FOR NO-STANDARD HOLES

NOTE FOR THE INSTALLER: In order to assure the correct function, we suggest that the shafts be inserted on the joint respecting the distance "E"as shown in the above diagram.

Joint dimensions



INSTALLATION AND OPERATION PRECAUTIONS

Installation and operation precautions

	The encoder must be used with respect for its qualifications, which are defined as an impulse generator and not as a safety device.
	The personnel assigned to assembling and installing the device must be qualified and follow the instructions in the technical manual.
	The personnel assigned to assembling and installing the device must be qualified and follow the instructions in the technical manual.
	Make sure that the mechanical coupling of the encoder shaft is made with the appropriate elastic joints, especially in the case of accentuated axial or radial movements.
	Make sure that the environment of use is free of corrosive agents (acids, etc.) or, at any rate, substances that are not compatible with the device's mechanical characteristics. In addition, the IP protection grade must be appropriate for the environment of use.
	Verify the ground connection of the device's body, in the event that it is not possible to provide for an additional external connection.
	Before putting it into operation, verify the voltage range applicable to the device, protecting it from exceeding the stated technical specifications.
	Install the power supply and signal cables in such a way as to avoid capacitive or inductive interference that could cause the device to malfunction and far from power lines.
	**The wiring of the cables must be carried out in a POWER-OFF condition.**
	**We recommend that you absolutely avoid making mechanical or electrical modifications for safety reasons and because they will void the warranty.**

Principal product warranty conditions

Replacements or repairs whether under the warranty or at the customer's expense must be performed in the service department of Eltra S.r.l. or by explicitly authorized personnel. Before sending material for repair, you must obtain an RGA number from our sales office. During the repair process in our service department, Eltra S.r.l. will be authorized to remove all parts that the customer added to the product.
Any malfunctions due to a failure to observe these usage and installation precautions will lead to the voiding of the warranty.
Repairs will not extend the product warranty. We also exclude compensation for any type of damage or injury due to the use, or suspension of use, of the transducer.
Note: For additional information, we refer you to the Conditions of Sale that can be consulted on our web site, **www.eltra.it** or requested from our office.

SV009GB0803A

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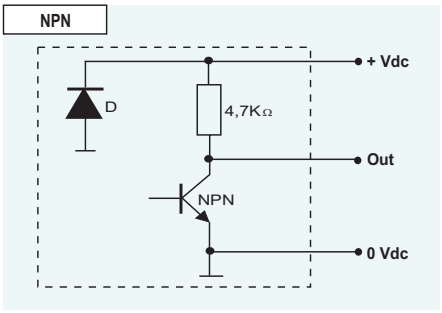
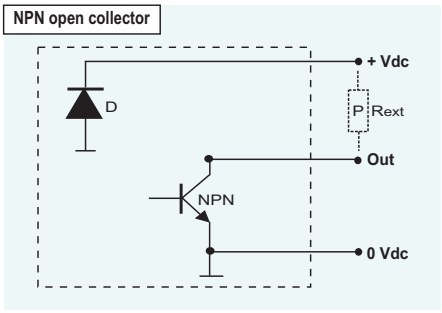
NPN and NPN OPEN COLLECTOR Electronics

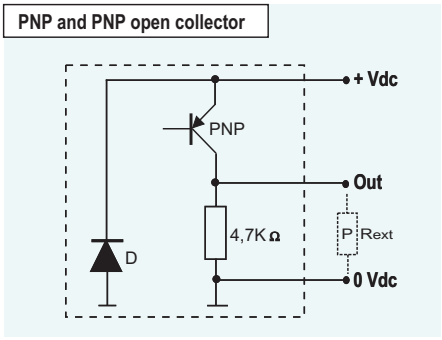
It is composed of an only transistor of NPN type and of a resistor of pull-up configuration, which fixes the output voltage to that of power supply when the transistor is in the quiescent position. It is circuitly similar to the logics of TTL type and for this reason is considered to be compatible to them. When it is used correctly it shows low levels of saturations towards the 0 Vdc and practically null towards the positive. The manner is influenced in proportional way by the increase of the cable length, by the frequency of impulses to be transmitted and by the increase of the load, thus the ideal application should keep these considerations in mind. The open collector variant is different for the lack of the pull-up resistor, freeing, in such way, the transistor collector from the tie of the encoder power supply, allowing to obtain output signals with different voltage.





