Temposonics®

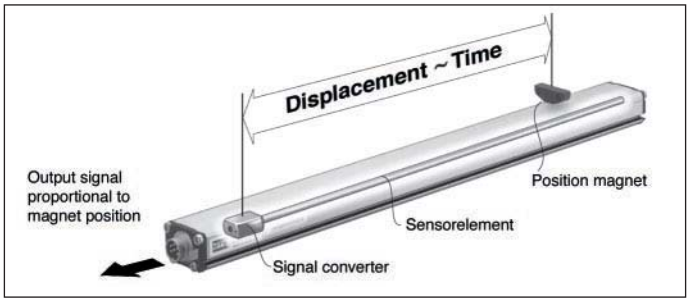
Magnetostrictive Position Sensors

MTS SENSORS

G-Series
Analog + Digital

Temposonics GH - Replaced Temposonics II
Measuring length 50 - 7600 mm

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



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 hight precise speed-measurement of an ultrasonic wave (torsion pulse in its sensor element) for position detecting. Sensor integrated signal processing transforms the measure-ments directly into market standard outputs. The contactless priciple - 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.

CE ISO 9001 CERTIFIED

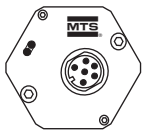
Temposonics G-Series ... the next sensor generation

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 temoerature-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

New...a sensor diagnostic display

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

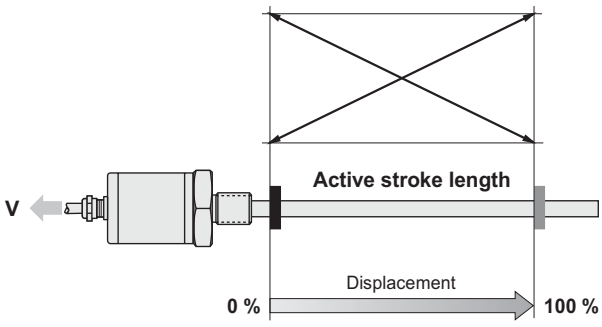


Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected
ON	Flashing	Missing external start signal
Flashing	OFF	Serial PC programming mode

Sensor ouputs

1. Analog

Temposonics-GH provides direct voltage outputs, forward or reverse acting. All outputs allow **full** adjustment of Null and Span setpoints inside the **active electrical stroke** length. Since the outputs are direct, no signal conditioning electronics are needed when interfacing with controllers or meters.

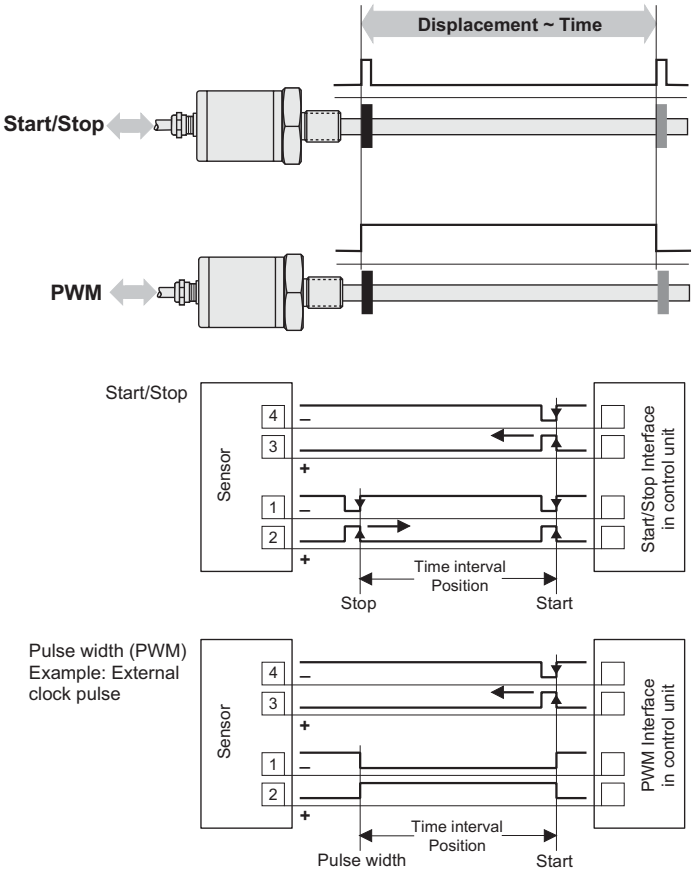


2. Digital

The sensor provides digital data as start/stop or pulse width modulated (PWM) signals, whose running times are directly proportional to the displacement. Measurements are transmitted as differential signals (single end possible). Start, transformation and evaluation of time measurement are made in user's controller.

