

Absolute, Non-Contact Position Sensors

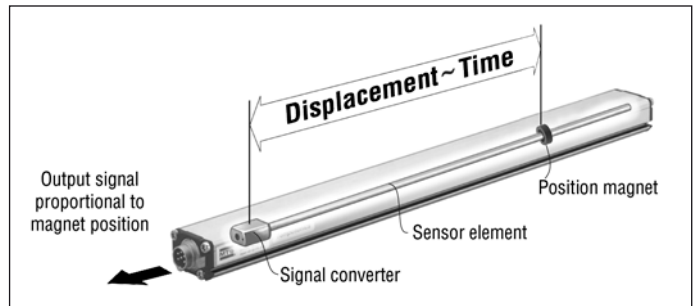
G-Series Analogue + Digital

Temposonics® GP and GH
Measuring length 50 - 7600 mm



100% field adjustable

- Rugged Industrial Sensor
- Linear Absolute Measurement
- Contactless Sensing with Highest Durability
- Enhanced diagnostics and programming capability
- Superior Accuracy: Linearity better 0,02 %
- Repeatability 0,001 %
- Direct Analogue Output
- Digital Start/Stop Pulse Output



Magnetostriction

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. Sensor integrated signal processing transforms the measurements directly into market standard 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.

Form factor

The extremely robust sensor, ideal for continuous operation under harshest industrial conditions is completely modular in mechanic and electronic design.

- A profile or rod-shaped sensor housing protects the sensing element in which gives rise to the measurement signal.
- The sensor head accommodates the complete modular electronic interface with active signal conditioning. Double encapsulation ensures high operating safety and optimum EMC protection.
- The position transmitter, a permanent magnet - fixed at the mobile machine part - drives contactlessly over the sensor's stroke and starts measuring through the housing wall.

Temposonics-GP+GH

Analogue + Digital

Temposonics® G-Series ... the next sensor generation

MTS Sensors is proud to introduce our new G-Series linear position sensors utilizing our next generation technology platform. G-Series sensors feature a microprocessor-based design with enhanced diagnostics and programmability to maximize backwards compatibility.

Novelties ready for series...

apart from the smaller electronics housing - 15 mm shorter - our new sensor models feature a new mechanical re-design and a completely revised interior, i.e.:

- Completely new electronics
- No wiring, i.e. trouble sources are omitted
- For higher accuracy, we have refrained from using temperature-sensitive components, e.g. setup potentiometers
- Easy programming from outside without opening the sensor housing
- New sealing concept
- Double shielded electronics for better EMC protection
- New filter against shock and vibrations

Sensor diagnostic display

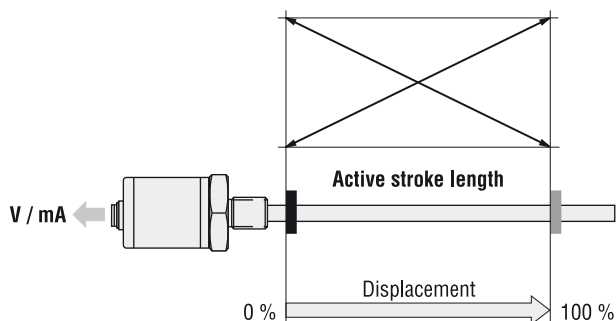
Integrated LEDs (green/red) provide basic visual feedback for normal sensor operation and troubleshooting.