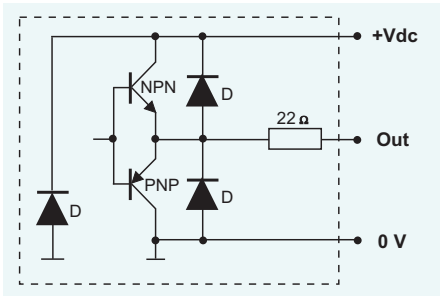
PNP and PNP OPEN COLLECTOR electronics

The most important considerations are the same carried out for the NPN electronics. The main differences are in the transistor, which is of pnp type and is constrained to the positive; the resistor, if present, is of the pull-down type connected, therefore, between the output and the zero volt.



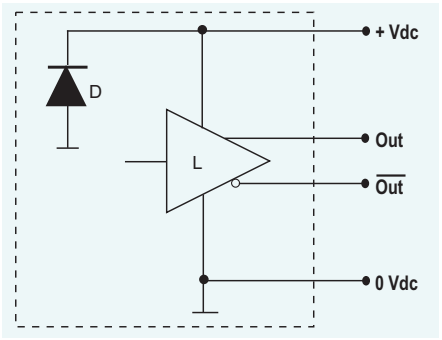
PUSH-PULL electronics

It is used to increase the performance with respect to preceeding electronics. Infact the major limitations of the npn or pnp electronics, can depend on the use of the resistor which presents a much higher impedance than a transistor in closing. To overcome these inconveniences in the push-pull type elctronics, another transistor of a complimentary is inserted, so that the output is of low impedance, for commutations whether towards the positive or towards zero. This solution increases the frequency performance, favouring long connections and optimal data transmission, even at high velocities. The levels of signal saturation are contained, but sometimes higher, in comparison to the preceeding logics. The PUSH PULL electronics is, in any case, indifferently applicable also to receivers for npn or pnp electronics.



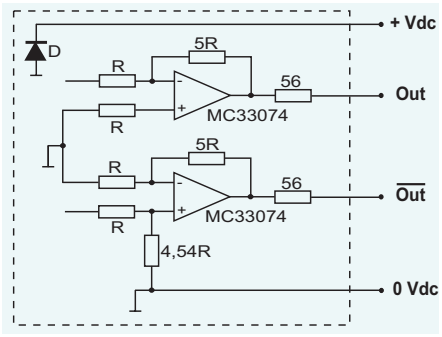
LINE DRIVER electronics

It is used when the operative evironments is particularly subjected to electrical disturbances or in presence of high distances between the encoder and the reception system. The transmission and the reception of the data happens on two complementary channels, so the disturbances are limited (the disturbances are caused to cables or adjacent apparatus); these interferences are known as “common way disturbances”, as their generation is refered to a common point, which is the mass of the system. The transmission and reception in line-driver, instead, happens in a “differential” way, or rather from the differences of the voltages present on the complementary channels of trasmission and, therefore, it is insensitive to common way disturbances.This type of transmission is used in 5 Vdc systems and is also known as RS422 compatible, further more power supplies up to 24 Vdc are available where the hard conditions of use need them (long cables, elevated disturbances, etc.).



DIFFERENTIAL electronics type

It is used in the sinusoidal line-driver analogic encoders where is necessary a transmission of a signal without disturbances. Like to the line-driver electronics, for digital signals are generated two signals out of phase for 180 electrical degrees.This electronics presents an impedance of typical line of about 120 Ohm, created on purpose, to be balanced by the input resistance of the receiver that must have an equal load impedance; it is normally realized through a termination resistance of 120 Ohm connected in parallel between the complementary signals.