2.1 Start/Stop output: the sensor requires a start signal from the control system and returns a stop signal corresponding to the magnet position. *Option Multi-magnet measurement: One Sensor can detect the positions of several magnets simultaneously.*

2.2 Pulse width output (PWM): needs an external start signal or uses an internal interrogation pulse and returns a pulse width corresponding to the magnet position.

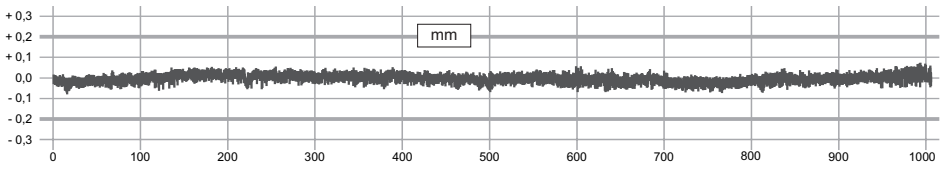


Technical Specifications

Measured variable	Position
Measuring range	
- Analog	50 - 2500 mm
- Digital	50 - 7600 mm
Output	
Voltage	0...10 / 10...0 / -10...+10 / +10...-10 VDC (min. load controller: > 5 kOhms)
Digital	RS422 serial differential signal or single end
Accuracy	
- Null/Span adjustment	100 % of electrical stroke (Min. range 25 mm)
- Resolution	Analog: Infinite Digital: 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)	Analog: < 1 ms typical Digital: measuring range and controller dependent
- Ripple	< 0,01 % F.S.
Operating conditions	
Magnet speed	any
Operating temperature	-40 °C ... +80 °C
Dew point, humidity	90% rel. humidity, no condensation for profile sensor
Protection	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
Standards, EMC test	Electromagnetic emission EN 50081-1 Electromagnetic immunity EN 50082-2 EN 61000-4-2/3/4/6/8, Level 3/4, Criterium A, CE-qualified
Form factor, material	
Diagnostic display	LEDs beside connector
Sensor head	Aluminum
Rod with flange	Stainless steel 1.4301 / AISI 304
-Pressure rating	350 bar, 700 bar spike
Position magnet	Ring magnets, U-magnets, floats
Installation	
Mounting position	any orientation
Rod	Threaded flange M18 x 1,5 or 3/4" -16 UNF-3A, Hex nut M18
Position magnet	Mounting plate and screws from non-ferrous material
Electrical connection	
Connection type	2 m cable or 0,3 m cable with 10 pin cable connector or 0,3 m cable with 5 pin cable connector
Input voltage	+ 15 VDC (9...28,8 VDC)
- Polarity protection	up to -30 VDC
- Overvoltage protection	up to 36 VDC
Current drain	100 mA tyical
Ripple	< 1 % S-S
Electric strength	500 V (DC ground to machine ground)

Linearity protocol

Example:
Sensortype GH, stroke length 1000 mm
Tolerance allowed: ± 0,2 mm
Tolerance measured: ± 0,09 mm
uncorrected



For Machinery and Fluid Cylinders....

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 rod without any mechanical contact.

Advantage...

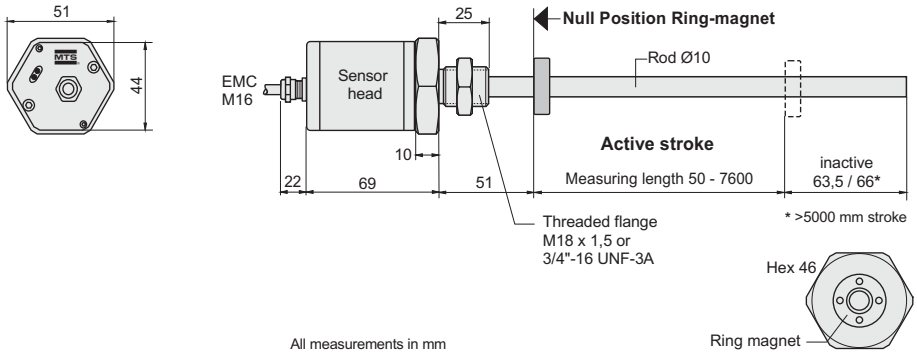
the completely operable sensor cartridge can be replaced for servicing easily without opening the fluid circuit.

Connection types

1. Cable outlet R02
2 m PVC cable 3 x 2 x 0,14 mm²
Outer cable dia. 6 mm

2. Cable outlet T02
2 m Teflon cable 4 x 2 x 0,25 mm²
Outer cable dia. 7,6 mm

Screened unshielded twisted pair
50 mm bending radius at fixed installation

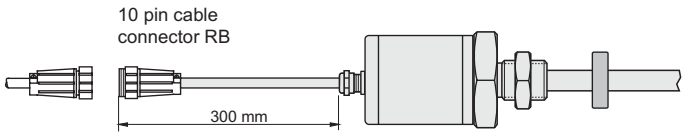


All measurements in mm

Backward compatible !

