

## R-Series Profibus

**Temposonics RP and RH**  
Measuring length 25 - 7600 mm

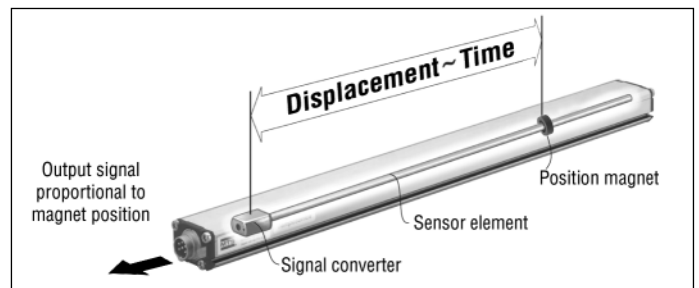


Advanced Communication  
... offers Multi-Position Measurement

New: Diagnostic LED



- Rugged Industrial Sensor
- Linear and Absolute Measurement
- LEDs for Sensor Diagnostics
- Contactless Sensing with Highest Durability
- Superior Accuracy: Linearity better 0,01 %
- Resolution 5 µm
- Repeatability 0,001 %
- Direct Profibus-DP Output, Displacement + Speed
- Multi-Position Measurement: 1 Sensor for max. 15 Positions



### 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 height 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.

## New...a 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	ON	Magnet not detected or Wrong quantity of magnets
Flashing	OFF	Waiting for Master parameters
Flashing	ON	Programming mode

## Profibus Interface

Temposonics sensors fulfill all requirements of PROFIBUS-DP (EN 50170). The sensor realizes the absolute position measuring with direct transmission of serial, bitsynchronous data in RS485 standard to control units in a baud rate of 12 Mbit/s maximum. PROFIBUS interface is built-up with Siemens buscontroller SPC3. In addition to applications data transmission, PROFIBUS provides powerful functions for diagnostics and configuration, loaded into the bus via the GSD (Electronic Device Data Sheet). Profibus sensors - corresponding DP-slave Class 2 - featuring

### Sensor outputs:

- Absolute position measurement
- Speed measurement
- Sensor status
- Error detection (e.g. magnet status)

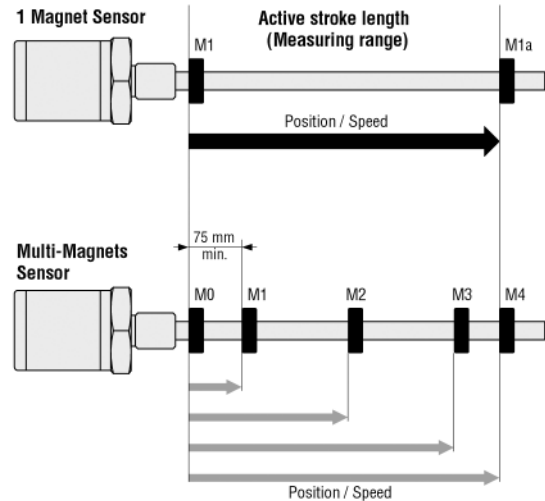
### Selectable parameters:

- Offset/Preset for each magnet
- Measuring direction: Forward/reverse
- Resolution
- Different data formats

## Operation modes

PROFIBUS sensors provide measurements with one or multiple magnets. Following different operation modes are available:

- **Standard measurement:** Position measurement 1 magnet
- **Multi-Magnets measurement:** Position measurement of max. 15 magnets simultaneously resp. position and speed of max. 5 magnets.



## Data exchange

With Multi-Magnet measurement, 1 status byte and 3 bytes of position data for each position are transmitted. The status byte contains e.g. the error bit and the position number of the following measurement value. Dependent on sensor parameters setting, the position data can be transferred to the control unit in different formats (e.g. INTEL or MOTOROLA format).

## Accessory: MTS Servicetool

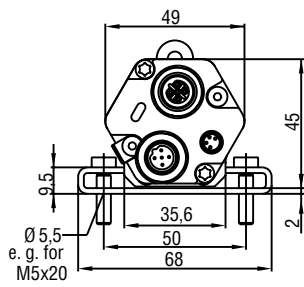
**Profibus Address-Programmer** is used for setup sensor's slave address. Normally addressing is done by Profibus **SetSlaveAddress**. Since some master systems do not support this standard, or customers controller can not handle, this tool - connected to the sensor - can be used for direct addressing.

