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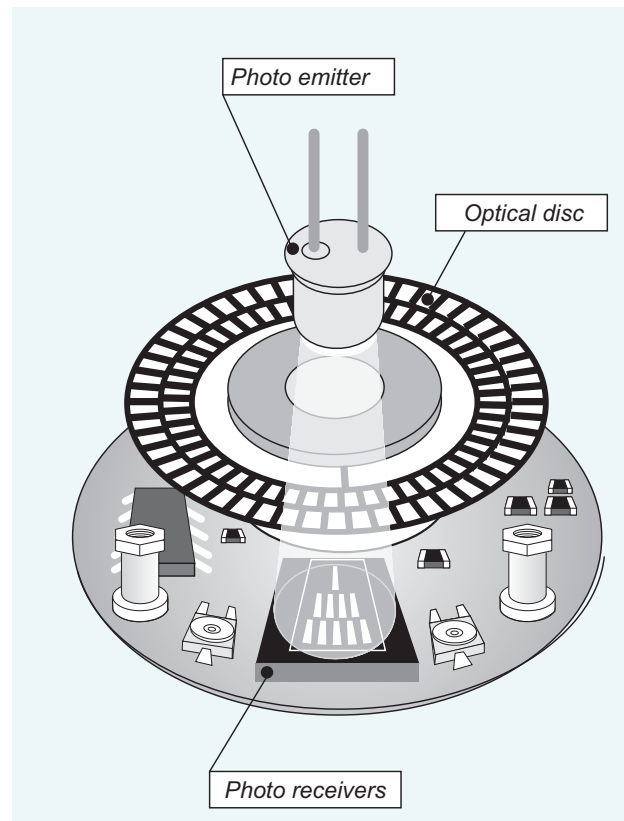




INCREMENTAL ENCODER GENERAL DESCRIPTION

Functioning Principle

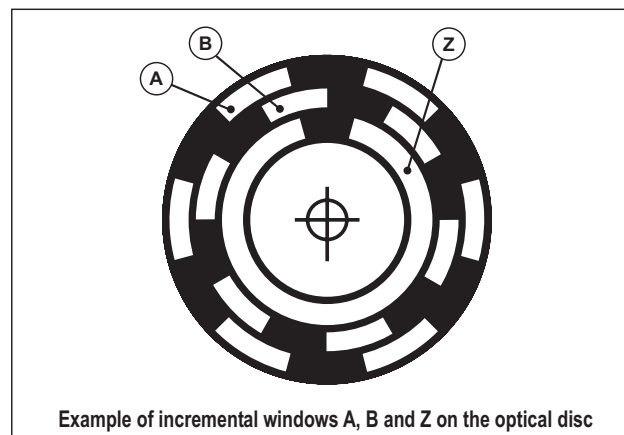
The encoder is a rotational transducer to convert an angular movement into a series of electrical digital impulses. These generated impulses can be used to control angular or linear movements, if they are associated with a rack or endless screws. The electrical signals during rotation can be elaborated 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, measurement and control apparatus. In ELTRA's encoders the angular movement transduction 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 transducing the light variations occurring 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.



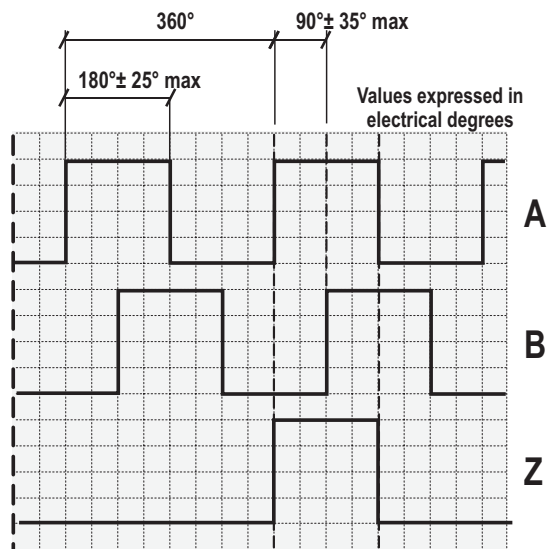
The incremental encoder precision depends from mechanical and electrical factors among which, the error in the grating division, the disc eccentricity, the bearings eccentricity, the error introduced by the reading electronics and the innaccuracy of optic. The unit of measurement, to define the encoder precision is the electrical degree, which determines the division of the impulse generated by the encoder, in fact 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:

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

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.

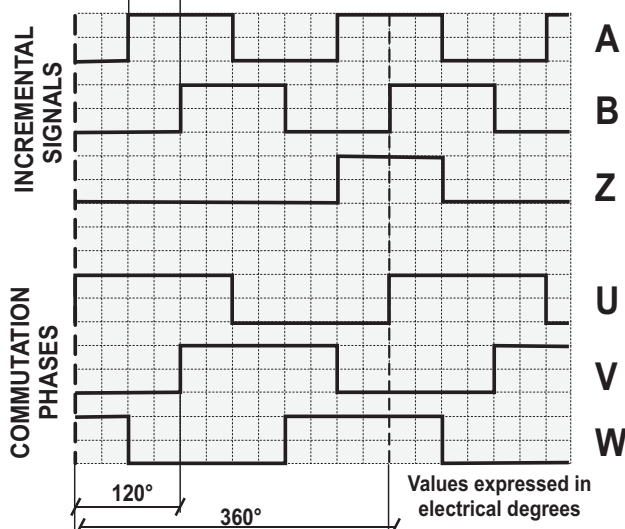
For Eltra encoders this error is included in electrical +/- 25° Max. (in whatever condition declared) which corresponds to a shifting +/- 7% from the nominal value. Regarding the shifting between the two channels shifted by electrical 90° nominally, it differs by electrical +/- 35° max, corresponding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



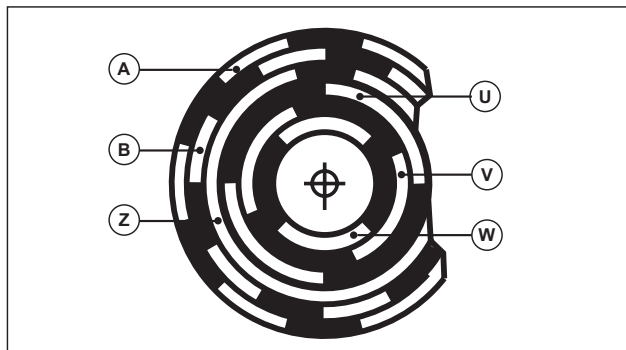
Graphic representation of the A, B and Z incremental signals .

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.



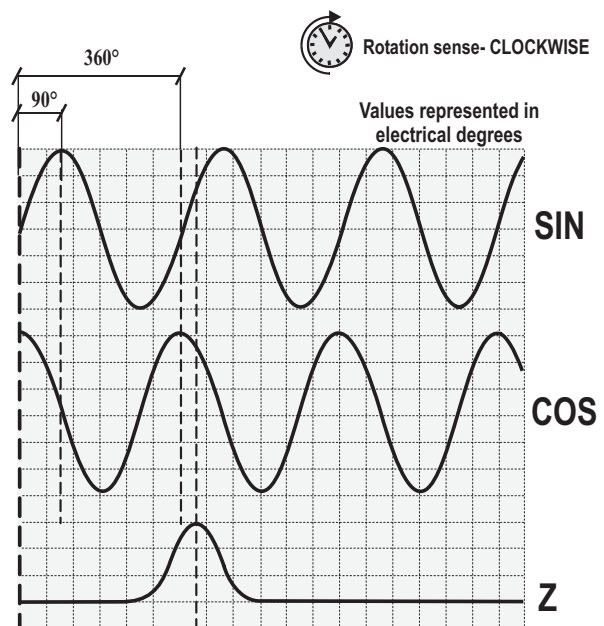
Sinusoidal Encoder

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.

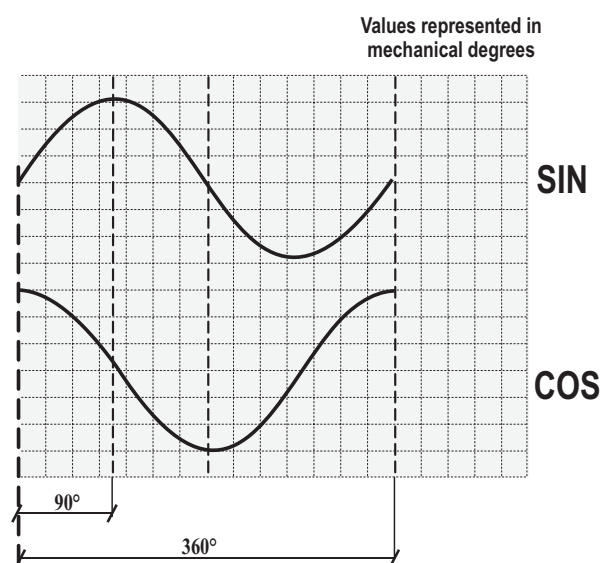
The band-width necessary for the reception of the signal is enough if it is little higher than 100 KHz. The output signals from the encoder are formed by two sinusoids out of phase for 90 electrical degrees, which we will call sine and cosine (2408 sin/turn MAX) and by the analogue zero signal that is 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 displacement. 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 referred 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:

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

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

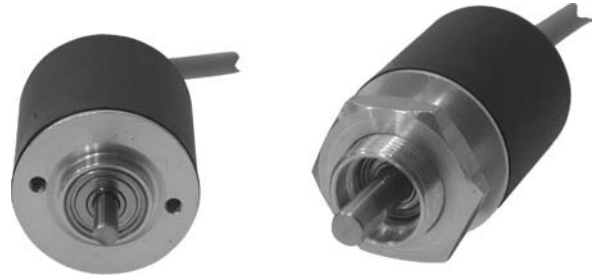


EL30E / H / I INCREMENTAL ENCODERS

Incremental encoders

Series of miniaturized encoders $\varnothing 30$ for application where the minimum size is required still maintaining 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 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

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

In case of particular Customer variant separate 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
N.B.: For impulse availability contact directly our offices
Resolutions

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

5
8 ÷ 24
Encoder power supply (Vdc)

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

A = axial

P = output cable (standard length 0.5 m)

3 = 3000 max R.P.M.

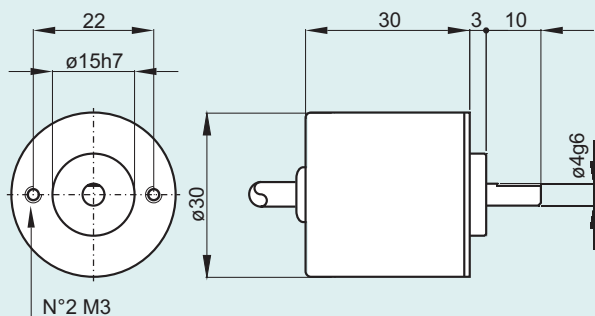
X = IP54 Protection

4 = $\varnothing 4g6$ EL30E
6 = $\varnothing 6g6$ EL30H / 30I
Shaft diameter

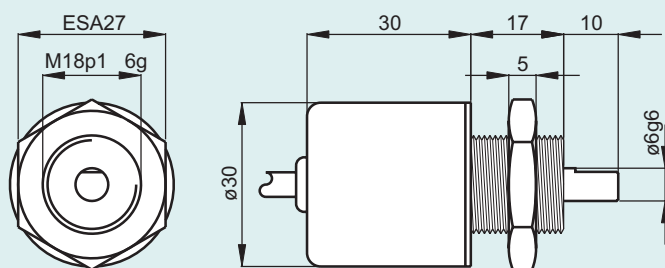
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration

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

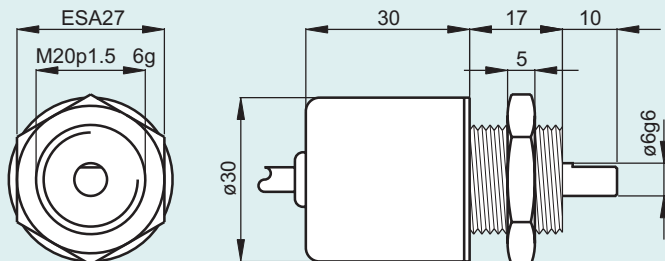
EL30E



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	$F = \frac{\text{RPM} \times \text{Resolution}}{60}$

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





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

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

In case of particular Customer variant separate with a full stop

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 = with zero impulse
Zero impulse

5
8 ÷ 24
Encoder power supply (Vdc)

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

R = radial

P = output cable (standard length 0.5 m)

3 = 3000 max R.P.M.

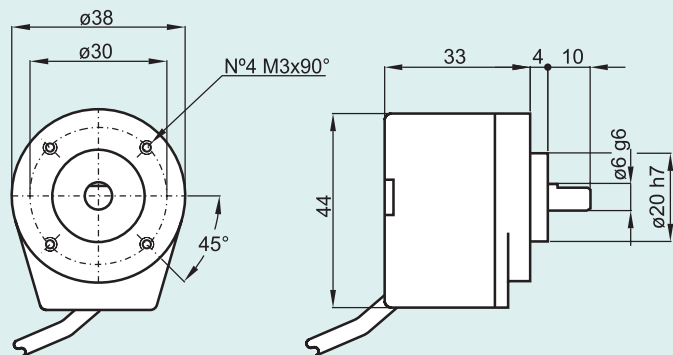
X = standard IP54 Protection

6 = ø6 mm Shaft diameter

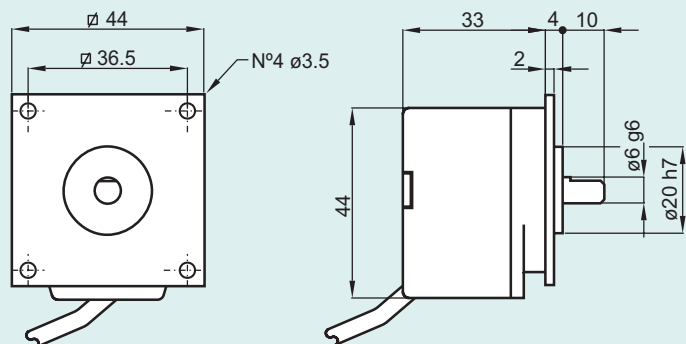
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration

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

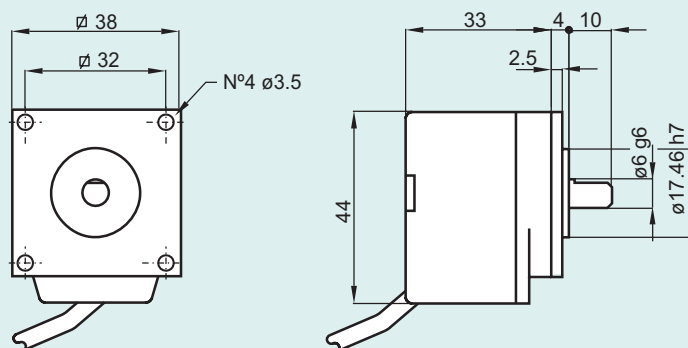
EH38A



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	$F = \frac{\text{RPM} \times \text{Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	ø6 g6
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 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

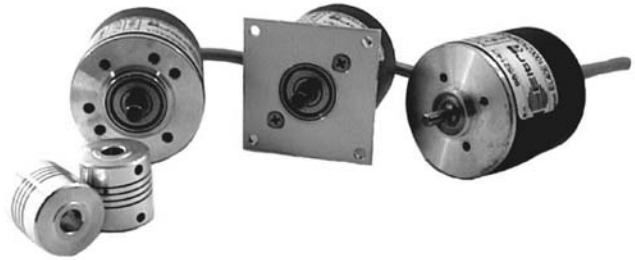




EH-EL40A / B / C / E INCREMENTAL ENCODERS

Incremental encoders

- Series of miniaturized encoders $\varnothing 42$ 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

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

In case of particular Customer variant separate with a full stop

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

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

40 = body dimension

R = radial
A = axial

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

Type of flanges

P = standard output cable 0.5 m

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

Resolutions

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

X = standard IP54
S = optional IP65

Protection

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

Zero Impulse

4 = \varnothing 4 mm EH-EL40E
6 = \varnothing 6 mm EH-EL40A / B / C

Shaft diameter

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

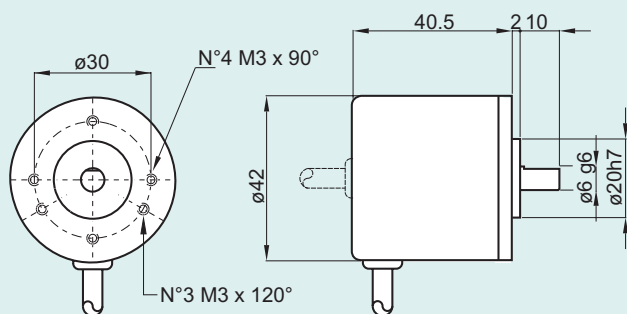
Encoder power supply (Vdc)

