

# MAGNETIC LINEAR ENCODER

# MT



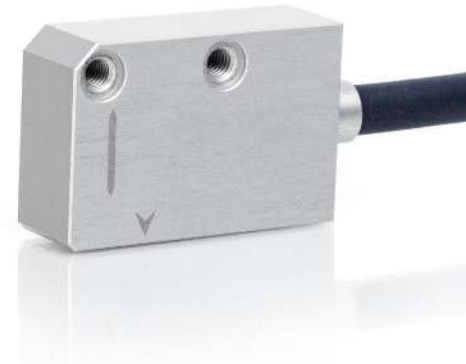
Analog output signals



Long measuring distance



Magnetic Technology

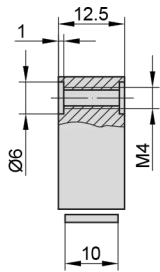
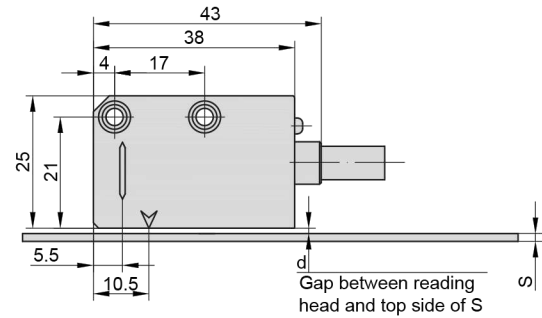


Magnetic linear encoder MT has measuring length of up to 50.000 mm and accuracy up to  $\pm 25 \mu\text{m}$ .

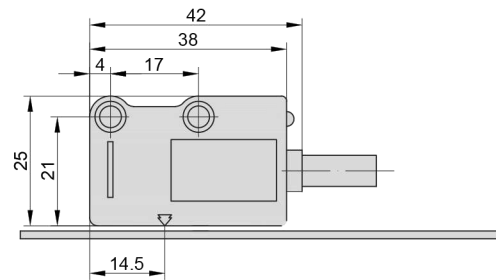
Other parameters differ depending on required modifications.

## MODIFICATION MT

VERSION 1 (POWER SUPPLY +5V)

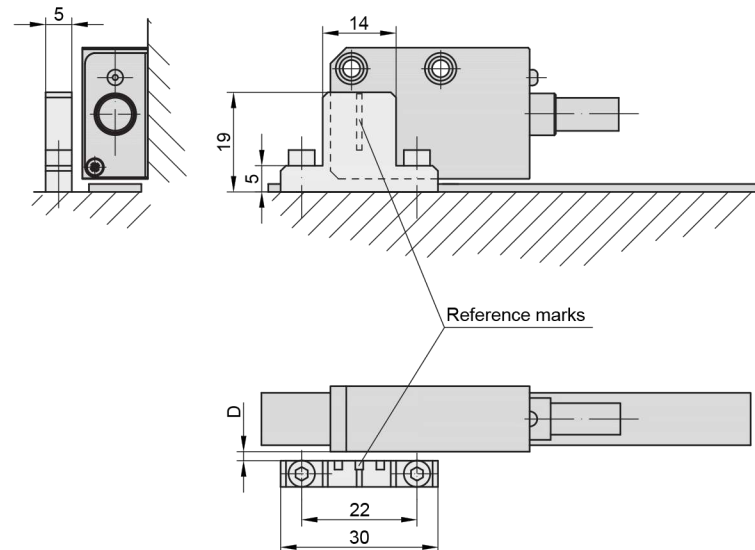
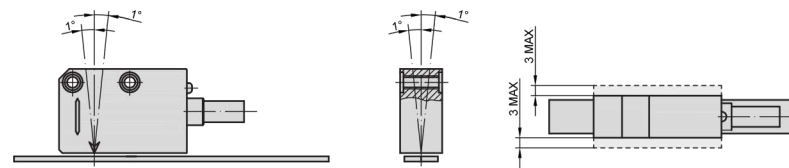


VERSION 2 (POWER SUPPLY +[5...28]V)