**Technical Data**

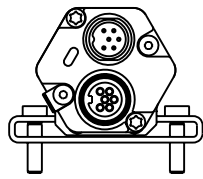
<b>Input</b>	
Measured variable	Displacement / Option: Multi-Magnets measurement (max. 15 positions or 5 positions + 5 velocities)
Measuring length	Profile 25 - 5000 mm / Rod 25 - 7600 mm
<b>Output</b>	
Output signal	PROFIBUS-DP System according ISO 74498
Data format	PROFIBUS-DP (EN 50 170)
Data transmission rate	Max. 12 Mbit/s
<b>Accuracy</b>	
Resolution	
- Displacement	5 µm / other values selectable via GSD-File
- Speed	5 mm/s µm displacement resolution : 0,64 mm/s up to 500 / 0,43 mm/s up to 2000 / 0,21 mm/s up to 4500 / 0,14 mm/s up to 7600 mm stroke length
Linearity	< ± 0,01 % F.S. (Minimum ± 50 µm)
Repeatability	< ± 0,001 % F.S. (Minimum ± 2,5 µm)
Cycle time, standard (1 magnet)	0,5 ms at 500 mm / 1 ms at 2000 mm / 2 ms at 4500 mm / 3,1 ms at 7600 mm stroke length each additional magnet + 0,05 ms; for speed measurement ca. + 0,03 ms
Temperature coefficient	<15 ppm/° C
Hysteresis	< 4 µm
<b>Operating conditions</b>	
Magnet speed	any
Operating temperature	-40 °C ... +75 °C
Dew point, humidity	90% rel. humidity, no condensation
Protection	Profile: IP65, Rod: IP67, if mating connector is correctly fitted
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, Level 3/4, Criterion A, CE-qualified
<b>Form factor, material</b>	
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
<b>Installation</b>	
Mounting position	any orientation
Profile	Movable mounting clamps 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
<b>Electrical connection</b>	
Connection type	2 x 6 pin connector M16 or 2 x 5 pin connector M12 + 4 pin. connector M8
Input voltage	24 VDC (-15 / +20 %)
- Polarity protection	up to -30 VDC
- Overvoltage protection	up to 36 VDC
Current drain	90 mA typical
Ripple	< 1 % S-S
Electric strength	500 V (DC ground to machine ground)

# Temposonics-RP+RH

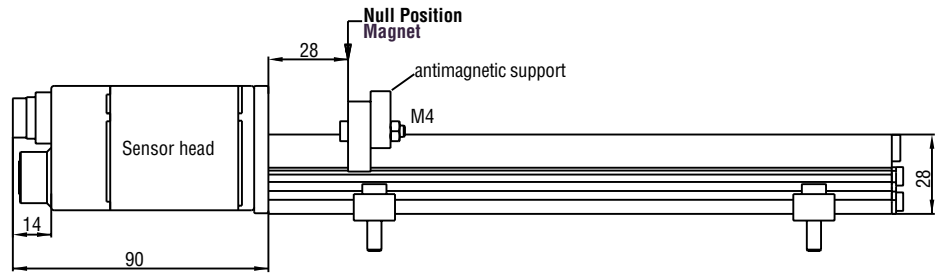
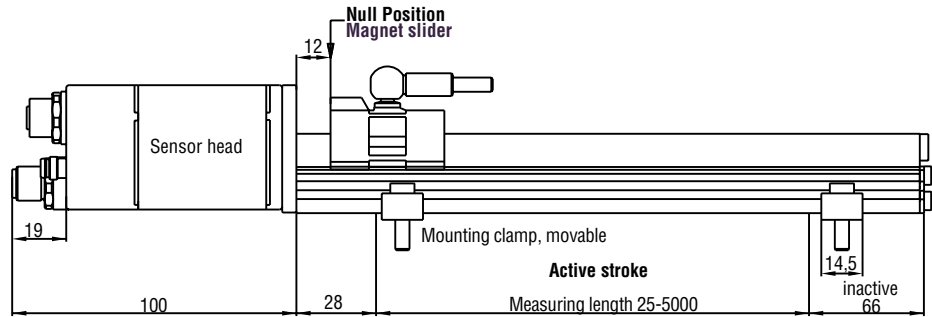
## Profibus