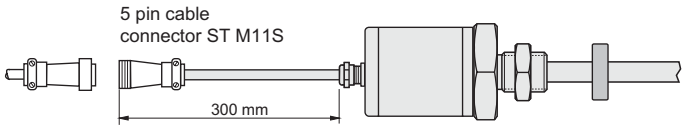
3. Cable with connector type RB1
Replacement for Temposonics II
Type TTx - *RB* - M .....

10 pin MTS cable
connector female
Part No. ST 400 755-3

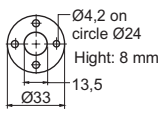


4. Cable with connector type RR8
Replacement for Temposonics II
Type TTx - *R8* - M .....

5 pin cable connector
M16S, female
Part No. ST M16S

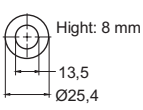


Position magnets (select your type and order separately)



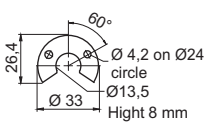
Ring magnet OD33 (Standard)
Part No. Nr. 201 542-2

PA-Ferrite-GF 20, weight ca. 14 g,
operating temperature -40...+75 °C



Ring magnet OD25,4
Part No. 400 533

Composite PA-Ferrite, weight ca. 10 g,
operating temperature -40...+100 °C



U-Magnet OD33
Part No. 251 416-2

PA-Ferrite-GF 20, weight ca. 11 g,
operating temperature -40...+75 °C

Installation

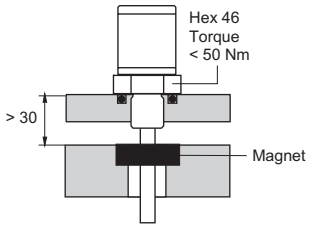
Mount the sensor via flange thread or hex nut. If possible, non-ferrous material should be used for mounting support (see dimensions). With horizontal mounting, longer sensors (from 1 meter) must be provided with mechanical support.

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.

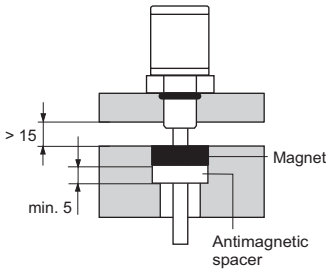
Min. assembly distance

1. Non-magnetizable material



Recommended hydraulic sealing

2. Magnetizable material

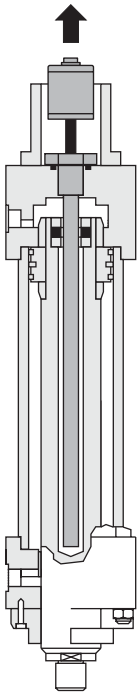


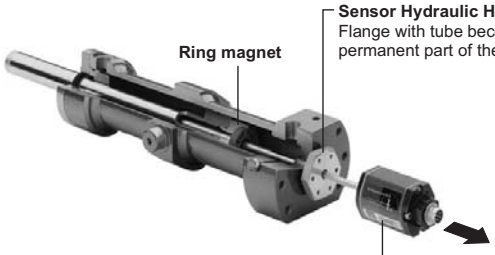
Alternative sealing: O-Ring 15,3 x 2,2

Cylinder installation

Due to form factor, a rod sensor is excellently suited for direct stroke measurement in fluid cylinders. The magnet, mounted on the piston bottom, drives contactlessly along the stroke and marks exactly the position through the rod wall - independent of the used hydraulic fluid - that guarantees a longlife and trouble-free operation.

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.





Sensor Hydraulic Housing
Flange with tube becomes a permanent part of the cylinder

Sensor Cartridge
Electronic head + sensor element easy to replace in field with 2 screws (2,5 mm hexagon socket)

Notes
- Magnet must not slide along the sensor tube
- Bore in the piston rod and type of sealing depends on pressure and piston velocity (13 mm min.)
- Do not exceed peak pressure

Connection types

1. Cable outlets R02, T02, W02

6 wires Cable **R02** (type K27)*	8 wires Cable **T02** (type K34) **W02** (type K61)	Sensor Output Analog	Start/Stop	Pulse-width (PWM)
gray	gray	DC Ground	Stop (-)	Gate (-)
pink	pink	Voltage (V)	Stop (+)	Gate (+)
yellow	yellow	PC-Programming	Start (+)	Start (+)
green	green	PC-Programming	Start (-)	Start (-)
brown	rot	+15 VDC	+15 VDC	+15 VDC
white	white	DC Ground (0V)	DC Ground (0V)	DC Ground (0V)
	brown	internal n.c.	internal n.c.	internal n.c.
	blue	internal n.c.	internal n.c.	internal n.c.