Green	Red	Description
ON	OFF	Normal function
ON	Flashing	Missing external start signal
ON	ON	Magnet no detected
Flashing	OFF	Serial programming mode

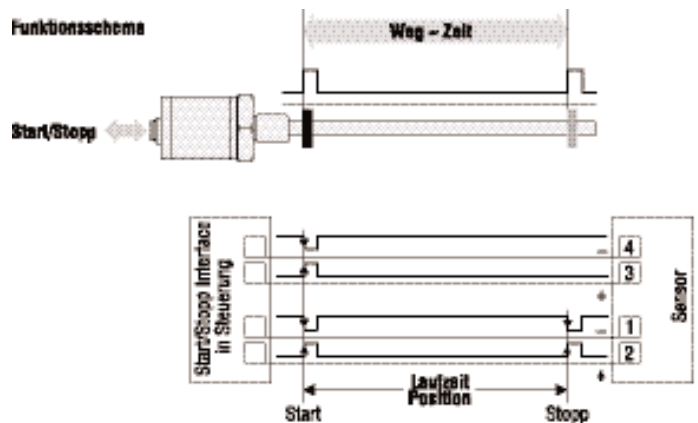
Analogue output

Temposonics® G-Series with analogue outputs provide direct analogue outputs including voltage and current, forward or reverse acting. All outputs allow full adjustment of Null and Span setpoints (minimum range 50 mm between setpoints) inside the **active electrical stroke** length. Since the outputs are direct, no signal conditioning electronics are needed when interfacing with controllers or meters.



Start/Stop pulse output

The digital Temposonics® G-Series is equipped with a start/stop output. The sensor requires a start signal from an **external indicator** in the control system and returns a stop signal corresponding to the magnet position. The time elapsed between the two signals is proportional to the displacement. Time measurement is by the control unit and used for calculating the position value. Option Multi-magnet measurement: One Sensor can detect the positions of several magnets simultaneously.



Sensor field programming

Temposonics® G-Series 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 50 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-Analogue

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

2. USB-Programmer G-Analogue/Digital

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:

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

Digital: Start/Stop special parameters

Technical Data

Input

Measured variables	Position, Liquid level
Measuring range	Analogue: Profile/Rod models: 50 - 2500 mm (longer stroke length are available on a custom basis) Digital: Profile model: 50 - 5000 mm, Rod model: 50 - 7600 mm

Output

Voltage	0...10 / 10...0 / -10...+10 / +10...-10 VDC (min. load controller: > 5 kOhms)
Current	4(0)...20 mA / 20...4(0) mA (min/max. load: 0/500 Ohms)
Overvoltage protection	Start/Stop pulse (RS422 serial differential signal)

Accuracy

Position measurement:	
- Null/Span adjustment	100 % of electrical stroke (Min. range 50 mm)
- Resolution	Analogue: Infinite Digital (Start/Stop): 0,1 mm; 0,01; 0,005 mm (controller dependent)
- Linearity	< ± 0,02 % F.S. (Minimum ± 50 µm)
- Repeatability	< ± 0,001 % F.S. (Minimum ± 2,5 µm)
- Hysteresis	< 4 µm
- Update time (ms)	Analogue: < 1 ms typical Digital (Start/Stop): controller dependent
- Ripple	< 0,01 % F.S.

Operating conditions

Magnet speed	any
Operating temperature electronic housing	-40 °C ... +80 °C (STR -40 °C ... +85°C)
Operating temperature active stroke	-40 °C ... +105 °C
Dew point, humidity	90% rel. humidity, no condensation
Protection	Profile: IP 65, Rod: IP 67, IP 68 for cable outlet
Shock test	100 g single hit, IEC-Standard 68-2-27
Vibration test	15g / 10 - 2000 Hz, IEC-Standard 68-2-6 (Resonance frequencies causing excess of 15g are excluded)
Standards, EMC test	Electromagnetic emission EN 61000-6-4, CISPR 16 Electromagnetic immunity EN 61000-6-2 EN 61000-4-2/3/4/6, Level 3/4, Criterion A, CE-qualified

Form factor, material

Diagnostic display	LEDs beside connector
<u>Profile model:</u>	
Sensor head	Aluminum
Sensor stroke	Aluminum
Position magnet	Magnet slider or removable U-magnet
<u>Rod model:</u>	
Sensor head	Aluminum
Rod with flange	Stainless steel 1.4301 / AISI 304
-Pressure rating	350 bar, 700 bar peak
Position magnet	Ring magnets, U-magnets