	MPx00	MPx00+CV	MPx00+SP	MPx00Z	MPx00Z+CV	MPx00Z+SP
S(mm)	1.3	1.6	2.1	1.3	1.6	2.1
d(mm) MT P	0.1 ± 0.4	-	-	-	-	-
d(mm) MT M	0.2 ± 1.4	1.1 MAX	0.6 MAX	0.3 ± 0.8	0.5 MAX	Impossible
d(mm) MT H	0.3 ± 4.0	3.7 MAX	3.2 MAX	0.35 ± 2.0	1.7 MAX	1,2 MAX

d - distance between reading head and magnetic band MP or protective cover CV (protective support SP)  
To get the best accuracy distance d must be the lowest possible (in the indicated range)

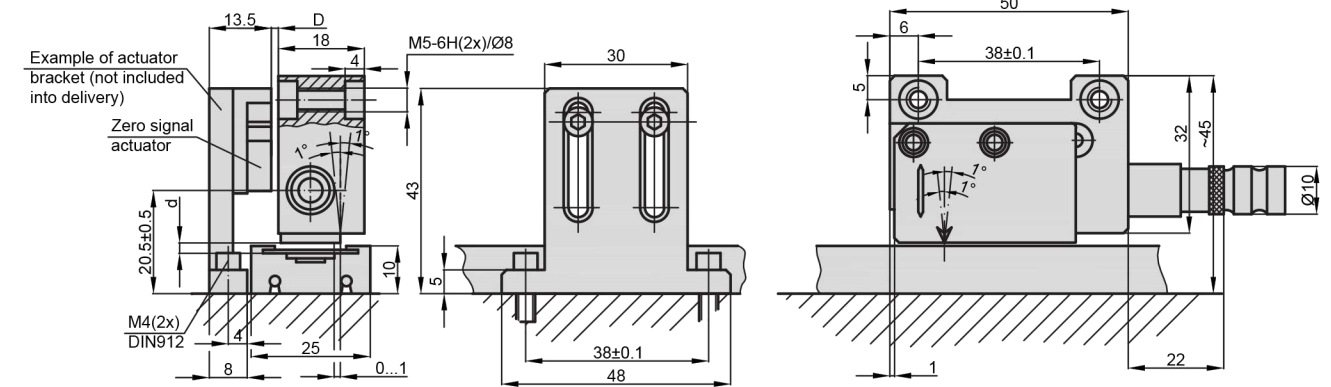


	MT.....C MT.....E	MT.....Z
a (mm)	3 MAX	1 MAX

	D (mm)	
MTP (MP100)	-	-
MTM (MP200)	1.5 nom.	2 MAX
MTH (MP500)	1 nom.	2 MAX

D - distance between external zero signal actuator and reading head

## MODIFICATION CMT



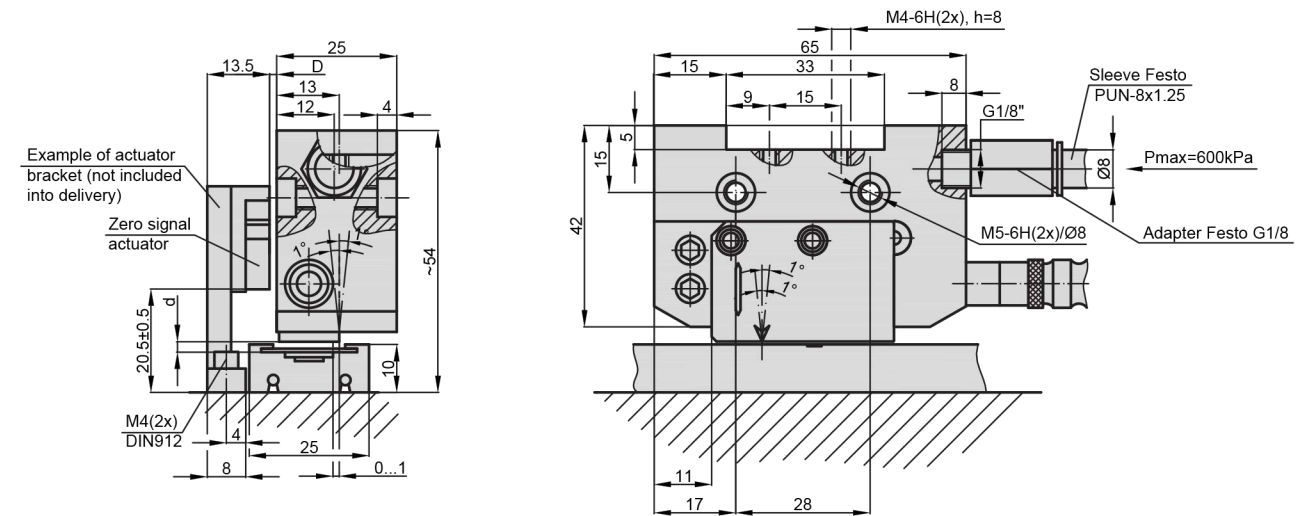
	D (mm)	
CMTM (MP200)	1.5 nom	2.5 MAX
CMTH (MP500)	1 nom	2 MAX

