

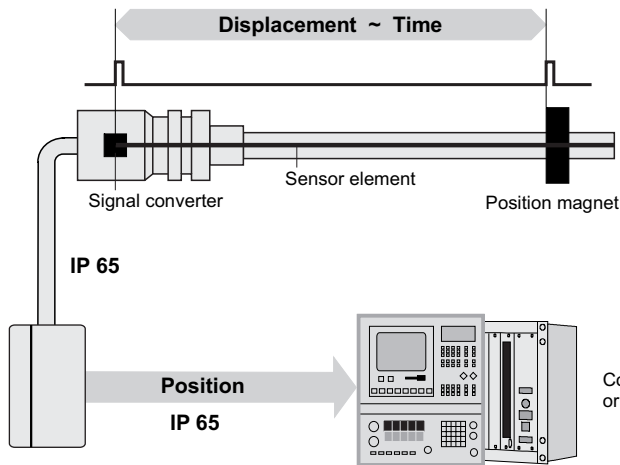
L-Series Analog + Digital

Temposonics LD
Measuring range 50 - 5000 mm



A Compact Sensor for Hydro Cylinders

- Absolute Sensor
- Non-contact Measurement
- Modular Construction
- Stable Design
- Highest Durability
- Measuring Range: 50 - 5000 mm
- Linearity: Better 0,02 %
- Repeatability: 0,001 %
- Direct Analog Output (V/mA): 100% field adjustable
- Digital Pulse Output, Start-Stop



The *absolute Temposonics®* linear position sensors are based on the **MTS** developed *magnetostrictive* measurement principle. That combines various magneto-mechanical effects and uses the physical high precise speed-measurement of an ultrasonic wave (torsion pulse in its sensor element) for position detecting. The integral signal processing transforms the measurements into analog or digital standardized outputs. The *contactless* principle - an external movable magnet marks the position - eliminates the wear, noise and erroneous signal problems and guarantees the best durability without any recalibration.

Measured Variables	Displacement
Measuring Range	50 - 5000 mm
Output	Voltage: 0 - 10 VDC oder 10 - 0 VDC (Minimum load: >5 kOhms) Current: 4(0) - 20 mA or 20 - 4(0) mA (Min. / Max. 0 / 500 Ohms) Start/Stop pulse: RS 422 differential signal
Adjustment of NULL and SPAN	Analog: 100 % of measuring range (F.S.)
Resolution	Analog: Infinite, restricted by output ripple Digital: 0,1 mm; 0,01 mm (controller depending)
Linearity	< ± 0,02 % F.S. (Minimum ± 50 µm), independent of external temperature influences
Repeatability	< ± 0,001 % F.S.
Update Frequency	Analog: 1 kHz / Digital: depends of controller
Connetion Type	Cable outlet
Input Voltage	24 VDC (±10 %)
Current Drain	100 mA typical
Ripple	< 1 % peak to peak
Electric Strength	500 V (DC ground to machine ground)
Operating Temperature	-40° C ... +75° C
Temperature Coefficient	< 40 ppm/° C
Dew Point, Humidity	90 % rel. humidity, no condensation
EMC-Test	Electromagnetic emission EN 50081-2 Electromagnetic immunity EN 50082-2 EN 61000-4-2/3/4/6 Level 3/4, Criteria A LD-sensor installed in a grounded metal housing CE qualified
Shock Rating	100 g, 6 ms / IEC-Standard 68-2-27
Vibration Rating	10 g / 10 - 2000 Hz / IEC-Standard 68-2-6
Mounting	Any orientation
Magnet Speed	Any
Sensor rod + flange	Stainless steel
- Pressure Rating	350 bar, 700 bar peak pressure
- Sealing connection cable	IP 65
Sensor Electronics Housing	Aluminum diecasting housing
Sealing	IP 65
Sensor Installation	Fitting flange or thread M18 x 1,5
Magnet Type	Ring magnet

