



LINEAR TRANSDUCERS

HIGH RELIABILITY EVEN IN THE HEAVY ENVIRONMENTS

Easy installation made easier for the presence of a groove in the housing potentiometer represent an ideal solution for the most used machine of material manufacture, for example injection press for plastic and gum.

ELTRA's linear transducers are engineered for high accuracy, high cycle-life and easy installation. Standard strokes are from 10 (4/10") mm to 1250 mm (4 ft).

ELTRA's linear transducers provide accurate sensing in a wide range of configurations. Rod style for fitting within hydraulic pistons or profile housing for a convenient mounting are available.

ELTRA's linear sensors feature absolute positioning, greater reliability, easy control, noise reduction, robustness, increased productivity, reduced shock and stress on mechanical parts, high precision for high performances, cost-effective solutions.

MAIN FEATURES

Incremental linear system based on optical or magnetic principle.
Easy mounting due to joint heads.

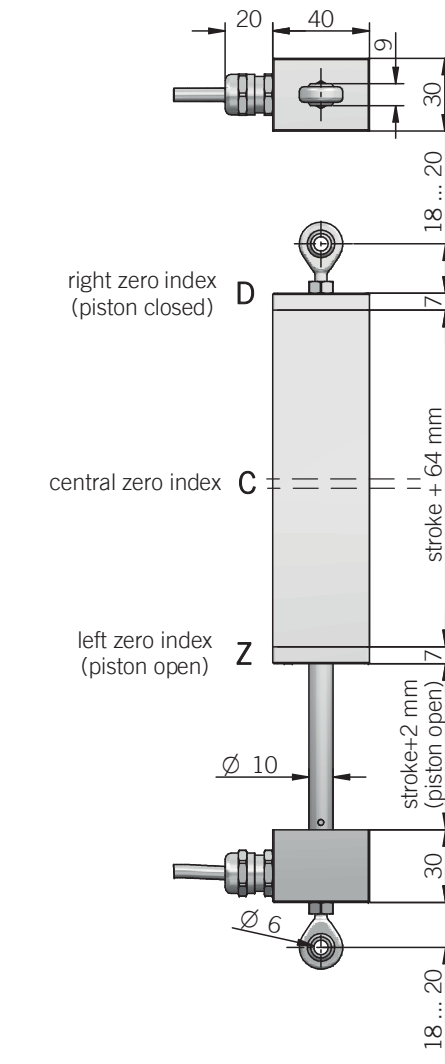
- 0,01 mm max resolution (after quad eval)
- Available with or without zero mark on left, right or central position
- Up to 1 m/s travel speed
- Working stroke up to 500 mm
- Cable output, connectors available on cable end
- Mounting by joint heads



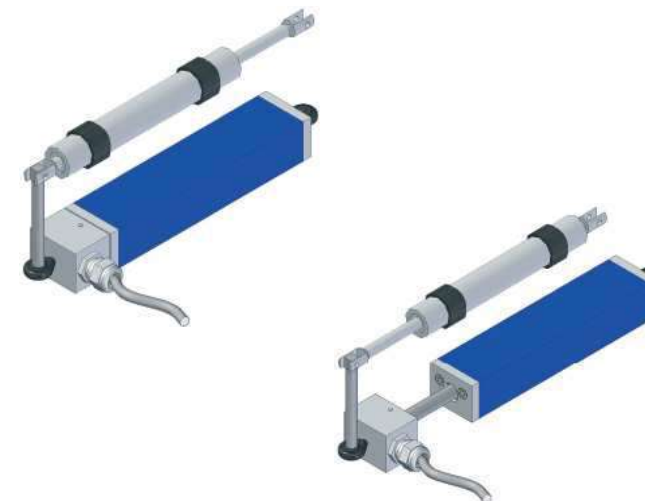
ORDERING CODE

ER	A	100	S	8/24	P	6	P	.XXX
SERIES incremental linear encoder ER								
RESOLUTION 0,2 mm A 0,1 mm B 0,04 mm C 1 mm D 0,5 mm E 0,2 mm F								
WORKING STROKE working stroke (mm) from 100 to 500								
ZERO PULSE without zero pulse S (mod. A) central zero index C (mod. A) right zero index (closed position) D (mod. A) left zero index (open position) Z								
POWER SUPPLY 5 V DC 5 8 ... 24 V DC 8/24								
ELECTRICAL INTERFACE (mod. A) NPN open collector C push-pull P line driver L								
BALL JOINTS FIXING HOLE DIAMETER mm 6								
OUTPUT TYPE radial cable (standard length 1,5 m) P preferred cable lengths 2 / 3 / 5 / 10 m, to be added after output type								
VARIANT custom version XXX								

A/B/C/D/E/F



dimensions in mm



ELECTRICAL SPECIFICATIONS

Technology	optical mod. A magnetic mod. B / C / D / E / F
Resolution	A / F = 0,2 mm (0,05 mm after quad eval) B = 0,1 mm (0,025 mm after quad eval) C = 0,04 mm (0,01 mm after quad eval) D = 1 mm (0,25 mm after quad eval) E = 0,5 mm (0,125 mm after quad eval)
Linearity error	± 1/4 pulse
Power supply¹	5 = 4,5 ... 5,5 V DC 8/24 = 7,6 ... 25,2 V DC mod. A 8/24 = 4,5 ... 30 V DC (reverse polarity protection) mod. B / C / D / E / F
Current consumption without load	< 100 mA max
Max load current	50 mA / channel (NPN open) 20 mA / channel (push pull / line driver)
Electrical interface²	NPN open collector (pull-up max +30 V DC) push-pull / line driver HTL (AEIC-7272 or similar)
Max output frequency	100 kHz
Mean time to dangerous failure (MTTF)_d³ according to EN ISO 13849-1	431 years mod. A 318 years mod. B / C / D / E / F
Mission time (Tm)³	20 years
Diagnostic coverage (DC)³	0%
Counting direction	A leads B (piston opening) mod. A B leads A (piston opening) mod. B / C / D / E / F
Cable type	shielded - fixed installation conductors section 0,22 mm ² / AWG 24 bending radius min 60 mm
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	file n. E212495

MECHANICAL SPECIFICATIONS

Working stroke	100 - 150 - 200 - 250 - 300 - 350* - 400* - 500* mm * vertical mounting only (mod.A)
Enclosure rating	IP 64 (IEC 60529)
Travel speed	1 m/s max
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)
Rod material	stainless steel
Housing material	painted aluminum
Fixing	n.2 ball joints with ø 6 mm hole
Operating temperature^{3,4}	-10° ... +60°C (+14° ... +140°F)
Storage temperature⁴	-25° ... +70°C (-13° ... +158°F)
Weight	400 ... 1000 g (14,11 ... 35,27 oz)

¹ as measured at the transducer without cable influences

² for further details refer to OUTPUT LEVELS on TECHNICAL BASICS section

³ measured on transducer housing

⁴ condensation not allowed

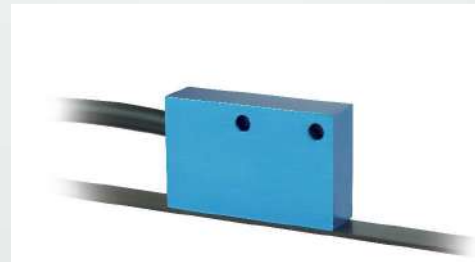
CONNECTIONS

Function	Cable C / P	Cable L
+V DC	red or brown	red
0 V	black or grey	black
A+	green	green
A-	/	brown or grey
B+	yellow	yellow
B-	/	orange
Z+	blue or white	blue
Z-	/	white
≡	shield	shield

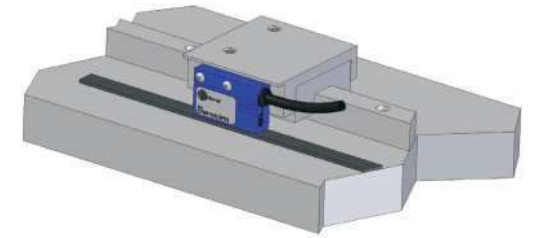
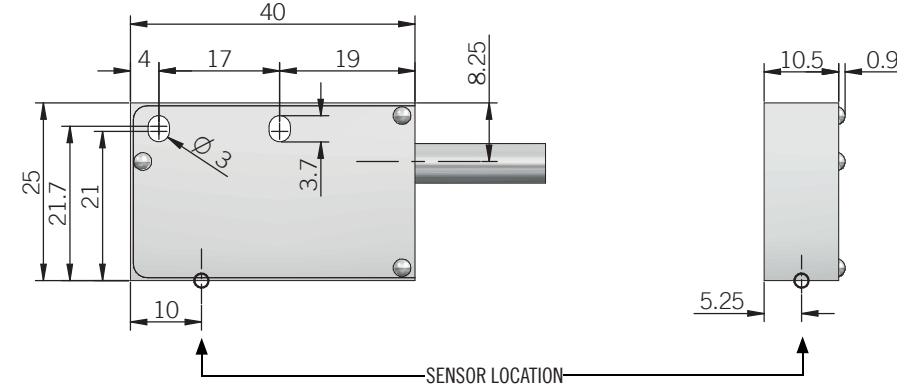
MAIN FEATURES

Incremental linear system based on magnetic principle without wear thanks to no-contact technology. Thanks to high IP rating ETMA is suitable for harsh environment applications such as marble and glass working machines, washing systems machines.

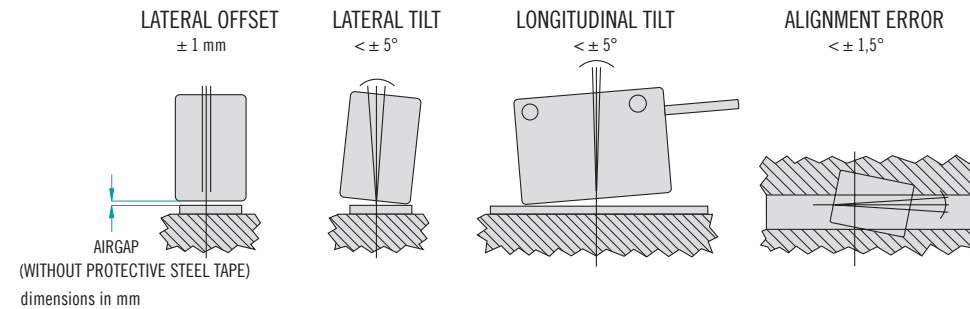
- Resolution up to 0,01 mm
- Power supply up to +30 V DC with several electrical interfaces available
- Up to 4 m/s travel speed
- IP 67 as protection grade
- Cable output, connectors available on cable end



ETMA 1 / 2 / 4 / 5 / 6



MECHANICAL TOLERANCES



ORDERING CODE ETMA 1 Z 5 L S PR3 .XXX

SERIES magnetic incremental linear sensor ETMA									
RESOLUTION 0,1 mm 1 0,04 mm 2 0,2 mm 4 0,5 mm 5 1 mm 6									
ZERO PULSE without zero pulse S with zero pulse Z									
POWER SUPPLY (with L electrical interface) 5 V DC 5 5 ... 28 V DC 5/28									
ELECTRICAL INTERFACE push-pull P line driver L power supply 5/28 V DC - output RS-422 RS									
ENCLOSURE RATING IP 67 S									
OUTPUT TYPE cable length 3m PR3 preferred cable lengths 6 / 10 / 20 m, to be added after output type									
VARIANT custom version XXX									

ELECTRICAL SPECIFICATIONS

Resolution	1 = 0,1 mm (0,025 mm after quad eval) 2 = 0,04 mm (0,01 mm after quad eval) 4 = 0,2 mm (0,05 mm after quad eval) 5 = 0,5 mm (0,125 mm after quad eval) 6 = 1 mm (0,25 mm after quad eval)
Zero pulse	ETMA 1 / 4 / 5 = every 5 mm ETMA 2 / 6 = every 2 mm
Power supply¹	5 = 4,5 ... 5,5 V DC 5/28 = 4,5 ... 30 V DC (reverse polarity protection)
Current consumption without load	30 mA max
Max load current	20 mA / channel
Electrical interface²	push-pull / line driver HTL (AEIC-7272 or similar) line driver RS-422 (AELT-5000 or similar)
Accuracy (at +20°C / +68°F)	± 1/4 pulse with recommended airgap
Travel speed	4 m/s
Cable type	shielded - fixed or flexible installation conductors section 0,14 mm ² / AWG 26 min bending radius min 60 mm
Mean time to dangerous failure (MTF_d)³ according to EN ISO 13849-1	318 years
Mission time (Tm)³	20 years
Diagnostic coverage (DC)³	0%
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive
UL / CSA	file n. E212495

MECHANICAL SPECIFICATIONS

Enclosure rating	IP 67 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Housing material	anodized aluminium
Fixing	n.2 holes ø 3 mm
Operating temperature^{4,5}	-20° ... +85°C (-4° ... +185°F)
Storage temperature⁵	-25° ... +70°C (-13° ... +158°F)
Air gap	ETMA 1 / 4 / 5 1 ... 2 mm (1,5 mm recommended) ETMA 2 / 6 0,1 ... 1 mm (0,3 mm recommended)
Weight	150 g (5,29 oz)

CONNECTIONS

Function	Cable P	Cable L / RS
+V DC	red or brown	red
0 V	black or grey	black
A+	green	green
A-	/	brown or grey
B+	yellow	yellow
B-	/	orange
Z+	blue or white	blue
Z-	/	white
⊖	shield	shield

¹ as measured at the transducer without cable influences

² for further details refer to OUTPUT LEVELS on TECHNICAL BASICS section

³ this product is not a safety component, for further details refer to TECHNICAL BASICS section

