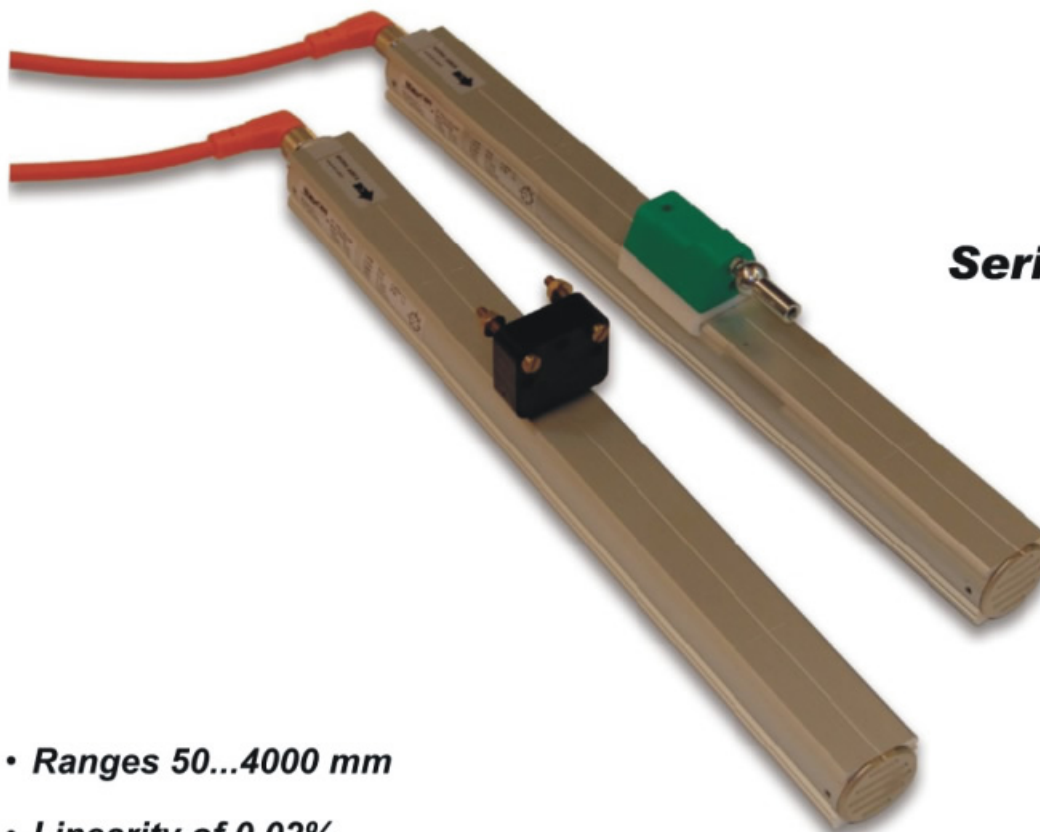




MAGNETOSTRIKTIV

Magnetostrictive Transducers



Series MAB

- *Ranges 50...4000 mm*
- *Linearity of 0,02%*
- *Sliding cursor or floating magnet*
- *Protection IP67*
- *Working temperature range -30...+75°C*
- *Vibration and shock resistant*
- *Analogue outputs 0...10 VDC, 4...20 mA, 0...20 mA,*
- *Digital outputs RS422 Start/Stop, PWM (pulse width modulated)*
- *Absolute output SSI, Profibus DP*
- *Position and velocity measurement*

DESCRIPTION

Mode of Operation

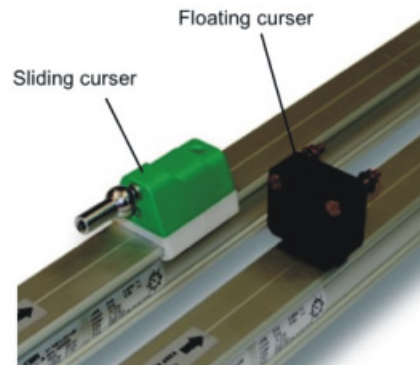
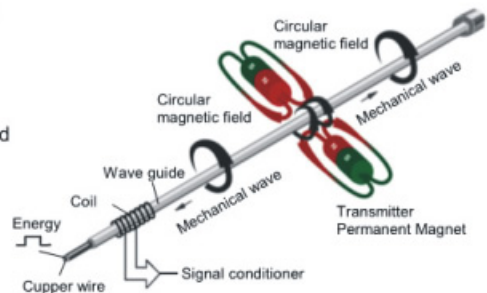
An electro-magnetic pulse is generated in a copper tube. Thus a circular magnetic field spreads bundled within the wave guide. The permanent magnet is the transmitter. The lines of magnetic flux of the transmitter interact at an angle of 90° the lines generated by the electro-magnetic pulse. By that, an elastic distortion is generated in the wave guide due to the interaction of both electro-magnetic lines. This is called magnetostriction. The distortion spreads in the wave guide to both ends. The velocity of propagation is 2850 m/s. This mechanical puls is transformed at one end of the wave guide into an electrical signal.