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER (only the EL series)

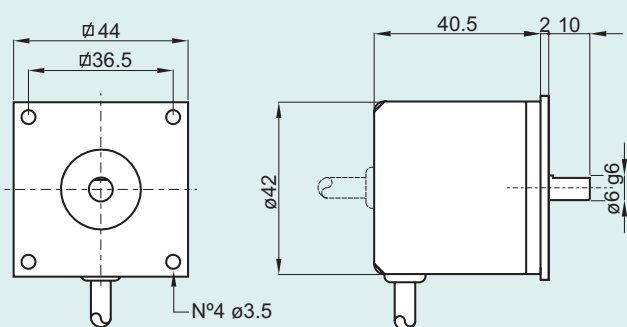
Electronic output configuration

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

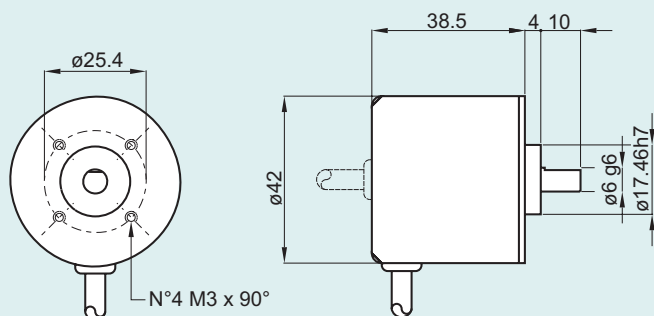
EH-EL40A



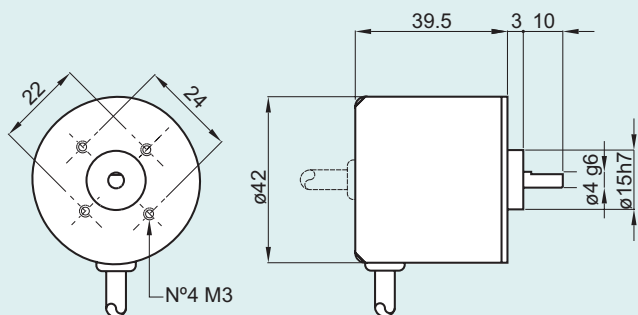
EH-EL40B



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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

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 bidirectional
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 $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	<table border="0"> <tr> <td>ø4 g6</td> <td>EH-EL40E</td> </tr> <tr> <td>ø6 g6</td> <td>EH-EL40A / B / C</td> </tr> </table>	ø4 g6	EH-EL40E	ø6 g6	EH-EL40A / B / C
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 ⁸ 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	100 g				

IN002GB0803A





EH-EL40G / H / I INCREMENTAL ENCODERS

Incremental encoders

- Series of miniaturized encoders $\varnothing 42$ 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

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

R = radial
A = axial

P = standard output cable 0.5 m

3 = 3000

R.P.M.

X = standard IP54

Protection

6 = \varnothing 6 mm EH-EL40G

Hole diameter

6 = \varnothing 6 mm EH-EL40H / I

Shaft diameter

N = NPN

C = NPN OPEN COLLECTOR

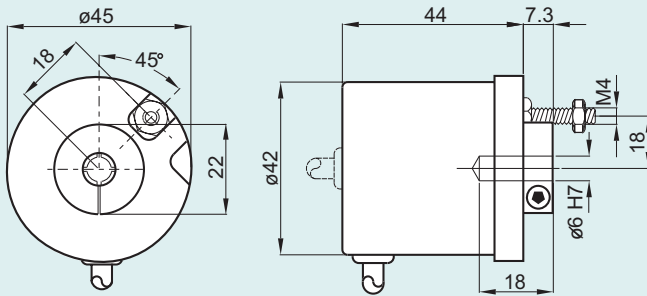
P = PUSH PULL

L = LINE DRIVER (only the EL series)

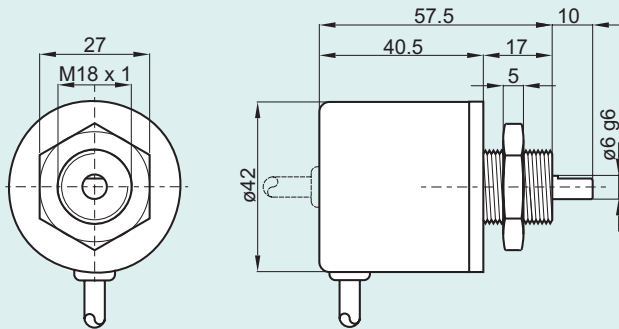
Electronic output configuration

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

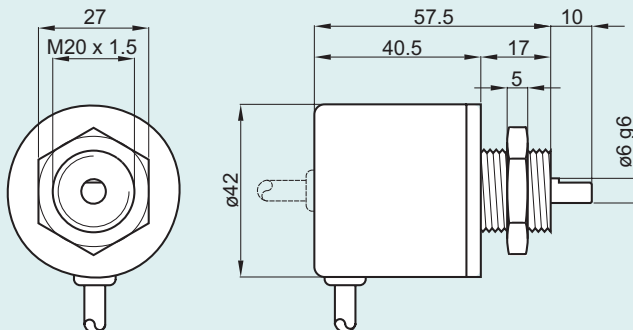
EH-EL40G



EH-EL40H



EH-EL40I



Electronic Characteristics EL series

Resolutions	from 1 to 2000 impules / turn
Power Supply	5 + 28 Vdc <small>N.B.: LINE DRIVER only 5 / 8+24 Vdc configuration</small>
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 $F = \frac{RPM \times Resolution}{60}$

Electronic Characteristics EH series

Resolutions	from 50 to 400 impulses / turn
Power Supply	5 Vdc / 8 + 24 Vdc <small>N.B.: LINE DRIVER only with supply of 5 / 8+24 Vdc</small>
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 $F = \frac{RPM \times Resolution}{60}$

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	





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

EL 53 A 1000 Z 5/28 N 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

53 = body dimension

R = radial
A = axial

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

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 EL53

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

6 = 6000 R.P.M.

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

X = standard IP54 EH53
standard IP64 EL53
Protection

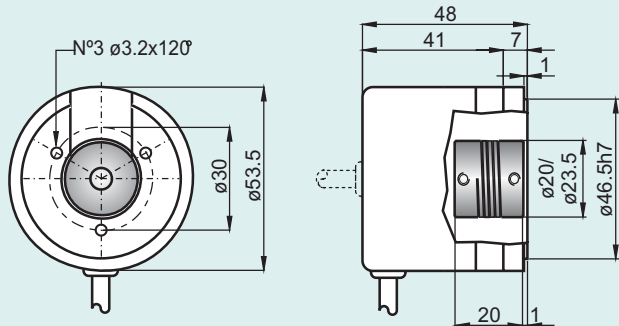
5 ÷ 28 = power supply for the EL series
5 / 8 ÷ 24 = power supply for the EH series
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

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

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

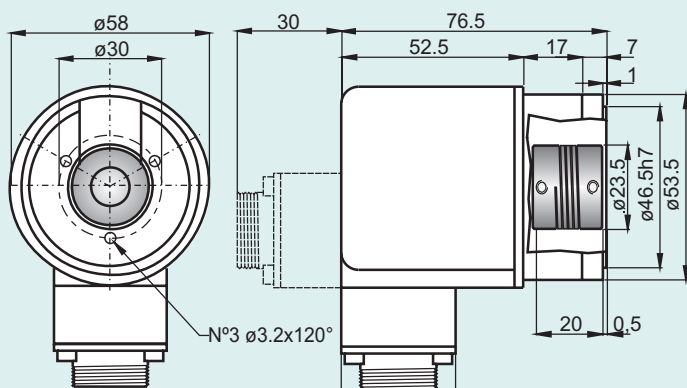
N.B.: For the optionals on the output configurations see the output incremental connections card

EH53A



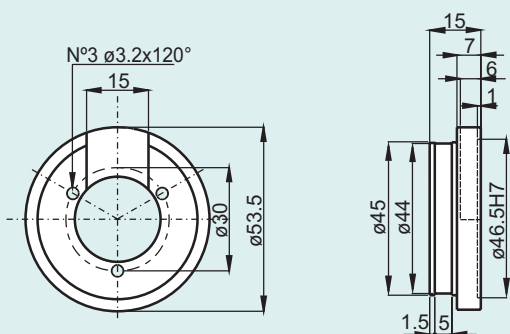
STANDARD JOINTS
G20A6
G23A6/8
G23A6/10

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 $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

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 $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm.)	$\phi 6 / 8 / 10$ 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	Aluminium D11S - UNI 9002/5
Cover material	Special plastic with glass fibre
Operating temperature	$0^\circ + 60^\circ\text{C}$
Storage temperature	$-25^\circ + 70^\circ\text{C}$
Weight	EH53 : 150 g EL53 : 350 g





EH-EL58B / C / H / T INCREMENTAL ENCODERS

Incremental encoders

Standard series of encoders $\varnothing 58$ 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 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

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 output 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
N.B.: For impulse availability contact directly our offices

Resolutions

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

Encoder power supply (Vdc)

6 = \varnothing 6 mm EH-EL58B / 58H
8 = \varnothing 8 mm EH-EL58B / 58H / 58T
10 = \varnothing 10 mm EH-EL58B / 58C / 58H / 58T
12 = \varnothing 12 mm EH-EL58T

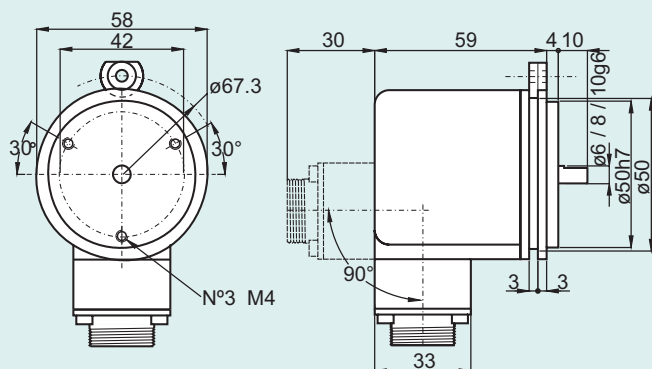
Shaft diameter

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

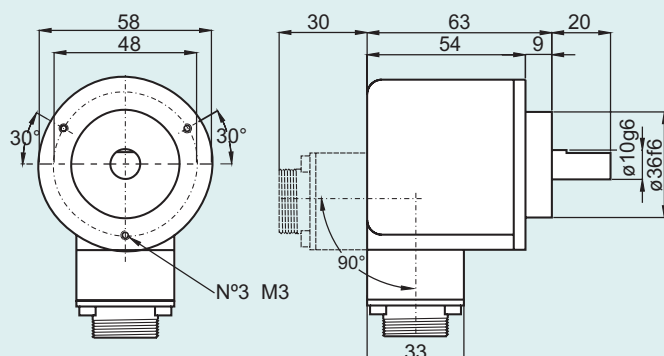
Electronic output configuration

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

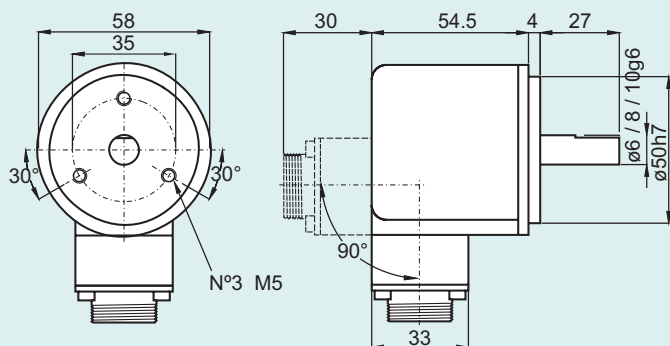
EL-EH58B



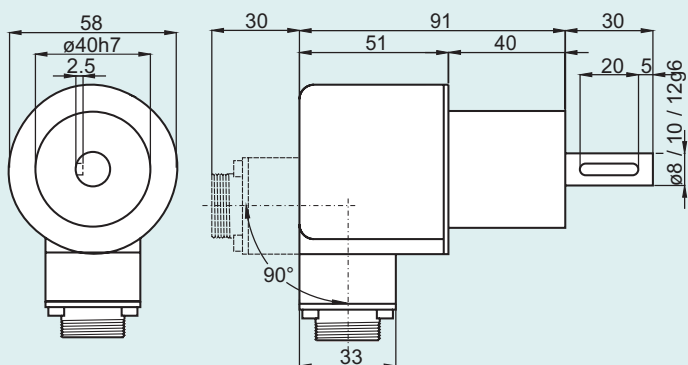
EL-EH58C



EL-EH58H



EL-EH58T



Electronic Characteristics EL series

Resolutions	from 1 to 10000 imp / turn
Power supply	5 + 28 Vdc <small>N.B.: LINE DRIVER only 5 / 8+24 Vdc power supply</small>
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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

Electronic Characteristics EH series

Resolutions	from 40 to 1024 imp / turn
Power supply	5 Vdc / 8 + 24 Vdc <small>N.B.: LINE DRIVER only 5 / 8+24 Vdc power supply</small>
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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	$\varnothing 6 / 8 / 10 g6$ EH-EL58B / 58H $\varnothing 10 g6$ EH-EL 58C $\varnothing 8 / 10 / 12 g6$ 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 $\varnothing 6$ 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	⁹ 10 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

IN005GB0803A





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

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

In the 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

63 = body dimension

R = radial
A = axial

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

P = standard output 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 availability 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

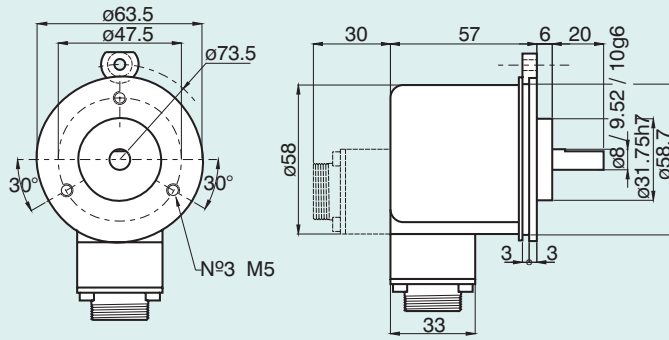
5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply
Encoder power supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

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

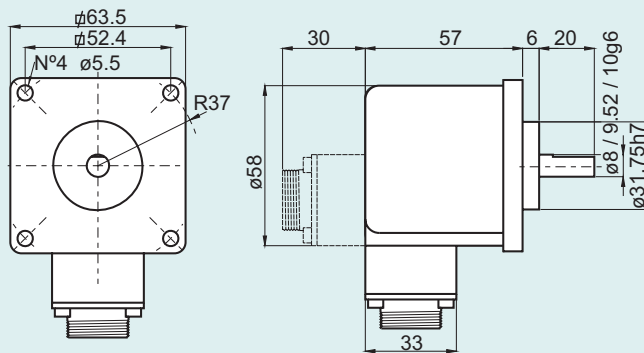
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration

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

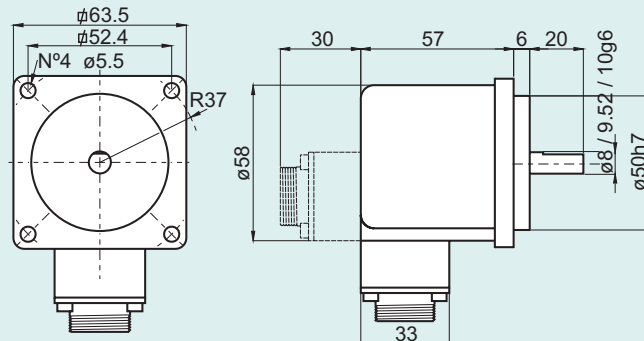
EH-EL63A



EH-EL63D



EH-EL63E



Electronic Characteristics EL series

Resolution	from 1 to 10000 imp / turn
Power supply	5 Vdc / 8 + 24 Vdc <small>N.B.: LINE DRIVER only 5 / 8+24 Vdc power supply</small>
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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

Electronic Characteristics EH series

Resolutions	From 40 to 1024 imp / turn
Power supply	5 Vdc / 8 + 24 Vdc <small>N.B.: LINE DRIVER only 5 / 8+24 Vdc power supply</small>
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 $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

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

IN006GB0803A





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 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 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 Type of flanges
P = mod.EH-EL63P

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 Resolutions
from **40** to **1024** imp./turn EH63F/G series
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

XXX = Special Customer variants indicated by a progressive number from 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 continuous R.P.M.