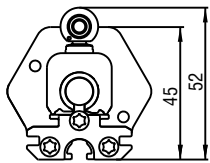
Connector outlet D53



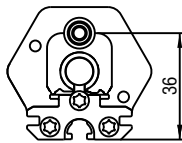
Connector outlet D63



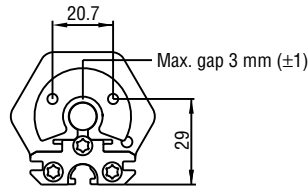
### Selection of position magnets (upon delivery)



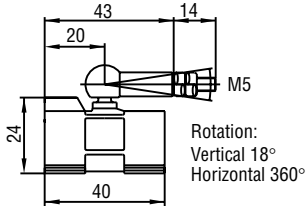
**Magnet slider S**  
Part No. 252 182



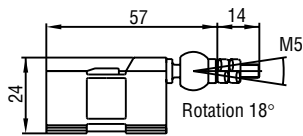
**Magnet slider V**  
Part No. 252 184



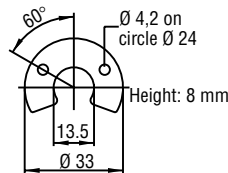
**U-Magnet M OD33**  
Part No. 251 416-2



GFK, Magnet Hardferrite  
Weigth ca. 30 g  
Operating temperature:  
-40 ... +75°C



GFK, Magnet Hardferrite  
Weigth ca. 30 g  
Operating temperature:  
-40 ... +75°C



Composite PA-Ferrite-GF20  
Weigth ca. 11g  
Operating temperature:  
-40 ... +100°C

### Stable Profile Design

Temposonics-RP 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 via 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

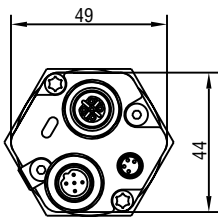
#### 1. Connector outlet D63

- 6 pin male receptacle M16
- 6 pin female receptacle M16

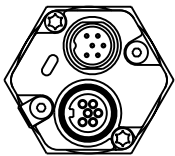
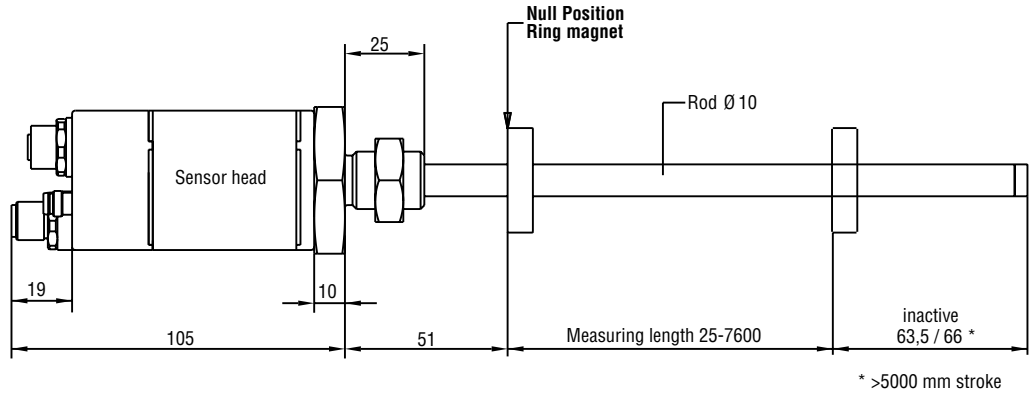
#### 2. Connector outlet D53

- 5 pin female receptacle M12
- 5 pin male receptacle M12
- 4 pin male receptacle M8

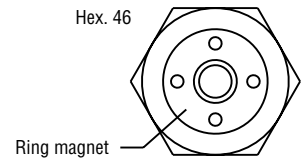
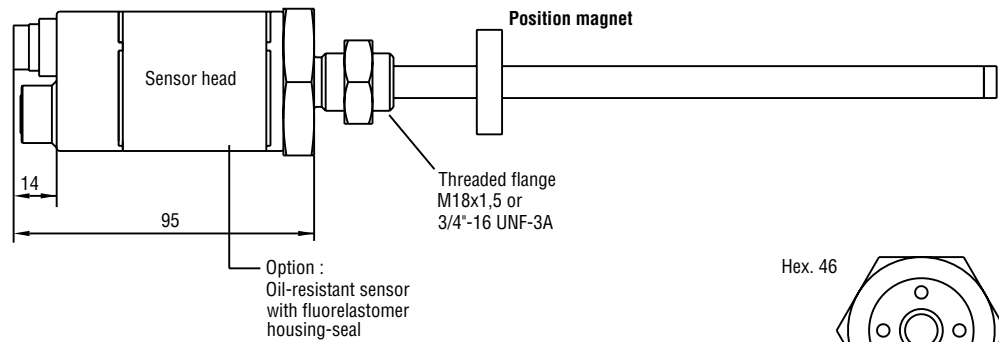
All measurements in mm