Installation

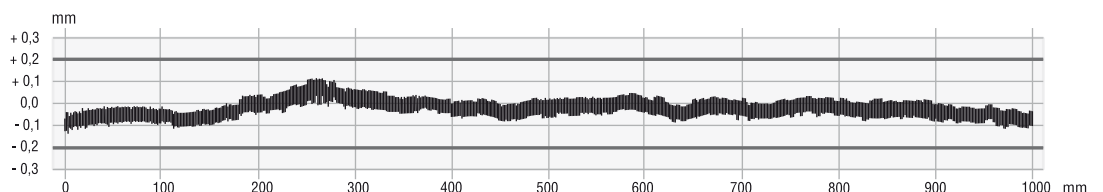
Mounting position	any orientation
Profile	Movable mounting clamps fixed with M5 x 20 screws or T-slot nuts M5 in base channel
U-Magnet, removable	Mounting plate and screws from antimagnetical material
Rod	Threaded flange M18 x 1,5 or 3/4" -16 UNF-3A, Hex nut M18
Position magnet	Mounting plate and screws from antimagnetical material

Electrical connection

Connection type	6 pin connector
Input voltage	24 VDC (-15 / +20 %)
- Polarity protection	up to -30 VDC
- Overvoltage protection	up to 36 VDC
Current drain	100 mA typical
Ripple	< 1 % S-S
Electric strength	500 VDC (DC ground to machine ground)

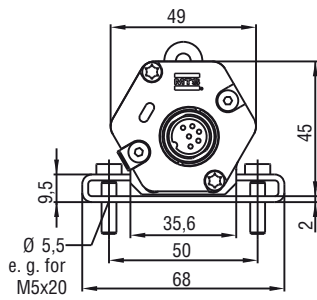
Linearity protocol

Temposonics®-GP, stroke 1000 mm
Tolerance allowed: ± 0,2 mm
Tolerance measured: typical ± 0,12 mm
uncorrected

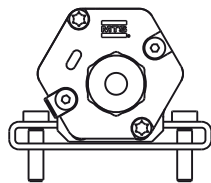


Temposonics-GP+GH

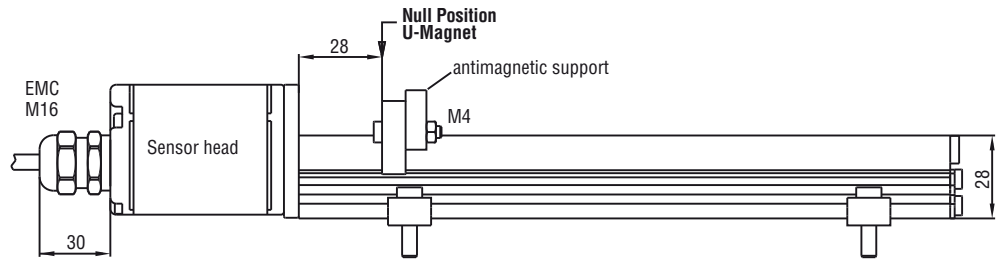
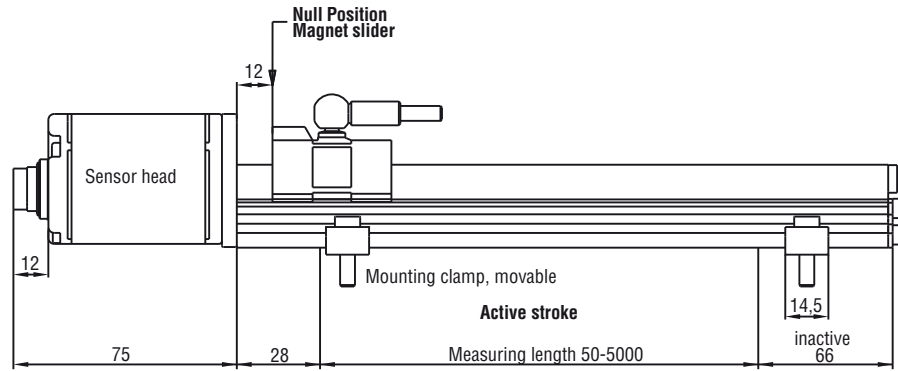
Analogue + Digital