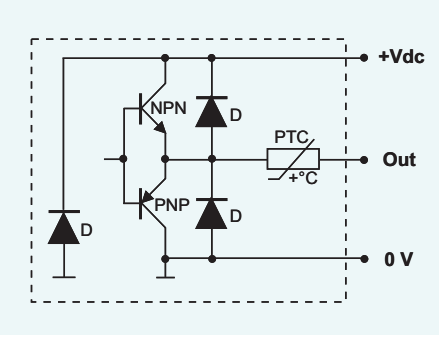


Protection for output stages

Exist two different mode to protect an electronic circuit from short circuit: the first uses passive element (fuses, non linear resistors, etc.) and the other uses active parts (transistor, etc.). The Eltra encoders can be equipped with these two levels of protection against short circuits.

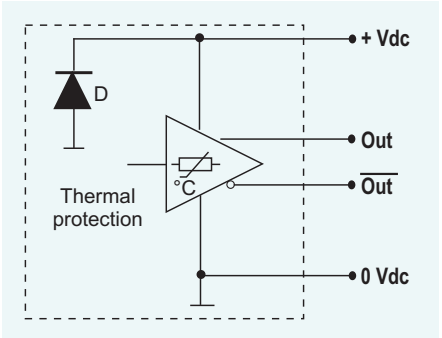
Passive protection

The passive solution is the cheapest solution and is direct to cover accidental short circuits, which happen with limited repetitions. The component which carries out the protection is called PTC and is a resistor that, if crossed by a superior current to the one prearranged, increases its resitance to limit the increase of the current itself. The use limitations of this protection are to be found in the speed of the intervention which is rather low, which can bring about a progressive delay in the components to be protected. This protection is, therefore, effective for a limited number of short circuits and is available for the npn, pnp and push-pull electronics. Another factor to consider is given to the fall of introduced voltage which increases at the increase of the load.



Active protection

The second solution is based on an integrated electronic circuit on the output stage, which follows in every moment the temperature reached by the element to be protected. This characteristic allows at the protection to be very efficient and fast in the intervention on repetitive and permanent short circuits and it is specifically indicated for heavy use. It is only available for line-driver and push-pull electronics.

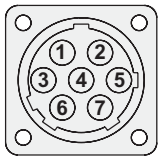


Connections and standard colours for INCREMENTAL encoders

NPN / NPN OPEN COLLECTOR TTL COMPATIBLE — PUSH - PULL

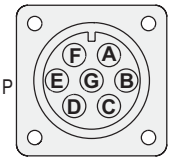
5 WAY CABLE COLOURS	FUNCTION	PIN "J" JMR 1607 M	PIN "M" MS 4102A 16S-1P
Black	0 Volt	1	A
	/	2	B
green	Out 1 (Ch.A)	3	C
Blue	Out 3 (Ch.Z)	4	D
Yellow	Out 2 (Ch.B)	5	E
Red	+ Vdc	6	F
	CASE	7	G

J CONNECTOR JMR 1607 M



PANNEL SIDE

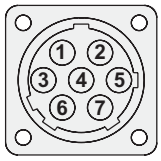
M CONNECTOR MS4102A 16S-1P



LINE-DRIVER without ZERO

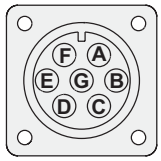
6 WAY CABLE COLOURS	FUNCTION	PIN "J" JMR 1607 M	PIN "M" MS 4102A 16S-1P
Green	Out 1 (Ch.A)	1	A
Yellow	Out 2 (Ch.B)	2	B
Brown	$\overline{\text{Out 1}}$ (Ch.$\overline{\text{A}}$)	3	C
Red	+ Vdc	4	D
Orange	$\overline{\text{Out 2}}$ (Ch.$\overline{\text{B}}$)	5	E
Black	0 Volt	6	F
	CASE	7	G