A controller calculates the run time between the point of origin and the signal conditioner. The run time is direct proportional to the distance between signal conditioner and permanent magnet. This principle allows a contactless and wear-free absolute measurement. The sensors operate reliable at hydraulic cylinders, machine tools, presses, wood cutting machines, milling machines, packing machines, portal frame robots, cutters, in the mining industry and in material handling processes.

Sliding or floating magnets

The object to be measured is connected to the sliding or floating magnet. The floating magnet is fixed by two M4 screws (brass). Different fixing holes are available in the magnet (see technical drawings). The magnet is to be guided over the entire measurement range at a distance of 2 to 7 mm to the transducer housing.

The sliding curser is to be fixed either at the attached setscrew M5 x 35 mm, or at the M5 ball head. Different drill holes are available with the sliding curser to chose the point of fixation (see technical drawings).



INSTALLATION

Magnetism

Please avoid any external magnetism to the transducer. This includes metallic objects close to the sensor, which acts as permanent magnets or have been magnetised during operation. The minimum distance to magnetic valves should be 20 cm but never fall below 10 cm. The output signal could be interrupted.

Setting up

The setting up of the transducer is done with fixing brackets (fixing sets PKIT091 and PKIT090). The PKIT091 is fixed with the M5 x 20 mm screws and the PKIT090 is fixed with the M4 screws. The distance of the fixing holes is 50 mm (PKIT091) or 42.5 mm (PKIT090). An isolated installation of the sensor is possible (using the insulation rings between screws and fixing brackets) as well as a non isolated installation.

The minimum depth of the drill hole is:

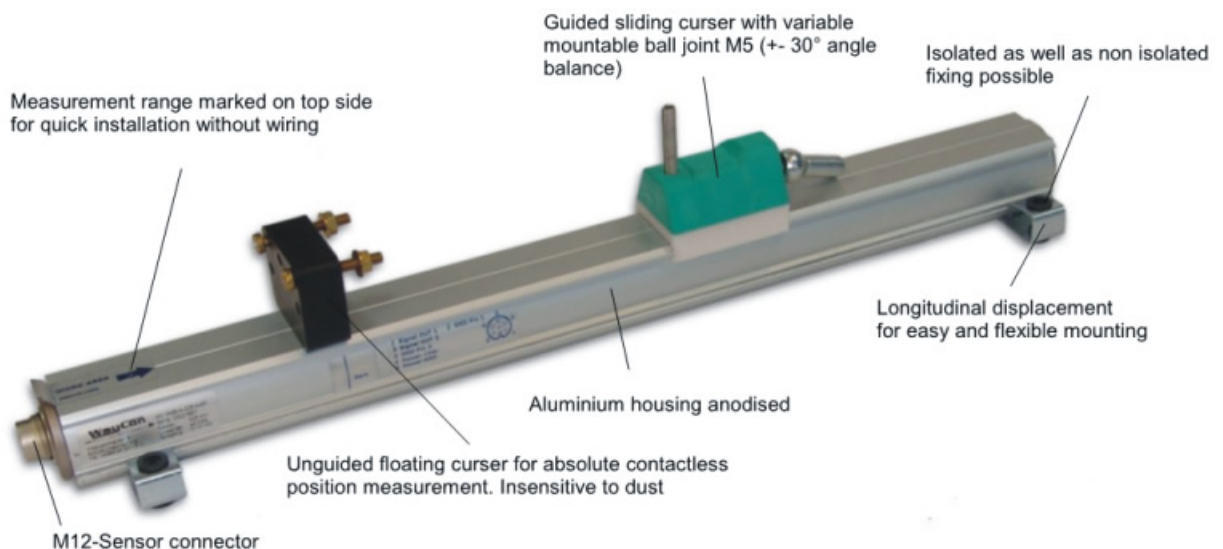
- 6 mm isolated installation
- 8 mm non isolated installation