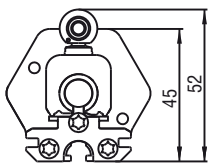
Connector outlet D60



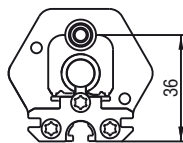
Cable outlet R02
Cable outlet H02



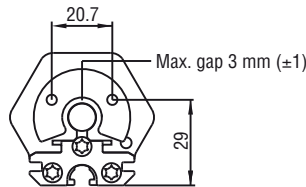
Selection of position magnet (upon delivery)



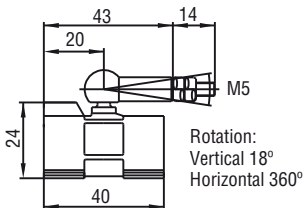
Magnet slider S
Part No. 252 182



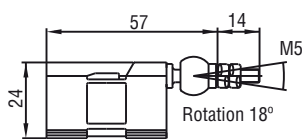
Magnet slider V
Part No. 252 184



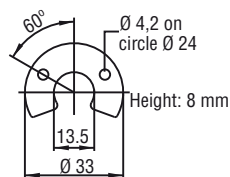
U-Magnet OD33
Part No. 251 416-2



GFK, Magnet Hardferrite
Ball joint CuZn39Pb3 nickel plated
Weight ca. 30 g
Operating temperature:
-40 ... +75°C



GFK, Magnet Hardferrite
Ball joint CuZn39Pb3 nickel plated
Weight ca. 30 g
Operating temperature:
-40 ... +75°C



Composite PA-Ferrite-GF20
Weight ca. 11g
Operating temperature:
-40 ... +100°C
Surface pressure max. 90 N/mm²
Fastening Torque for M4 screws max. 1 Nm

Stable Profile Design

Temposonics®-GP offers modular construction, flexible mounting configurations and easy installation. Position measurement is contactless via two versions of permanent magnets.

- A sliding magnet running in profile housing rails. Connection with the mobile machine part is by a ball jointed arm to taking up axial forces.
- A floating magnet, mounted directly on the moving machine part, travels over the profile at a low distance. Its air-gap allows the correction of small misalignments at installation.

Connection types

1. Connector outlet D60

6 pin Male receptacle M16

2. Cable outlet R02

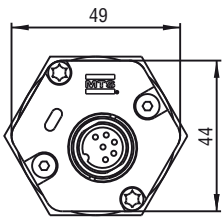
2 m PVC cable 3 x 2 x 0,14 mm²
Outer cable dia. 6 mm

3. Cable outlet H02

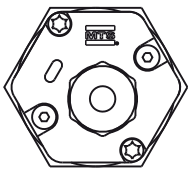
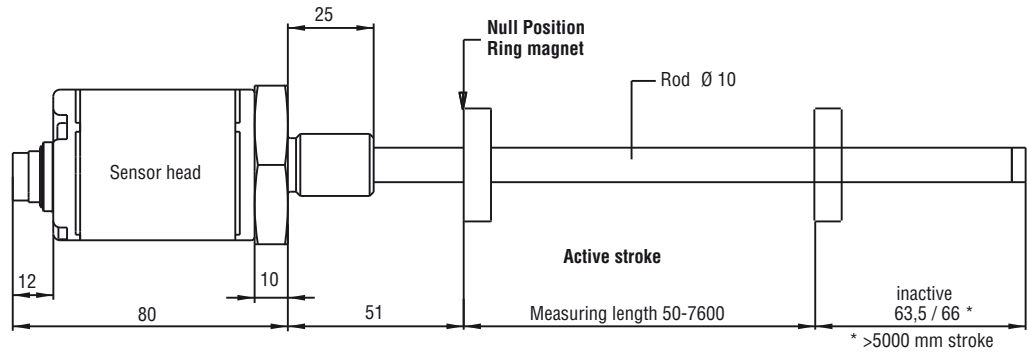
2 m PUR cable 3 x 2 x 0,25 mm²
Cable Ø 6,8 mm