Temposonics-LD

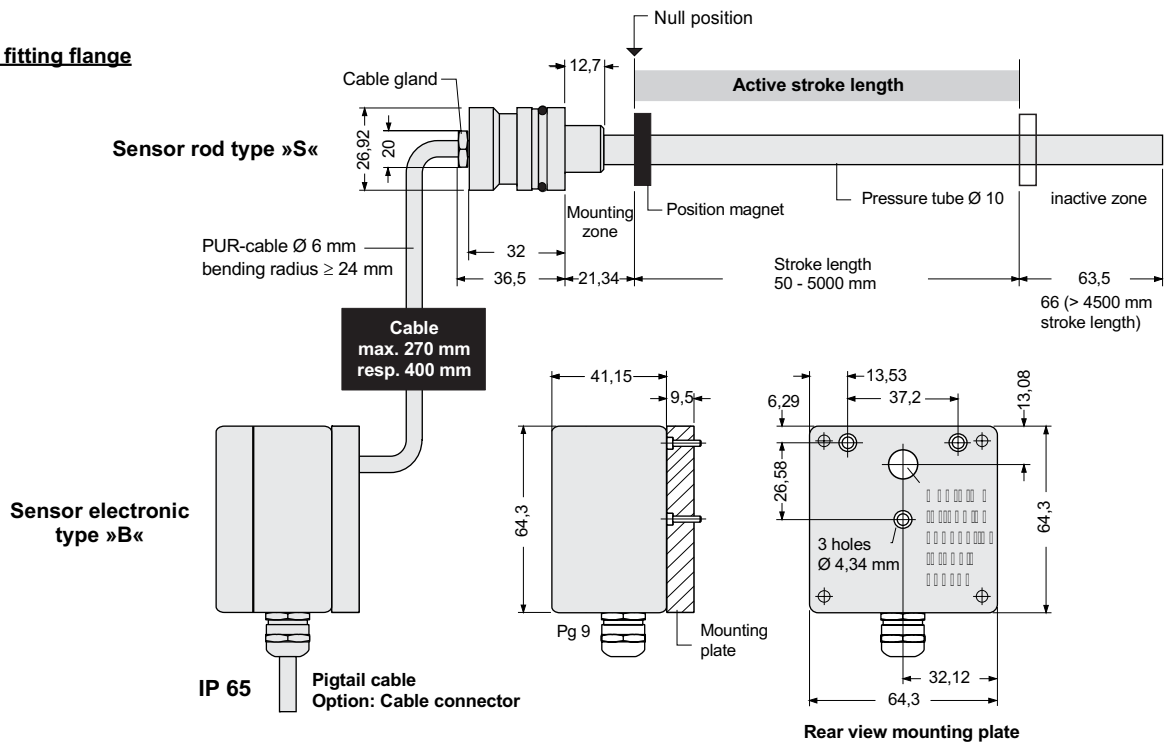
The compact position sensor system was designed for installation into hydraulic cylinders, specifically for use in standard clevis head cylinders or any space limited cylinder applications. The extremely rugged sensor consists of 3 main parts

- The pressure proof stainless steel sensor rod with fitting or threaded flange protects the sensing element in which gives rise to the measurement signal. It fits into the bored piston rod.