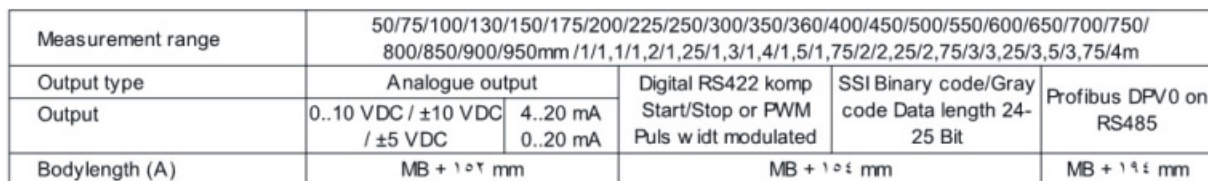
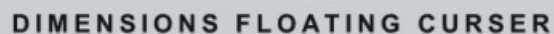
The distance between the fixing brackets is not regulated but should not exceed 1/3 of the MAB housing. The sensor can be displaced in the fixing brackets with loose screws, so that the zero of the output signal is still adjustable by fixing the brackets i.e.



TECHNICAL DATAS

Measurement Range	50/75/100/130/150/175/200/225/250/300/350/360/400/450/500/550/600/650/700/750/ 800/850/900/950mm /1/1,1/1,2/1,25/1,3/1,4/1,5/1,75/2/2,25/2,75/3/3,25/3,5/3,75/4m				
Output	Analogue output		Digital RS422 Start/Stop or PWM	SSI Binarycode/ Graycode, Data length 24-25 bit	Profibus DPV0 on RS485
Output (Position)	0...10 VDC / ±10 VDC / ±5 VDC	4...20 mA/ 0...20 mA			
Linearity	< 0,02% v. F.S., (0,02% for ranges up to 100 mm, 0,03% for ranges up to 1000 mm)				
Resolution	infinite, ripple < 5 mV		< 10 µm	2/0/10/20/50 µm	0 µm
Output (Velocity)	from min. 0...0,1 m/s to max. 0...10 m/s, Lin. < 2%		-	-	-
Response of the analogue output	0,0 ms (200...1100 mm), 1,0 ms (1200...2000 mm), 2 ms (> 2000 mm), 3 ms (> 2000 mm)				
Hysteresis	< 10 µm				
Repeatability	< 10 µm				
Force required to move sliding cursor	< 1 N				
Max. velocity	10 m/s				
Max. acceleration	100 m/s²				
Temperature coefficient	0,000% FS/°C		20 ppm FS/°C		
Supply voltage	24 VDC ±20%				
Current consumption	70 mA	90 mA	90 mA (60 Ohm load)	100 mA	100 mA
Output load	2 k Ohm	< 500 Ohm	60 Ohm	RS422/485 Standard	RS485 Standard
Max. ripple of supply voltage	1 Vpp				
Max. output value	10,6 V	20 mA	-	-	-
El. Isolation (supply-ground)	500 V				
Reverse voltage protection	Yes				
Overvoltage protection	Yes				
Internal, selfreset fuse	Yes				
Working temperature	-20...+70°C				
Storage temperature	-40...+100°C				
Shock DIN IEC 60068-2-27	100g, 11 ms single cycle				
Vibration DIN IEC 60068-2-6	12g, 10...2000 Hz				
Protection	IP 17				
Housing	Aluminium anodised				





ANALOGUE OUTPUT

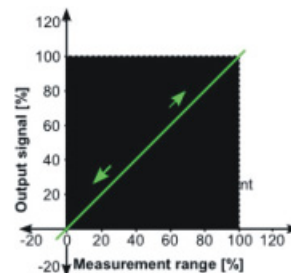
Selectable output signals

Voltage (4-wire-technique) 0...10 V, ± 10 V, ± 5 V

Current (4-wire-technique) 0...20 mA, 4...20 mA

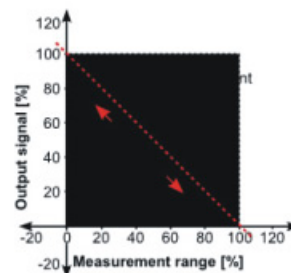
Analogue signal 1

The analogue signal 1 increases proportional to the displacement of the floating or sliding curser, if the curser is moved away from connection side (connector).



Inverted analogue signal

The analogue output 2 is preset with the inverted position signal, if no other output is required. That means that the signal routing is inverted to analogue output 1.

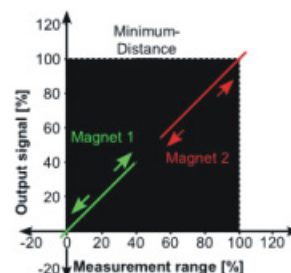


Second positioning signal

Alternatively the sensor can be equipped with a second floating or sliding curser.