Screened unshielded twisted pair
50 mm bending radius at fixed installation

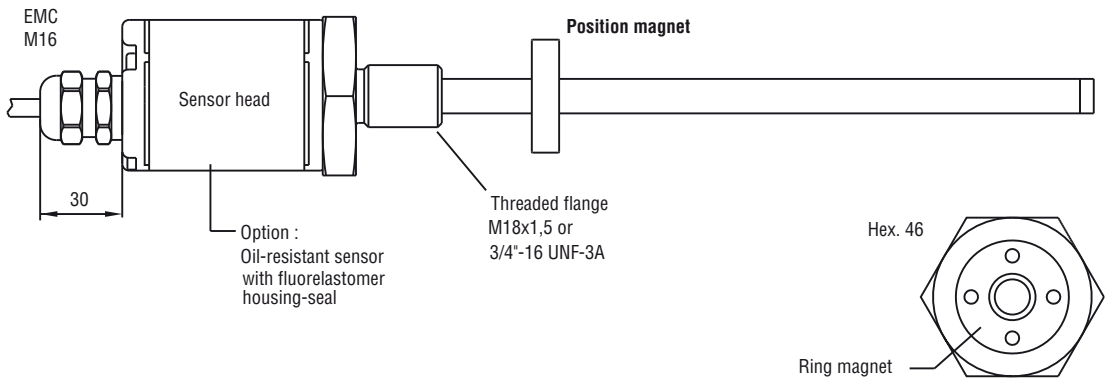
All measurements in mm



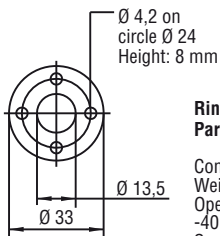
Connector outlet D60



Cable outlet R02
Cable outlet H02
(see profile style)

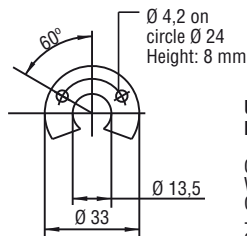


Selection of position magnet (not on delivery)



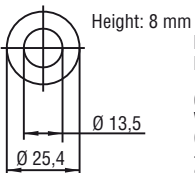
Ring magnet OD33
Part No. 201 542-2

Composite PA-Ferrite-GF20
Weight ca. 14 g
Operating temperature:
-40 ... +100°C
Surface pressure max. 40 N/mm²
Fastening Torque for M4 screws max. 1 Nm



U-magnet OD33
Part No. 251 416-2

Composite PA-Ferrite-GF20
Weight ca. 11 g
Operating temperature:
-40 ... +100°C
Surface pressure max. 40 N/mm²
Fastening Torque for M4 screws max. 1 Nm



Ring magnet OD25,4
Part No. 400 533

Composite: PA-Ferrite
Weight ca. 10 g
Operating temperature:
-40 ... +100°C
Surface pressure max. 40 N/mm²

High Pressure Rod Design

Temposonics®-GH with a pressure-resistant stainless steel flange and sensing rod is suitable for use in hydraulic cylinders and externally in all applications where space is a problem. Position measurement is via ring or U-magnets travelling along the sensing rod without any mechanical contact.

Advantage...

the completely operable sensor cartridge can be replaced for servicing easily without opening the fluid circuit.