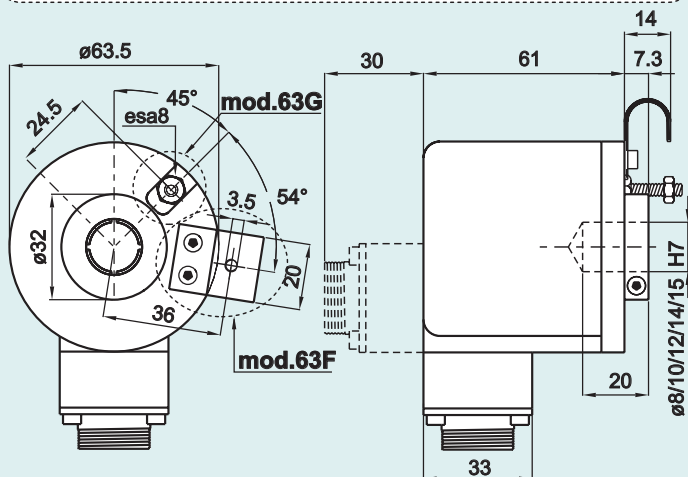
X = standard IP54
S = IP66 for model G Protection

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

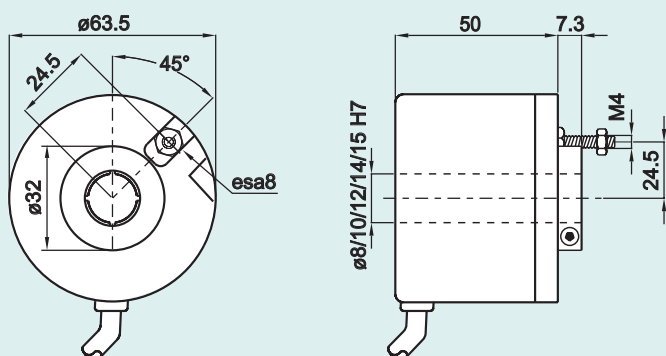
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER Electronic output configuration

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

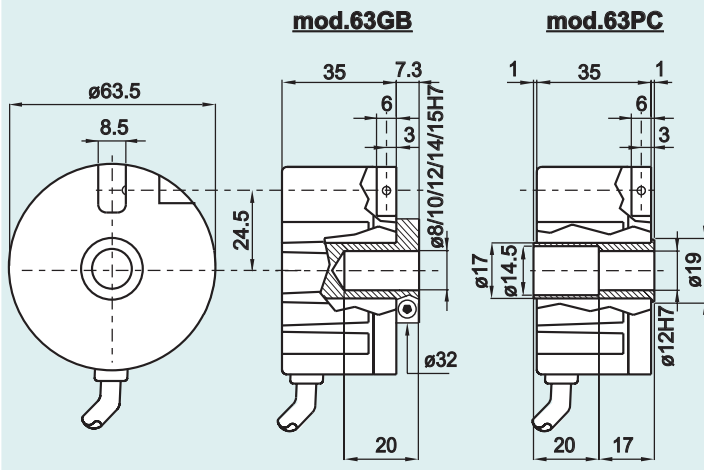
EH-EL63F / 63G



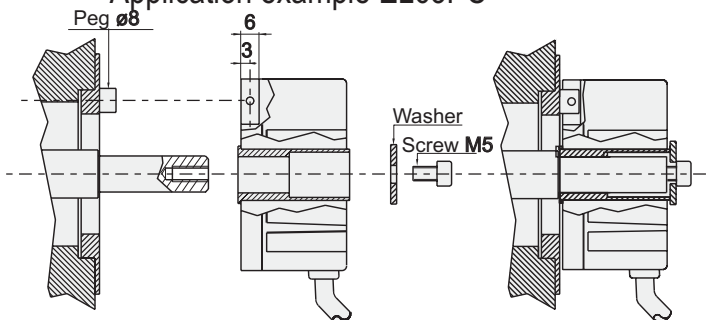
EH-EL63P



EH-EL63 GB / PC in execution



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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

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

IN007GB0803A





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 incorporated 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

EL 72 1 A 1000 Z 5/28 N 10 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 = Particular Customer variants indicated by a progressive number from 001 to 999

72 = body dimension

R = radial
A = axial

1 = \varnothing 63.5 mm
2 = \varnothing 65 mm
3 = \varnothing 57 mm
4 = \varnothing 60 mm

Fixing holes diameter

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

A = mod.EH-EL72A
B = mod.EH-EL72B

Type of flanges

3 = 3000 with IP66
6 = 6000

R.P.M.

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

X = standard IP54
S = optional IP66

Protection

S = without zero impulse
Z = with zero impulse

Zero impulse

6 = \varnothing 6 mm
8 = \varnothing 8 mm
10 = \varnothing 10 mm

Shaft diameter

5 ÷ 28 = EL series power supply
5 / 8 ÷ 24 = EH series power supply

Encoder power supply (Vdc)

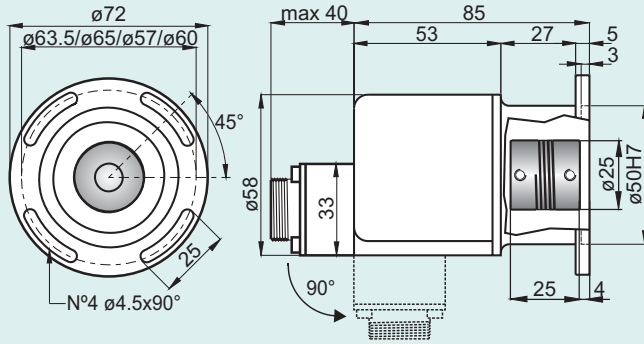
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

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

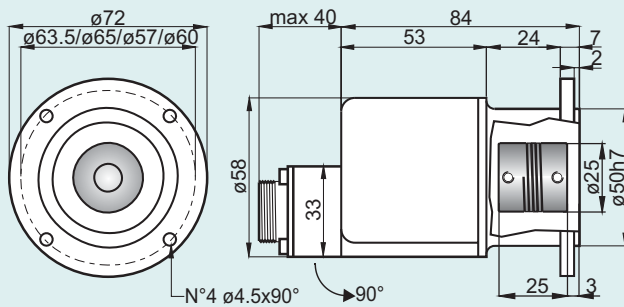
Electronic output configuration

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

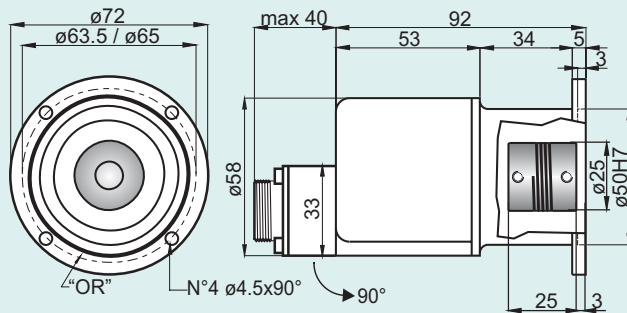
EH-EL72 mod. A



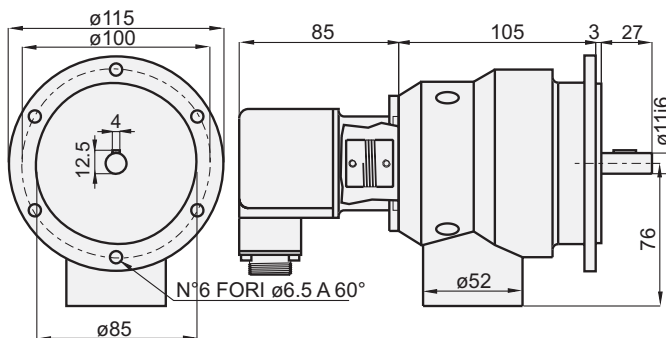
EH-EL72 mod. B



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 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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	$\phi 6 / 8 / 10 h7$
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 $10 \div 2000$ 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	$0^\circ \div +60^\circ\text{C}$
Storage temperature	$-25^\circ \div +70^\circ\text{C}$
Weight	400 g
Accessories	Precision elastic joints G25A6/10 G25A8/10 G25A10





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

Electronic output configuration

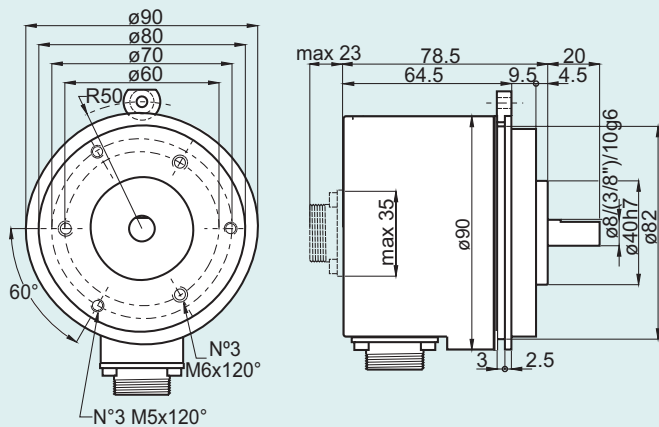
Encoder power supply (Vdc)

Zero Impulse

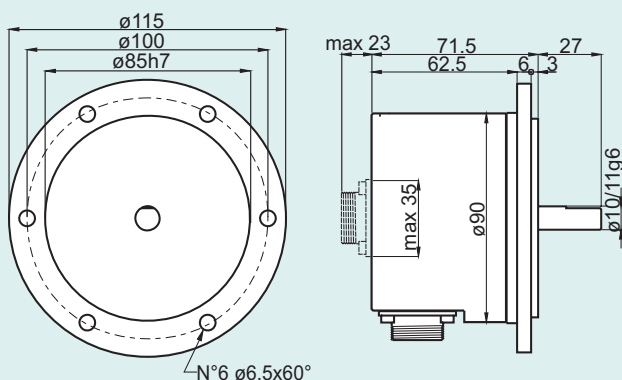
Resolutions

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

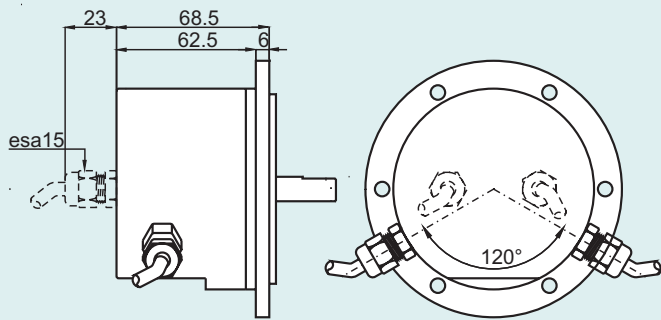
EH-EL90A



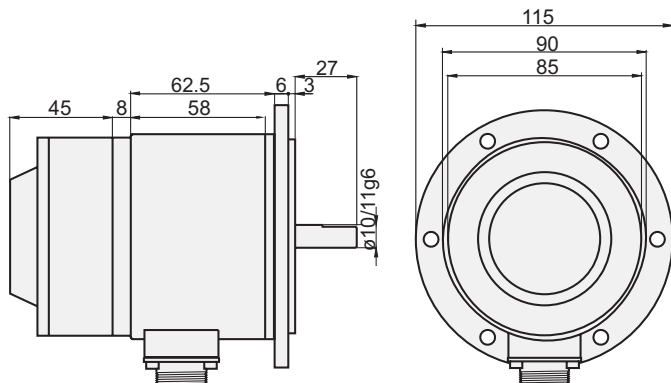
EH-EL115A



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 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 $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

Electronic Characteristics EH series

Resolutions	From 40 to 1024 impulses / turn
Power supply	5 Vdc / 8 + 24 Vdc N.B.: LINE DRIVER only 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 with LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

Mechanical Characteristics

Shaft diameter (mm)	$\varnothing 8 / \varnothing 9.52(3/8") / \varnothing 10g6$ EH-EL90 $\varnothing 10 / \varnothing 11g6$ 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





EX80A / D FLAMEPROOF ENCODERS

Flameproof encoders

Flameproof encoders for applications within explosive and dangerous areas

- Resolutions up to 10000 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

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

In case of particular Customer variant separate with a full stop

EX = Flameproof encoder by EExd IIC T6 standard

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

80 = body dimension

R = radial

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

P = standard output cable 1.5 m
G = threaded union 1/2" Gas

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

3 = 3000
R.P.M.

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

X = Standard IP64
Protection

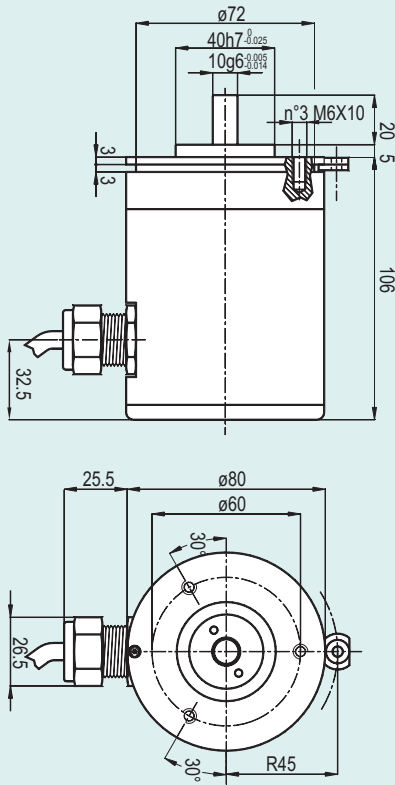
5 ÷ 28 = power supply
Encoder powers supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

10 = ø 10 mm
Shaft Diameter

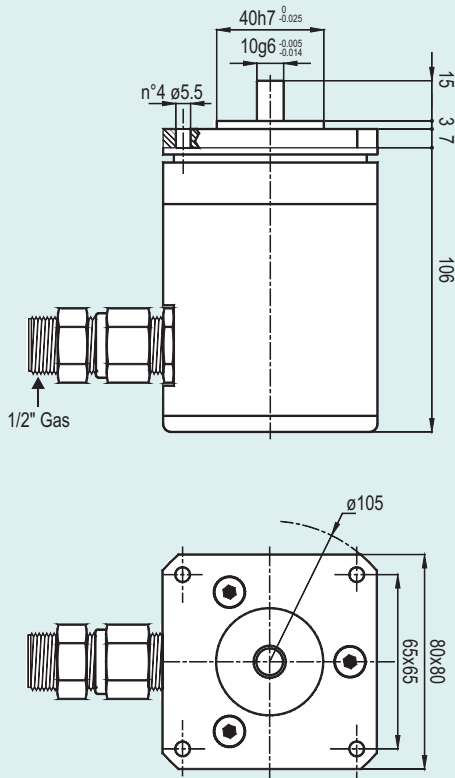
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration

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

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 $F = \frac{\text{RPM} \times \text{Resolution}}{60}$

Mechanical Characteristics

Shaft Diameter (mm)	ø10 g6 $\begin{pmatrix} -0.005 \\ -0.014 \end{pmatrix}$
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	Aluminium D11S - UNI 9002/5
Operating temperature	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.

IIC: 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.