Gap "d" between protective cover and reading head:

- for CMTM - d = 0.3...0.7 mm;
- for CMTM - d = 0.3...2.2 mm;
- for CMTM - d = 0.1...0.3 mm

Warning: To get the best accuracy distance d must be the lowest possible (in the indicated range).

## MODIFICATION PCMT



	D (mm)	
CMTM (MP200)	1.5 nom	2.5 MAX
CMTM (MP500)	1 nom	2 MAX

Gap "d" between protective cover and reading head:

- for CMTM - d = 0.3...0.7 mm;
- for CMTM - d = 0.3...2.2 mm;
- for CMTM - d = 0.1...0.3 mm

Warning: To get the best accuracy distance d must be the lowest possible (in the indicated range).

## ACCESSORIES

CONNECTORS FOR CABLE	B12 12-pin round connector	C12 12-pin round connector	D9 9-pin flat connector	D15 15-pin flat connector	RS10 10-pin round connector	ONC 10-pin round connector
DIGITAL READOUT DEVICES		CS3000			CS5500	

## SPECIFICATION

	TTL output signals (F)	Sine wave output signals (AV) - version 2 only
Measuring length (ML)	up to 50 m (20 m with MP 500)	up to 50 m (20 m with MP 500)
Repeatability	± 1 increment	± 1 increment
Max. measuring frequency	300kHz	See tables below
Power supply - version 1 - version 2	5V DC ± 5% (5 ... 28) V DC ± 5%	– (5 ... 28) V DC ± 5%
Current consumption without load	60 mA max	90 mA max
Current consumption with load	140 max (with 5V and R=120Ω); 115 max (with 12V and R=1.2kΩ) 90 max (with 28V and R=1.2Ω)	10 max (with 5V and R=12Ω)
Phase shift between signals	90° ± 5°	90° ± 5°
Protection (IEC 529)	IP67	IP67
Operating temperature - version 1 - version 2	-20...+85 °C 0...+50 °C	– 0...+50 °C
Storage temperature	-20...+85 °C	-20...+85 °C
Permissible humidity	100% non-condensing	100% non-condensing
Permissible vibration (55...2000 Hz)	300 m/s <sup>2</sup>	300 m/s <sup>2</sup>
Permissible shock (11 ms)	1000 m/s <sup>2</sup>	1000 m/s <sup>2</sup>
Output signal shape	Square-wave TTL or HTL pulses	Sine wave
Output signals	two main + one zero and their complementary	two main sine wave + one zero squ
Output scheme	Line driver	Line driver
Weight of reading head - MT - CMT - PCMT	40 g 100 g 100 g	40 g 100 g 100 g
Standard cable length	2.0 m	2.0 m
Max. cable length of head	10.0 m	10.0 m
Max. cable length of encoder (2 m of head + adapter)	100.0 m	100.0 m
Electrical protections	from inversion of power supply polarity; from short circuit on output port	

## READING HEAD VERSION P (MTP, CMT, PCMT)

	TTL output signals (F)	Sine wave output signals (AV) - version 2 only
Reference (zero) signal	Without reference signal (version C)	Without reference signal (version C)
Pole pitch	1+1 mm	1+1 mm
Accuracy*	up to ±6 μm	up to ±6 μm
Resolution (after x4 in CNC)	0.5; 1; 5; 10 μm	500 μm
Max. traversing speed: - MTP-F05 - MTP-F100	0.6 m/s 6 m/s	12 m/s
Max. measuring frequency	300 kHz	12 kHz