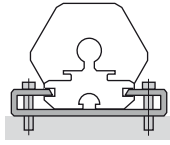
Temposonics-GP+GH

Analogue + Digital

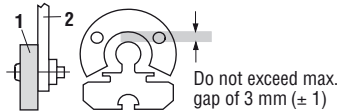
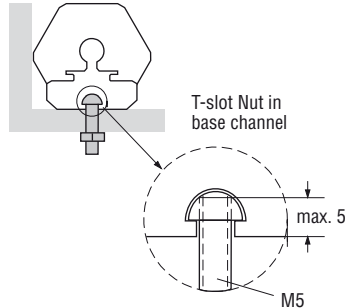
Flexible installation in any position

Profile model

Normally, the sensor is firmly installed - fixed on a straight surface of the machine with movable mounting clamps or M5 screws in base channel - whilst the magnet is mounted at the mobile machine part.



Mounting clamp with screws M5x20
Tightening torque: max. 5 Nm



1 U-Magnet
2 Mounting plate and screws non-ferrous material

Rod model

Mount the sensor via flange thread or a hex nut. If possible, non-magnetizable material should be used for mounting support (dimensions as shown). With horizontal mounting, longer sensors (from 1 meter) must be provided with mechanical support.

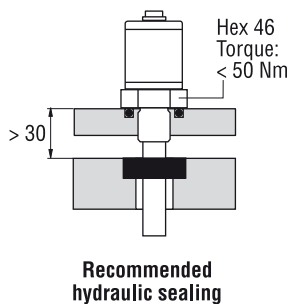
Hydraulic sealing

Recommended is sealing of the flange facing with O-Ring (e.g. 22,4 x 2,65) in a cylinder cover nut or an O-Ring 15,3 x 2,2 in undercut.

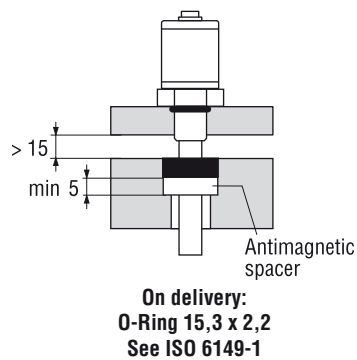
Minimum assembly distance

1. Non-magnetizable material

2. Magnetizable material



Recommended hydraulic sealing

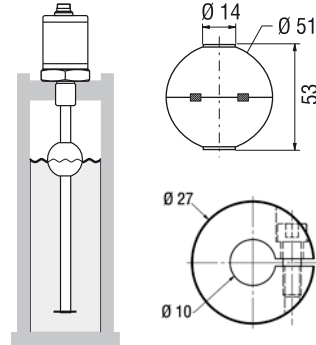


On delivery:
O-Ring 15,3 x 2,2
See ISO 6149-1

Connector	Pin	Cable	Analog	Digital
<p>Male insert connector rear of cable connector</p>	1	grey	V/mA	Stop(-)
	2	pink	DC Ground	Stop(+)
	3	yellow	USB-Programmer	Start(+)
	4	green	USB-Programmer	Start(-)
	5	brown	+ 24 VDC (-15 / +20 %)	
	6	white	DC Ground	

A Liquid Level Sensor...

With installation of position magnet into a float, the application range of G-series extends substantially. These highly precise float sensors supply exact level values or - provided with suitable floats - interface heights e.g. in the process-industry or laboratory technology etc.



Magnet float (upon request)