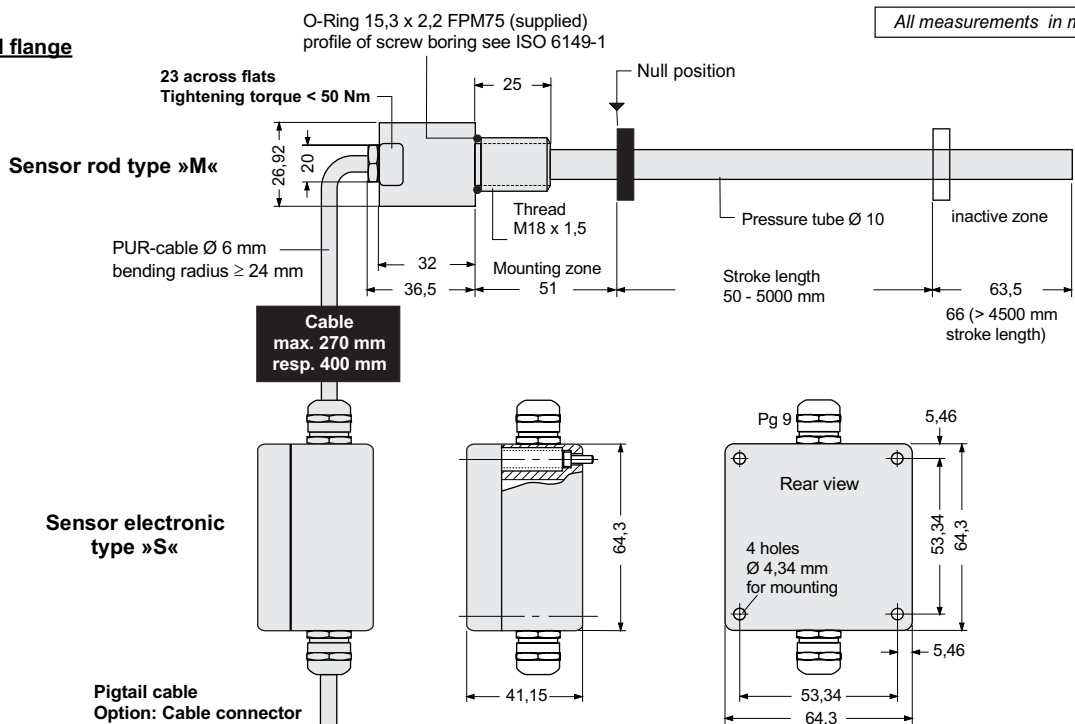
• The external standard industrial housing accommodates the modular electronic interface with active signal conditioning. The sensor electronic is connected to the basic-sensor via inside terminal screws and to the controller with integrated cable outlet.

- The position magnet, the only moving part is mounted on the piston bottom. This permanent magnet travels wearfree and contactless along the stationary sensor tube. Its magnetic field starts the measurement signal through sensor's rod wall.

LD with fitting flange



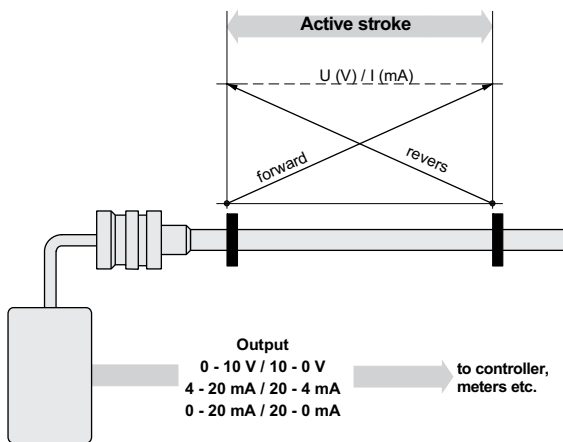
LD with threaded flange



All measurements in mm

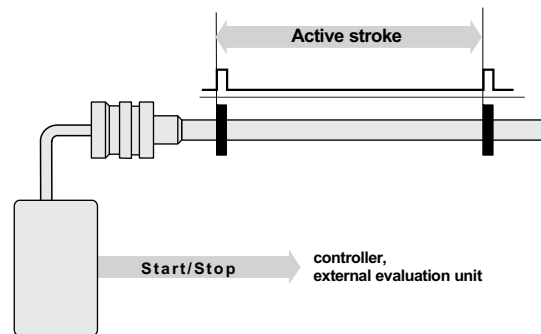
Analog Output

Temposonics-LD sensors provide direct analog outputs, including voltage (0-10 V) and current (4-20 or 0-20 mA), forward and reverse acting. Resolution is only limited by the output ripple. Since the outputs are direct, no signalconditioning electronics are needed when interfacing with controllers or meters.



Digital Start/Stop pulse

Digital Temposonics-LD is equipped with a start/stop output. The sensor requires a start signal from an external indicator in the control system and returns a signal corresponding to the magnet position. The time elapsed between the two signals is proportional to the magnet position, i.e. to the displacement. Time measurement is by the indicator and used for calculating the position value. Generation and evaluation of the start/stop pulse is made by a customized Start/Stop interface module of many controller companies.



