

# Temposonics®

Absolute, Non-Contact Position Sensors

## R-Series Profibus

Temposonics® RP and RH  
Stroke length 25...7600 mm

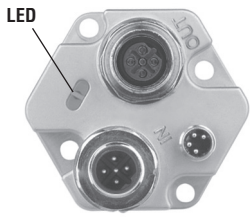


Advanced Communication  
...offers Multi-Position Measurement

- Rugged industrial sensor
- Linear and absolute measurement
- LEDs for sensor diagnostics
- Non-contact sensing with highest durability
- Superior accuracy: Linearity better 0.01 %
- Resolution up to 1  $\mu\text{m}$
- Repeatability 0.001 %
- Direct Profibus-DP output, position + velocity
- Multi-position measurement: 1 sensor for max. 20 positions

## 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

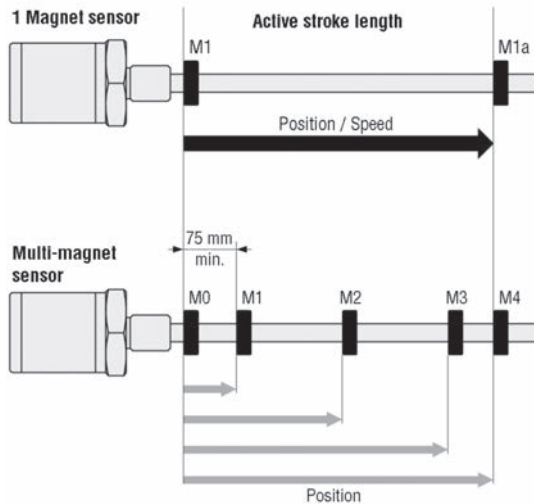
## Operation mode:

### P101 1-20 multi-magnet measurement

Position measurement of max. 20 magnets simultaneously

### P102 1 magnet measurement (Standard)

Positions measurement 1 magnet



## 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

### Input

Measured value	Position / Option: Multi-magnet measurement (max. 20 positions or 5 positions + 5 velocities)
Stroke length	Profile 25...5000 mm / Rod 25...7600 mm

### Output

Output signal	IEC 61158 CPF3 PROFIBUS
Data format	PROFIBUS-DP slave
Data transmission rate	Max. 12 Mbit/s

### Accuracy

Resolution	
- Position	1 µm / other values selectable via GSD-file
- Speed	5 µm position resolution: 0.64 mm/s up to 500 mm; 0.43 mm/s up to 2000 mm; 0.21 mm/s up to 4500 mm; 0.14 mm/s up to 7600 mm stroke length
Linearity	< ± 0.01 % F.S. (Minimum ± 50 µm) Option internal linearization Linearity tolerance: <u>RP/RH</u> < 300 mm: typ. ± 15 µm, max. ± 25 µm, > 300 ... 600 mm: typ. ± 20 µm, max. ± 30 µm > 600...1200 mm: typ. ± 30 µm, max. ± 50 µm <u>RP</u> 1200...3000 mm: typ. ± 45 µm, max. ± 90 µm, 3...5 m: typ. ± 85 µm, max. ± 150 µm
Option internal linearization	Linearity ± 20 µm...± 70 µm = 100 mm...5000 mm ML
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
Ripple	< 5 µm
Hysteresis	< 4 µm

### Operating conditions

Magnet speed	any
Operating temperature	-40 °C...+75 °C
Dew point, humidity	90% rel. humidity, no condensation
Ingress protection <sup>1</sup>	Profile: IP65, Rod: IP67, if mating connector is correctly fitted, RS: IP69K
Shock test	100 g single hit, IEC-Standard 60068-2-27
Vibration test	15 g / 10 - 2000 Hz, IEC-Standard 60068-2-6
Standards, EMC test	Electromagnetic emission EN 61000-6-4 Electromagnetic immunity EN 61000-6-2 EN 61000-4-2/3/4/6, Level 3/4, Criterion A, CE-qualified

### Design, 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) for hydraulic rod
Position magnet	Ring magnets, U-magnets

### Installation

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 ¾" -16 UNF-3A, Hex nut M18
Position magnet	Mounting plate and screws from antimagnetical material