Part No. 251 447

- Density 720 kg/m³

- Material 1.4571

polished AISI 316 Ti

- Pressure < 25 bar

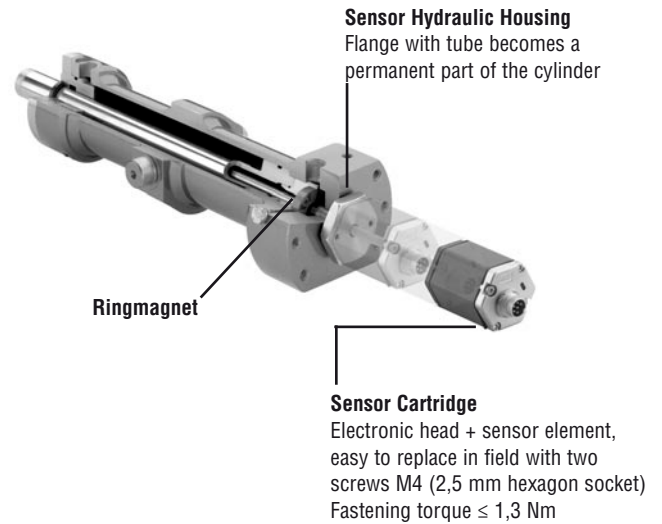
Collar

Part No. 560 777

Cylinder installation

When used for direct stroke measurement in fluid cylinders, the sensor's high pressure, stainless steel rod installs into a bore in the piston head/rod assembly as illustrated. That guarantees a longlife and trouble-free operation - independent of used hydraulic fluid.

The sensor cartridge can be removed from the flange and rod housing while still installed in the cylinder. This procedure allows quick and easy sensor cartridge replacement, without the loss of hydraulic pressure.

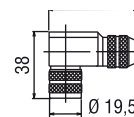


Cable connector (recommended, not on delivery)



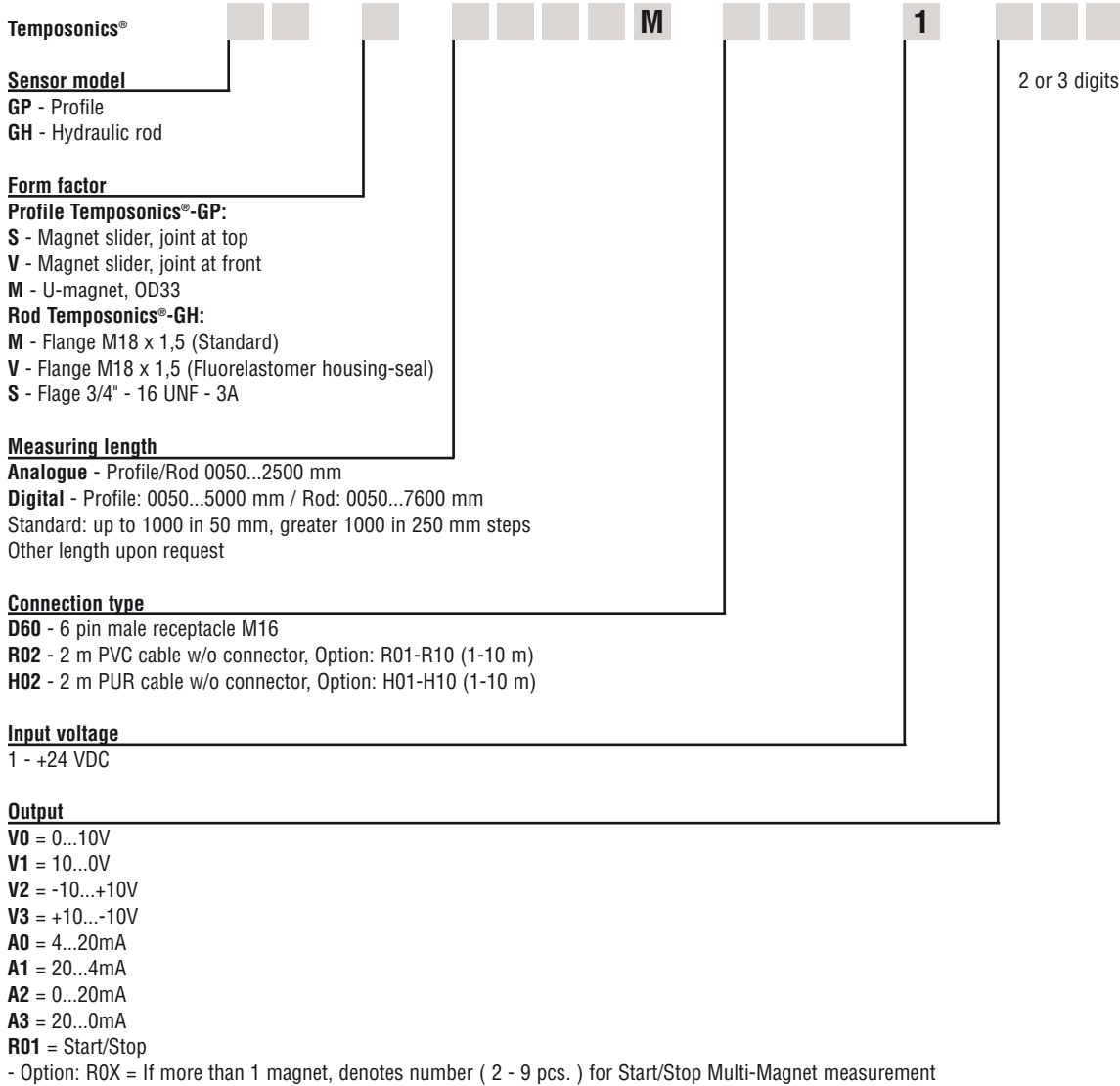
6 pin female connector M16, PG7
Part No. 370 623