Sensor field programming

Temposonics-LD sensors are preconfigured at the factory by model code designation. If needed, MTS offers different external service tools for modifying sensor parameters inside the **active electrical stroke** (minimum 25 mm between setpoints) via the standard connection cable. There is no need to open the sensors electronics. Following tools are available:

1. Hand-Programmer G-Analog

for setups of measuring length inside the ordered output by pushing an up/down-button.

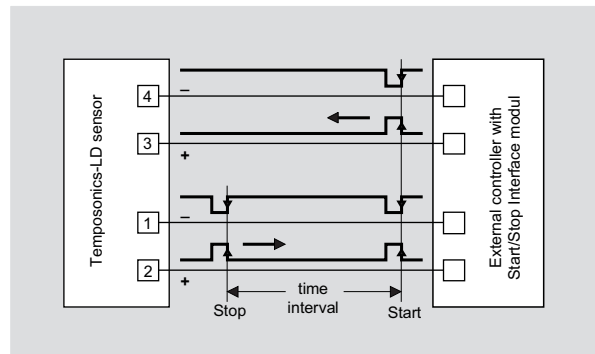


2. PC-Programmer G-Analog

This hardware converter is required to communicate via serial port of Window PC to the sensor. Customized settings are possible by using a MTS programming software (CD-ROM) for:

- Analog:**
1. Null and Span
 2. Forward and reverse acting
 3. Output: Voltage/Current and output values

Logic diagram Start/Stop



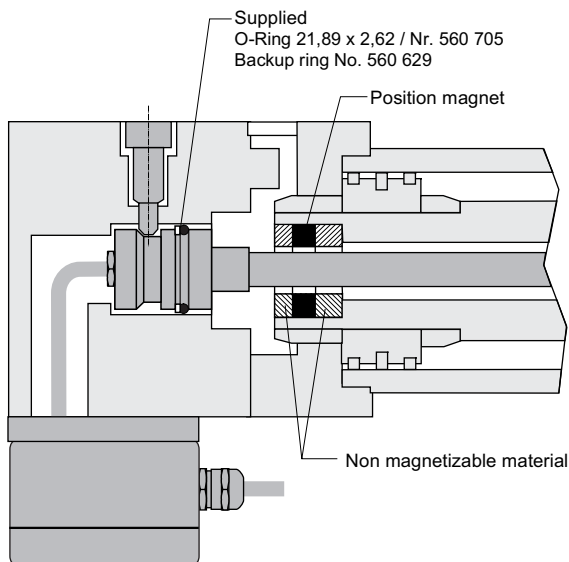
Cylinder installation

Temposonics-LD is designed for installation into hydraulic cylinders. Mounting of a LD sensor requires the use of a O-ring (black) and a backup-ring (orange). Both are supplied with the sensor. The sensor will be fixed via special screw.

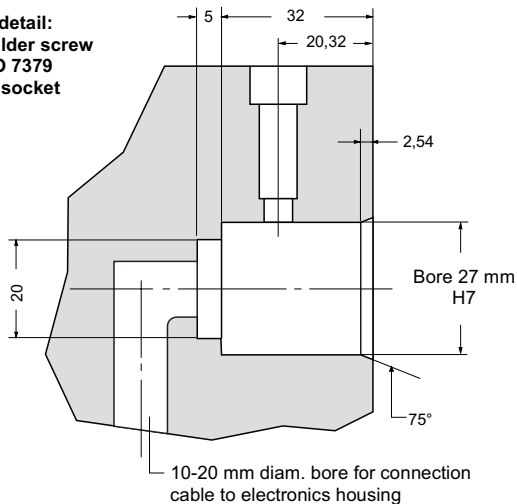
Interconnection cable

When mounted in the manner as shown below, interconnection cable is shielded according to EMC standards at the cylinder end cap. However, when the LD sensor is mounted in an alternative way, proper care must be taken to shield the interconnection cable.