IN010GB0803A



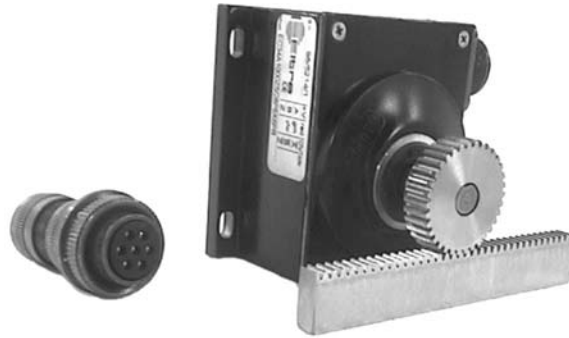


EC34 SERIES OF ENCODERS FOR RACKS

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

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 availability contact directly our offices

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

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

In case of particular Customer variant separate with a full stop

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

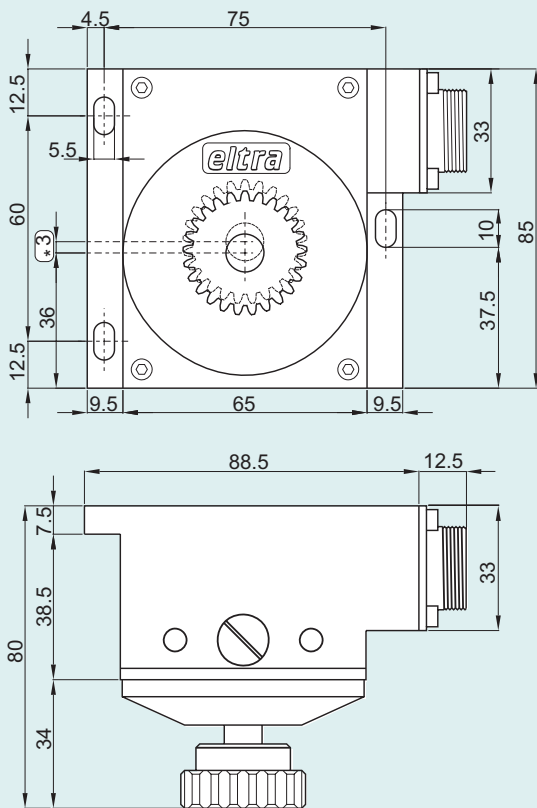
P = standard cable length 1.5m
M = connector MS3106E 16S-1S or 18-1S
J = connector JMSP 1607 F or 1610 F

10 = ø 10 mm Shaft diameter

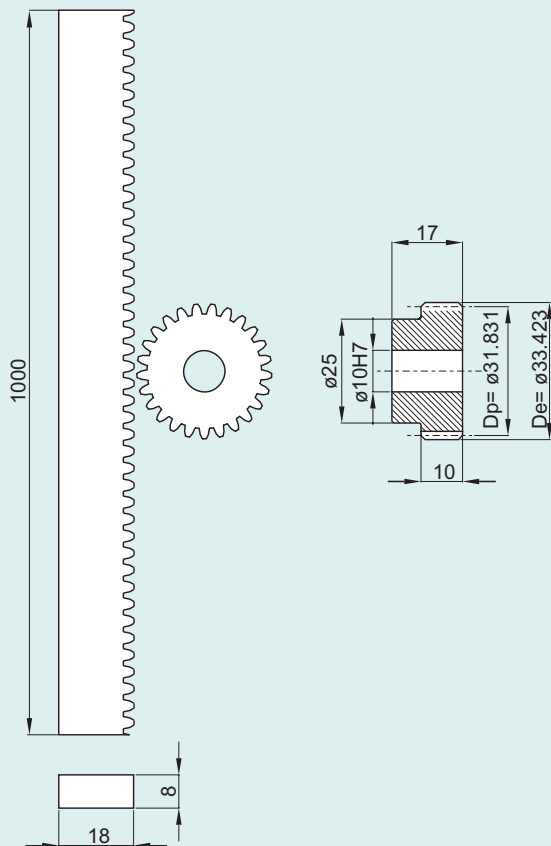
N = NPN
C = NPN OPEN COLLECTOR Electronic output configuration
P = PUSH PULL
L = LINE DRIVER
N.B.: For the optionals on output configurations see the output incremental connections card

EC34A

* 3mm total preload stroke



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 channel LINE DRIVER
Electronic output configuration	NPN / NPN OPEN COLLECTOR / PUSH PULL / LINE DRIVER
Max output frequency	Max 100 KHz
Frequency calculation	$F = \frac{\text{RPM} \times \text{Resolution}}{60}$

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 spurgear	Steel
Operating Temperature	0° ÷ +60°C
Storage Temperature	-25° ÷ +70°C
Weight	700 g





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

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

In case of particular Customer variant separate with a full stop

RH = support RH200 - 500
RM = support RM500

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

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

R = radial
A = axial

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

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

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

3 = 3000

R.P.M.

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

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

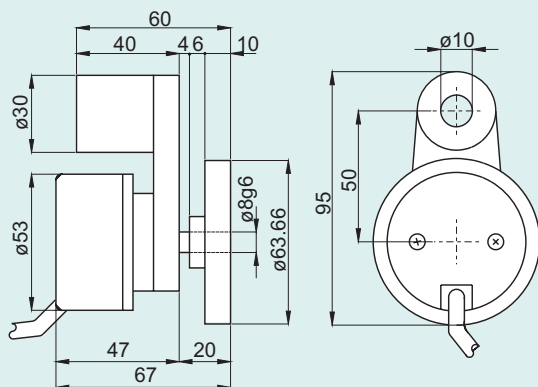
5 ÷ 28 = power supply RM500 series
5 / 8 ÷ 24 = power supply RH200 / 500 series
Encoder powers supply (Vdc)
N.B.: LINE DRIVER available only with 5 Vdc or 8 ÷ 24 Vdc power supply

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

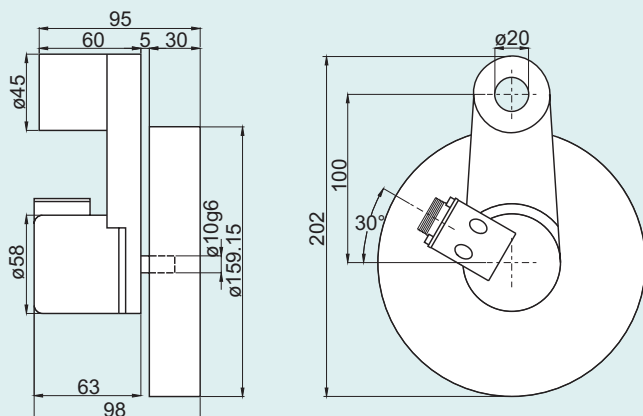
N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE DRIVER
Electronic output configuration

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

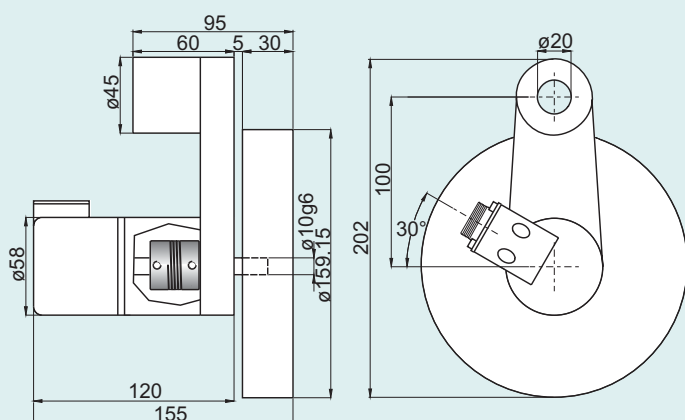
RH200



RH500



RM500



Electronic Characteristics RM500 Series

Resolutions	from 1 to 10000 impulses / turn
Power supply	5 + 28 Vdc <small>N.B.: LINE DRIVER only with 5 / 8 + 24 Vdc power supply</small>
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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

Electronic Characteristics RH200 Series

Resolutions	from 40 to 1024 impulses / turn
Power supply	5 Vdc / 8 + 24 Vdc <small>N.B.: LINE DRIVER only with 5 / 8 + 24 Vdc power supply</small>
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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

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 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 + 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

IN012GB0803A





ERA 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 available with power supply up to 24 Vdc
- Output cable, eventual connector applied to the end of the cable
- Resolution 0.2mm



Ordering codes

ER A 100 D 5 N 6 P . XXX

In case of particular Customer variant separate with a full stop

ER = incremental linear system

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

A = mod. ERA

Type of fixing

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

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

6 = \varnothing 6 mm

Diameter assembling hole

S = without zero index

C = central zero index

D = right zero index (system in close position)

Z = left zero index (system in open position)

N = NPN

C = NPN OPEN COLLECTOR

P = PUSH PULL

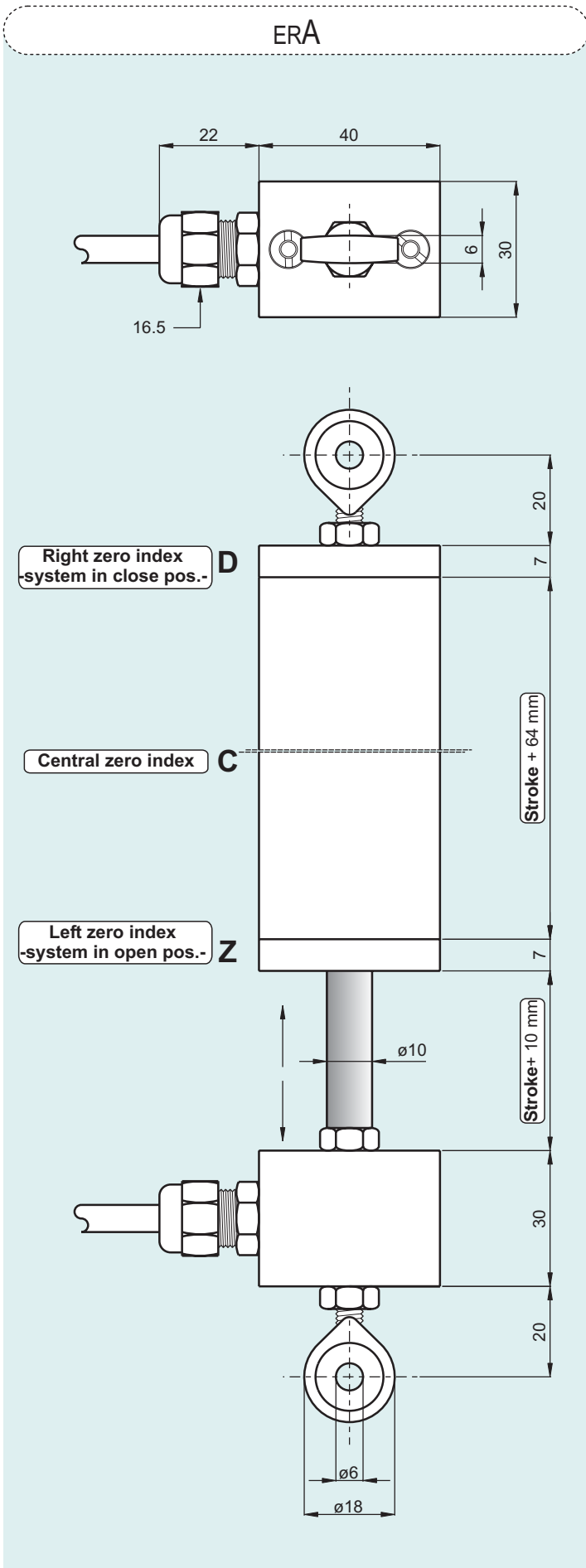
L = LINE DRIVER

Electronic output configuration

5
8 ÷ 24

Power supply (Vdc)

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



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 $\varnothing 6$
Operating temperature	0° + +60°C
Storage temperature	-25° + +70°C
Weight	From 400g to 1000g





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 to 10000 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

In case of particular Customer variant separate with a full stop

EV A 100 Z 5 L 10 M R . XXX

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

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

A = axial
R = radial

P = standard cable length 1.5 m

M = connector MS3106E 16S-1S or 18-1S

J = connector JMSP 1607 F or 1610 F

10 = ø 10 mm

Shaft diameter

N = NPN

C = NPN OPEN COLLECTOR

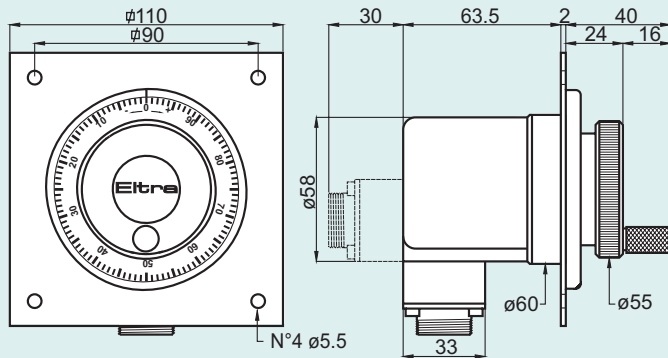
P = PUSH PULL

L = LINE DRIVER

Electronic output configurations

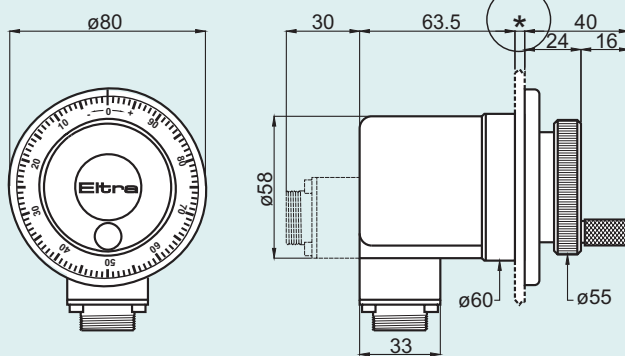
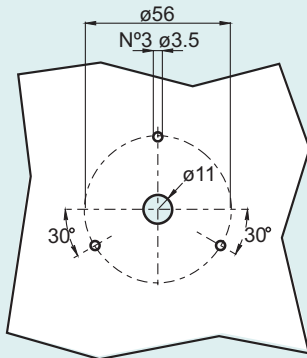
N.B.: For the optionals on output configurations see the output incremental connections card

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	$F = \frac{\text{RPM} \times \text{resolution}}{60}$

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





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



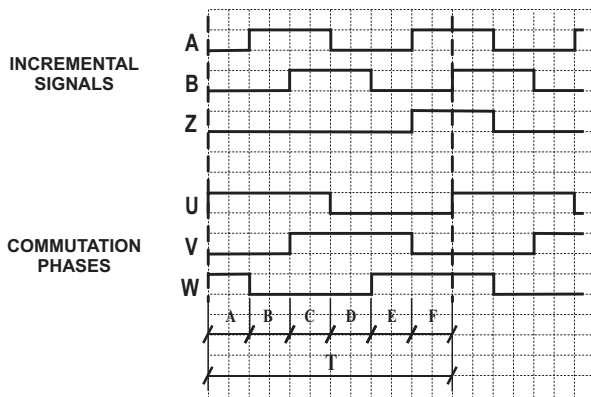
General electronic characteristics

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 $F = \frac{R.P.M. \times \text{Resolution}}{60}$
"EF" Electronic characteristics	
Power supply	5Vdc \pm 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	$\varnothing 8 / \varnothing 9.52 / \varnothing 10 H7$
R.P.M.	6000 MAX
Shock Vibrations	50 G per 11 msec 5G 10 + 500 Hz
Bearings	n° 2 ball bearings
Shaft material	Stainless Steel
Body material	Aluminium
Cover material	Aluminium
Weight	50 g
Protection	IP40
Operating temp.	-10° + + 85°C
Storage temp.	-25° + + 85°C
Accessories	Flange for fixage on the predisposed motors "Resolver" size 15

Signal configurations

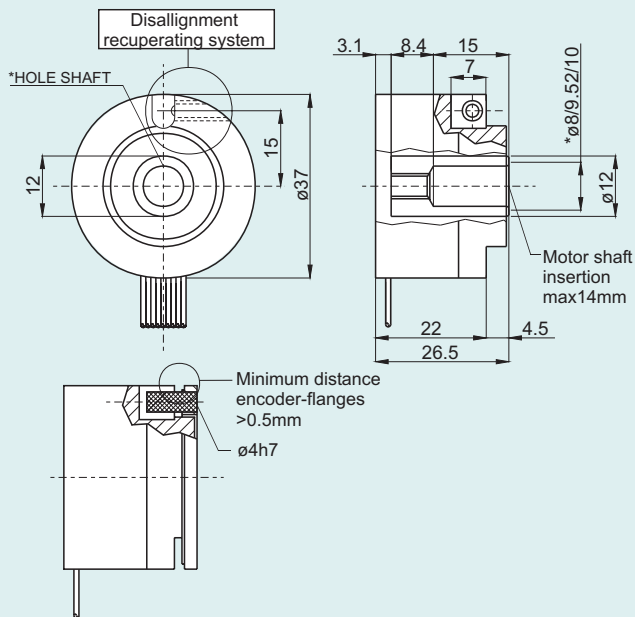


N° POLES	A / B / C / D / E / F	T
4	30° \pm 1.5°	180°
6	20° \pm 1.5°	120°
8	15° \pm 1.5°	90°

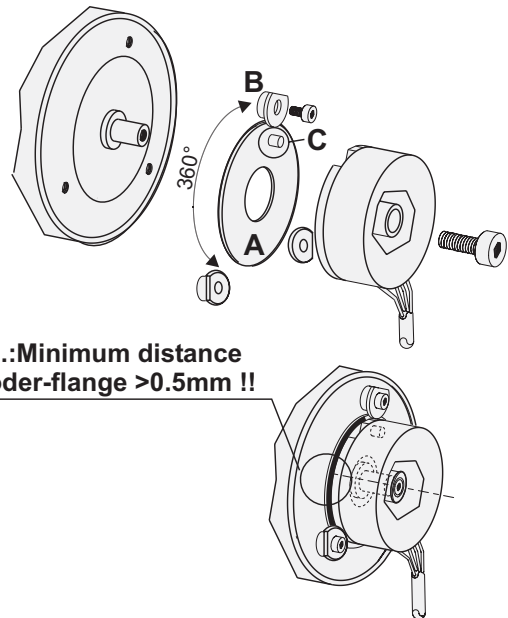
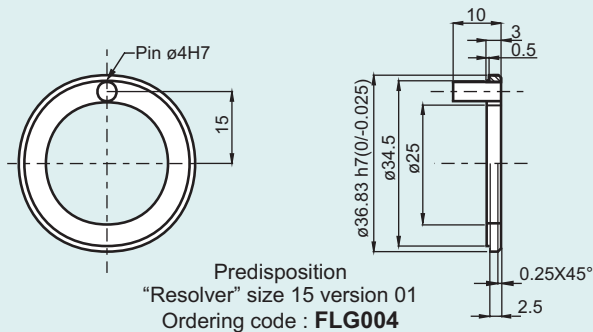
Cable colour

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



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 disalignment 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 disalignment works correctly.