J CONNECTOR JMR 1607 M



PANNEL SIDE

M CONNECTOR MS4102A 16S-1P



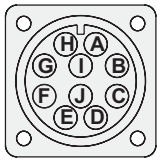
LINE-DRIVER WITH ZERO

8 way cable COLOURS	FUNCTION	PIN "J" JMR 1610 M	PIN "M" MS 3102A 18-1P
Green	Out 1 (Ch.A)	1	A
yellow	Out 2 (Ch.B)	2	B
Blue	Out 3 (Ch.Z)	3	C
Red	+ Vdc	4	D
	+ Vdc	5	E
Black	0 Volt	6	F
brown	$\overline{\text{Out 1}}$ (Ch.$\overline{\text{A}}$)	7	G
orange	$\overline{\text{Out 2}}$ (Ch.$\overline{\text{B}}$)	8	H
White	$\overline{\text{Out 3}}$ (Ch.$\overline{\text{Z}}$)	9	I
	Case	10	J

J CONNECTOR JMR 1610 M

PANNEL SIDE

M CONNECTOR MS 3102A 18-1P



PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGES

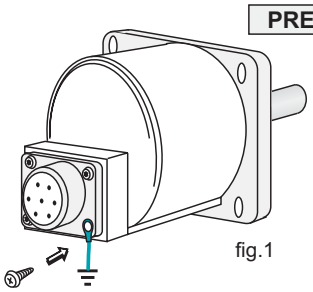


fig.1

Connection of the metallic connector casing to the ground through a ring fixed to the screw of the connector itself (fig.1)

For a better protection of the electronics against the electrostatic discharges connect the metallic connector casing to the ground.

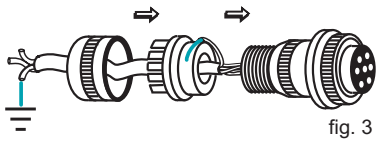


fig. 3

Connection to the ground of the continuity wire and of the connector casing (see fig. 3)

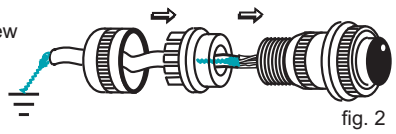


fig. 2

Connection of the braded wire and of the casing of the connector to the ground (Fig.2)

Note

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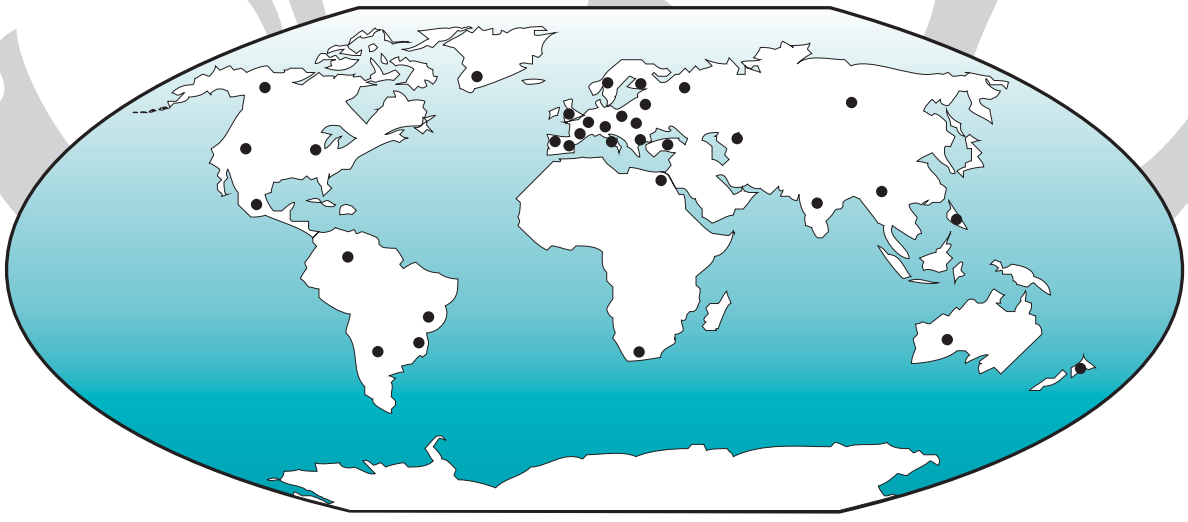

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