⁴ measured on the transducer flange

⁵ condensation allowed

MAIN FEATURES

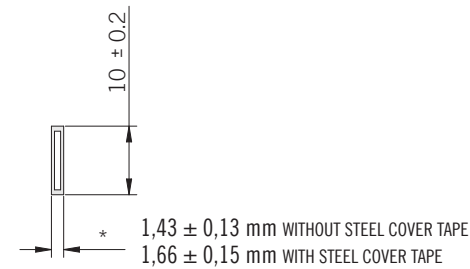
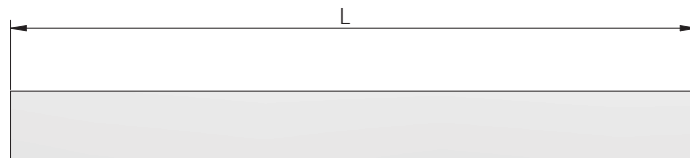
- Magnetic tape to be used with ETMA
- Easy mounting due to premounted double side adhesive
- 2 mm or 5 mm pole pitch
- High pole accuracy
- Available in reels up to 50 m



ORDERING CODE

SERIES magnetic tape EBM	TAPE TYPE 10 mm width magnetic tape A	PITCH 5mm pitch for ETMA 1 / 4 / 5 1 2mm pitch for ETMA 2 / 6 2 separate the code with a dash -	TAPE LENGTH from 0,5 m to 50 m 10	VARIANT custom version XXX
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EBMA



dimensions in mm
for fixing clips please refer to Accessories

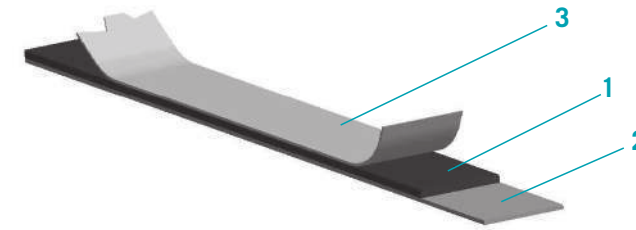
GENERAL SPECIFICATIONS

Operating temperature	-20° ... +100°C (-4° ... +212°F)
Accuracy	± 40 µm/m
Linear expansion coefficient	17 x 10 ⁻⁶ m/K
Bending radius	> 65 mm without steel cover tape > 100 mm with steel cover tape

CONSTRUCTION

As shown in the figure below, Eltra magnetic tape is composed by three layers:

- 1 - a flexible magnetic tape made of elastomer filled with ferrite
- 2 - a stainless steel tape used to create a shield against any external magnetic fluxes and other external agents. Furthermore it's glued to the upper layer in order to give the correct mechanical rigidity to the magnetic tape. The stainless steel tape is supplied with an acrylic double side adhesive (thickness 0,13 mm) not shown in the figure
- 3 - a steel tape, magnetically transparent and with the function to protect mechanically the magnetic layer; it is the most rigid part and therefore is supplied separately due to transport and application needs. It must be stuck on the magnetic tape by the user. The steel tape is supplied with an acrylic double side adhesive (thickness 0,13 mm) not shown in the figure



To prevent damage from possible internal stresses in the magnetic tape rolled up with magnetic layer facing outwards, with a minimum internal diameter of 200 mm; keep of least 5 mm between the layers. If supplied in single strip keep at least 10 mm between the strips.

TIPS TO STICK THE MAGNETIC TAPE ON

Fixing pressure

The magnetic tape is adhesive. Therefore it is important an optimum contact between the surfaces for right use. A good pressure must be uniformly applied to guarantee a perfect result.

Applying temperature

In order to guarantee optimal sticking it is recommended a surface temperature between +20°C and +37°C (+68°F to +98,6°F). Maximum adhesion is obtained after 72 hours at temperature of +21°C (+69,8°F). Please do not apply magnetic tape when the surface temperature is lower than +10°C (+50°F).

Application materials

Magnetic tape must be placed on dry, smooth and clean surfaces. The surfaces must be cleaned with aqueous solution (like water and alcohol 50% or heptane). Metallic surfaces like brass, copper etc. must be protected to prevent possible oxidation.

CHEMICAL AGENTS AND MAGNETIC TAPE BEHAVIOUR

Null effect	Medium effect	Strong effect
motor oil	JP-4 fuel	aromatic hydrocarbons (benzene, toluene, xylene, trichloroethylene, freon 10)
transmission oil	gasoline	ketones (acetone)
ATF (automatic transmission fluid)	heptane	mineral acids (hydrochloric, sulphuric, nitric, phosphoric, boric)
hydraulic oil	alcohols	
kerosene		
antifreeze		
detergents, disinfectants (Clorox®)		
turpentine		
water		
salt spray		

MAIN FEATURES

Absolute linear system based on magnetic principle without wear thanks to no-contact technology. Thanks to high IP rating TMAA is suitable for harsh environment applications such as marble and glass working machines or washing systems machines.

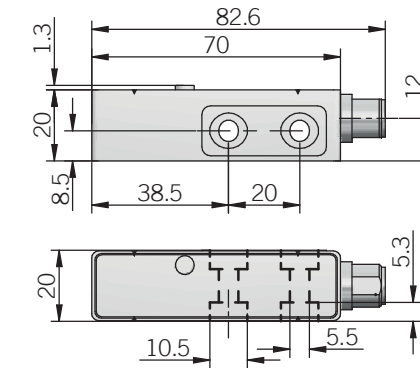
- 5 µm max absolute resolution / 1 µm incremental resolution
- Power supply up to +30 V DC with SSI electrical interface
- Up to 5 m/s travel speed
- IP 67 as protection grade
- M12 radial connector
- To be used with BMAA magnetic tape



ORDERING CODE TMAA 5 G 5/30 S 1 L G S M12R .162

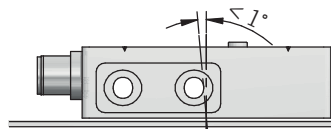
SERIES magnetic absolute linear sensor TMAA	ABSOLUTE RESOLUTION 5 µm 5 10 µm 10	CODE TYPE gray G	POWER SUPPLY 5 ... 30V DC 5/30	ELECTRICAL ABSOLUTE INTERFACE Serial Synchronous Interface - SSI S	INCREMENTAL RESOLUTION without incremental signals X 1 µm 1 5 µm 5 10 µm 10	ELECTRICAL INCREMENTAL INTERFACE to be reported if not used X RS-422 L	MAX INCREMENTAL SIGNALS FREQUENCY to be reported if not used X 1250 kHz A 100 kHz D 15 kHz G refer to the table for travel speed limits	ENCLOSURE RATING IP 67 S	OUTPUT TYPE 12 pin M12 radial plug connector M12R	SOCKET socket not included .162 for socket see Accessories
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TMAA

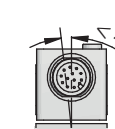


MOUNTING TOLERANCES

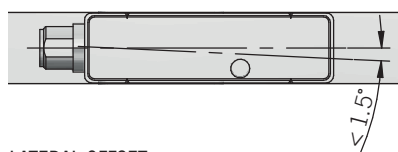
LONGITUDINAL TILT



LATERAL TILT



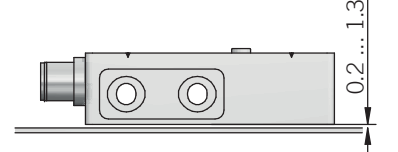
ALIGNMENT ERROR



LATERAL OFFSET



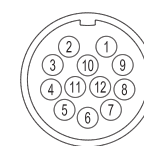
AIRGAP



dimensions in mm
for connector please refer to Accessories

CONNECTIONS

Function	M12 connector 12 pin
+ V DC	5
0 V	12
A+	7
A-	6
B+	9
B-	8
DATA +	2
DATA -	3
CLOCK +	11
CLOCK -	4
PROG	10



M12 connector (12 pin)
M12 A coded front view

ELECTRICAL SPECIFICATIONS

Absolute resolution	5 - 10 µm
Incremental resolution	1 - 5 µm
Stroke	≤ 10240 mm
Power supply¹	4,5 ... 30 V DC (reverse polarity protection)
Power draw without load	< 1,5 W
Electrical interface for absolute signals²	RS-422
Electrical interface for incremental signals²	RS-422
Clock frequency	50 ... 750 kHz
Pause time (Tc)	> 25 µs
SSI frame	MSB ... LSB 27 bit data length 24 bit data + 3 bit status
Code type	gray
Accuracy (sensor+tape)	± (0,02 + 0,03 x length) mm length in meter
Repeatability	± 5 µm, ± 1 increment
Max travel speed	≤ 5 m/s for absolute output refer to the table for incremental output
Mean time to dangerous failure (MTTF)³ according to EN ISO 13849-1	106 years
Mission time (Tm)³	20 years
Diagnostic coverage (DC)³	0%
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive

MECHANICAL SPECIFICATIONS

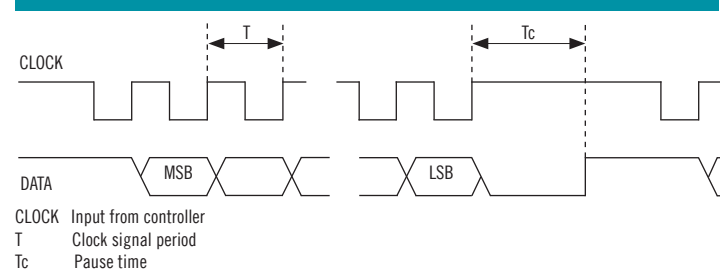
Enclosure rating	IP 67 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 10 ... 2000 Hz (IEC 60068-2-6)
Housing material	zinc die-cast
Operating temperature^{3,4}	-30° ... +85°C (-22° ... +185°F)
Storage temperature⁴	-40° ... +85°C (-40° ... +185°F)
Working distance from magnetic tape without steel cover tape	0,2 ... 1,3 mm
Weight	80 g (2,82 oz)

¹ as measured at the transducer without cable influences
² for further details refer to OUTPUT LEVELS on TECHNICAL BASICS section
³ this product is not a safety component, for further details refer to TECHNICAL BASICS section
⁴ measured on the transducer flange
⁵ condensation allowed

INCREMENTAL FREQUENCY - TRAVEL SPEED

Resolution (µm)	Travel speed (m/s)		
	4	0,32	0,05
1	4	0,32	0,05
5	20	1,60	0,25
10	25	3,20	0,50
Max frequency (Khz)	1250	100	15,63

SSI INTERFACE



MAIN FEATURES

- Magnetic tape to be used with TMAA
- Easy mounting due to premounted double side adhesive
- High pole accuracy
- Available in reels up to 75 m

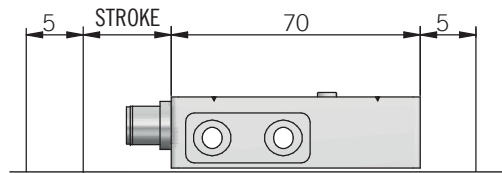
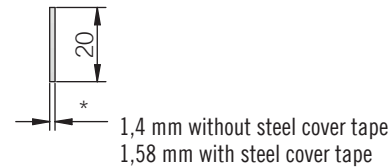
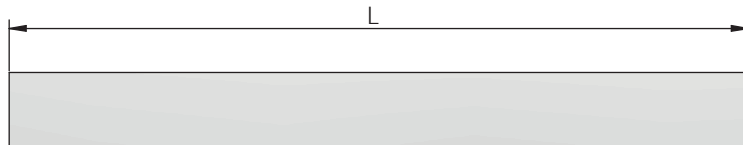


ORDERING CODE

BMA A 50 - 1 .XXX

SERIES magnetic tape BMA	TAPE TYPE 20 mm width magnetic tape A	ACCURACY CLASS ± 50 µm 50	TAPE LENGTH 0,2 ... 75 m 1 in intervals of 0,1 m	VARIANT custom version XXX
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BMAA



Minimum tape length (mm) = 70 + 10 + STROKE

dimensions in mm
for fixing clips please refer to Accessories

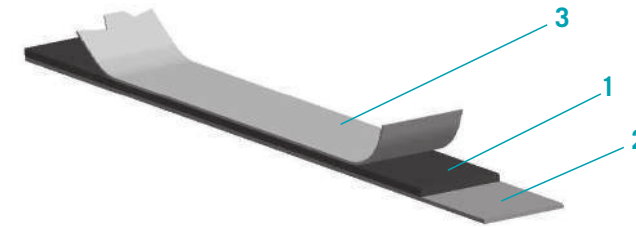
SPECIFICATIONS

Operating temperature	-20° ... +70°C (-4° ... +158°F)
Storage temperature	-40° ... +70°C (-40° ... +158°F)
Relative humidity	100%
Accuracy	± 50 µm
Linear expansion coefficient	(11 ± 1) x 10 ⁻⁶ m/K
Bending radius	> 350 mm

CONSTRUCTION

As shown in the figure below, Eltra magnetic tape is composed by three layers:

- 1 - a flexible magnetic tape made of elastomer filled with ferrite
- 2 - a stainless steel tape used to create a shield against any external magnetic fluxes and other external agents. Furthermore it's glued to the upper layer in order to give the correct mechanical rigidity to the magnetic tape. The stainless steel tape is supplied with an acrylic double side adhesive (thickness 0,1 mm) not shown in the figure
- 3 - a steel tape, magnetically transparent and with the function to protect mechanically the magnetic layer; it is the most rigid part and therefore is supplied separately due to transport and application needs. It must be stuck on the magnetic tape by the user
The steel tape is supplied with an acrylic double side adhesive (thickness 0,1 mm) not shown in the figure



To prevent damage from possible internal stresses in the magnetic tape rolled up with magnetic layer facing outwards, with a minimum internal diameter of 200 mm; keep of least 5 mm between the layers. If supplied in single strip keep at least 10 mm between the strips.

TIPS TO STICK THE MAGNETIC TAPE ON

Fixing pressure

The magnetic tape is adhesive. Therefore it is important an optimum contact between surfaces for right use. A good pressure must be uniformly applied to guarantee a perfect result.