## READING HEAD VERSION M (MTM, CMTM, PCMTM)

	TTL output signals (F)	Sine wave output signals (AV) - version 2 only
Reference (zero) signal	Constant pitch every 2 mm (version C) With external actuator (version E). Reference marks are made with constant pitch 2 mm Reference marks made on magnetic band according customer requirements (version Z)	Constant pitch every 2 mm (version C) With external actuator (version E). Reference marks are made with constant pitch 2 mm.
Pole pitch	2+2 mm	2+2 mm
Accuracy*	up to ±8 μm	up to ±8 μm
Resolution (after x4 in CNC)	1;5;10;25;50;100,500 μm	1000 μm
Max. traversing speed: - MTM-F10 - MTM-F100	1,2 m/s 12 m/s	1,2 m/s 12 m/s
Max. measuring frequency	300 kHz	6 kHz

## READING HEAD VERSION H (MTH, CMTH, PCMTH)

	TTL output signals (F)	Sine wave output signals (AV) - version 2 only
Reference (zero) signal	Constant pitch every 5 mm (version C) With external actuator (version E). Reference marks are made with constant pitch 5 mm Reference marks made on magnetic band according customer requirements (version Z)	Constant pitch every 5 mm (version C) With external actuator (version E). Reference marks are made with constant pitch 5 mm.
Pole pitch	5+5 mm	5+5 mm
Accuracy*	up to ±30 μm	up to ±30 μm
Resolution (after x4 in CNC)	5; 10; 25; 50 μm	2500 μm
Max. traversing speed: - MTH-F50 - MTH-F250	6 m/s 30 m/s	12 m/s
Max. measuring frequency	300 kHz	2,4 kHz

\*The smaller is the gap between reading head and magnetic band the better is accuracy of encoder.

Version E - zero signal is generated when external zero actuator acts to reference mark, which is made on magnetic band.

It is possible to use several actuators.

Version Z - zero signal is generated when reference mark is acted by actuator incorporated into reading head.

## MAGNETIC BAND

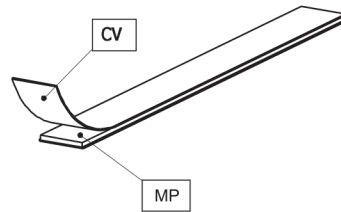
Accuracy (at 20°C)	±30 (standard); ±15 (optional) μm/m
Width	10 mm
Thickness	1.3 mm
Length	50 m max. (20 m max.- for MP 500)
Thermal expansion coefficient	10,5 x 10 <sup>-6</sup> °C <sup>-1</sup> (at 20°C±0,1°C)
Bend radius	130 mm min.
Weight of magnetic band	65 g/m
Weight of protective cover	25 g/m
Operating temperature	0...+70 °C
Storage temperature	-20...+80 °C

Note: In order to ensure the accuracy of encoder magnetic band must be longer than ML by 80 mm (40 mm from each side)

MAGNETIC BAND	MP100	MP200/MP200Z	MP500/MP500Z
Pole pitch	1+1 mm	2+2 mm	5+5 mm
Reference mark position	-	on request from left or right at pitches of 4 mm or multiples	on request from left or right at pitches of 10 mm or multiples
	Note: With MP100 magnetic band, it is not possible to use any protective cover (CV or SP)	Note: Magnetic band MP200Z is used only with reading head MTMxxxZ	Note: Magnetic band MP500Z is used only with reading head MTXxxxZ

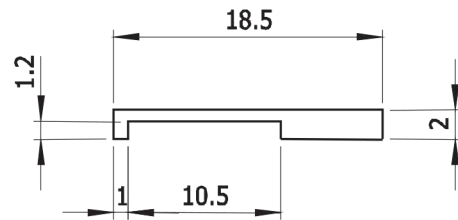
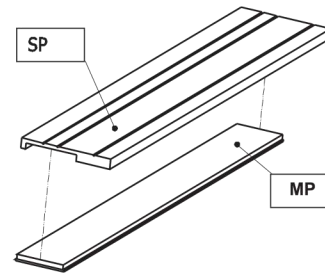
## PROTECTIVE BAND CV

Stainless steel cover CV (width 10 mm, thickness 0,3 mm) for magnetic band MP protection is glued on magnetic band (excluding MP100)