The analogue signal 2 equals the position of the second sliding or floating curser.

The minimum distance between the two curser is 75 mm. The minimum measurement range of such sensor is 360 mm.

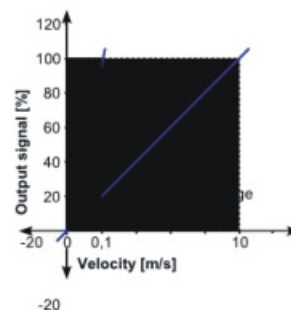


Velocity signal

Alternatively the sensor can be equipped with an additional velocity signal. The maximum velocity can vary from 0,1 m/s to 10 m/s. That means the maximum velocity is to be indicated when the sensor is ordered.

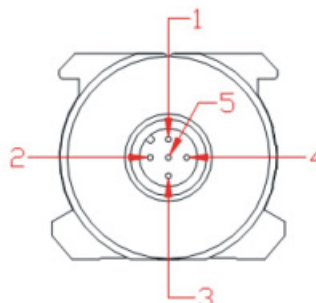
example: sensor with analogue output 0...10 V for position and additional velocity output of 5 m/s as maximum value.

- 0 V output signal equals 0 m/s
- 10 V output signal equals 5 m/s



Analogue output 5-pin M12

Pin N°	Function	Cable color
1	Output position signal 1	Brown
2	GND Pin 1/2	White
3	Inv. Output position signal 1 or Output position signal 2 or velocity output	Blue
4	GND Power	Black
5	24 V Power	Grey

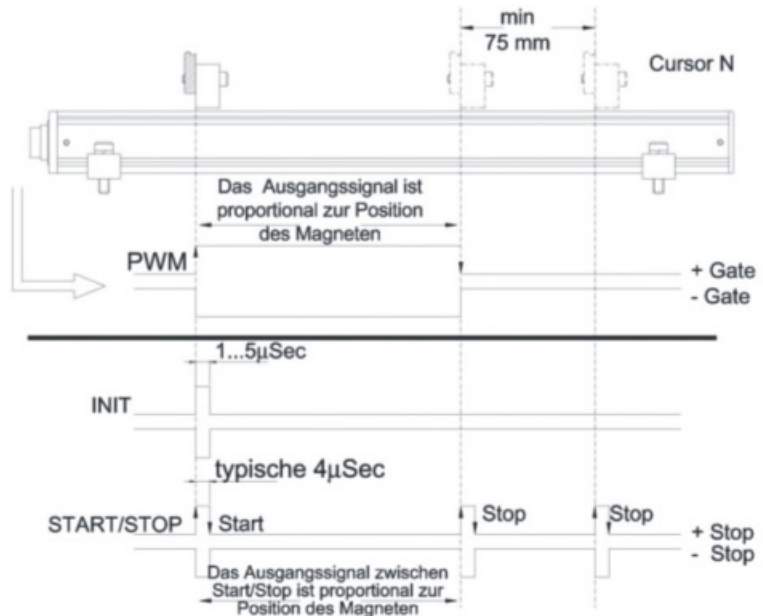


DIGITAL OUTPUT START/STOP-PWM

The magnetostrictive sensors of series MAB offer digital output signals type START/STOP or PWM (Pulse Width Modulated) by the extra fail-safe differential transmission of the serial interface RS422. This data transmission allows a maximum cable length of up to 500 m. The signal can be connected to plcs of various manufacturer like, Siemens, Schleicher, B&R, Bosch, Mitsubishi, Schiele, Parker, Esitron, Wago i.e.

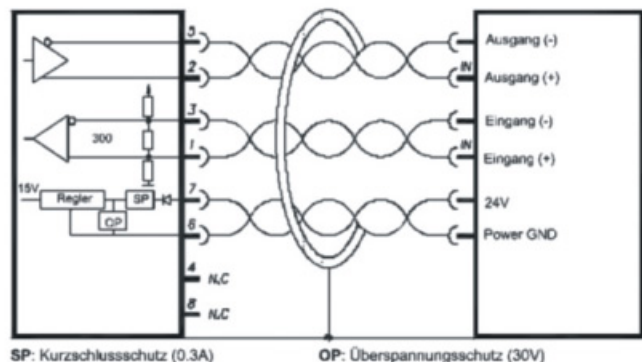
The measurement is initiated by the external caused INIT with a minimum period of 1...5 μ s. The startsignal certifies the incoming INIT with a period of 4 μ s. Depending on the position of the cursor, the stopsignal follows with time delay. If there are more cursors in use, additional stopsignals are received accordant to the distance. The minimum distance between the cursors is 75 mm.