Applying temperature

In order to guarantee optimal sticking it is recommended a surface temperature between +20°C and +37°C (+68°F to +98,6°F). Maximum adhesion is obtained after 72 hours at temperature of +21°C (+69,8°F). Please do not apply magnetic tape when surface temperature is lower than +10°C (+50°F).

Application materials

Magnetic tape must be placed on dry, smooth and clean surfaces. Surfaces must be cleaned with aqueous solution (like water and alcohol 50% or heptane). Metallic surfaces like brass, copper etc. must be protected to prevent possible oxidation.

CHEMICAL AGENTS AND MAGNETIC TAPE BEHAVIOUR

Null effect	Medium effect	Strong effect
motor oil	JP-4 fuel	aromatic hydrocarbons (benzene, toluene, xylene, trichloroethylene, freon 10)
transmission oil	gasoline	ketones (acetone)
ATF (automatic transmission fluid)	heptane	mineral acids (hydrochloric, sulphuric, nitric, phosphoric, boric)
hydraulic oil	alcohols	
kerosene		
antifreeze		
detergents, disinfectants (Clorox®)		
turpentine		
water		
salt spray		

MAIN FEATURES

Rope encoder series with Dyneema rope available for lengths up to 4 m.
The applied encoder could be incremental or absolute.
Perfectly suitable also for harsh environments, thanks to its high mechanical strength.
It can be used in wide range of applications such as: vertical storehouses, presses, extruders, etc.



ORDERING CODE

FE 1500 A - EH30

SERIES	rope encoder for linear measures FE
WORKING STROKE	1,5 m 1500 4 m 4000
TYPE OF ROPE END	eyelet A
ENCODER FLANGE MODEL	EH30 EL/ER53 EAM53

The encoder applied to the FE model must be ordered separately. The F letter must be placed before the ordering code.

- Example:
- 1) encoder model EH 30 M ordering code: FEH30M300S5/28P6X6PR
 - 2) encoder model EL 53 B ordering code: FEL53B1100S5/28P6X3MR
 - 3) encoder model EAMR 53 B ordering code: FEAMR53B12/13G8/30SX6XM12R
 - 4) encoder model EAML 53 B ordering code: FEAML53B16B12/30V010X6M12R

Complete ordering code example:
FE1500A-EH30
FEH30M1024S5/28P6X6PR

SPECIFICATIONS

Model	FE 1500	FE 4000
Linearity error	± 0,75 mm	± 2 mm
Drum circumference	120 mm	220 mm
Max speed	0,85 m/s	
Pull-out force required	≥ 9 N (2,02 lbs)	
Enclosure rating	depends on encoder IP	
Shock	50 G, 11 ms (IEC 60068-2-27)	
Vibration	10 G, 10 ... 2000 Hz (IEC 60068-2-6)	
Housing material	painted aluminum	
Rope material	Dyneema®	
Operating temperature	-10° ... +60°C (+14° ... +140°F)	
Storage temperature	-25° ... +70°C (-13° ... +158°F)	
Weight	500 g (17,64 oz) mod. 1500 1100 g (38,80 oz) mod. 4000	
Electromagnetic compatibility	see encoder	
RoHS	see encoder	

For encoder specifications, refer to single product datasheet :

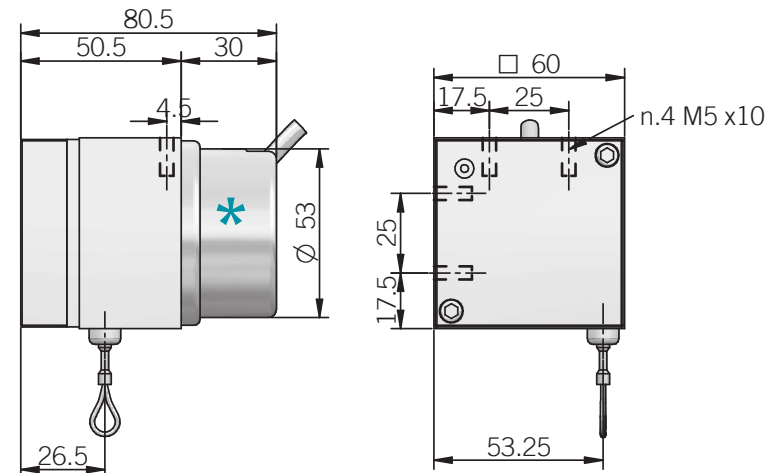
- FEH 30 M see EH 30 M - EH 30 MH encoder
- FEL 53 B see EL - ER 53 encoder
- FEAMR 53 B see EAMR 58 - 63 solid shaft encoder
- FEAML 53 B see EAML 58 - 63 solid shaft encoder

FE installation notes

A 5 mm wire extension is recommended before the measurement starting point.
This prevents the wire snapping back to the stop on rewinding.
Wire should be pulled out straight in line with wire outlet; the wire must not spring back loosely, it must be stressed by spring force in every situation and movement.
Do not twist or bend the wire seat or wire.
Do not open the spring case of the rope encoder.
Do not extend the wire beyond the specified maximum extension length.

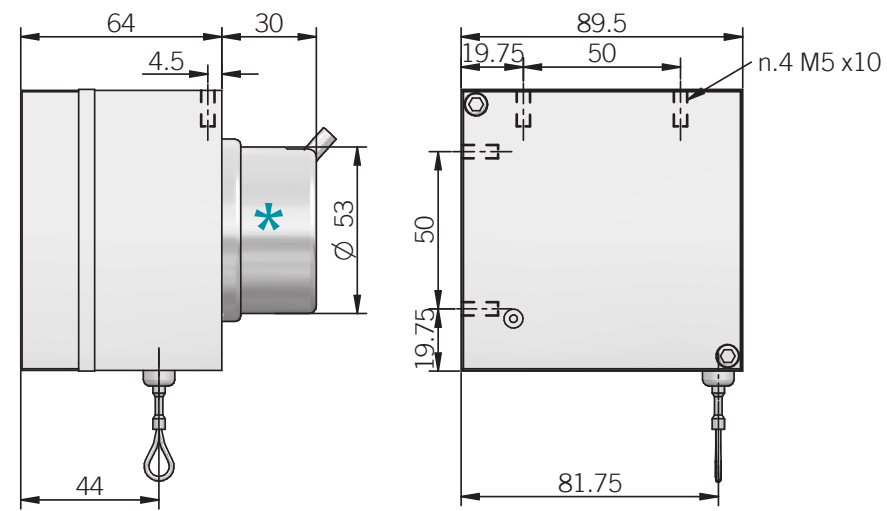
Mechanical resolution [mm] = Drum circumference [mm] / Encoder pulses [ppr o singleturn resolution]

FE 1500



* dimensions with EH30M encoder

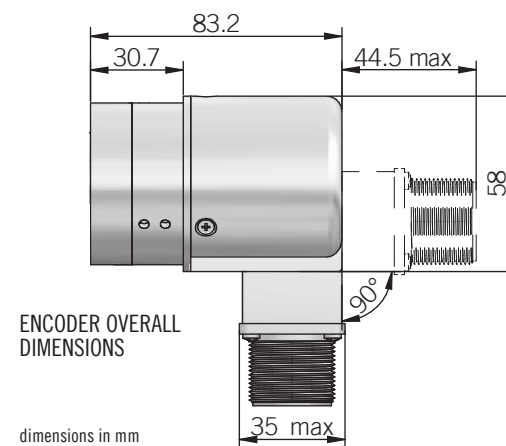
FE 4000



* dimensions with EH30M encoder

FEL 53 B

* INCREMENTAL ENCODER APPLICATION

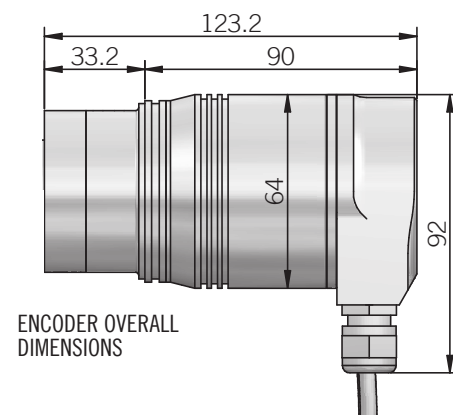


ENCODER OVERALL DIMENSIONS

dimensions in mm

FEAM 53 B

* MULTITURN ABSOLUTE ENCODER APPLICATION



ENCODER OVERALL DIMENSIONS

MAIN FEATURES

Rope encoder series with steel rope available for lengths up to 15 m.
The attached encoder can be incremental or absolute.
Perfectly suitable also for harsh environments, thanks to its excellent mechanical strength.
It can be used in wide range of applications such as: vertical warehouses, presses, extruders, etc.



ORDERING CODE

FES 3000 A -58B

SERIES	rope encoder for linear measures FES
WORKING STROKE	3 m 3000 6 m 6000 15 m 15000
OUTPUT TYPE	horizontal output A
ENCODER FLANGE MODEL	58B

Incremental or absolute (model 58B) must be ordered together.
Please add letter F before standard encoder ordering code.

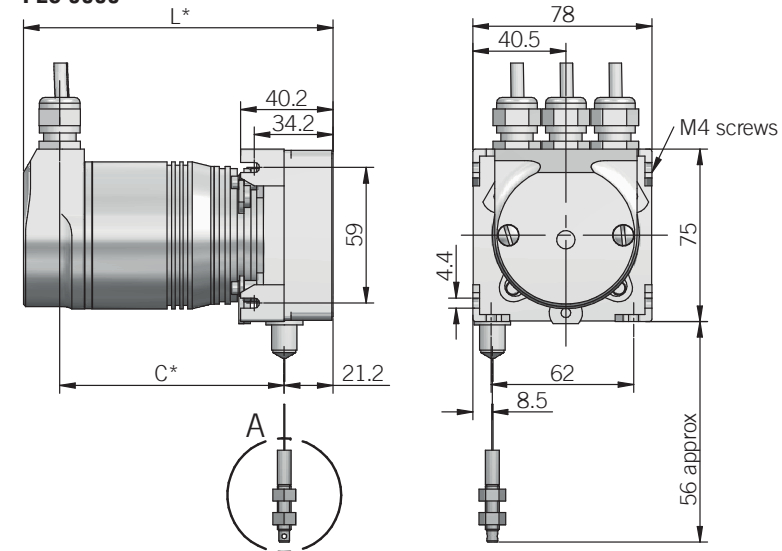
- Example:
- 1) with incremental encoder ordering code will be : FER58B ...
 - 2) with absolute multiturn encoder ordering code will be : FEAMR58BR ...
 - 3) with absolute Profinet multiturn encoder ordering code will be : FAAM58B ...

Complete ordering code example:
FES3000A-58B
FER58B1024Z5/28L6X3PR

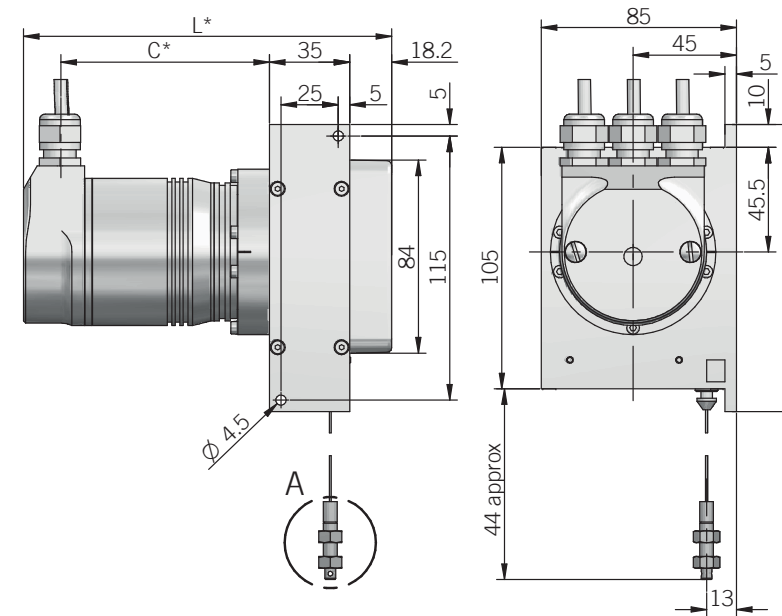
SPECIFICATIONS

Model	FES 3000	FES 6000	FES 15000
Max length measurement	3 m	6 m	15 m
Drum circumference	200 mm	200 mm	500 mm
Wire diameter	0,87 mm	0,6 mm	0,87 mm
System accuracy	/	± 0,1%	± 0,1%
Repeat accuracy	± 0,15 mm	± 0,15 mm	± 0,2 mm
Max speed	0,8 m/s	3 m/s	≤ 2,4 m/s
Max acceleration	/	≤ 23,5 m/s ²	/
Pull-out force required	≥ 3 N (0,67 lbs)	≥ 8 N (1,8 lbs)	≥ 15,5 N (3,48 lbs)
Housing material	aluminum / plastic		aluminium die casting
Rope material	steel		steel rope, synthetically coated
Enclosure rating	depends on encoder IP		
Shock (IEC 60068-2-27)	/	50 G, 11 ms	/
Vibrations (IEC 60068-2-6)	/	10 G, 5 ... 150 Hz	/
Operating temperature	-40° ... +80°C (-40° ... +176°F)	-20° ... +80°C (-4° ... +176°F)	-40° ... +80°C (-40° ... +176°F)
Weight	350 g (12,35 oz) + encoder	600 g (24,69 oz) + encoder	2500 g (88,18 oz) + encoder
(EL-ER 58B) L*	95 mm	120 mm	114 mm
(EAM 58BR) L*	109 mm	134 mm	128 mm
(EAM 58B PROFIBUS) L*	135 mm	160 mm	154 mm
(EL-ER 58B) C*	58 mm	50 mm	99,5 mm
(EAM 58BR) C*	70 mm	62 mm	100,5 mm
(EAM 58B PROFIBUS) C*	98 mm	90 mm	127,2 mm
Electromagnetic compatibility	see encoder		
RoHS	see encoder		