Ordering Code

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

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

Incremental encoder resolution

S = without zero impulse

Z = with zero impulse

5 = 5 Vdc

Power supply

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

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

PR = standard radial output cable 0.3 m

3 = 3000 R.P.M.

6 = 6000 R.P.M. max

X = protection Ip40

8 = ø8H7 mm

9,5 = ø9.52H7 mm

10 = ø10H7 mm

Shaft hole diameter

L = LINE DRIVER

Electronics for EF mod.

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





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

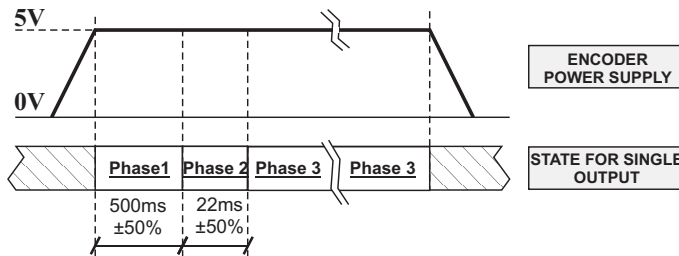
Base version with incremental encoder.
Availability of various electronic output configurations

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
- phase 2:** COMMUTATION TRANSMISSION PHASES
- phase 3:** CONTINUOUS FUNCTIONING INCREMENTAL PHASES



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= $\frac{\text{R.P.M.} \times \text{Resolution}}{60}$

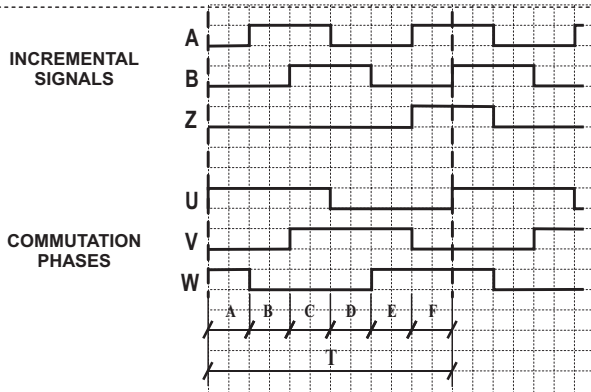
"EL" electronic characteristics

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 \pm 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

Signal configurations

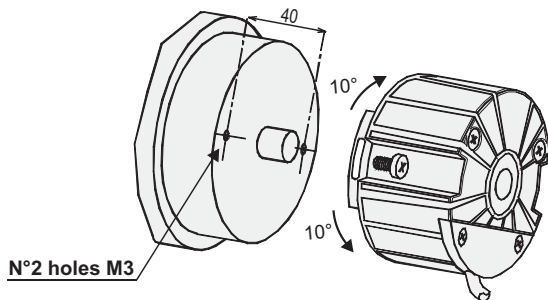
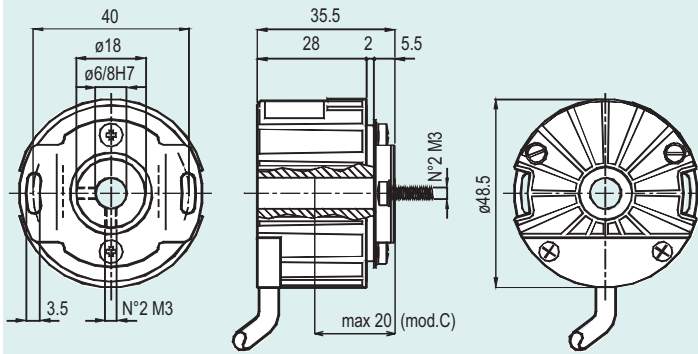


N° POLES	A / B / C / D / E / F	T
4	30° \pm 1.5°	180°
6	20° \pm 1.5°	120°
8	15° \pm 1.5°	90°

Cable colour

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

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

In case of particular Customer variant separate by a full stop

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

Special Customer variants **XXX** = 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 Electronics for EL mod.
P = PUSH PULL
L = LINE DRIVER

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.





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
- Simplification 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.



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 $F = \frac{R.P.M. \times \text{Resolution}}{60}$

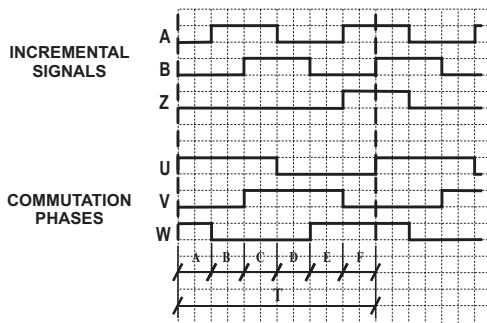
"EL" Electronic characteristics

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

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°

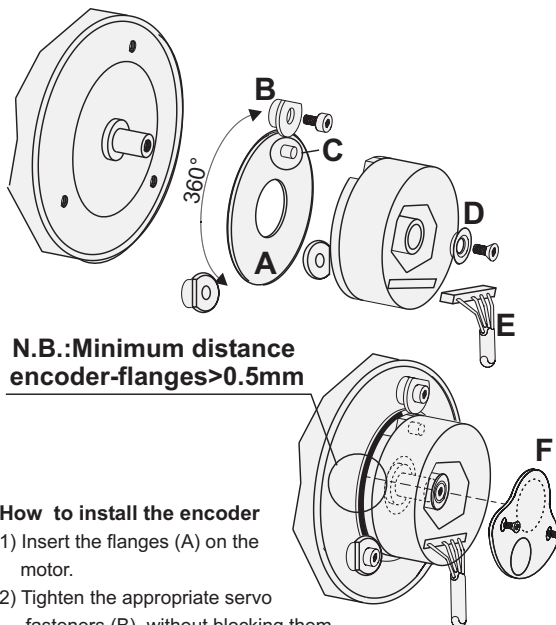
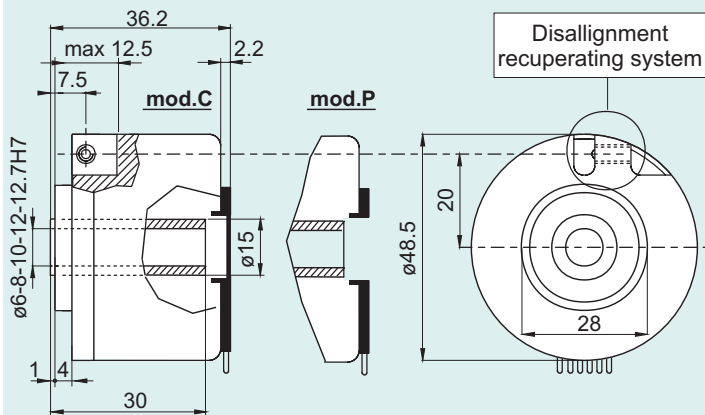
Cable colour

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

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	n° 2 ball bearings
Shaft material	Stainless Steel
body material	Aluminium
cover material	Fe
Weight	100 g
Protection	IP40
Operating temp.	-10° + + 85°C
Storage temp.	-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

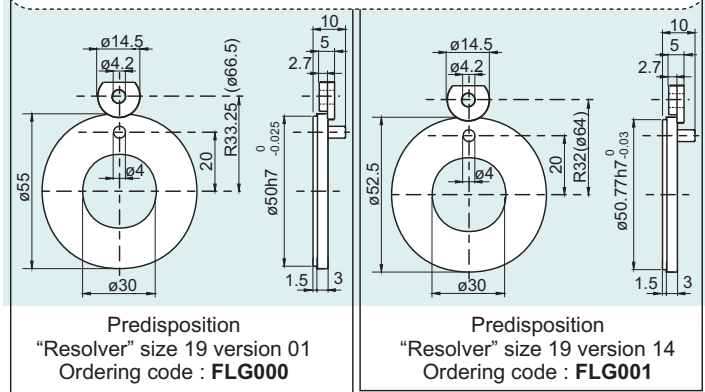


N.B.: Minimum distance encoder-flanges > 0.5mm

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 disalignment 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 disalignment 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

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

In case of particular Customer variant separate by a full stop

EL = incremental encoder
EF = incremental encoder + commutation 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

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

Incremental encoder resolutions

S = without zero impulse

Z = with zero impulse

5 = 5 Vdc

5 = 5 Vdc

8 ÷ 24 = from 8 to 24 Vdc

Power supply for the. EF mod.

Power supply for the. EL mod.

Special Customer variants 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 length 1.5 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



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

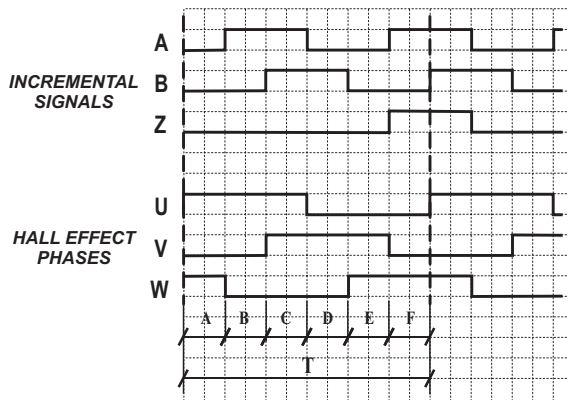
Serie EF

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 $F = \frac{\text{R.P.M.} \times \text{Resolutions}}{60}$

"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

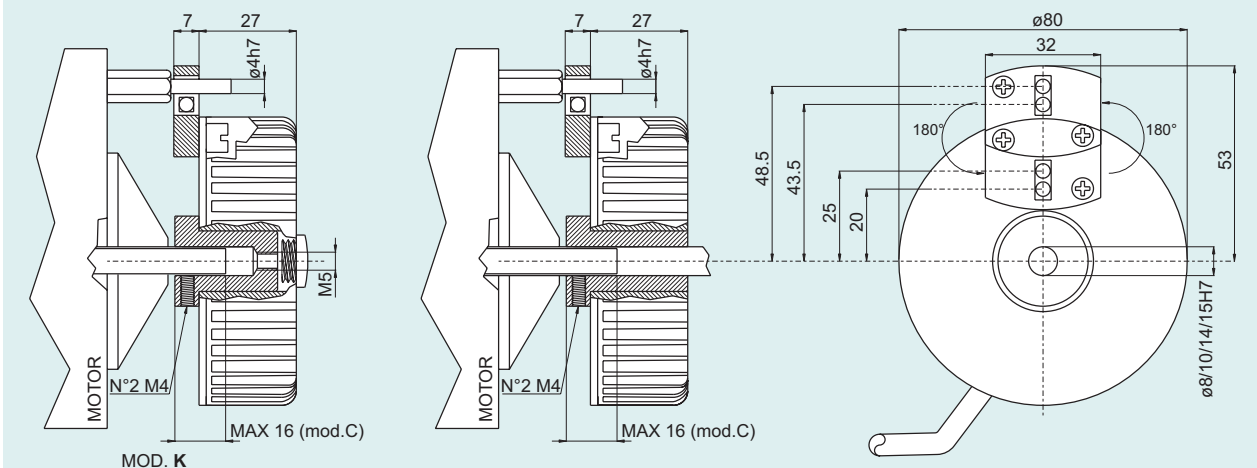
Cable colour

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}		●

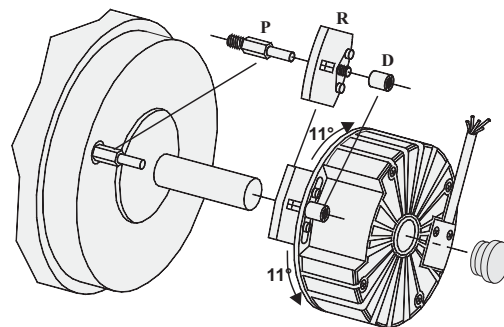
Mechanical Characteristics

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

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

80 = Body dimension

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

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

4 = n° 4 poles
6 = n° 6 poles
8 = n° 8 poles

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

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

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

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

In case of particular Customer variant separate by a full stop

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

R = radial

P = output cable standard length 0.3 m

3 = 3000 R.P.M.

X = standard IP54 Protection

8 = ϕ 8 mm for EH/EF80C
10 = ϕ 10 mm for EH/EF80C-EH/EF80P
14 = ϕ 14 mm for EH/EF80C-P
15 = ϕ 15 mm for EH/EF80C-P

L = LINE DRIVER Electronics for EF mod

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

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

IN018GB0803A





EH88P INCREMENTAL ENCODERS



Ordering codes

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

In case of particular Customer variant separate by a full stop

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)

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

R = radial

P = output cable (standard length 0.5 m)

3 = 3000 max

R.P.M.

X = standard IP54

Protection

25 = ø25 mm

30 = ø30 mm

35 = ø35 mm

38 = ø38 mm

Shaft hole diameter

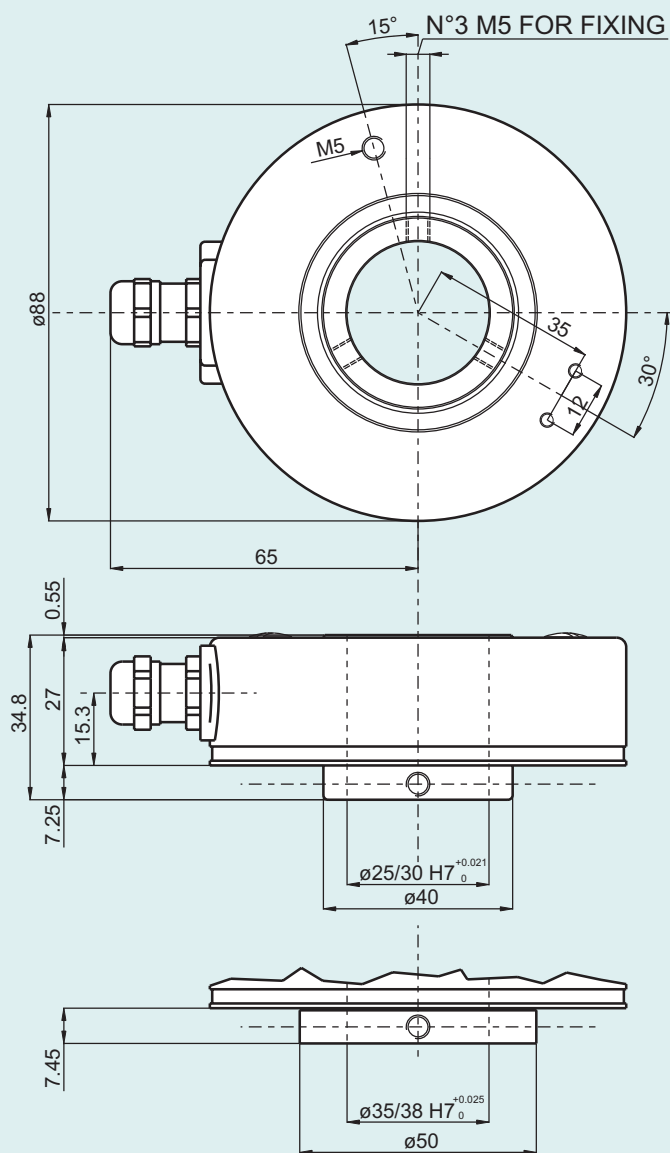
P = PUSH PULL

L = LINE DRIVER

Electronics output configuration

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

EH88



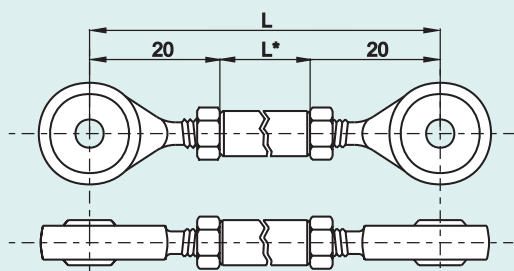
Electronic Characteristics

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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

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





EH120P INCREMENTAL ENCODERS



Ordering codes

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

In case of particular Customer variant separate by a full stop

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)

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

R = radial

P = output cable (standard length 0.5 m)

3 = 3000 max

R.P.M.