The PWM-output does not need the INIT and runs with a frequency of approx. 1000 Hz. The rate High/Low (key rate) equals the distance signal. Example: 50% High and 50% Low-signal equals the half of the measurement range. If the distance of the cursor increases, the High-level prolongates.



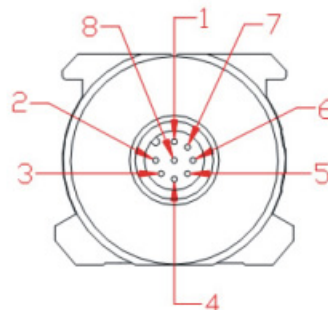
Connection and wiring:

The cores for output, input and supply need to be twisted pair with shielded installation.



Digital output 8-pin. M12

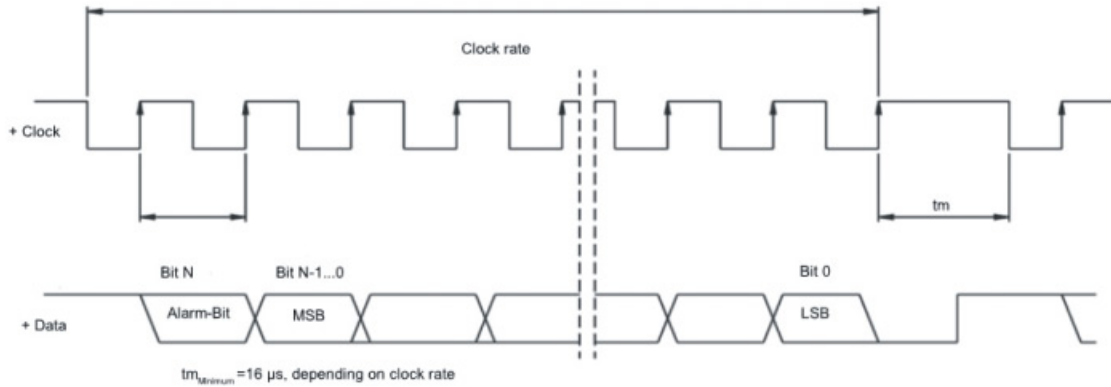
Pin	Function	Cable color
1	Input +	White
2	Output +	Brown
3	Input -	Green
4	n.c.	Yellow
5	Output -	Grey
6	GND Power	Pink
7	+24 V Power	Blue
8	n.c.	Red



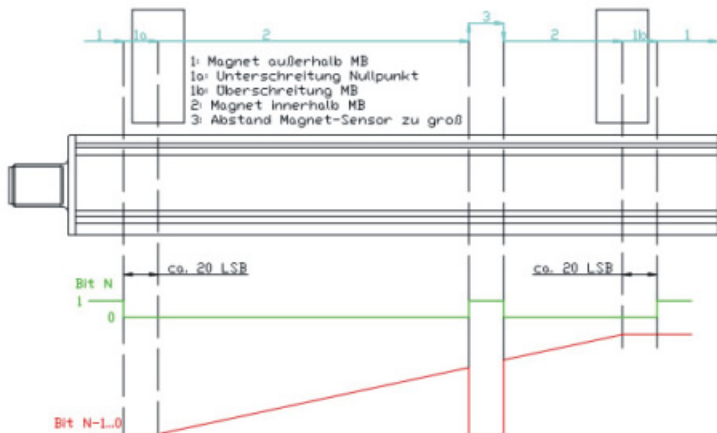
SERIAL SYNCHRONOUS OUTPUT SSI

The series MAB with SSI-output can be connected directly to plcs. In that case, the internal scanning frequency is synchronised with the external scanning frequency of the plc.. Thus, the information of displacement is written as a serial data word with Bit length 24 or 25 Bit (also 21 + 1 Bit) in the internal shifting register of the transducer. The loadtime for data update is approx. $t_m = 16 \mu s$. After a successful data update, a High signal of the LSB is generated (see diagram).

The information of the displacement is provided by a data word given in Binary or Gray-Code. This information is readout by a processing unit (PLC). The update frequency of the data word can be up to 2000 Hz and depends on the measurement range. Moreover, the given signals are absolute values, which guaranty that the distance values of the transducer are provided immediately at any time, even if the system is restarted.