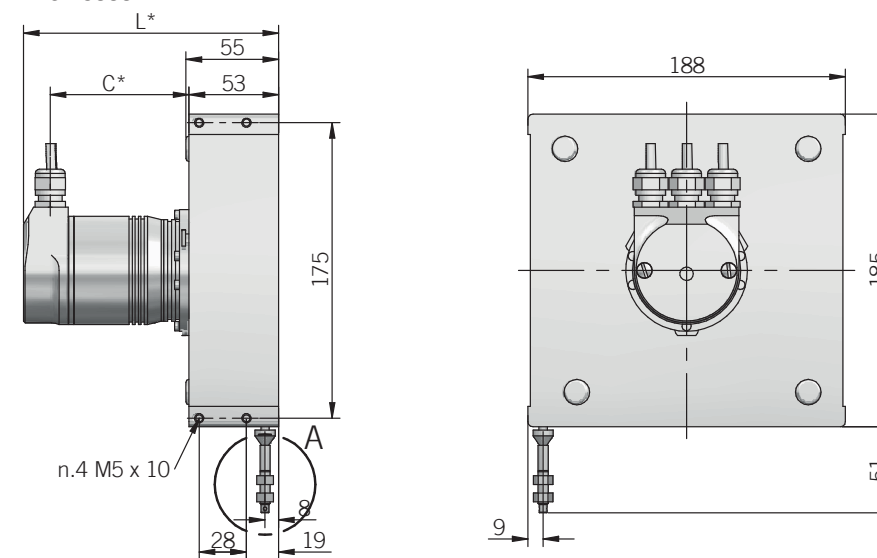
FES 3000



FES 6000



FES 15000



dimensions in mm

FES installation notes

A 5 mm wire extension is recommended before the measurement starting point.
This prevents the wire snapping back to the stop on rewinding.
Wire should be pulled out straight in line with wire outlet; the wire must not spring back loosely, it must be stressed by spring force in every situation and movement.
Do not twist or bend the wire seat or wire.
Do not open the spring case of the rope encoder.
Do not extend the wire beyond the specified maximum extension length.

MAIN FEATURES

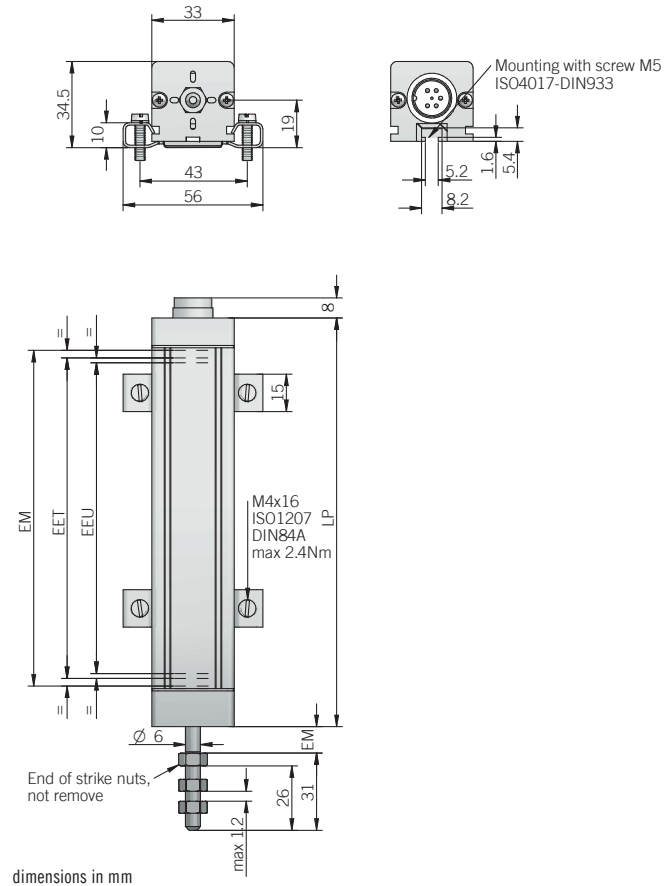
EPLA is an absolute linear potentiometer assuring great reliability even in tough applications with heavy vibrations and shocks. The groove on the enclosure of the transducer represents an excellent alternative to the usual system of fastening with brackets.
Installation is also made simpler by the absence of variations on the electrical output signal outside of the theoretical electrical stroke. EPLA is the right solution in machinery for material processing such as injection presses for plastic, rubber and so on.



ORDERING CODE

	EPLA	200	X	10	C5	A
SERIES	linear potentiometer model EPLA					
STROKE	mm from 50 to 900 see table for stroke availability					
ENCLOSURE RATING	IP 60 X IP 65 S					
TRAVEL SPEED	max 10 m/s 10					
OUTPUT TYPE	cable (standard length 1 m) P 3 pin connector C3 DIN 43650-A 4 pin connector C4 DIN 43322 5 pin connector C5					
OUTPUT DIRECTION	axial A					

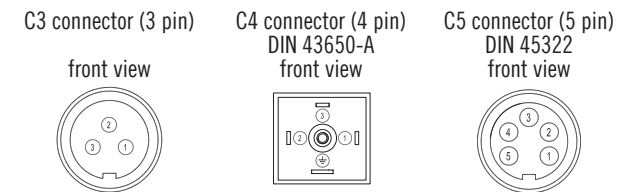
EPLA



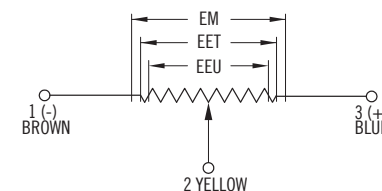
dimensions in mm

CONNECTIONS

Function	Cable	3 pin C3	4 pin C4	5 pin C5
+	blue	3	3	3
-	brown	1	1	1
OUTPUT	yellow	2	2	2
NC	/	/	4	4
NC	/	/	/	5



- fixing kit (brackets, screws) included
- socket connector not included, please refer to Accessories



ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite
Independent linearity	± 0,05 %
Repeatability	0,01 mm
Resistance tolerance	± 20 %
Recommended cursor current	< 0,1 µA
Resistance thermal coefficient	-200 ... 200 ppm / °C typical
Output voltage temperature coefficient	≤ 5 ppm / °C
Power dissipation	3 W at 40 °C / 0 W at 120 °C
Max cursor current	10 mA
Applicable voltage	60 V DC max
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1 bar, 2 s
Cable type	shielded - fixed installation conductors section 0,20 mm ² /AWG 24 bending radius min 40 mm
RoHS	according to 2011/65/EU directive

Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 300 - 350 - 400 - 450 - 500 - 600 - 750 - 900 mm
Useful electric stroke (EEU) (+3 / - 0 mm)	see stroke (mm)
Theoretical electric stroke (EET) (±1 mm)	EEU + 3 mm (50 ... 150), EEU + 4 mm (200 ... 300), 355 mm (350), 406 mm (400), 457 mm (450), 508 mm (500), 609 mm (600), 762 mm (750), 914 mm (900)
Mechanical stroke (EM)	EEU + 9 mm (50 ... 150), EEU + 10 mm (200 ... 300), 361 mm (350), 412 mm (400), 463 mm (450), 518 mm (500), 619 mm (600), 772 mm (750), 924 mm (900)
Resistance (on the EET)	5 kΩ (50 ... 600) 10 kΩ (750 ... 900)
Case length (LP)	EEU + 63 mm (50 ... 150), EEU + 64 mm (200 ... 300), 415 mm (350), 466 mm (400), 517 mm (450), 572 mm (500), 673 mm (600), 826 mm (750), 978 mm (900)
Travel speed	10 m/s max
Acceleration	200 m/s ² max
Enclosure rating	X = IP 60 (IEC 60529) S = IP 65 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)
Displacement force typical	3,5 N (0,79 lbs) with X enclosure rating 15 N (3,37 lbs) with S enclosure rating
Housing material	anodized aluminium / Nylon 66 G
Pull shaft material	stainless steel
Mounting	brackets with variable center-to-center distance or M5 ISO4017 - DIN933 screw
Life	> 25 x 10 ⁶ m strokes or > 100 x 10 ⁶ manoeuvres
Operating temperature^{1,2}	-30° ... +100°C (-22° ... +212°F)
Storage temperature²	-50° ... +120°C (-58° ... +248°F)

¹ measured on transducer

² condensation not allowed

Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

MAIN FEATURES

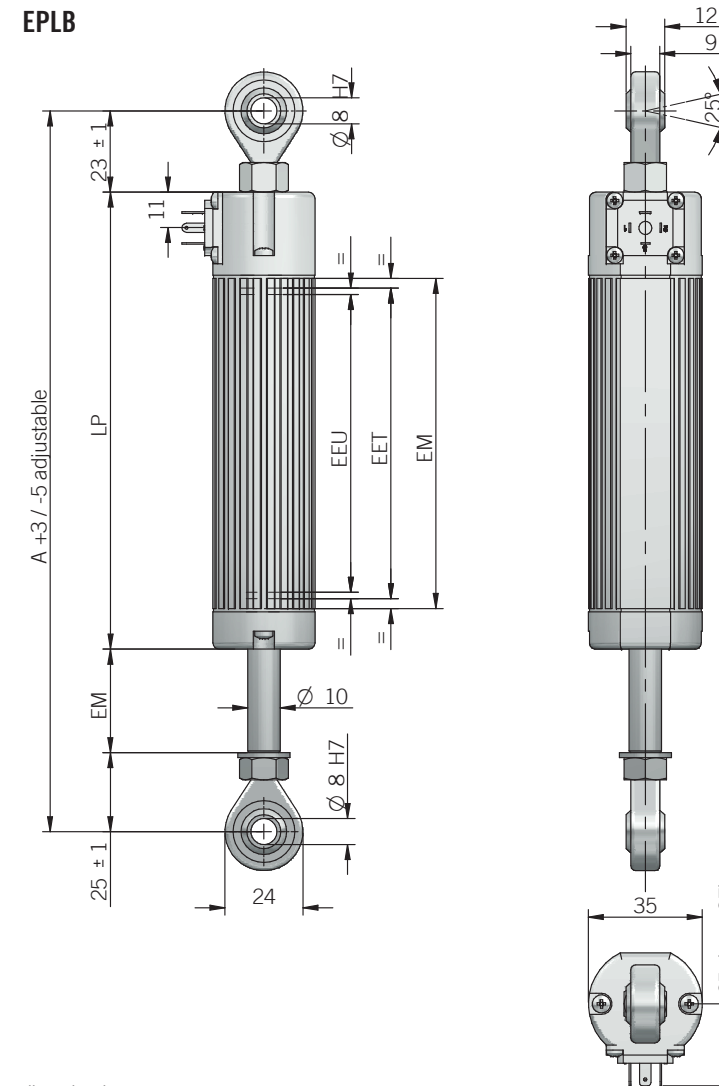
EPLB is an absolute linear potentiometer transducer. Mechanical mounting is made simpler by the presence of two spherical joints on the two sides and by the enclosure's cylindrical shape. The main characteristic is the absence of variations on the electrical output signal outside of the theoretical electrical stroke. Thanks to its robustness and precision EPLB represents a great solution in most mechanical application for automation.



ORDERING CODE

	EPLB	300	S	5	P	R
SERIES cylindrical linear potentiometer model EPLB						
STROKE mm from 50 to 750 see table for stroke availability						
ENCLOSURE RATING IP 65 S						
TRAVEL SPEED max 5 m/s 5						
OUTPUT TYPE cable (standard length 1 m) P 3 pin connector C3 DIN 43650-C 4 pin connector C4 M16 DIN 43322 5 pin connector C5						
OUTPUT DIRECTION radial R						

EPLB



dimensions in mm

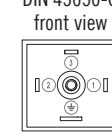
CONNECTIONS

Function	Cable	3 pin C3	4 pin C4	5 pin C5
+	blue	3	3	3
-	brown	1	1	1
OUTPUT	yellow	2	2	2
NC	/	/	4	4
NC	/	/	/	5

C3 connector (3 pin) front view



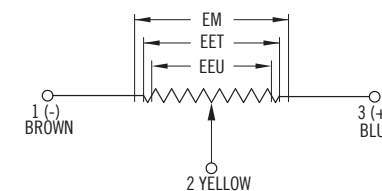
C4 connector (4 pin) DIN 43650-C front view



C5 connector (5 pin) DIN 43322 front view



socket connector not included, please refer to Accessories



ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite
Independent linearity	± 0,05 %
Repeatability	0,01 mm
Resistance tolerance	± 20 %
Recommended cursor current	< 0,1 µA
Output voltage temperature coefficient	≤ 1,5 ppm / °C
Power dissipation	3 W at 40 °C / 0 W at 120 °C
Max cursor current	10 mA
Applicable voltage	60 V max
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1 bar, 2 s
Cable type	shielded - fixed installation conductors section 0,20 mm²/AWG 24 bending radius min 40 mm
RoHS	according to 2011/65/EU directive

Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 300 - 400 - 450 - 500 - 600 - 750 mm
Useful electric stroke (EEU) (+3/-0 mm)	see stroke (mm)
Theoretical electric stroke (EET) (±1 mm)	EEU + 3 mm (50 ... 150), EEU + 4 mm (200 ... 300), 406 mm (400), 457 mm (450), 508 mm (500), 609 mm (600), 762 mm (750)
Mechanical stroke (EM)	EEU + 9 mm (50 ... 150), EEU + 10 mm (200 ... 300), 412 mm (400), 463 mm (450), 518 mm (500), 619 mm (600), 772 mm (750)
Resistance (on the EET)	5 kΩ (50 ... 600) 10 kΩ (750)
Case length (LP)	EEU + 130,5 mm (50 ... 150), EEU + 131,5 mm (200 ... 300), 539,5 mm (400), 590,5 mm (450), 665,5 mm (500), 766,5 mm (600), 919,5 mm (750)
Minimum interaxis length (A)	EEU + 177 mm (50 ... 150), EEU + 178 mm (200 ... 300), 586 mm (400), 637 mm (450), 712 mm (500), 813 mm (600), 966 mm (750)
Travel speed	5 m/s max
Enclosure rating	IP 65 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)
Displacement force	≤ 15 N (3,37 lbs)
Moving angle	± 25° max
Housing material	anodized aluminium / Nylon 66 G
Rod material	stainless steel
Mounting	2 selfloading and selfaligning ball-joints
Life	> 25 x 10 ⁶ m strokes or > 100 x 10 ⁶ manoeuvres
Operating temperature^{1,2}	-30° ... +100°C (-22° ... +212°F)
Storage temperature²	-50° ... +120°C (-58° ... +248°F)

¹ measured on transducer

² condensation not allowed

Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

MAIN CHARACTERISTICS

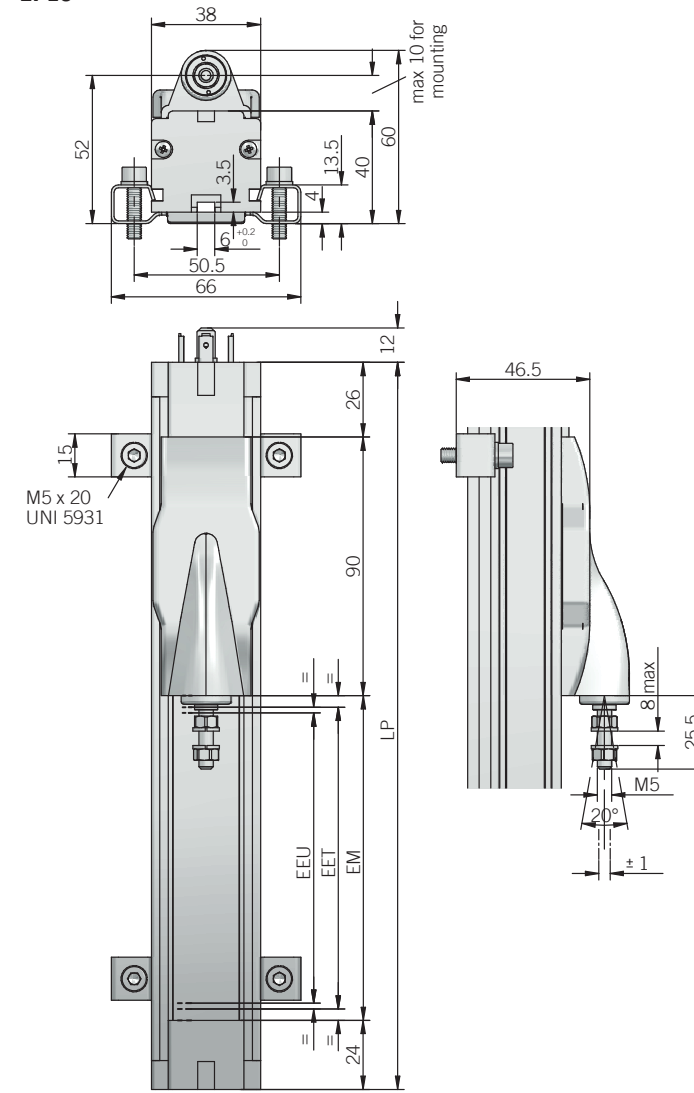
EPLC is an absolute linear potentiometer transducer without internal rod. This transducer is characterized by a cursor with integrated coupling sliding on the axis. The main characteristic is the absence of variations on the electrical output signal outside of the theoretical electrical stroke.



ORDERING CODE

	EPLC	500	X	4	C4	A
SERIES rodless linear potentiometer model EPLC						
STROKE mm from 100 to 1500 see table for stroke availability						
ENCLOSURE RATING IP 40 X						
TRAVEL SPEED max 4 m/s 4 max 10 m/s 10						
OUTPUT TYPE DIN 43650-A 4 pin connector C4 M16 DIN 43322 5 pin connector C5						
OUTPUT DIRECTION axial A						

EPLC

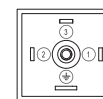


dimensions in mm

CONNECTIONS

Function	4 pin C4	5 pin C5
+	3	3
-	1	1
OUTPUT	2	2
NC	4	4
NC	/	5

C4 connector (4 pin)
DIN 43650-C
front view



C5 connector (5 pin)
DIN 45322
front view



- fixing kit (brackets, screws, grower) included
- socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite
Independent linearity	± 0,05 %
Repeatability	0,01 mm
Resistance tolerance	± 20 %
Recommended cursor current	< 0,1 µA
Resistance temperature coefficient	-200 ... 200 ppm / °C typical
Output voltage temperature coefficient	≤ 5 ppm / °C typical
Power dissipation	3 W at 40 °C / 0 W at 120 °C
Max cursor current	10 mA max
Applicable voltage	60 V max
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1bar, 2 s
RoHS	according to 2011/65/EU directive

Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

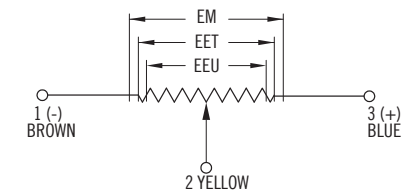
Stroke	100 - 150 - 200 - 300 - 400 - 500 - 600 - 700 - 850 - 900 - 1000 - 1250 - 1500 mm
Useful electric stroke (EEU) (+3/-0 mm)	see stroke (mm)
Theoretical electric stroke (EET) (±1 mm)	103 mm (100), 153 mm (150), 204 mm (200), 305 mm (300), 406 mm (400), 509 mm (500), 611 mm (600), 713 mm (700), 865 mm (850), 915 mm (900), 1017 mm (1000), 1271 mm (1250), 1521 mm (1500)
Mechanical stroke (EM)	EET + 10mm (100 ... 1500)
Resistance (on the EET)	5 kΩ (100 ... 300) 10 kΩ (400 ... 1000) 20 kΩ (1250 ... 1500)
Case length (LP)	EET + 150mm (100 ... 1500)
Travel speed	4 = 4 m/s max 10 = 10 m/s max
Acceleration	200 m/s ² max
Enclosure rating	IP 40 (IEC 60529)
Shock	50 G, 11 ms (IEC 60068-2-27)
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)
Displacement force	≤ 1,2 N (0,27 lbs) max
Housing material	anodized aluminium / Nylon 66 G 25
Mounting	brackets with variable center-to-center distance with M6 screw ISO4017 - DIN933
Operating temperature^{1,2}	-30° ... +100°C (-22° ... +212°F)
Storage temperature²	-50° ... +120°C (-58° ... +248°F)

¹ measured on transducer

² condensation not allowed

Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level



MAIN CHARACTERISTICS

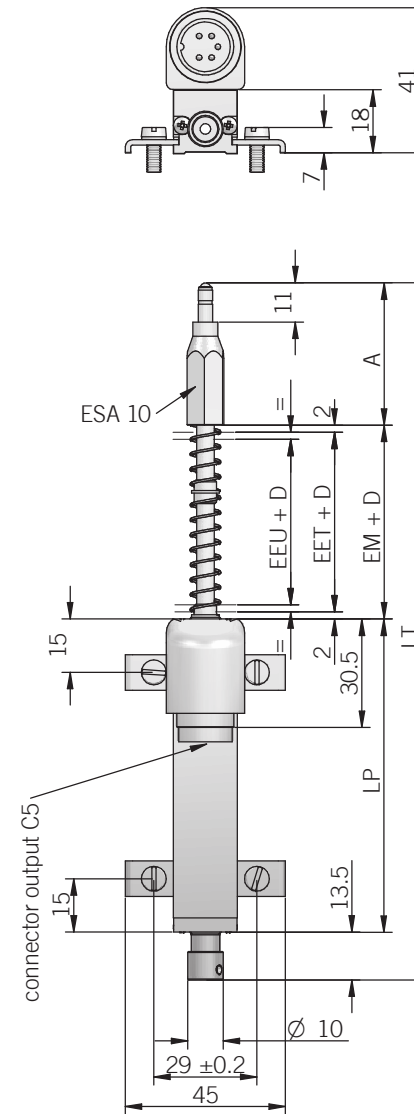
EPLT is an absolute linear potentiometer transducer. This model is characterized by the absence of cursor and the presence of a sensing system, composed by a moving rod, stainless steel sphere mounted on a threaded tip with a spring. This transducer is suitable for applications where short strokes are requested. The presence of the spring assures an automatic head positioning making this device suitable for being used in precise applications on cams or to control products coming from automatic production line. EPLT is also characterized by the absence of variations on the electrical output signal outside of the theoretical electrical stroke.



ORDERING CODE

EPLT	100	X	10	P	A
SERIES linear potentiometer with ball tip EPLT					
STROKE 10 / 25 / 50 / 75 / 100 please contact our offices for other strokes					
ENCLOSURE RATING IP 40 X					
TRAVEL SPEED max 10 m/s 10					
OUTPUT TYPE cable (standard length 1 m) P M16 DIN 43322 5 pin connector C5					
OUTPUT DIRECTION axial A					

EPLT



dimensions in mm

CONNECTIONS

Function	Cable P	5 pin C5
+	blue	3
-	brown	1
OUTPUT	yellow	2
NC	/	4
NC	/	5

C5 connector (5 pin)
DIN 45322
front view



- fixing kit (brackets, M4x10 screws, washer) and tip with ball included
- socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite					
Stroke	mm	10	25	50	75	100
Independent linearity	%	± 0,3	± 0,2	± 0,1	± 0,1	± 0,1
Resistance tolerance	± 20 %					
Recommended cursor current	< 0,1 µA					
Output voltage temperature coefficient	< 1,5 ppm / °C					
Power dissipation at 40 °C (0 W at +120 °C)	W	0,2	0,6	1,2	1,8	2,4
Max cursor current	10 mA max					
Max applicable voltage	V	14	25	60	60	60
Electrical insulation	> 100 MΩ, 500 V DC, 1 bar, 2 s					
Dielectric strenght	< 100 µA, 500 V AC, 50 Hz, 1bar, 2 s					
Cable type	shielded - fixed installation conductors section 0,20 mm²/ AWG 24 bending radius min 40 mm					
RoHS	according to 2011/65/EU directive					

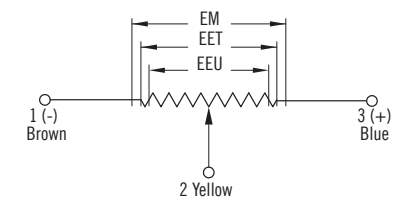
Important: data are valid if the transducer is used as a ratiometric device with a maximum applicable current ≤ 0,1 µA

MECHANICAL SPECIFICATIONS

Stroke	mm	10	25	50	75	100
Useful electric stroke (EEU) (+1/-0 mm)	mm	10	25	50	76	101
Theoretical electric stroke (EET) (±1 mm)	mm	11	26	51	76	101
Mechanical stroke (EM)	mm	15	30	55	81	106
Resistance (on EET)	kΩ	1	1	5	5	5
Case length (LP)	mm	48	63	88	114	139
Sensing probe length	mm	32	32	40	40	40
Additional length (D)	mm	-	-	-	5	11
Total length (LT)	mm	108	138	196	251	307
Travel speed	10 m/s max					
Enclosure rating	IP 40 (IEC 60529)					
Shock	50 G, 11 ms (IEC 60068-2-27)					
Vibration	20 G, 5 ... 2000 Hz (IEC 60068-2-6)					
Displacement force	≤ 4 N (0,9 lbs)					
Housing material	anodized aluminium / Nylon 66 G 25					
Rod material	stainless steel					
Mounting	brackets with variable center-to-center distance					
Life	> 25 x 10 ⁶ m strokes or > 100 x 10 ⁶ operations					
Operating temperature^{1,2}	-30° ... +100°C (-22° ... +212°F)					
Storage temperature²	-50° ... +120°C (-58° ... +248°F)					

¹ measured on transducer

² condensation not allowed



Installation warning instructions:

- connect the transducer according to the reported connections
- DO NOT use it as a variable resistance
- the transducer calibration has to be done setting the stroke in order to have an output signal between 1 % and 99 % of the voltage level