Sensor rod style »S« with Electronics Housing style »B«



Example detail:
Cap shoulder screw
8 M6 - ISO 7379
with hex. socket



When installing the sensor in the cylinder notice following:

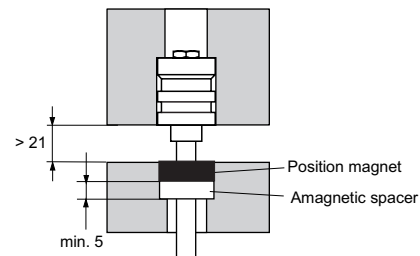
The high pressure sensor element (flange with rod) fits into the piston rod. The magnet on the bottom of the piston floats contactlessly over the sensor rod and marks the measuring point through the rod wall.

- Magnet must not slide along the sensor tube.
- The bore in the piston rod and type of sealing are determined by cylinder manufacturers as these depend on hydraulic pressure and piston velocity. We recommend 13 mm bore hole diameter at minimum. Do not exceed peak pressure.
- Protect the sensor rod from wear.

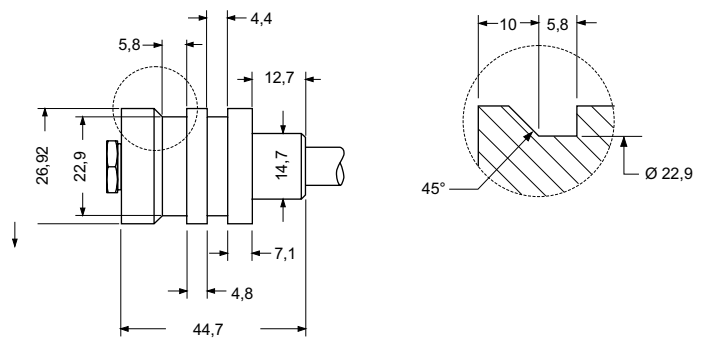
Mounting ring magnet

For accurate position measurements mount the magnet with non-magnetizable fastening material (screws, supports etc.).

Using magnetizable supports, note the minimum clearances.



Detail: Flange



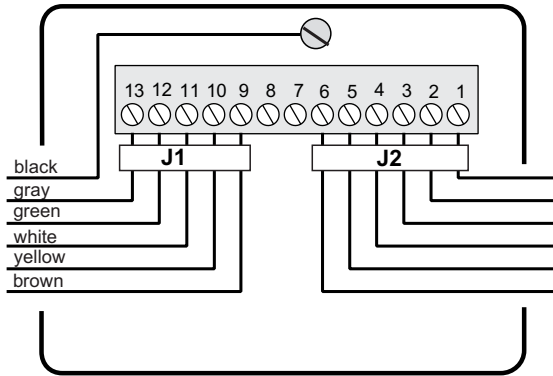
Attention:

Only the mounting of sensorsystem as shown here fulfill the EMC standards of Electromagnetic Emission and Electromagnetic Immunity.

Sensor Electronics Housing

CABLE OF SENSOR ROD

Customer Wiring



CABLE TO CONTROLLER

pigtailed, Option: connector

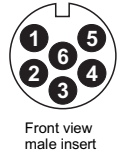
Factory Wiring

Terminal	Color	Function
9	brown	V in
10	yellow	SE out
11	white	GND
12	green	WG (-)
13	gray	WG (+)
Screw	black	Frame GND

Attention: For side entry housing connect shield on EMC cable gland

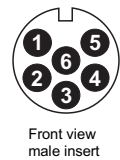
1. Start/Stop Output

Terminal	Color	Function	Option: Connector
1	white	DC Ground (0V)	Pin 6
2	pink	Stop (+)	Pin 2
3	yellow	Start (+)	Pin 3
4	gray	Stop (-)	Pin 1
5	green	Start (-)	Pin 4
6	brown	+24 VDC	Pin 5



2. Analog Output

Terminal	Color	Function	Option: Connector
1	white	DC Ground (0V)	Pin 6
2	pink	DC Ground	Pin 2
3	green	PC Programmer only	Pin 4
4	gray	0-10, 10-0 V, 4(0)-20, 20-(0)4 mA	Pin 1
5	yellow	PC Programmer only	Pin 3
6	brown	+24 VDC	Pin 5