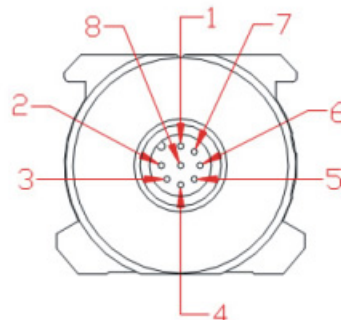
The following sketch and tabel illustrate possible malfunctions. For example, it is possible to analyse overtravel and under-run of the measurement range as well as an increasing distance between floating cursor and transducer. This status is shown by the Alarm-Bit (Bit N).



Position of cursor	Bit N	Bit N-1...0
1: Magnet out of range	1	0
1a: Underrun Zero	0	0
1b: Overrun MB	0	end of scale
2: Cursor in MB	0	prop. to distance
3: Cursor distance exceeded	1	0

Serial synchronous output SSI 8-pin. M12

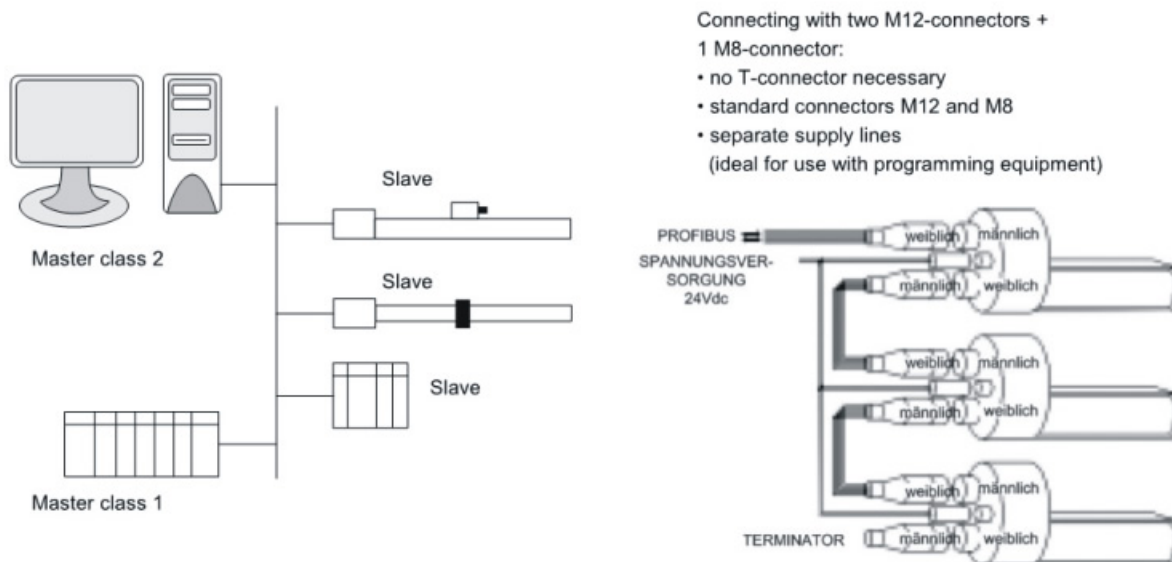
Pin	Function	Cable color
1	Clock -	White
2	Data +	Brown
3	Clock +	Green
4	n.c.	Yellow
5	Data -	Grey
6	GND Power	Pink
7	+24 V Power	Blue
8	n.c.	Red



PROFIBUS

A Profibus based network allows the connections of peripheral equipments (transducers or actuators) defined as slaves, or processing units (usually PLCs) defined as class 1 masters. The installation of the network software is done by through class 2 master, Die Installation der Netzwerk-Software erfolgt durch einen Master der Klasse 2, which contains the data base of the GSD files of all connected equipments. The network is planned and parametrised by support of a graphic tool. After that, the configuration is loaded into the class 1 masters which are part of the network.

The class 1 master(s) start(s) the communication process with the peripheral equipments according to the received configurations by class 2 master. This process contains an initial data exchange, which covers the slave identification as well as slave parameterisation and configuration. In the following the exchange of process datas through the network is started. The GSD-file contains all identifications of the equipment, all supporting functions and length and formats of the data packages.