6 pin female connector M16, PG9
Part No. 370 423



6 pol. 90° female connector M16 insert adjustable in 45° positions
Part No. 560 778

Housing: Zinc, nickel plated
Termination: Solder
Contact insert: Silver plated
Cable clamp PG7:
Max. cable-Ø 6 mm
Cable clamp PG9/M16:
Max. cable-Ø 8 mm



On delivery profile model: Sensor, Position magnet, 2 mounting clamps up to 1250 mm + 1 clamp for every additional 500 mm
On delivery rod model: Sensor, O-ring, pls. order magnet separately.

Accessories (selection)

Accessories (selection)	Part No.
Magnet slider type »S«	252 182
Magnet slider type »V«	252 184
U-Magnet OD33	251 416-2
Ring magnet OD33, Standard	201 542-2
Hex nut	500 018
O-Ring 15,3 x 2,2 Fluorelastomer FPM 75	401 133
Magnet float	251 447
Collar	560 777
Mounting clamp	400 802
T-slot nut M5 for base channel mounting	401 602
6 pin female cable connector M16, PG7	370 623
6 pin female cable connector M16,	370 423
6 pin 90°-female cable connector M16,	560 778
PVC-cable 3 x 2 x 0,14 mm ²	530 032
PUR-cable 3 x 2 x 0,25 mm ²	530 052
MTS-Servicetools	
Analogue Hand-Programmer G	253 853
Analogue USB-Programmer G, incl. power supply	253 145-1
100 - 240 VAC / 24 VDC, connection cable and CD-ROM	
Digital USB-Programmer G, incl. power supply	253 146-1
100 - 240 VAC / 24 VDC, connection cable and CD-ROM	

Stroke length Standard

GP	
Stroke	Ordering steps
≤ 500 mm	25 mm
500 - 2500	50 mm
2500 - 5000	100 mm
> 5000	250 mm

GH	
Stroke	Ordering steps
< 500 mm	5 mm
500 - 750	10 mm
750 - 1000	25 mm
1000 - 2500	50 mm
2500 - 5000	100 mm
> 5000	250 mm

www.mtssensor.com
www.temposonics-shop.de

© MTS Temposonics® GPGH Analogue + Digital 26052011e - Alterations reserved



Germany
MTS Sensor Technologie
GmbH & Co. KG
Auf dem Schüffel 9
58513 Lüdenscheid, Germany
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, NC 27513, USA
Tel.: +1-919-677-0100
Fax: +1-919-677-0200
sensorsinfo@mts.com
www.mtssensors.com

Japan
MTS Sensors Technology Corp.
737 Aihara-cho,
Machida-shi
Tokyo 194-0211, Japan
Tel.: +81-42-775-3838
Fax: +81-42-775-5516
info@mtssensor.co.jp
www.mtssensor.co.jp