MAIN CHARACTERISTICS

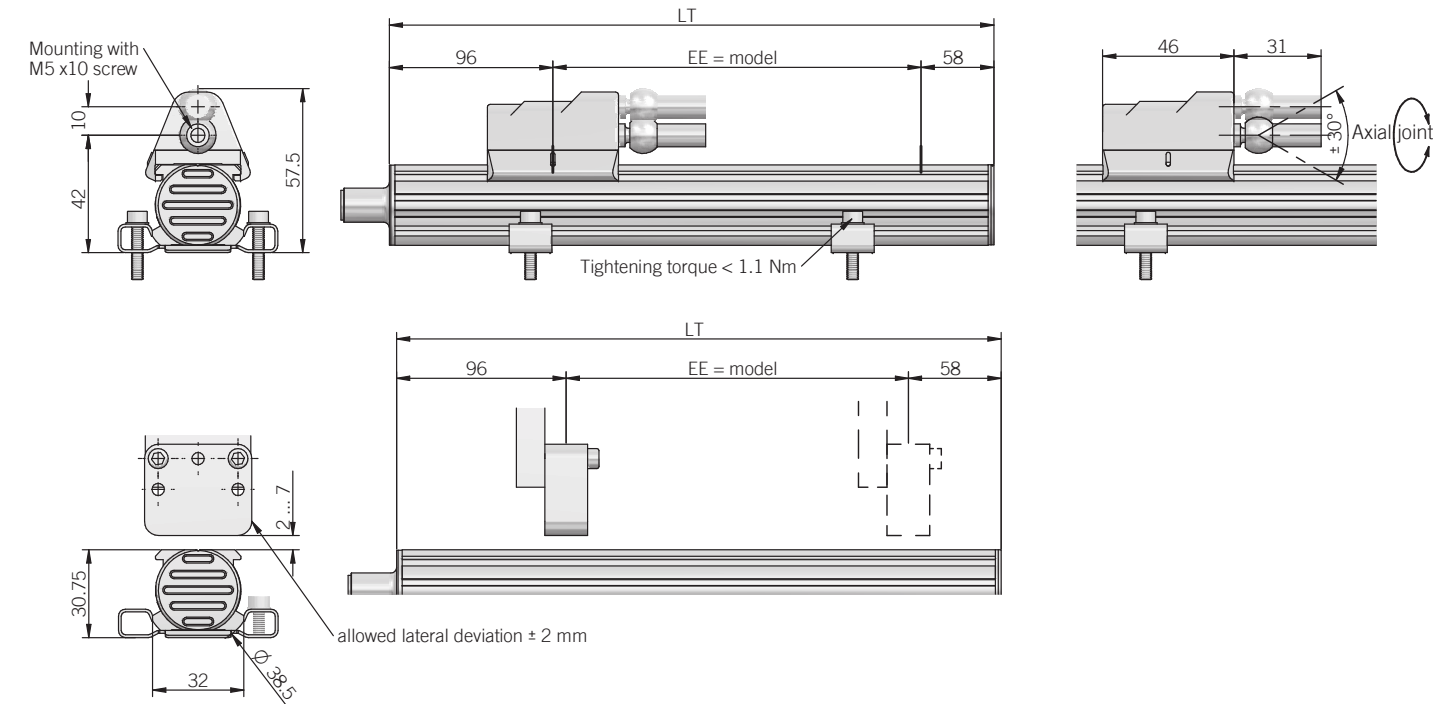
EMSPA is an absolute linear magnetostrictive transducer with analog interface. Thanks to the absence of electrical contact on the enclosure there is no issue of wear and deterioration during working life. Magnetostrictive technology guarantees great performances of speed and accuracy. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure.



ORDERING CODE

EMSPA	500	S	20D	10	P	A
linear magnetostrictive transducer with analogue output						
SERIES EMSPA						
STROKE mm from 50 to 1500 see table for stroke availability						
ENCLOSURE RATING IP 67 S						
OUTPUT SIGNAL 0 ... 10 V DC / 1 cursor (standard) 10S 0 ... 10 V DC / 1 cursor position/speed 10P 0 ... 10 V DC / 2 cursors (min. stroke 400 mm) 10D 4 ... 20 mA / 1 cursor 20S 4 ... 20 mA / 1 cursor position/speed 20P 4 ... 20 mA / 2 cursors (min. stroke 400 mm) 20D						
TRAVEL SPEED max 10 m/s 10						
OUTPUT TYPE cable (standard length 1 m) P M12 5 pin connector S5 M12 8 pin connector S8 M16 DIN 45322 6 pin connector C6 M16 DIN 45326 8 pin connector C8						
OUTPUT DIRECTION axial A						

EMSPA



dimensions in mm

brackets, cursors and socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	16 bit (max electrical noise 5 mVpp)	
Output signal	0 ... 10 V DC	4 ... 20 mA
Output alarm value	10,5 V DC	21 mA
Output max value	12 V DC	30 mA
Power supply¹	19,2 ... 28,8 V DC	
Power ripple	1 Vpp max	
Current consumption	70 mA max	90 mA max
Output load	5 kΩ	< 500 Ω
Output ripple	< 5 mVpp	
Independent linearity	≤ ± 0,01 % FS (min ± 0,060 mm) typical with sliding cursor ≤ ± 0,02 % FS with floating cursor (working distance 2 ... 5 mm) ≤ ± 0,04 % FS with floating cursor (working distance 5 ... 7 mm)	
Repeatability	< 0,01 mm	
Hysteresis	< 0,01 mm	
Sampling time	0,5 ms (50 ... 300) 1 ms (350 ... 1100) 1,5 ms (1200 ... 1500)	
Protection against overvoltage	yes	
Protection against polarity inversion	yes	
Protection against power supply on output	yes	
Electrical insulation	500 V DC	
Cable type	shielded - fixed installation conductors section 0,25 mm ² / AWG 24 bending radius min 40 mm	
Electromagnetic compatibility	according to 2014/30/EU directive	
RoHS	according to 2011/65/EU directive	

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 - 1300 - 1400 - 1500 mm
Electric stroke (EE)	see stroke (mm)
Overall dimension (LT)	EE + 154 mm
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement / speed
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Speed measurement range	0 ... 10 m/s
Speed accuracy	< 2 %
Shock	100 G, 11 ms, single shock (IEC 60068-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 680068-2-6)
Housing material	anodized aluminium / Nylon 66 G 25
Cursor type	sliding or floating cursor
Temperature coefficient	0,005 % FS / °C
Operating temperature^{2,3}	-30° ... +75°C (-22° ... +167°F)
Storage temperature³	-40° ... +100°C (-40° ... +212°F)

¹ as measured at the transducer without cable influences

³ measured on transducer

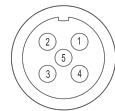
⁴ condensation not allowed

CONNECTIONS

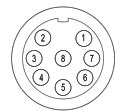
Function	Cable P	5 pin M12 S5	8 pin M12 S8	6 pin M16 C6	8 pin M16 C8
+ V DC	brown	5	7	5	7
0 V	white	4	6	6	8
Output cursor 1 0 ... 10 V 4 ... 20 mA	grey	1	5	1	5 (1*)
0V cursor 1	pink	2	1	2	2
Inverse output cursor 1 Output cursor 2 Output speed 10 ... 0 V 20 ... 4 mA	yellow	3	3	3	3
0 V Output cursor 1 Output cursor 2 Output speed	pink	2	2	4	6
NC	/	/	4	/	4
NC	/	/	8	/	/

* only with 4 ... 20 mA output

S5 connector (5 pin)
M12 A coded
front view



S8 connector (8 pin)
M12 A coded
front view



C6 connector (6 pin)
DIN 45322
front view

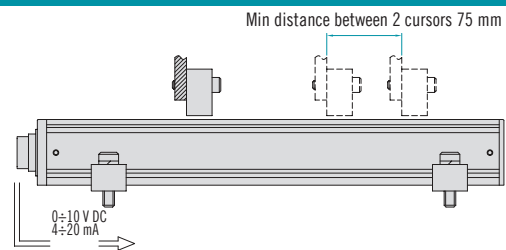


C8 connector (8 pin)
DIN 45326
front view



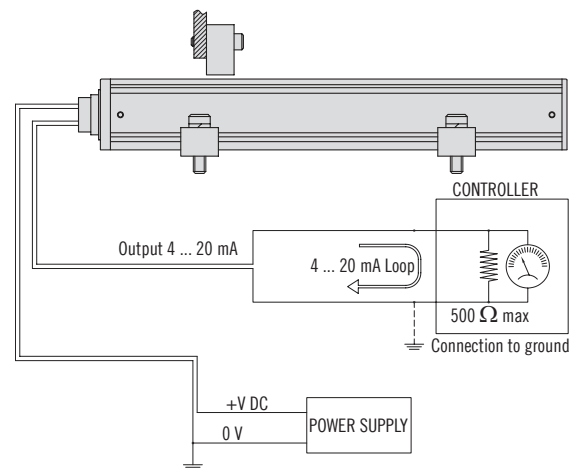
The transducer enclosure has to be connected to ground only on the control system side by the cable shield.
To guarantee the correct electrical insulation of the transducer from the machine, always assemble the brackets using the plastic washers included.

INSTALLATION EXAMPLE



For multi-cursor model, the cursors have to work in the same conditions of distance and temperature. Cursors must be installed on a support made of non-magnetic material (like brass, aluminium or AISI316 stainless steel).
The installation kit provides two screws, two nuts and two washers (all made of brass).
The cursor must be installed with maximum attention to horizontal alignment with the transducer axis (maximum tolerance is ± 2 mm), distance from the transducer surface has to be within the range from 2 to 7 mm.

APPLICATION EXAMPLE (CURRENT OUTPUT)



MAIN CHARACTERISTICS

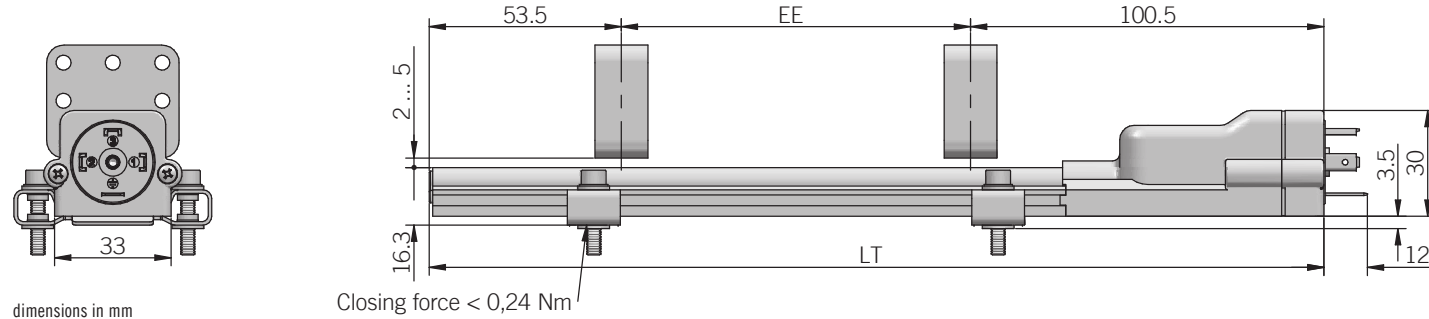
EMSPB is an absolute linear magnetostrictive transducer with analogue interface.
Thanks to the absence of electrical contact on the enclosure there is no issue of wear and deterioration during working life.
Magnetostrictive technology guaranties great performances of speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure.



ORDERING CODE

EMSPB	1000	S	10S	10	C4	A
linear magnetostrictive transducer with analogue output						
SERIES EMSPB						
STROKE mm from 50 to 1500 see table for stroke availability						
ENCLOSURE RATING IP 65 S						
OUTPUT SIGNAL 0,1 ... 10,1 V DC / 1 cursor (standard) 10S 4 ... 20 mA / 1 cursor 20S						
TRAVEL SPEED max 10 m/s 10						
OUTPUT TYPE DIN 43650-A 4 pin connector C4 M12 5 pin connector S5						
OUTPUT DIRECTION axial A						

EMSPB



dimensions in mm

brackets, cursors and socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	virtually infinite limited only by electrical noise 5 mVpp	
Output signal	0,1 ... 10,1 V DC	4 ... 20 mA
Output alarm value in absense of cursor	10,5 V DC	21 mA
Output value max	12 V DC	30 mA
Power supply ¹	19,2 ... 28,8 V DC	
Power ripple	1 Vpp max	
Current consumption	35 mA max	60 mA max
Output load	≥ 10 kΩ	50 ... 500 Ω
Independent linearity	± 0,04 % FS max (min ± 0,09 mm)	
Repeatability	≤ 0,01 mm (typical)	
Hysteresis	≤ 0,02 mm (typical)	
Sampling time	1 ms (50 ... 600) 1,5 ms (650 ... 900) 2 ms (1000 ... 1300) 3 ms (1400 ... 1500)	
Protection against overvoltage	yes	
Protection against polarity inversion	yes	
Protection against power supply on output	yes	
Electrical insulation	500 V DC	
Electromagnetic compatibility	according to 2014/30/EU directive	
RoHS	according to 2011/65/EU directive	

¹ as measured at the transducer without cable influences

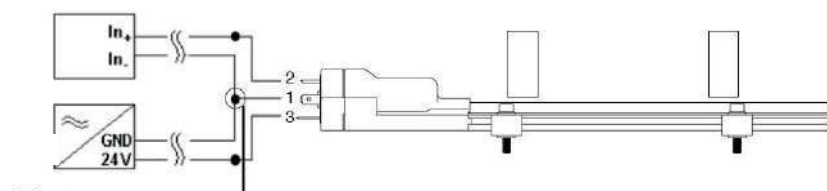
^{2,3} measured on transducer

³ condensation not allowed

INSTALLATION NOTES

For multi-cursor model, the cursors have to work in the same conditions of distance and temperature. Cursors must be installed on a support made of non-magnetic material (like brass, aluminium or AISI316 stainless steel). The installation kit provides two screws, two nuts and two washers (all made of brass). The cursor must be installed with maximum attention to horizontal alignment with the transducer axis (maximum tolerance is ± 2 mm), distance from the transducer surface has to be within the range from 2 to 5 mm.