Green LED (on)	Red LED (System fault)	Red LED (Bus fault)	CODE
Sw itched off	Sw itched off	Sw itched off	No supply
Sw itched on	Sw itched on	Sw itched on	Internal error of transducer (false initialisation) Master not connected to the netw ork
Sw itched on	Sw itched off	Sw itched on	Initialisation correct netw ork error, Master not connected to the netw ork
Sw itched on	Sw itched on	Sw itched off	False number of cursers, curser out of measurement range, internal error of the transducer
Sw itched on	Sw itched on/off	Flashing	Master not connected to the netw ork False parameterisation or configuration
Sw itched on	Sw itched off	Sw itched off	Transducer exchanges data

**Connector A
(M12 female)**

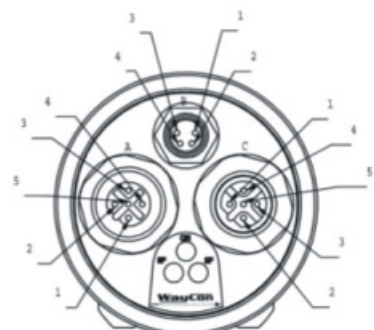
Pin	Funktion
1	5VD_ISO
2	LINE_A/N
3	GND_ISO
4	LINE_B/P
5	GROUND

**Connector B
(M8 male)**

Pin	Funktion
1	24 V
2	N.C.
3	0 V
4	N.C.