X = standard IP54

Protection

40 = ø40 mm

50 = ø50 mm

60 = ø60mm

Shaft hole diameter

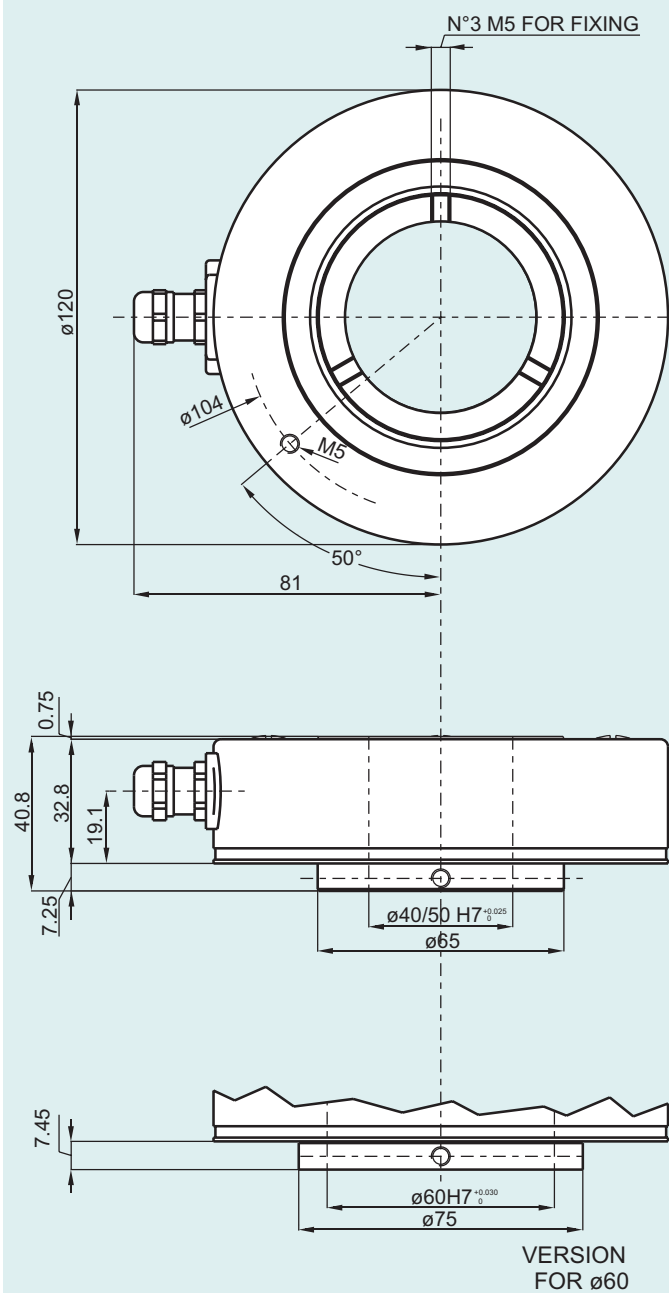
P = PUSH PULL

L = LINE DRIVER

Electronics output configuration

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

EH120



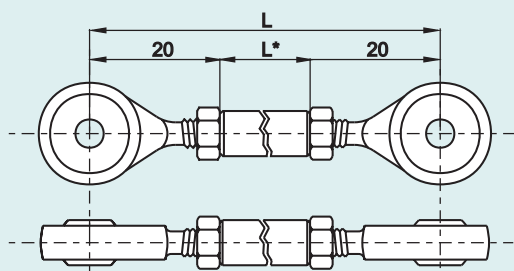
Electronic Characteristics

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 $F = \frac{\text{RPM} \times \text{Resolutions}}{60}$

Mechanical characteristics

Shaft diameter (mm)	40 / 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





FE Cable Extension Position Encoder



Various products

Ordering code

FE 2000 A . XXX

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

FE = cable extension position encoder

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

Stroke

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

A (standard) Type of cable attachment

N.B.: The encoder that gets applied to the cable extension position encoder should be ordered separately. The letter **F** should be placed before the standard ordering code.

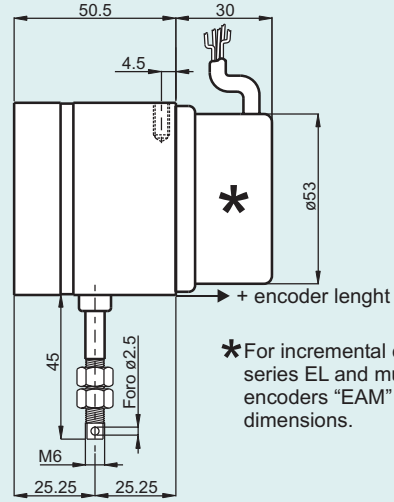
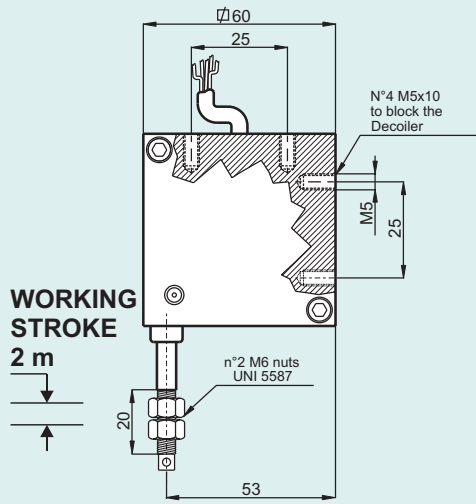
Example:

- 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

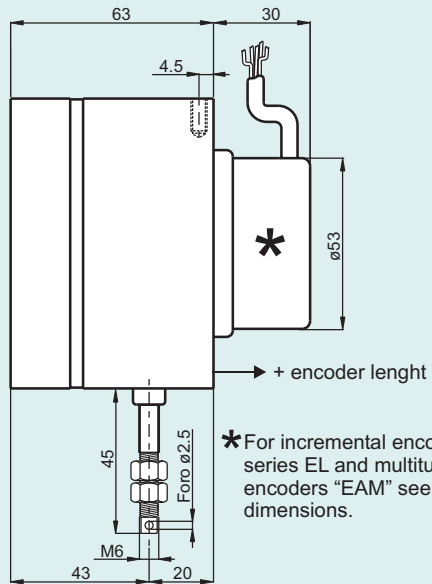
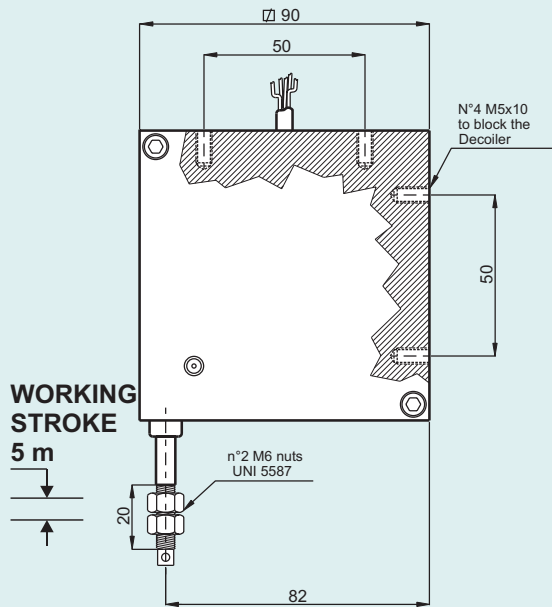
Complete example of the ordering code:

FE2000A - FEH30M300S8/24P6X6PR

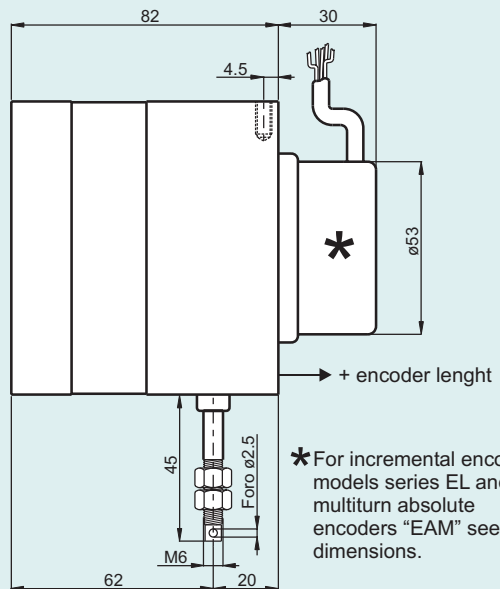
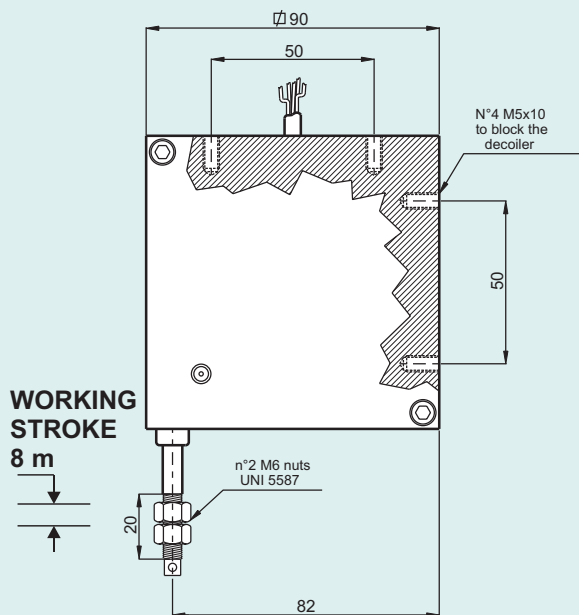
FE2000



FE5000

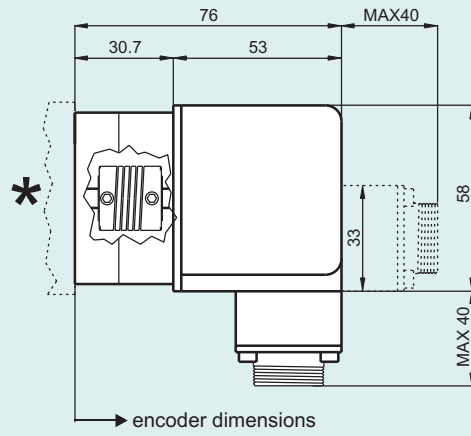


FE8000



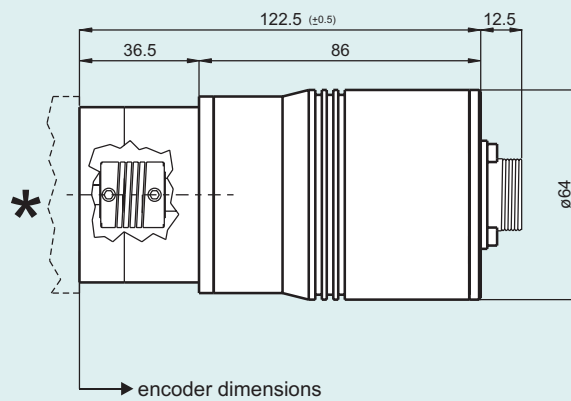
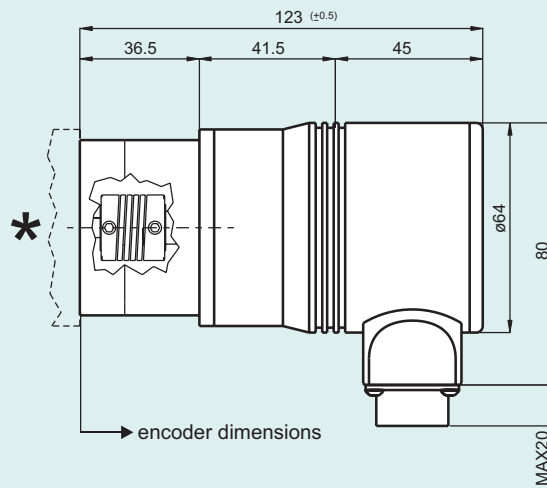
FEL53B

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 independent 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





ETMA

Magnetic incremental linear sensor



Various products

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

ETM A 1 Z 5 L S PR3 . XXX

In case of particular Customer variant separate with a full stop

ETM = Eltra magnetic incremental linear sensor

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

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

3 = 3m (Standard)
6 = 6m
10 = 10m
20 = 20m Lengths available

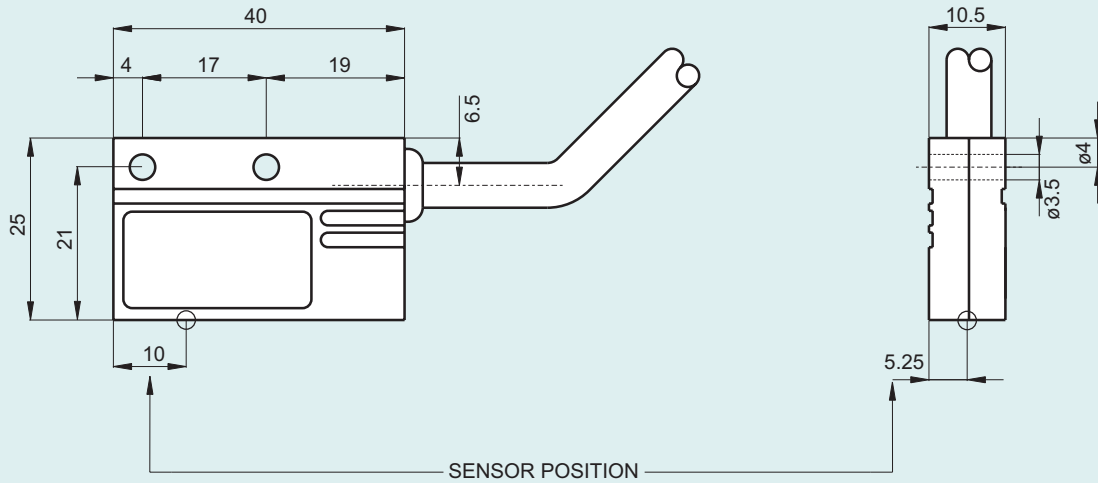
Z = with zero impulse every 5mm with ETMA1
with zero impulse every 2mm with ETMA2 Zero impulse

S = standard IP67 Protection

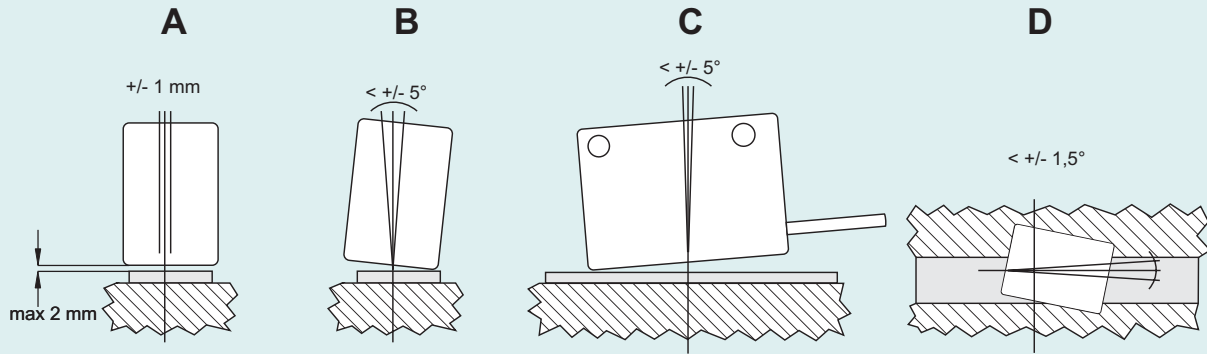
5 = 5V
8 ÷ 24 = from 8V to 24V Sensor power supply (Vdc)