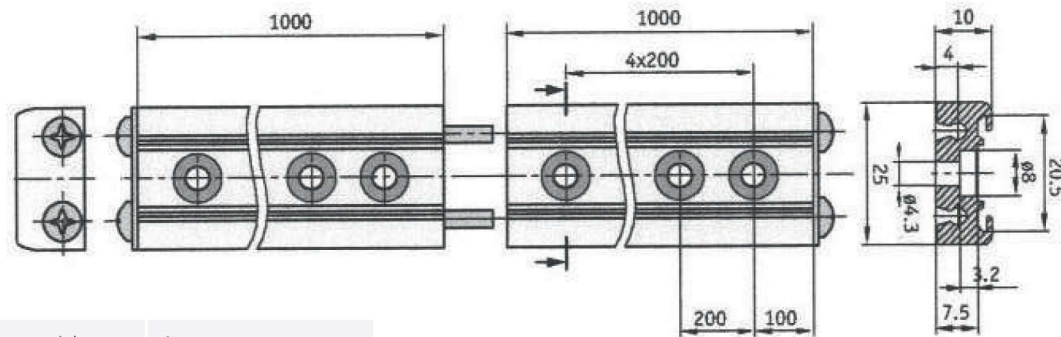
## PROTECTIVE SUPPORT SP

Aluminium protective support SP for magnetic band MP protection. Fixed on machine surface and holds magnetic band. It is not possible to use the support SP if the magnetic band is already covered by stainless steel band CV.



## PROFILE RAIL PS

Profile rail PS with protective band SB is used for support of magnetic band with width 10 mm. Profile rail is easy mounted and has not adhesive joints. The lengths of more than 1 m are obtained by joining together several rail modules.



Length of one module	1 m
Length	up to 50 m (pitch 1 m)
Width and height	25x10 mm
Material	aluminium

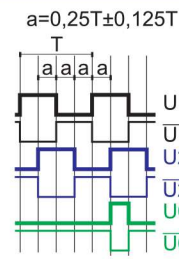
## PROTECTIVE BAND SB

Protective band SB is used for sliding into profile rail PS.

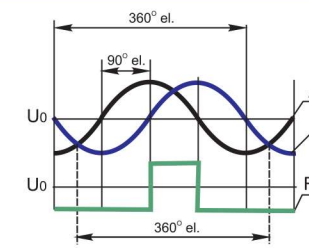
Length	up to 50 m
Material	aluminium

## OUTPUT SIGNALS

### TTL output signals



### AV output signals - version 2 only



A and B amplitude 0,6 V...1,2 V (~ 1V)

R amplitude 0,25...0,6V (useful part)

A and B phase shift 90° ± 10° el.

Reference voltage U0 2,5 V

Amplitudes of signals are referred to measurement made with 120 Ω impedance and power supply voltage of reading head 5V±5%.

## ORDER FORM

X1MT - X2 - X3 - X4 - X5 - X6 - X7 - X8 - X9/X10

Modification (X1):	Reading head Version (X2):	Reference marks (X3):	Power supply (X4):	Magnetic band (mp) (X5):	Protective steel Cover cv (X6):	Or Aluminium protective support sp (X7):	External Reference Mark Actuator sme (X8):	Cable length (X9):	Connector Type (X10):
MT CMT PCMT	P - MTP M - MTM H - MTH	C - standard, without reference mark; E - with external reference mark actuator; Z/L - made on magnetic band by order at any place. L - distance in mm from begin of ML	1 - 5V DC ± 5% 2 - 5...28V DC ± 5%	MP100/01 - 1m MP200/01 - 1m MP200Z/01 - 1m MP500/01 - 1m MP100/02 - 2m MP100/03 - 3m ... (20 m max for MP500)	W - without CV CV/01 - 1m CV/02 - 2m CV/03 - 3m ...	W - without SP SP/01 - 1m SP/02 - 2m SP/03 - 3m PS/01 - 1m ...	0 - without SME 1 - with SME	01 - 1m 02 - 2m 03 - 3m ...	W - without connector C12 - round, 12 pins D9 - flat, 9 pins D15 - flat, 15 pins

ORDER EXAMPLE: 1) MTM-MTP-C-1-MP200/03- SP/03-W-0-02/W  
2) PCMTH-MTH-E-2-MP500/05-CV/05-W-1-02/D9