APPLICATION EXAMPLE (CURRENT OUTPUT)



Note: connect as close as possible to the transducer

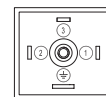
MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 225 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 - 1300 - 1400 - 1500 mm
Electric stroke (EE)	see stroke (mm)
Overall dimension (LT)	EE + 154 mm
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Shock	100 G, 11 ms, single shot (IEC 68000-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 68000-2-6)
Housing material	anodized aluminium / Nylon 66 G 25
Cursor type	floating cursor
Temperature coefficient	≤ 0,01 % FS / °C (min. 0,015 mm / °C)
Operating temperature ^{2,3}	-20° ... +75°C (-4° ... +167°F)
Storage temperature ³	-40° ... +100°C (-40° ... +212°F)

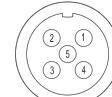
CONNECTIONS

Function	4 pin C4	M12 5 pin S5
+V DC	3	5
0 V	1	4
OUTPUT	2	1
0 V output	/	2
NC	/	3
⊕	4	housing

C4 connector (4 pin)
DIN 43650-A
front view



M12 connector (5 pin)
M12 A coded
front view



MAIN CHARACTERISTICS

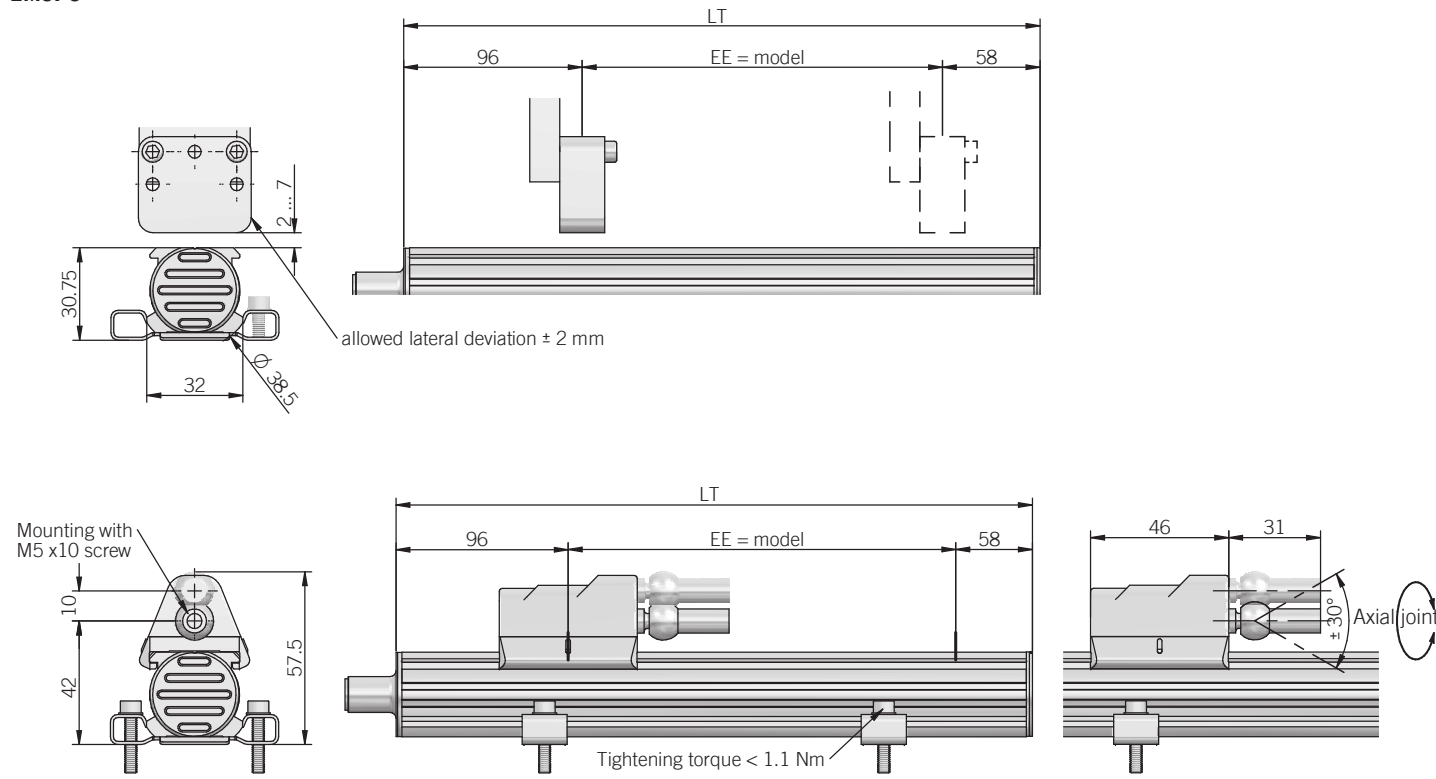
EMSPS is an absolute linear magnetostrictive transducer with SSI output. The main characteristic of magnetostrictive transducers is the absence of electric contact on the enclosure there is no issue of wear and deterioration during working life guaranteeing high displacement speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure.



ORDERING CODE

EMSPS	500	S	25	G	10	R5	P	A
linear magnetostrictive transducer with SSI output EMSPS								
SERIES		EMSPS						
STROKE		mm from 50 to 1500 see table for stroke availability						
ENCLOSURE RATING		IP 67 S						
DATA LENGTH		(FM357) 21+1 bit 21 24 bit 24 25 bit 25						
CODE TYPE		binary B gray G						
TRAVEL SPEED		max 10 m/s 10						
RESOLUTION		0,002 mm R2 0,005 mm R5 0,010 mm R10 0,020 mm R20 0,040 mm R40						
OUTPUT TYPE		cable (standard length 1 m) P DIN 45322 M16 6 pin connector C6 DIN 45326 M16 8 pin connector C8 M12 8 pin connector S8						
OUTPUT DIRECTION		axial A						

EMSPS



dimensions in mm
brackets, cursors and socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	2 - 5 - 10 - 20 - 40 μm
Independent linearity	≤ ± 0,01 % FS (min ± 0,060 mm) typical with sliding cursor ≤ ± 0,02 % FS typical with floating cursor
Repeatability	< 0,01 mm
Hysteresis	≤ ± 0,005 % FS (min 0,010 mm)
Power supply¹	10 ... 32 V DC
Power ripple	1 Vpp max
Max load current	50 mA max
Electrical interface	RS-422
SSI output code	binary or gray
Clock frequency	50 kHz ... 1 MHz
SSI monostable time (Tm)	16 μs
SSI frame	21 / 24 / 25 bit data length
Counting direction	increase
Protection against overvoltage	yes
Protection against polarity inversion	yes
Self-resetting internal fuse	yes
Electrical insulation	500 V DC (+V DC / earth)
Cable type	twisted pair shielded - fixed installation conductors section 0,22 mm ² / AWG 24 bending radius min 75 mm
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive

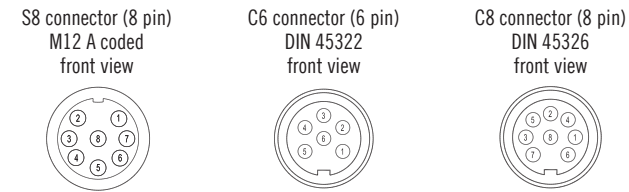
MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1100 - 1200 - 1300 - 1400 - 1500 mm
Electric stroke (EE)	see stroke (mm)
Overall dimensions (LT)	EE + 154 mm
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Scale orientation	increasing
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Shock	100 G, 11 ms, single shot (IEC 68000-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 68000-2-6)
Housing material	anodized aluminium / Nylon 66 G 25
Cursor type	sliding or floating cursor
Temperature coefficient	20 ppm FS / °C
Operating temperature^{2,3}	-30° ... +90°C (-22° ... +194°F)
Storage temperature³	-40° ... +100°C (-40° ... +212°F)

¹ as measured at the transducer without cable influences
² measured on transducer
³ condensation not allowed

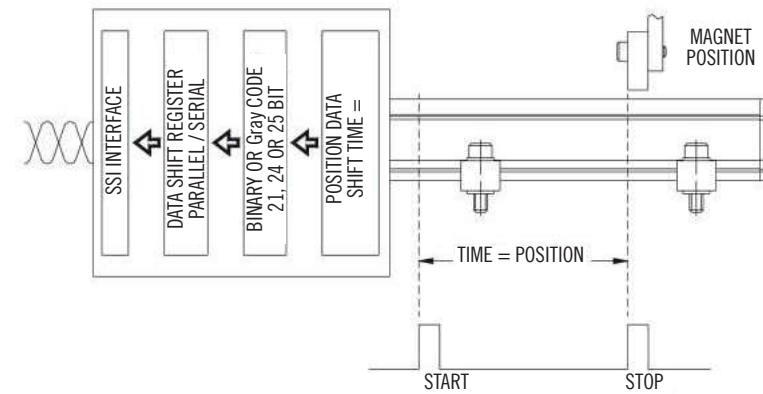
CONNECTIONS

Function	Cable P	8 pin M12 S8	6 pin M16 C6	8 pin M16 C8
+ V DC	blue / white	7	5	7
0 V	blue	6	6	6
DATA +	orange / white	2	2	2
DATA -	orange	5	1	5
CLOCK +	green / white	3	3	1
CLOCK -	green	1	4	3
NC	/	4	/	4
NC	/	8	/	8



The transducer enclosure and cable shield have to be connected to ground on both sides.

SSI BLOCK DIAGRAM

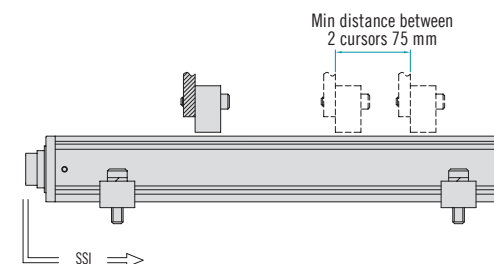


SSI output goes to 0 if the echo is absent (magnet out of measurement range or internal device error)

SSI CABLE LENGTH

Cable length	< 3 m	< 50 m	< 100 m	< 200 m	< 400 m
Baud rate	1 Mbaud	400 kbaud	300 kbaud	200 kbaud	100 kbaud

INSTALLATION EXAMPLE



For multi-cursor model, the cursors have to work in the same conditions of distance and temperature. Cursors must be installed on a support made of non-magnetic material (like brass, aluminium or AISI316 stainless steel). The installation kit provides two screws, two nuts and two washers (all made of brass). The cursor must be installed with maximum attention to horizontal alignment with the transducer axis (maximum tolerance is ± 2 mm), distance from the transducer surface has to be within the range from 2 to 7 mm.

MAIN CHARACTERISTICS

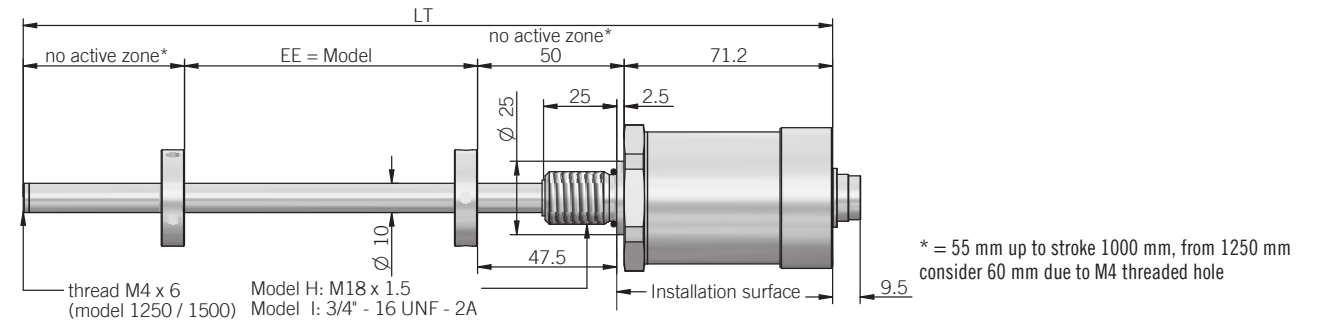
EMSSA is an absolute linear magnetostrictive transducer with analogue output. Main characteristics of magnetostrictive transducers is the absence of electric contact on the enclosure there is no issue of wear and deterioration during working life guaranteeing high displacement speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure. This series has been designed for being mounted internally to high applications (350 bar, 500 bar peak) such as hydraulic or pneumatic cylinders.



ORDERING CODE

EMSSA	500	S	10	H	10	P	A
linear magnetostrictive transducer with analogue output							
SERIES EMSSA							
STROKE mm from 50 to 1500 see table for stroke availability							
ENCLOSURE RATING IP 67 S							
OUTPUT SIGNAL 0 ... 10 V DC 10 4 ... 20 mA 20							
THREAD TYPE M18 x 1,5 H 3/4" - 16 UNF I							
DISPLACEMENT SPEED max 10 m/s 10							
OUTPUT TYPE cable (standard length 1 m) P DIN 45322 M16 6 pin connector C6							
OUTPUT DIRECTION axial A							

EMSSA



dimensions in mm

- OR 15,4 x 2,1 (mod.H) / OR 16,36 x 2,21 (mod.I) included
- Cursors and socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	16 bit (max electrical noise 5 mVpp)	
Output signal	0 ... 10 V DC	4 ... 20 mA
Output alarm value	10,5 V DC	21 mA
Output value max	12 V DC	30 mA
Power supply¹	19,2 ... 28,8 V DC	
Power ripple	1 Vpp max	
Current consumption	70 mA max	90 mA max
Output load	5 kΩ	< 500 Ω
Output ripple	< 5 mVpp	
Independent linearity	≤ ± 0,02 % FS (min ± 0,060 mm)	
Repeatability	< 0,01 mm	
Hysteresis	< 0,01 mm	
Sampling time	0,5 ms (mod. 50 ... 200) 1 ms (mod. 400 ... 1000) 1,5 ms (mod. 1250 ... 1500)	
Protection against overvoltage	yes	
Protection against polarity inversion	yes	
Protection against power supply on output	yes	
Electrical insulation	500 V DC	
Cable type	shielded - fixed installation conductors section 0,25 mm ² / AWG 24 bending radius min 40 mm	
Electromagnetic compatibility	according to 2014/30/EU directive	
RoHS	according to 2011/65/EU directive	