Connector outlet D53

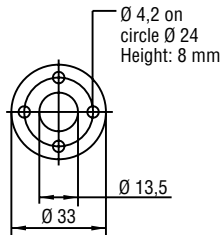


Connector outlet D63

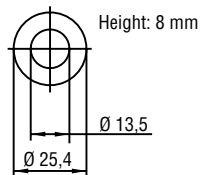


Ring magnet

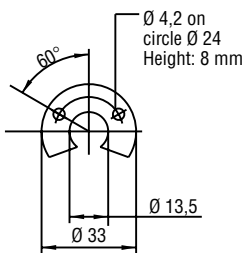
**Selection of position magnets (not on delivery)**



**Ring magnet OD33**  
Part No. 201 542-2  
Composite PA-Ferrite-GF20  
Weigh ca. 14g  
Operating temperature:  
-40 ... +100°C



**Ring magnet OD25,4**  
Part No. 400 533  
Composite: PA-Ferrite  
Weigh ca. 10g  
Operating temperature:  
-40 ... +100°C



**U-magnet M OD33**  
Part No. 251 416-2  
Composite PA-Ferrite-GF20  
Weigh ca. 11g  
Operating temperature:  
-40 ... +100°C

**High Pressure Rod Design**

Temposonics-RH 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.

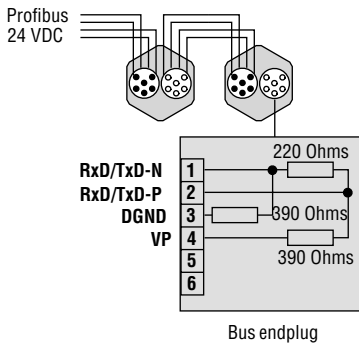
**Advantage...**  
the completely operable sensor cartridge can be replaced for servicing easily without opening the fluid circuit.

# Temposonics-RP+RH

## Profibus

### 1. Connector outlet D 63

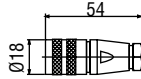
Shielded hybrid cable for bus and input voltage



### Wiring D63

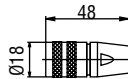
Pin	Cable	Function
1	green	RxD/TxD-N (Bus)
2	red	RxD/TxD-P (Bus)
3	----	DGND (Bus termination)*
4	----	VP (Bus termination)*
5	black	+24 VDC (-15/+20 %)
6	blue	DC Ground (0V)
-	yellow/green	do not connected

\*female only



1) 6 pin female connector M16  
Part No. ST C0 9131D06 PG9

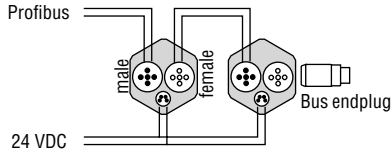
2) 6 pin male connector M16  
Part No. ST C0 9131H06 PG9



6 pin Bus endplug M16, male  
Part No. ST A0 9131H06

### 2. Connector outlet D 53

Separate cable for bus and input voltage with Profibus connectors



### Wiring D53

Pin	Cable	Function
1	----	VP+5 (Bus termination)*
2	green	RxD/TxD-N (Bus)
3	----	DGND (Bus termination)*
4	red	RxD/TxD-P (Bus)
5	shield	shield

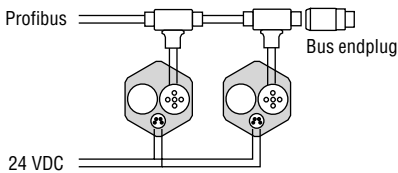
\*female only

### Input voltage

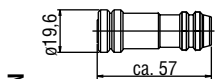
Pin	Cable	Function
1	brown	+24 VDC (-15/+20 %)
2	white	n.c.
3	blue	0 V (GND)
4	black	n.c.