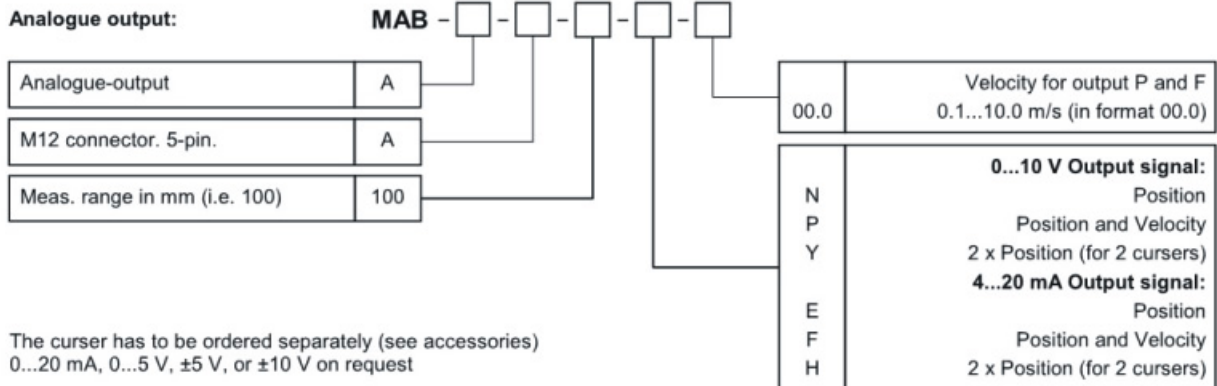
**Connector C
(M12 male)**

Pin	Funktion
1	5VD_ISO
2	LINE_A/N
3	GND_ISO
4	LINE_B/P
5	GROUND

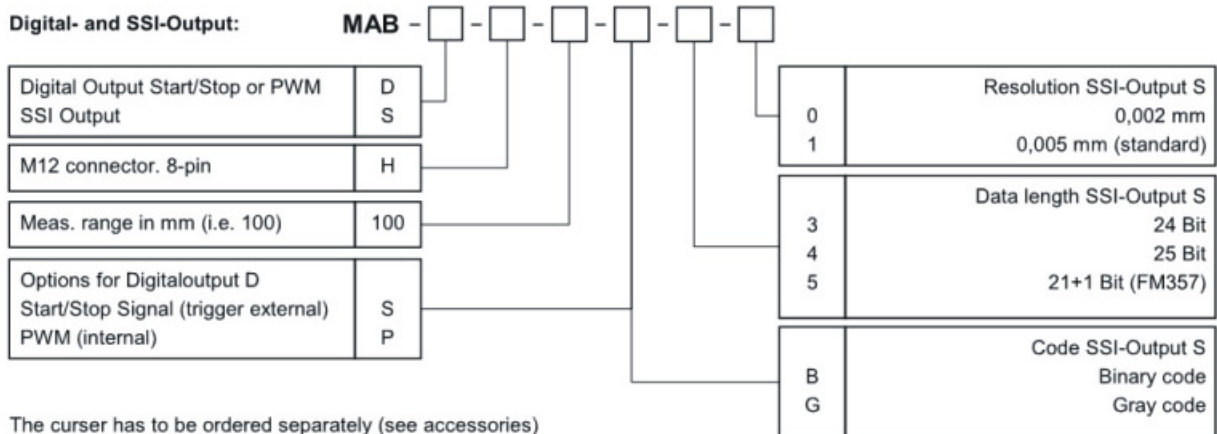


ORDER CODE

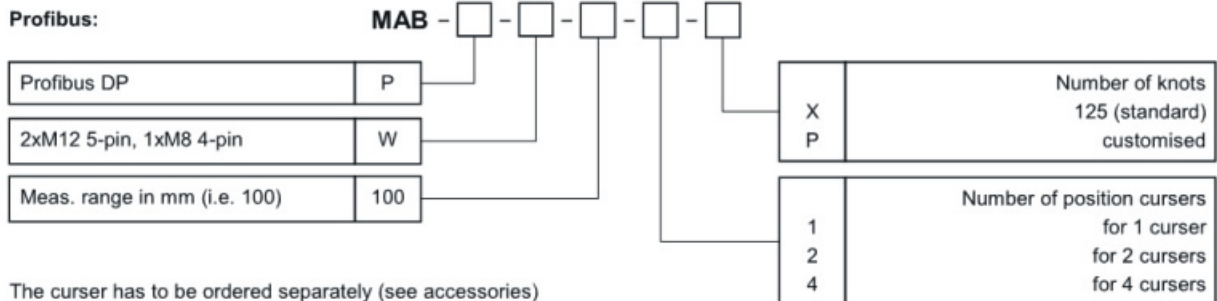
Analogue output:



Digital- and SSI-Output:



Profibus:



PRICE LIST

MAB-A-A-50-N	50 mm	185 €	MAB-A-A-800-N	800 mm	285 €
MAB-A-A-75-N	75 mm	187 €	MAB-A-A-850-N	850 mm	295 €
MAB-A-A-100-N	100 mm	189 €	MAB-A-A-900-N	900 mm	305 €
MAB-A-A-130-N	130 mm	191 €	MAB-A-A-950-N	950 mm	315 €
MAB-A-A-150-N	150 mm	193 €	MAB-A-A-1000-N	1000 mm	325 €
MAB-A-A-175-N	175 mm	195 €	MAB-A-A-1100-N	1100 mm	340 €
MAB-A-A-200-N	200 mm	197 €	MAB-A-A-1200-N	1200 mm	355 €
MAB-A-A-225-N	225 mm	199 €	MAB-A-A-1250-N	1250 mm	370 €
MAB-A-A-250-N	250 mm	202 €	MAB-A-A-1300-N	1300 mm	385 €
MAB-A-A-300-N	300 mm	206 €	MAB-A-A-1400-N	1400 mm	400 €
MAB-A-A-350-N	350 mm	210 €	MAB-A-A-1500-N	1500 mm	415 €
MAB-A-A-360-N	360 mm	214 €	MAB-A-A-1750-N	1750 mm	455 €
MAB-A-A-400-N	400 mm	218 €	MAB-A-A-2000-N	2000 mm	495 €
MAB-A-A-450-N	450 mm	222 €	MAB-A-A-2250-N	2250 mm	555 €
MAB-A-A-500-N	500 mm	225 €	MAB-A-A-2750-N	2750 mm	615 €
MAB-A-A-550-N	550 mm	235 €	MAB-A-A-3000-N	3000 mm	675 €
MAB-A-A-600-N	600 mm	245 €	MAB-A-A-3250-N	3250 mm	740 €
MAB-A-A-650-N	650 mm	255 €	MAB-A-A-3500-N	3500 mm	800 €
MAB-A-A-700-N	700 mm	265 €	MAB-A-A-3750-N	3750 mm	860 €
MAB-A-A-750-N	750 mm	275 €	MAB-A-A-4000-N	4000 mm	920 €

OPTIONS

0...10 V Output signal:			D	Digital Output	10 €
N	Position	standard	S	SSI-Output	250 €
P	Position and Velocity	30 €	P	Profibus DP	350 €
Y	2 x Position (for 2 cursers)	25 €			
4...20 mA Output signal:					
E	Position	10 €			
F	Position and Velocity	40 €			
H	2 x Position (for 2 cursers)	35 €			

ACCESSORIES

Floating cursor (magnet)	PCUR034	20 €	cable 5-pin with connector M12 f. analogue output		
Sliding cursor (magnet) with axial joint	PCUR035	22 €	K5P2M-SW-M12	2 m, angled connector	18 €
Sliding cursor (magnet) with angled joint	PCUR037	24 €	K5P5M-SW-M12	5 m, angled connector	23 €
			K5P10M-SW-M12	10 m, angled connector	32 €
Fixing set (2 pcs.)	PKIT091	6 €	cabel 8-pin with connector M12 f. Digital-/SSI-output		
Fixing set (2 pcs.)	PKIT090	6 €	K8P2M-SW-M12	2 m, angled connector	22 €
			K8P5M-SW-M12	5 m, angled connector	31 €
			K8P10M-SW-M12	10 m, angled connector	37 €

Diese Daten können jederzeit ohne Vorankündigung geändert werden

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