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

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

Cable colour

COLOUR	FUNCTION
RED	+Vdc
BLACK	0 Volt
GREEN	A
YELLOW	B
BLUE	Z
BROWN	<u>A</u>
ORANGE	<u>B</u>
WHITE	<u>Z</u>





EBM Magnetic Tape



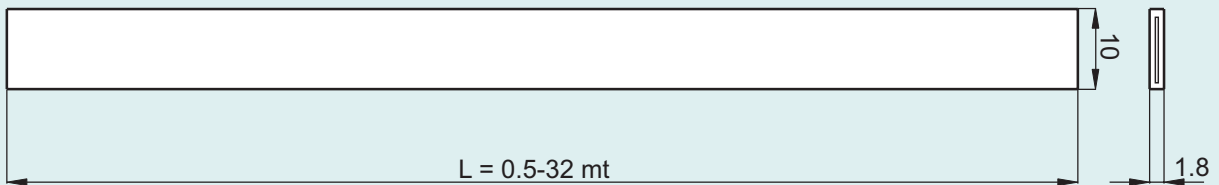
Various products

Ordering codes for magnetic tape

EBM A 1 - 10 . XXX

EBM = Eltra magnetic tape	In case of particular Customer variant separate with a full stop
A = type of magnetic tape	XXX = Special Customer variants indicated by a progressive number from 0001 to 999
1 = magnetic strip for resolution 0,1mm 2 = magnetic strip for resolution 0,04mm	10 = <u>Length magnetic tape (m)</u> N.B.= Multiples of a metre
- = separate with a hyphen	

EBM



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

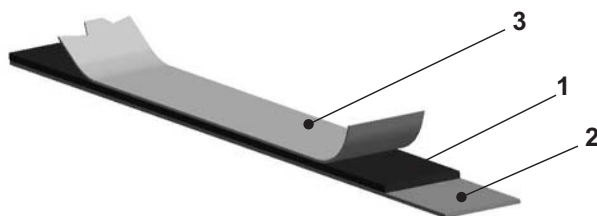
Technical Characteristics

Operating Temperature	0° +60°C
Accuracy at 20° C in mm	+/- (0,025 + 0,02 x L) L= length magnetic tape in m
Length expansion coefficient	16 x 10 ⁻⁵ 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 oxidation.

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





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.



Various products

Ordering codes

EP A 103 / 10 P R . XXX

EP = eltra potentiometer

A = mod. EP A with shaft \varnothing 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) Resistivity value per n° turns
103 / 3 = 10 Kohm / 3 turn (mod.B)
103 / 10 = 10 Kohm / 10 turn (mod.A)

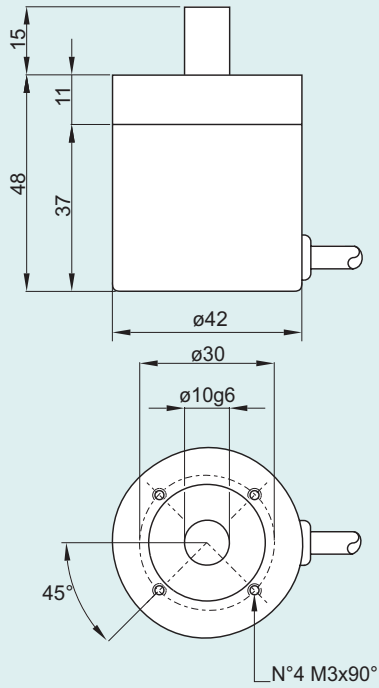
P = output cable (standard length 1.5m)

A = axial
R = radial

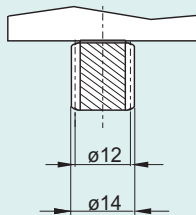
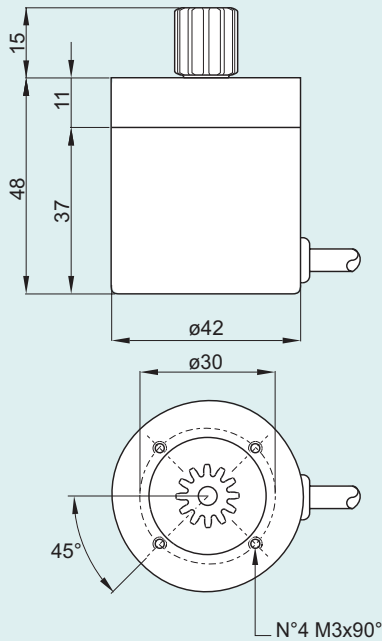
In the case of particular Customer variant - separate with a full stop

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

EPA



EPB



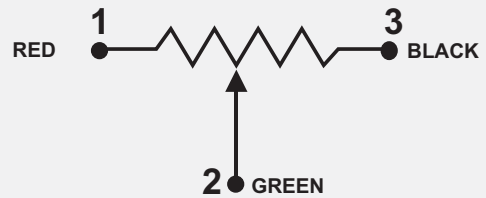
TOOTH CHARACTERISTICS

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 material	Steel C45
Cover material	Special plastic reinforced with glass fibre
Body material	Aluminium UNI 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

PV001GB0803A




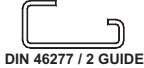


EMB Signal splitting adapter



Various products

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)	$I_{max} = \frac{0,12 (V_{x1} + V_{x2} + \dots + V_{xn} + V_{x4})}{V_{x4}}$ <p>Where: V_{x1} = input voltage x1 V_{x2}, \dots, V_{xn} = output voltage X2, ... Xn V_{x4} = Voltage of power supply of the card</p>
Operating temperature	0° + +50°C
Fixing on frame	 

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**.

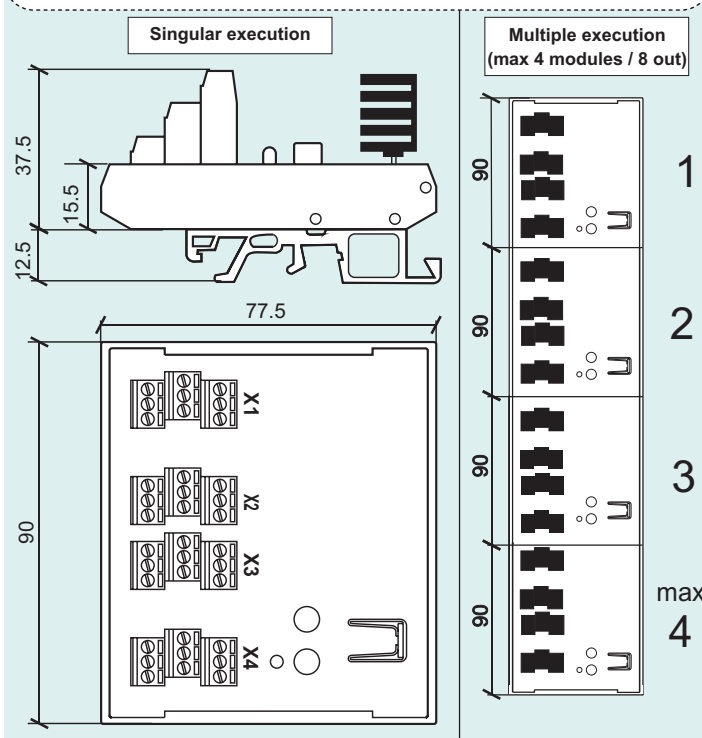
An example can clarify the typical application of such a board:

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.

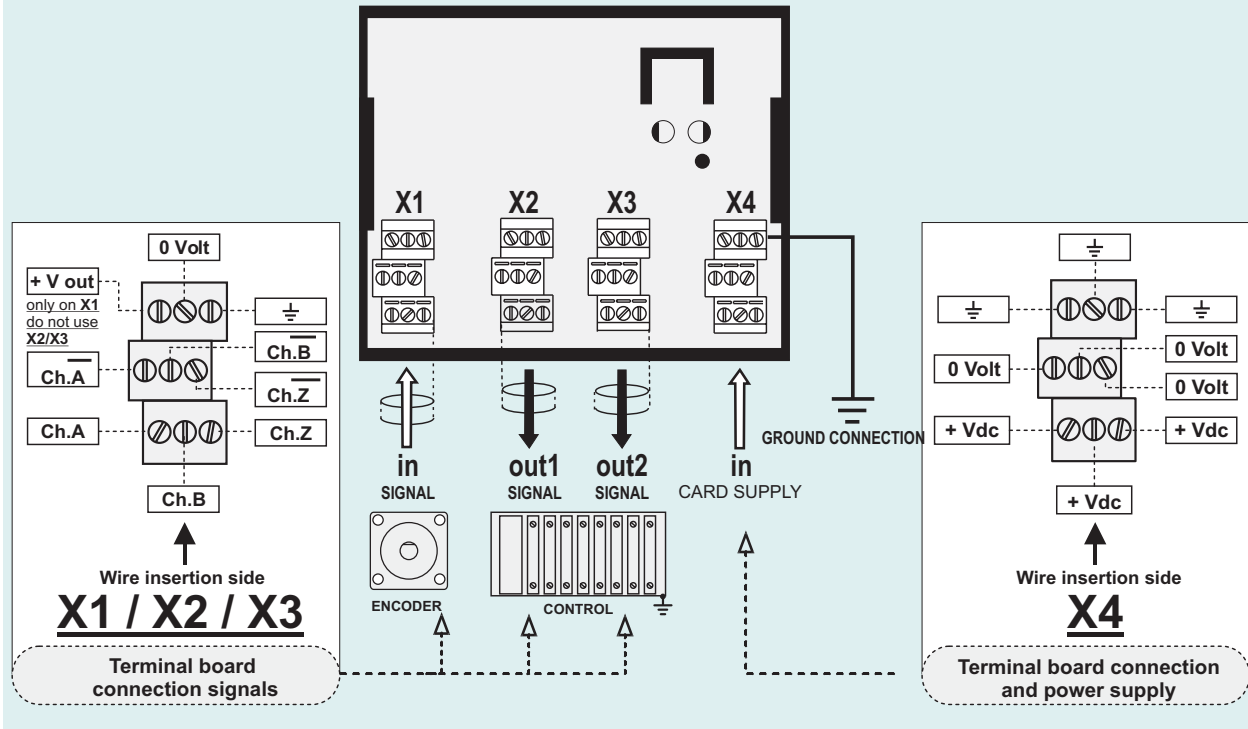
The board to be ordered will have this code : **EMB5L8/24P5L** where EMB5L indicates the input at 5Vdc line driver on the X1 connector, EMB5L8/24P indicates that the first output on the X2 connector has a push-pull electronic and is supplied with voltages from 8 to 24 Vdc, EMB5L8/24P5L indicates that 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.

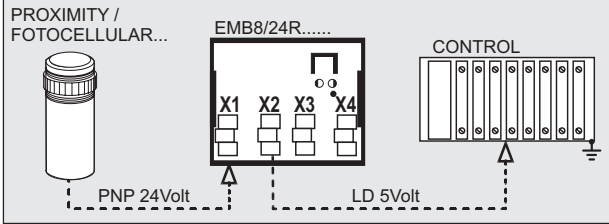
Sizes



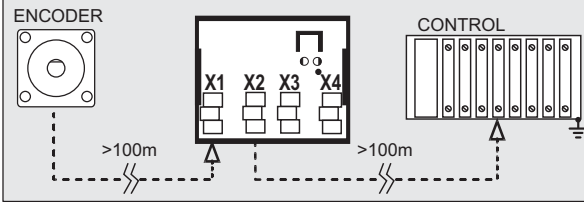
Working diagram and terminal board connection



EMB ADAPTATION OF ELECTRONIC SIGNALS



Examples of use



EMB AS INTERMEDIATE AMPLIFIER OF SIGNAL

Ordering codes

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

in out1 out2
 optional output

EMB = Adapter signal splitter

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

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

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

N = NPN
C = NPN OPEN COLLECTOR
P = PUSH PULL
L = LINE-DRIVER
Electronic out1 terminal board X2

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

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

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

In case of particular Customer variant separate with a full stop



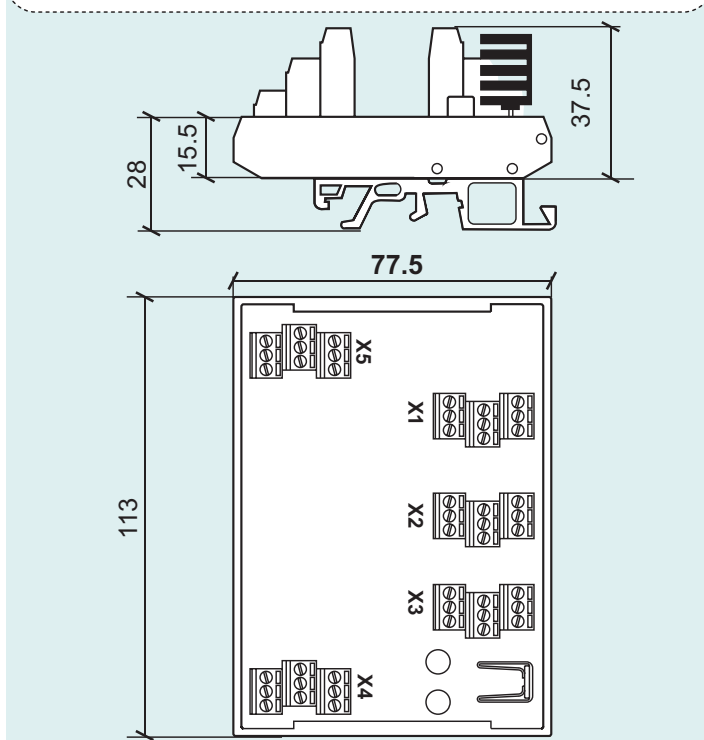


EMD Encoder signal selector

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 supplying 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 configures the terminal board of output in 4 different mode described in the label on the following page.