### 3. Variation of connector outlet with T-connector

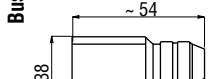
Separate cables for bus and input voltage with Profibus connectors  
No Bus breakdown at sensor disconnection



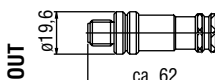
### Connector plug D 53 (recommended, not on delivery)



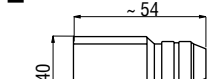
Part No. 560 885  
5 pin Profibus  
female connector M12-B



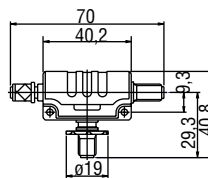
Part No. 370 514  
5 pin female connector M12-B  
adjustable in 90°-positions



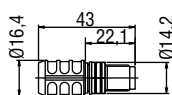
Part No. 560 884  
5 pin Profibus  
male connector M12-B



Part No. 370 515  
5 pin female connector M12-B  
adjustable in 90°-positions

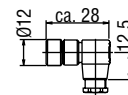


Part No. 560 887  
5 pin Profibus  
T-Connector M12

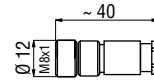


Part No. 560 888  
5 pin Profibus  
Endplug M12

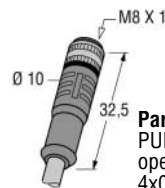
**Connector M12:**  
Housing: Zinc nickel plated  
Termination: Screws clamp  
Contact insert: Silver plated  
Cable clamp: M16  
Cable-Ø: 6,5 - 8,5mm  
Cable type e.g.: K58



Part No. 560 886  
4 pol. female connector M8  
input voltage insert  
adjustable in 90°-positions



Part No. 370 504  
4 pol. female connector M8  
Max. Cable-Ø 5 mm  
shieldable

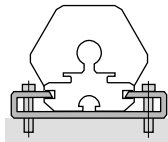


Part No. 530 066  
PUR-cable 5m, female connector  
open end (24V)  
4x0,25mm<sup>2</sup>  
shieldable

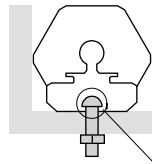
**Flexible installation in any position**

**Profile model**

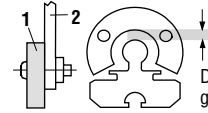
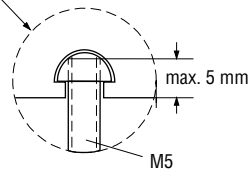
Normally, the sensor is firmly installed - fixed on a straight surface of the machine with movable mounting clamps or M5 screws in base channel - whilst the magnet is mounted at the mobile machine part.



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



T-slot Nut in base channel



Do not exceed max. gap of 3 mm ( $\pm 1$ )

- 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.

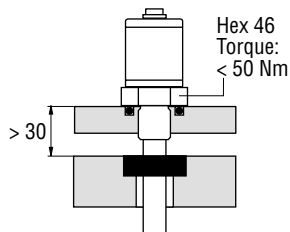
**Hydraulic sealing**

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.

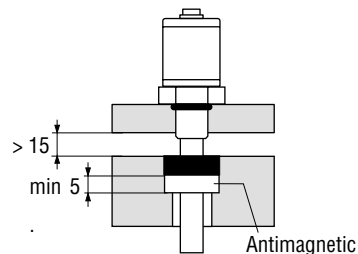
**Minimum assembly distance**

1. Non-magnetizable material

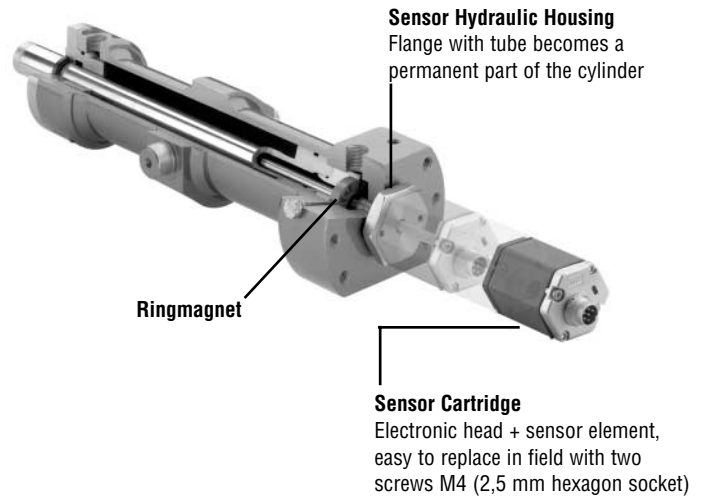
2. Magnetizable material



**Recommended hydraulic sealing**



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



**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.