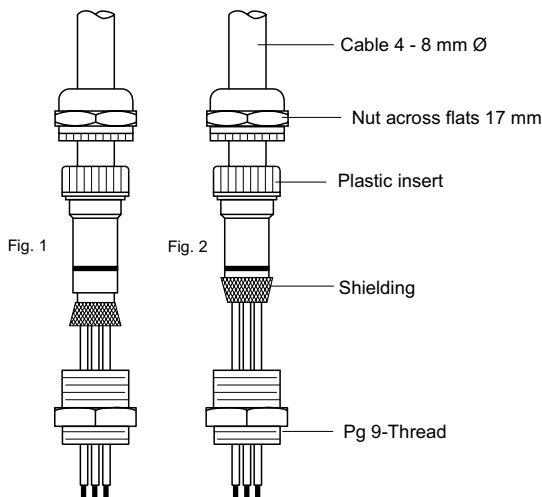


Note:

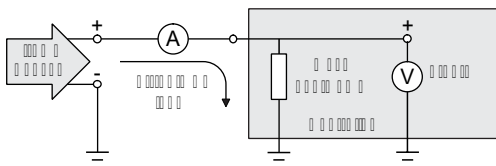
Wiring of the above 10-0 V and 20-4(0) mA outputs is valid for LD sensors from fabrication # (F-Nr.) 0546 xxxx.

Cable gland Pg 9-EMC

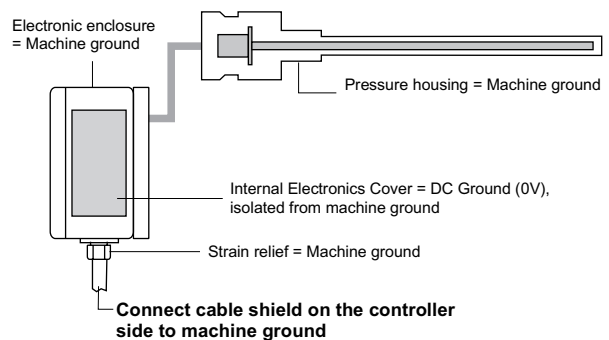
EMC-corresponding screwed cable gland for shielded cable. Simply to handle, as the cable shield must be removed backup over the plastic insert.



Typical 4 - 20 mA wiring



Typical Grounding



ATTENTION! Cable shield and DC Ground have to be isolated separately!

Sensor Temposonics-LD

Sensor rod style
S = Fiting flange (w. housing »B« only)
M = Threaded flange (w. housing »S« only)

Sensor electronic housing style
B = Bottom cable entry
S = Side cable entry

Cable type electronic housing
R = PVC-cable
H = PUR-cable

Cable outlet
PT = Pigtailed
D6 = Cable with 6 pin male connector

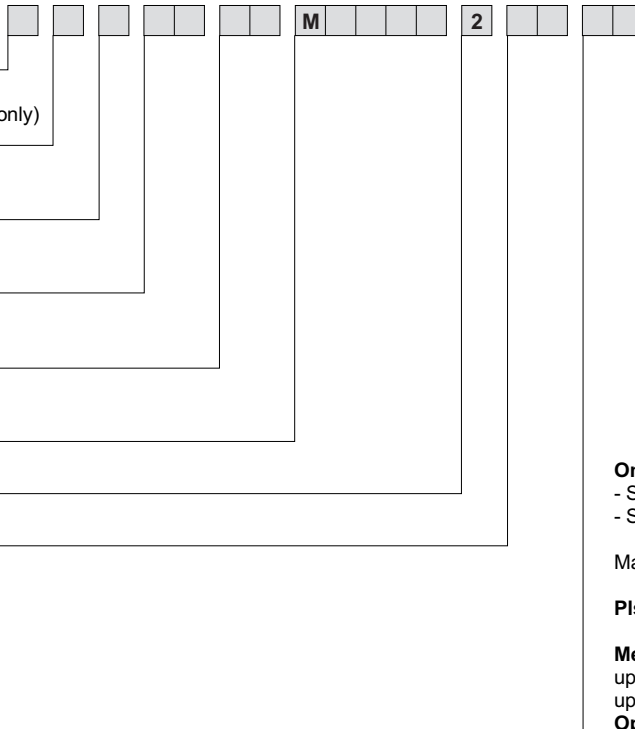
Cable length electronic housing
02 = 2 meters, Standard
01 - 10 = 01 up to 10 meters