MECHANICAL SPECIFICATIONS

Stroke	50 - 100 - 150 - 200 - 250 - 300 - 350 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1250 - 1500 mm
Electric stroke (EE)	see stroke (mm)
Overall dimensions (LT)	EE + 176,2 mm (mod. 50 ... 900) EE + 181,2 mm (mod. 1000 ... 1500)
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Speed measurement range	0 ... 10 m/s
Speed accuracy	< 2 %
Shock	100 G, 11 ms, single shock (IEC 60068-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 680068-2-6)
Rod / housing material	1.4401 / AISI 316 stainless steel
Operative pressure	350 bar (500 bar peak)
Cursor type	floating cursor
Temperature coefficient	≤ 0,01 % FS / °C
Operating temperature^{2,3}	-30° ... +75°C (-22° ... +167°F)
Storage temperature³	-40° ... +100°C (-40° ... +212°F)

¹ as measured at the transducer without cable influences

³ measured on transducer

⁴ condensation not allowed

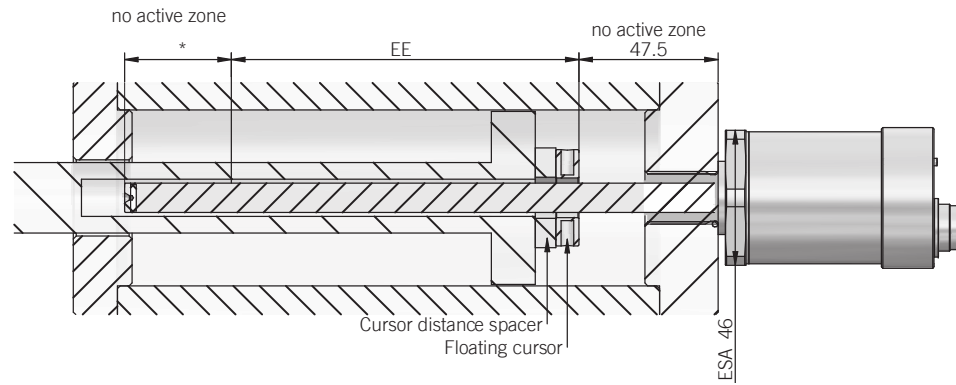
CONNECTIONS

Function	Cable P	6 pin M16 C6
+ V DC	brown	5
0 V	white	6
Output cursor 1 0 ... 10 V 4 ... 20 mA	grey	1
0 V cursor 1	pink	2
Inverse output cursor 1 10 ... 0 V 20 ... 4 mA	yellow	3
0 V inverse output cursor 1	pink	4

C6 connector (6 pin)
DIN 45322
front view



INSTALLATION EXAMPLE



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

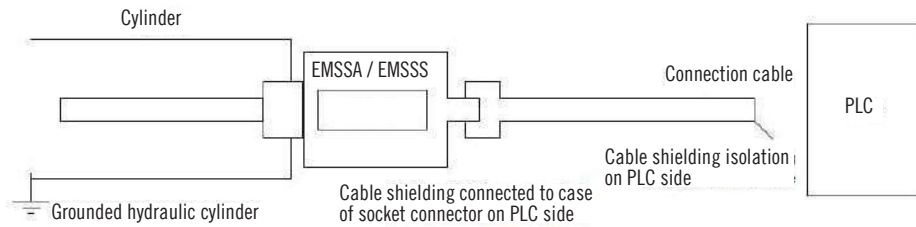
For correct installation of rod-type magnetostrictive transducers in hydraulic cylinders, remember that the cylinder head must be made of non-magnetic material where the threaded hole will be drilled to install the transducer. If not, the residual magnetisation caused by drilling the threaded hole must be less than 4 Gauss. Sealing surface must be free from scratches longitudinal or spiral

Ro 1,6 µm for sealing with non pulsating pressure
Ro 0,8 µm for seals with pulsating pressure

Suggested o-ring (model H)
Parker 6-349 15,4 x 2,1
Material: Viton 90° Shore A
Mixes: Parker N552-90

Suggested o-ring (model I)
Parker 3-908 16,36 x 2,21
Material: Viton 90° Shore A
Mixes: Parker N552-90

ELECTRICAL CONNECTION EXAMPLE



The transducer must be installed away from sources of magnetic fields, both static and 50 Hz (electric motors, solenoids, etc.).

- with floating cursor assembly support must be made with nonmagnetic material
- the transducer connection cable must be wired separate from power cables and/or solenoid controls, drives, or remote switches
- power supply must be drawn from dedicated power supply and connected directly to power terminals as near as possible
- since the transducer cursor is a magnet, make sure there are no iron filings or small fragments of magnetic metal near the transducer. This could produce an accumulation of material on the cursor, with consequent sliding problems
- if the transducer is installed in a cylinder isolated from the ground, the cable shielding on PLC side must be grounded
- with multiple cursors (two or more), cursors distance must be minimum 75 mm each

MAIN CHARACTERISTICS

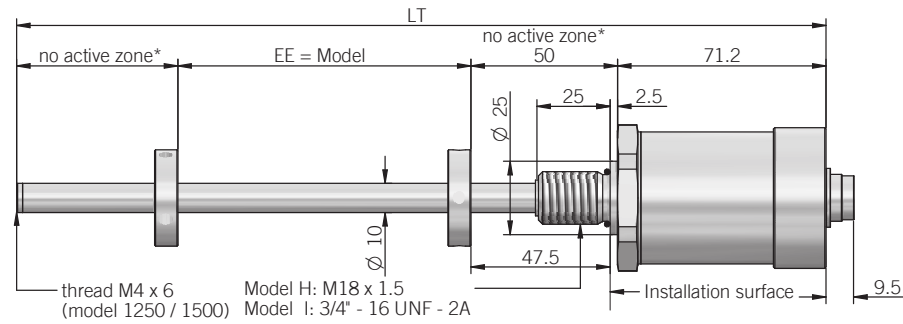
EMSSS is an absolute linear magnetostrictive transducer with SSI output. Main characteristics of magnetostrictive transducer is the absence of electric contact on the enclosure so there is no issue of wear and deterioration during working life guaranteeing high displacement speed and precision. High reliability and simple installation even for applications with mechanical stresses, shocks or high contamination are assured by the compact size and the rugged enclosure. This series has been designed for being mounted internally to high pressure (350 bar, 500 bar peak) such as hydraulic or pneumatic cylinders.



ORDERING CODE

EMSSS	500	S	24	G	H	10	R5	P	A
linear magnetostrictive transducer with SSI output	SERIES								
	EMSSS								
	STROKE								
	mm from 100 to 1500								
	see table for stroke availability								
	ENCLOSURE RATING								
	IP 67								
	DATA LENGTH								
	(FM357) 21+1 bit 21								
	24 bit 24								
	25 bit 25								
	CODE TYPE								
	binary B								
	gray G								
	THREAD TYPE								
	M18 x 1,5 H								
	3/4" - 16 UNF I								
	DISPLACEMENT SPEED								
	max speed 10 m/s 10								
	RESOLUTION								
	0,005 mm R5								
	0,010 mm R10								
	0,020 mm R20								
	0,040 mm R40								
	OUTPUT TYPE								
	cable (standard length 1 m) P								
	DIN 45322 M16 6 pin connector C6								
	OUTPUT DIRECTION								
	axial A								

EMSSS



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

dimensions in mm

- OR 15,4 x 2,1 (mod.H) / OR 16,36 x 2,21 (mod.I) included
- Cursors and socket connector not included, please refer to Accessories

ELECTRICAL SPECIFICATIONS

Resolution	5 - 10 - 20 - 40 µm
Independent linearity	± 0,02 % FS (min ± 0,060 mm)
Repeatability	< 0,01 mm
Hysteresis	± 0,005 % FS (min 0,010 mm)
Sampling time	1 ms (mod. 100 ... 1000) 2 ms (mod. 1250 ... 1500)
Power supply ¹	10 ... 32 V DC
Power ripple	1 Vpp max
Max load current	50 mA max
Electrical interface	RS-422
SSI output code	binary or gray
Clock frequency	50 kHz ... 1 MHz
SSI monostable time (Tm)	16 µs
SSI frame	21 / 24 / 25 bit data length
Counting direction	increase
Protection against overvoltage	yes
Protection against polarity inversion	yes
Self-resetting internal fuse	yes
Electrical insulation	500 V DC (+V DC / earth)
Cable type	twisted pair shielded - fixed installation conductors section 0,22 mm ² / AWG 24 bending radius min 75 mm
Electromagnetic compatibility	according to 2014/30/EU directive
RoHS	according to 2011/65/EU directive

MECHANICAL SPECIFICATIONS

Stroke	100 - 150 - 200 - 300 - 400 - 450 - 500 - 600 - 700 - 800 - 900 - 1000 - 1250 - 1500 mm
Electric stroke (EE)	see model (mm)
Overall dimensions (LT)	EE + 176,2 mm (mod. 100 ... 1000) EE + 181,2 mm (mod. 1250 ... 1500)
Enclosure rating	IP 67 (IEC 60529)
Detected measurement	displacement
Travel speed	10 m/s max
Acceleration	100 m/s ² max
Speed measurement range	min 0 ... 0,1 m/s max 0 ... 10 m/s
Speed accuracy	< 2 %
Shock	100 G, 11 ms, single shock (IEC 60068-2-27)
Vibration	12 G, 10 ... 2000 Hz (IEC 680068-2-6)
Rod / housing material	1.4401 / AISI 316 stainless steel
Operative pressure	500 bar
Cursor type	floating cursor
Temperature coefficient	20 ppm FS / °C
Operating temperature ^{2,3}	-30° ... +90°C (-22° ... +194°F)
Storage temperature ³	-40° ... +100°C (-40° ... +212°F)

¹ as measured at the transducer without cable influences

³ measured on transducer

⁴ condensation not allowed

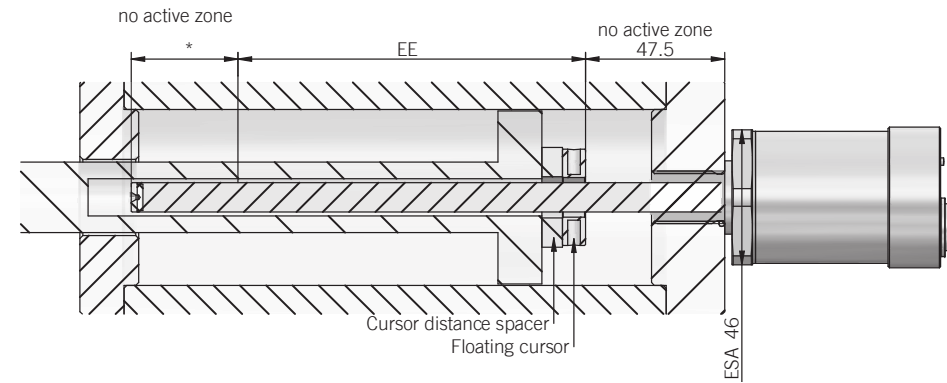
CONNECTIONS

Function	Cable P	6 pin M16 C6
+ V DC	blue / white	5
0 V	blue	6
DATA +	brown / white	2
DATA -	orange	1
CLOCK +	green / white	3
CLOCK -	green	4

C6 connector (6 pin)
DIN 45322
front view



INSTALLATION EXAMPLE



* = 55 mm up to stroke 1000 mm, from 1250 mm consider 60 mm due to M4 threaded hole

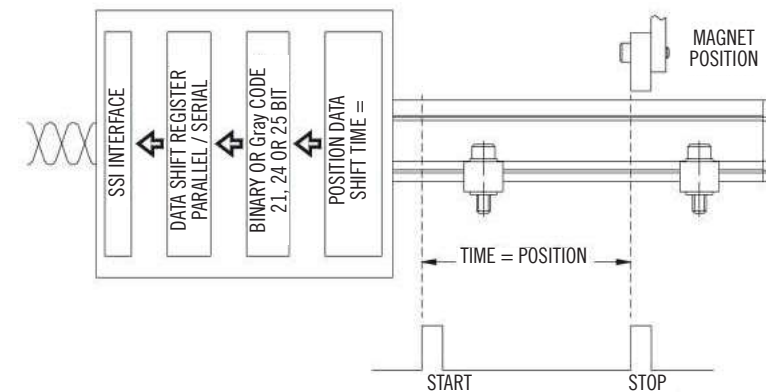
For the correct installation of rod-type magnetostrictive transducers in hydraulic cylinders, remember that the cylinder head must be made of non-magnetic material where the threaded hole will be drilled to install the transducer. If not, the residual magnetisation caused by drilling the threaded hole must be less than 4 Gauss. Sealing surface must be free from scratches longitudinal or spiral

- Ro 1,6 µm for sealing with non pulsating pressure
- Ro 0,8 µm for seals with pulsating pressure

Suggested o-ring (model H)
Parker 6-349 15,4 x 2,1
Material: Viton 90° Shore A
Mixes: Parker N552-90

Suggested o-ring (model I)
Parker 3-908 16,36 x 2,21
Material: Viton 90° Shore A
Mixes: Parker N552-90

SSI BLOCK DIAGRAM



SSI output goes to 0 if the echo is absent (magnet out of measurement range or internal device error)

SSI CABLE LENGTH

Cable length	< 3 m	< 50 m	< 100 m	< 200 m	< 400 m
Baud rate	1 Mbaud	400 kbaud	300 kbaud	200 kbaud	100 kbaud

INSTALLATION NOTES

The transducer must be installed away from sources of magnetic fields, both static and 50 Hz (electric motors, solenoids, etc.).

- with floating cursor assembly support must be made with nonmagnetic material
- the transducer connection cable must be wired separate from power cables and/or solenoid controls, drives, or remote switches
- power supply must be drawn from dedicated power supply and connected directly to power terminals as near as possible
- since the transducer cursor is a magnet, make sure there are no iron filings or small fragments of magnetic metal near the transducer. This could produce an accumulation of material on the cursor, with consequent sliding problems
- cable shield must be connected on both sides (PLC and transducer)
- if the transducer is installed in a cylinder isolated from the ground, the cable shielding on PLC side must be grounded.