Working diagram and terminal connections board

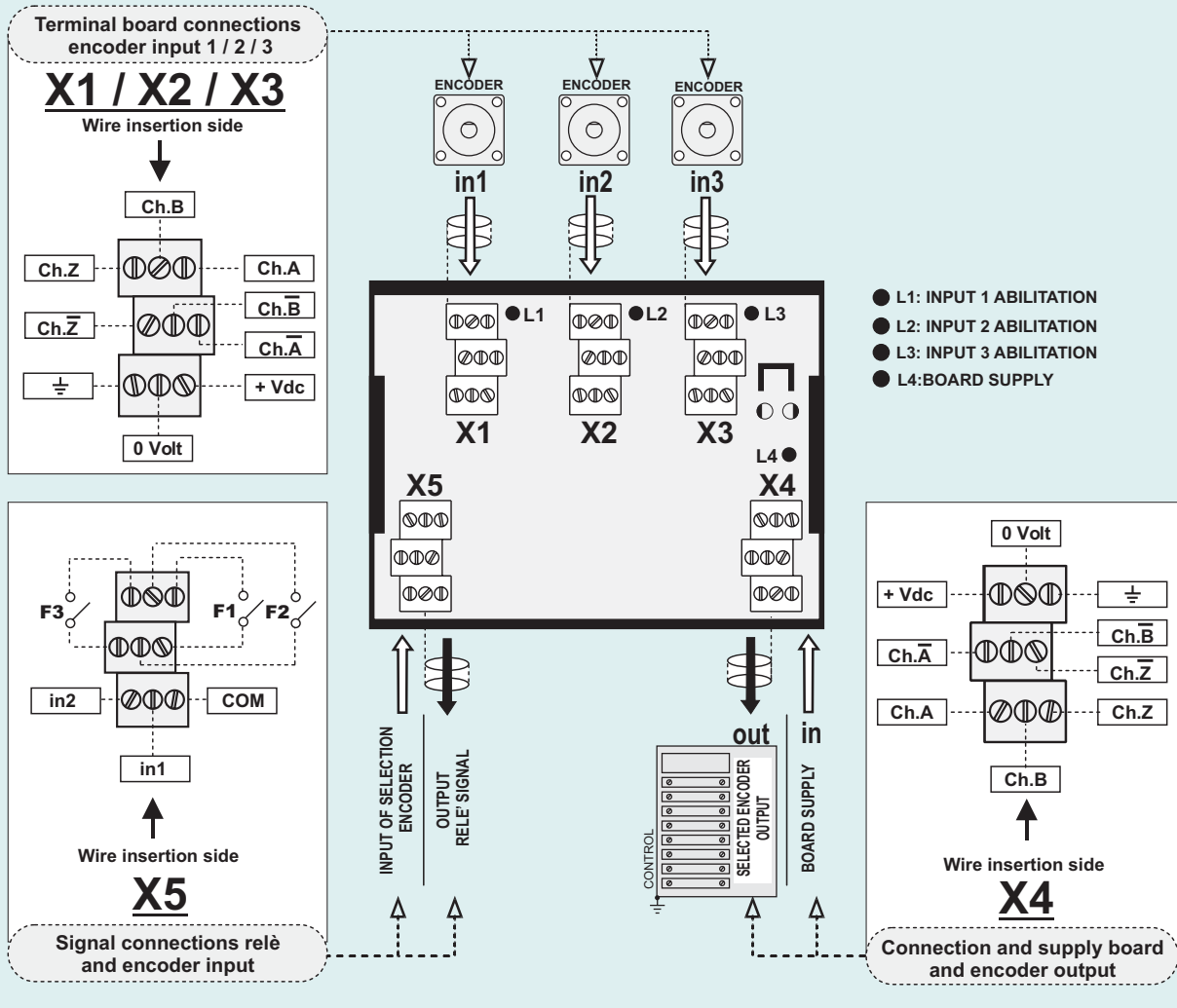


Table of logic status

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

In Out
EMD 5 L 8/24 P . XXX

EMD = Signal selector encoder

5 Input power supply of terminal boards X1 / X2 / X3 (Vdc)

8 ÷ 24

N = NPN
R = PNP
P = PUSH PULL
L = LINE-DRIVER

Electronics input of terminal board X1 / X2 / X3

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

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

N = NPN
P = PUSH PULL
L = LINE-DRIVER

OutX4 Electronics

5 Out voltage terminal board X4 (Vdc)
8 ÷ 24





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 characteristics 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 dissalignments 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 = $\varnothing 6$
8 = $\varnothing 8$
9 = $\varnothing 9.52$ (3/8")
10 = $\varnothing 10$


\varnothing hole "d1"

6 = $\varnothing 6$
8 = $\varnothing 8$
9 = $\varnothing 9.52$ (3/8")
10 = $\varnothing 10$

\varnothing hole "d2"

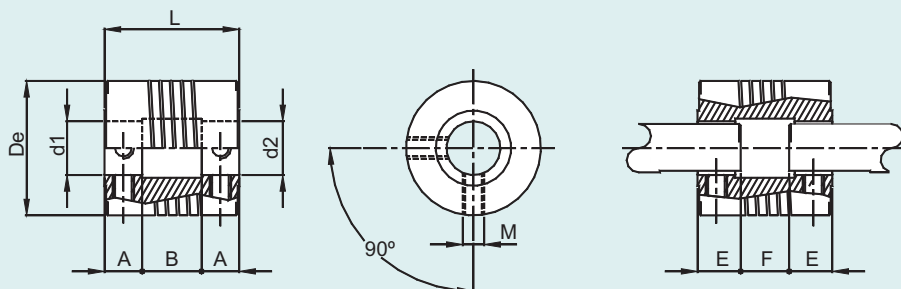
N.B.: Do not indicate in the case of d1=d2

Construction data and characteristics

Standard joints	De	L	d1 = d2	A	B	M	E	F	Twisting moment	Type of material
G 20 A 6	$\varnothing 20$	20 $^{+0.1}_{-0.1}$	$\varnothing 6H7 \text{ } ^{+0.012}_0$	6	8	M3	7	6	0,25 Nm	Aluminium  NOTE: OUR TECHNICIAN IS AT YOUR DISPOSAL FOR ANY REQUEST FOR NO-STANDARD HOLES
G 25 A 8	$\varnothing 25$	25 $^{+0.1}_{-0.1}$	$\varnothing 8H7 \text{ } ^{+0.015}_0$	7	11	M4	8	9	0,4 Nm	
G 25 A 9	$\varnothing 25$	25 $^{+0.1}_{-0.1}$	$\varnothing 9.52H7 \text{ } ^{+0.015}_0$	7	11	M4	8	9	0,4 Nm	
G 25 A 10	$\varnothing 25$	25 $^{+0.1}_{-0.1}$	$\varnothing 10H7 \text{ } ^{+0.015}_0$	7	11	M4	8	9	0,4 Nm	
G 30 A 10	$\varnothing 25$	30 $^{+0.1}_{-0.1}$	$\varnothing 10H7 \text{ } ^{+0.015}_0$	8	14	M4	9	12	0,4 Nm	

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.

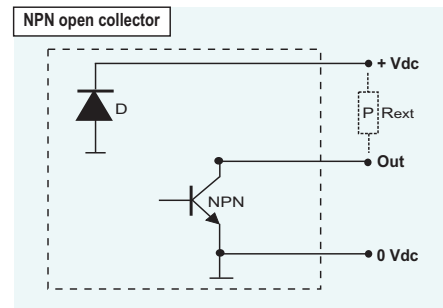
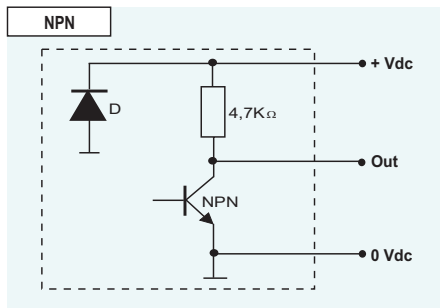
Repairs will not extend the product warranty. We also exclude compensation for any type of damage or injury due to the use, or suspension of use, of the transducer.

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.



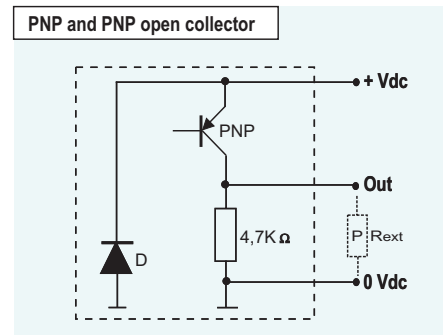
NPN and NPN OPEN COLLECTOR Electronics

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

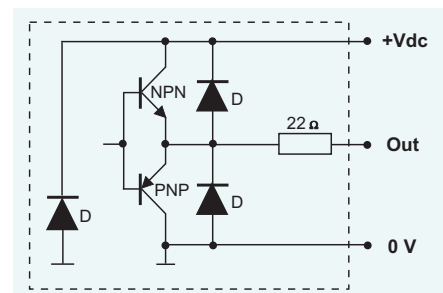
The most important considerations are the same carried out for the NPN electronics. The main differences are in the transistor, which is of pnp type and is constrained to the positive; the resistor, if present, is of the pull-down type connected, therefore, between the output and the zero volt.



PUSH-PULL electronics

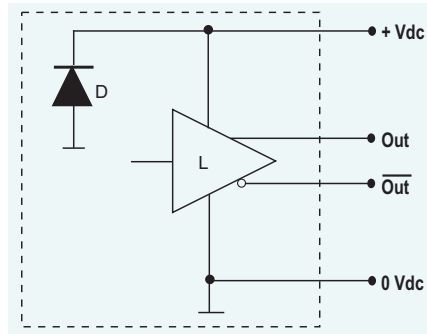
It is used to increase the performance with respect to preceding electronics. Infact the major limitations of the npn or pnp electronics, can depend on the use of the resistor which presents a much higher impedance than a transistor in closing. To overcome these inconveniences in the push-pull type electronics, 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 preceding logics. The PUSH PULL electronics is, in any case, indifferently applicable also to receivers for npn or pnp electronics.



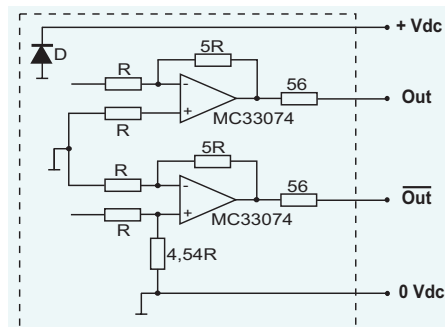
LINE DRIVER electronics

It is used when the operative environments 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 referred 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

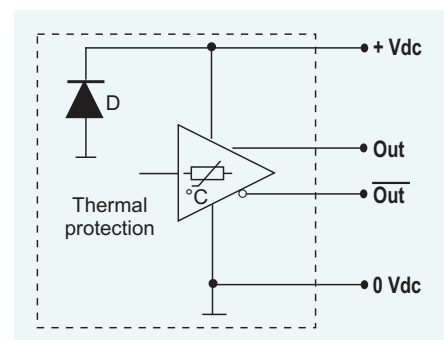
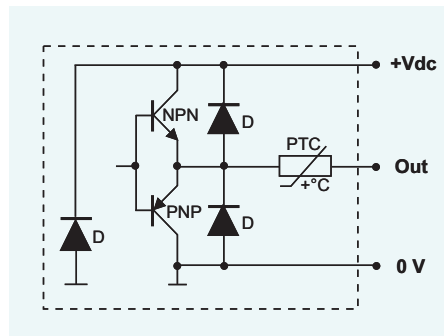
Exist two different mode to protect an electronic circuit from short circuit: the first uses passive element (fuses, non linear resistors, etc.) and the other uses active parts (transistor, etc.). The Eltra encoders can be equipped with these two levels of protection against short circuits.

Passive protection

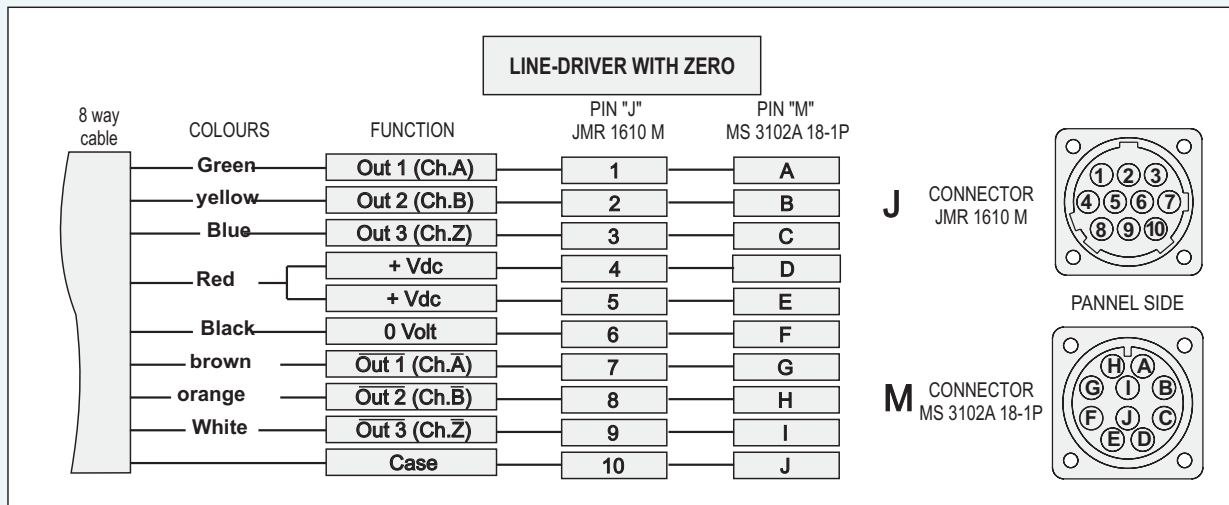
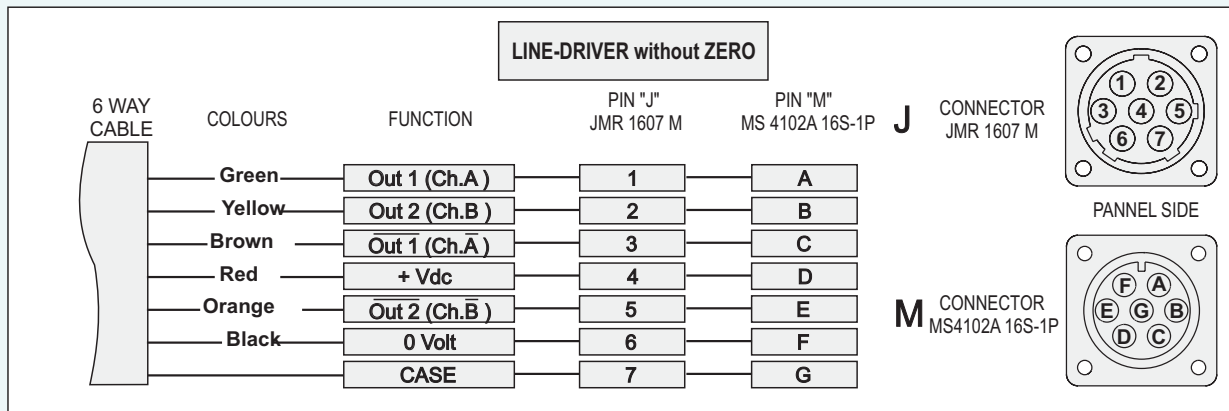
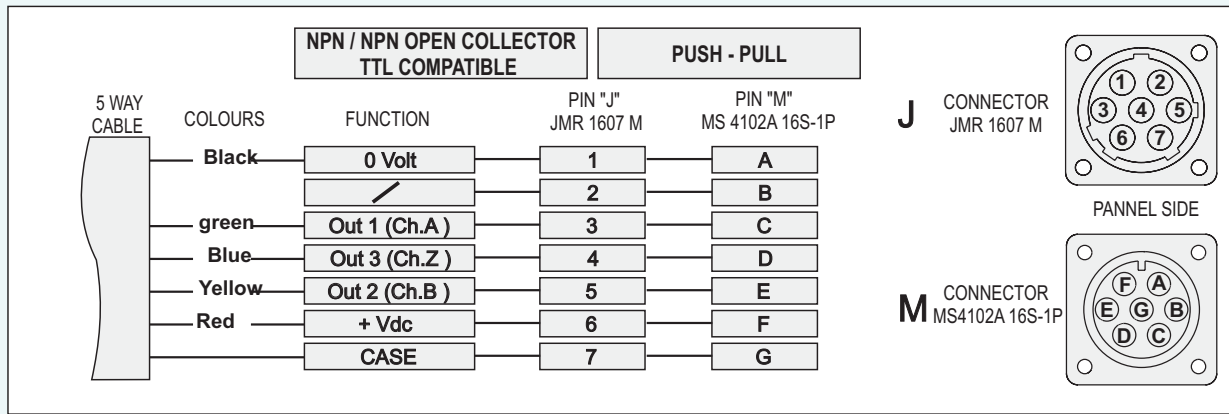
The passive solution is the cheapest solution and is direct to cover accidental short circuits, which happen with limited repetitions. The component which carries out the protection is called PTC and is a resistor that, if crossed by a superior current to the one prearranged, increases its resistance 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

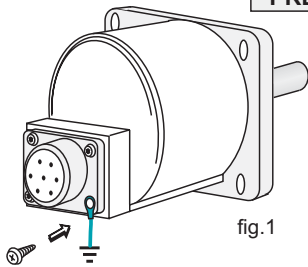
The second solution is based on an integrated electronic circuit on the output stage, which follows in every moment the temperature reached by the element to be protected. This characteristic allows at the protection to be very efficient and fast in the intervention on repetitive and permanent short 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

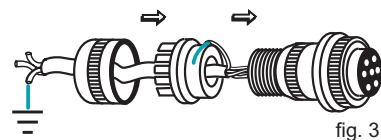


PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGES

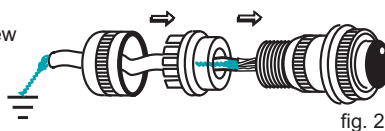


Connection of the metallic connector casing to the ground through a ring fixed to the screw of the connector itself (fig.1)

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



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



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

Note

Lined area for notes with horizontal dotted lines.





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