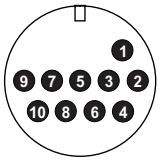
**) Pls. connect cable properly*

ATTENTION

Temposonics-II Sensors had a power supply of +15 VDC (cable color *red*) and -15 VDC (cable color *blue*)

Temposonics-GH Sensors need a power supply of +15 VDC only

2. Cable with connector RB1

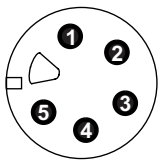


As viewed from end of sensor

Connector	Temposonics-II Wire colors	Sensor Output Analog
Pin 3	gray	DC Ground
Pin 4	pink	Voltage (V)
Pin 7	yellow	PC-Programming
Pin 8	green	PC-Programming
Pin 5	red	+15 VDC
Pin 1	white	DC Ground (0V)

Connector	Temposonics-II Wire colors	Sensor Output Start/Stop	PWM
Pin 3	gray	Stop (-)	Gate (-)
Pin 4 and 8	pink	Stop (+)	Gate (+)
Pin 9	yellow	Start (+)	Start (+)
Pin 10	green	Start (-)	Start (-)
Pin 5	red	+15 VDC	+15 VDC
Pin 1	white	DC Ground (0V)	DC Ground (0V)

3. Cable with connector RR8



As viewed from end of sensor

Connector	Temposonics-II Wire colors	Sensor Output Start/Stop
Pin 1	red	+ 15 VDC
Pin 2	white	DC Ground (0V)
Pin 3	pink	Stop (+)
Pin 4	blue	n.c.
Pin 5	yellow	Start (+)

How to order GH sensor and Temposonics II replacement

Position sensor Temposonics G H ☐ ☐☐☐☐ M ☐☐☐ 2 ☐☐☐

2 or 3 digits

Sensor model
GH - Hydraulic rod

Form factor
M = Flange M18 x 1,5 (Standard)
S = Flange 3/4" - 16 UNF - 3A
A = Flange M18 x 1,5 (Aluminum)

Stroke length
Rod (stainless steel): Analog = 0050...2500 / Digital = 0050...7600 mm
Rod (aluminum): 0050...2500 mm
Standard: up to 1000 in 50 mm, greater 1000 in 250 mm steps
Other length upon request

Connection type
R02 - 2 m PVC cable w/o connector, Option: R01-R10 (1-10 m)
T02 - 2 m Teflon cable w/o connector, Option: T01-T10 (1-10 m)
RB1 = 0,3 m PVC cable with 10 pin cable connector RB
RR8 = 0,3 m PVC cable with 5 pin cable connector R8
XXX = Specify cable and connector type

Input voltage
2 = +15 VDC

Output
V0 = 0...10 V
V1 = 10...0 V
V2 = -10...+10 V
V3 = +10...-10 V
_ _ C = Customized: Output and position of set-points SP1 and SP2 on additional specification 1)
1) Example: **V1C** (C = SP1: 0150 mm and SP2: 0650 mm)

R01 = Start/Stop
- Option R0X: If more than 1 magnet, denotes number (2 - 9 pcs.) for Start/Stop Multi-Magnet measurement
DE1 = PWM, external interrogation, 1 circulation (Option: DE2 - DEK = 2 - 20*)
DI1 = PWM, internal interrogation, 1 circulation (Option: DI2 - DIK = 2 - 20*)

*) 2 - 20 circulations up to 2134 mm stroke length max.

PWM Output

Circulation count	Order code DEx or DIx	Resolution based on 28 MHz counter in on-site controller
1	x = 1	0,1 mm
2	2	0,05 mm
5	5	0,02 mm
10	A	0,01 mm
15	F	0,0066 mm
20	K	0,005 mm

On delivery: Rod model sensor, hex nut, pls. order magnet (see below) separately.

Accessories (selection)	**Part No.**
Ring magnet OD33, Standard	201 542-2
Ring magnet OD25,4	400 533
U-Magnet OD33	251 416-2
O-Ring 15,3 x 2,2 FPM 75	401 133
Spacer for Magnet OD33, 3 mm, aluminum	400 633
PVC-cable 3 x 2 x 0,14 mm2	K27 (replaced K32 for GH mounting)
Teflon cable 4 x 2 x 0,25 mm2	K34
Silicon cable 3 x 2 x 0,25 mm2	K54 (replaced K36 for GH mounting)
10 pin female MTS cable connector	ST 400 755-3
5 pin female cable connector M16S	ST M16S

Temposonics-GH
Analog + Digital

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

MTS®
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