Measuring length
 0050 - 5000 mm

Input voltage
2 = +24 VDC

Output signal
R0 = Start/Stop
V0 = 0 - 10 V
V1 = 10 - 0 V
A0 = 4 - 20 mA
A1 = 20 - 4 mA
A2 = 0 - 20 mA
A3 = 20 - 0 mA

Integral cable length of Sensor rod
L1 = 270 mm
L2 = 400 mm



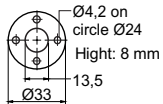
On delivery:
 - Sensor rod
 - Sensor Electronics

Magnets must be ordered separately.

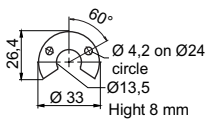
Pls. order accessories separately!

Measuring length
 up to 1000 mm in 50 mm steps
 up to 5000 mm in 250 mm steps
Option: In 5 mm steps

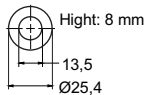
Available position magnets



Ring magnet OD33 (Standard)
 Part No. Nr. 201 542-2
 PA-Ferrite-GF20 composite
 weight ca. 14 g, operating
 temperature -40...+100 °C

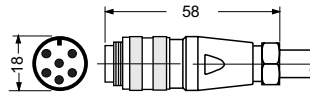


U-Magnet OD33
 Part No. 251 416-2
 PA-Ferrite-GF20 composite
 weight ca. 11 g, operating
 temperature -40...+100 °C



Ring magnet OD25,4
 Part No. 400 533
 Composite PA-Ferrite, weight ca. 10 g,
 operating temperature -40...+100 °C

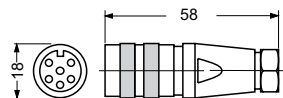
Male connector M16 wired on cable



6 pin DIN male connector
Part No. ST C0 9131 H06

Housing: Zinc, nickel plated
 Termination: Solder
 Contact insert: Silver plated
 Cable clamp: Pg 7
 Cable-Ø: 6 mm

Mating female connector M16



6 pin DIN female connector
Part No. ST C0 9131 D

Accessories

Accessories	Part No.
Ring magnet OD33, Standard	201 542-2
U-Magnet OD33	251 416-2
Ring magnet OD25,4	400 533
6 pol. female cable connector M16	St C0 9131 D
O-Ring 21,89 x 2,62	560 705
Backup ring	560 629

From F-Nr. 0546 xxxx the LD-Analog sensors are adjustable with following servicetools:

Hand-Programmer G-Analog	253 294
PC-Programmer G-Analog encl. power supply (100-240 VAC/24 VDC), cable and programming software (CD)	253 145

Temposonics-LD
Analog + Digital

Pioneers,
Innovators,
Leaders in
Magnetostrictive
Position Sensing

SENSORS

Sensor-Shop in Lüdenscheid: www.temposonics-shop.de
Service Hotline: 01805-mtssensor

© MTS/Temposonics-LD 13102005e • Alterations reserved

SENSORS

Germany

MTS Sensor Technologie
GmbH & Co.KG
Auf dem Schüffel 9
D-58513 Lüdenscheid
Tel. +49-2351-9587-0
Fax +49-2351-56491
info@mtssensor.de
www.mtssensor.de

USA

MTS Systems Corporation
Sensors Division
3001 Sheldon Drive
Cary, N.C. 27513
Tel. +1-919-677-0100
Fax +1-919-677-0200
info@mtssensors.com
www.mtssensors.com

Japan

MTS Sensors Technology Corp.
Ushikubo Bldg.
737 Aihara-cho, Machida-shi
Tokyo 194-0211
Tel. +81-42-775-3838
Fax +81-42-775-5512
info@mtssensor.co.jp
www.mtssensor.co.jp