### Electrical connection

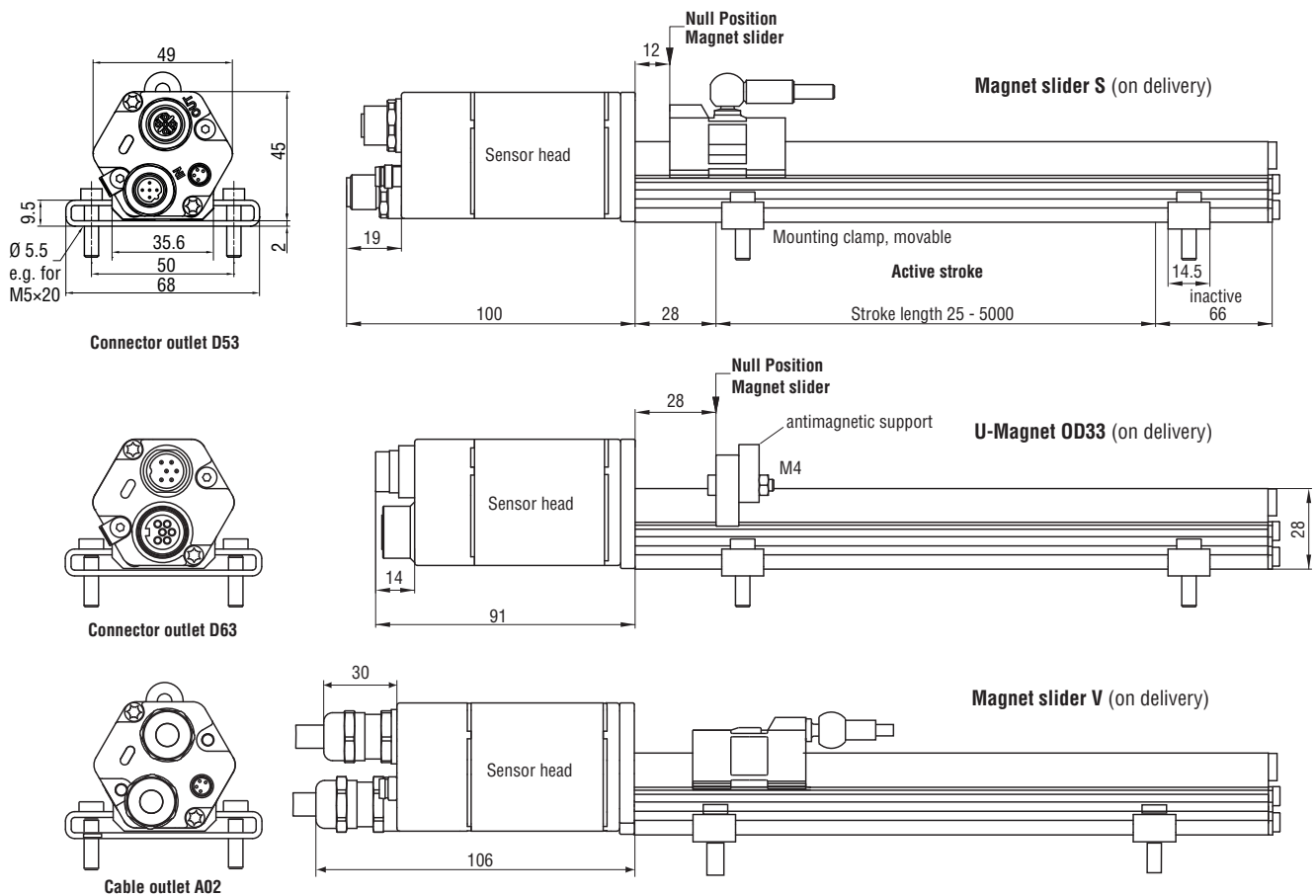
Connection type	2 x 6 pin connector M16 or 2 x 5 pin connector M12 + 4 pin, connector M8 Cable outlet 2 x 0 - 1 0 m PUR-cable + 4 pin, connector M8
Supply voltage	24 VDC (-15 / +20 %); UL Recognition requires an approved power supply with energy limitation (UL 61010-1), or Class 2 rating according to the National Electrical Code (USA) / Canadian Electrical Code.
- Polarity protection	up to -30 VDC
- Overvoltage protection	up to 36 VDC
Current drain	90 mA typical
Ripple	≤ 0.28 Vpp
Electric strength	500 VDC (DC ground to machine ground)

<sup>1</sup> The IP rating is not part of the UL recognition

## Stable profile design

**Temposonic® 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.



### Wiring D63

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

\*female only

### Wiring D53 Bus connector

Pin	Cable	Function
1	---	VP+5 (for Bus termination)*
2	green	RxD/TxD-N (Bus)
3	---	DGND (for 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	do not connect
3	blue	0 V (GND)
4	black	do not connect

All dimensions in mm

Standard position magnet included in delivery (see chapter accessories)

#### Position magnets

- Magnet slider S (part no. 252 182)
- Magnet slider V (part no. 252 184)
- U-magnet OD33 (part no. 251 416-2)

#### Connection types

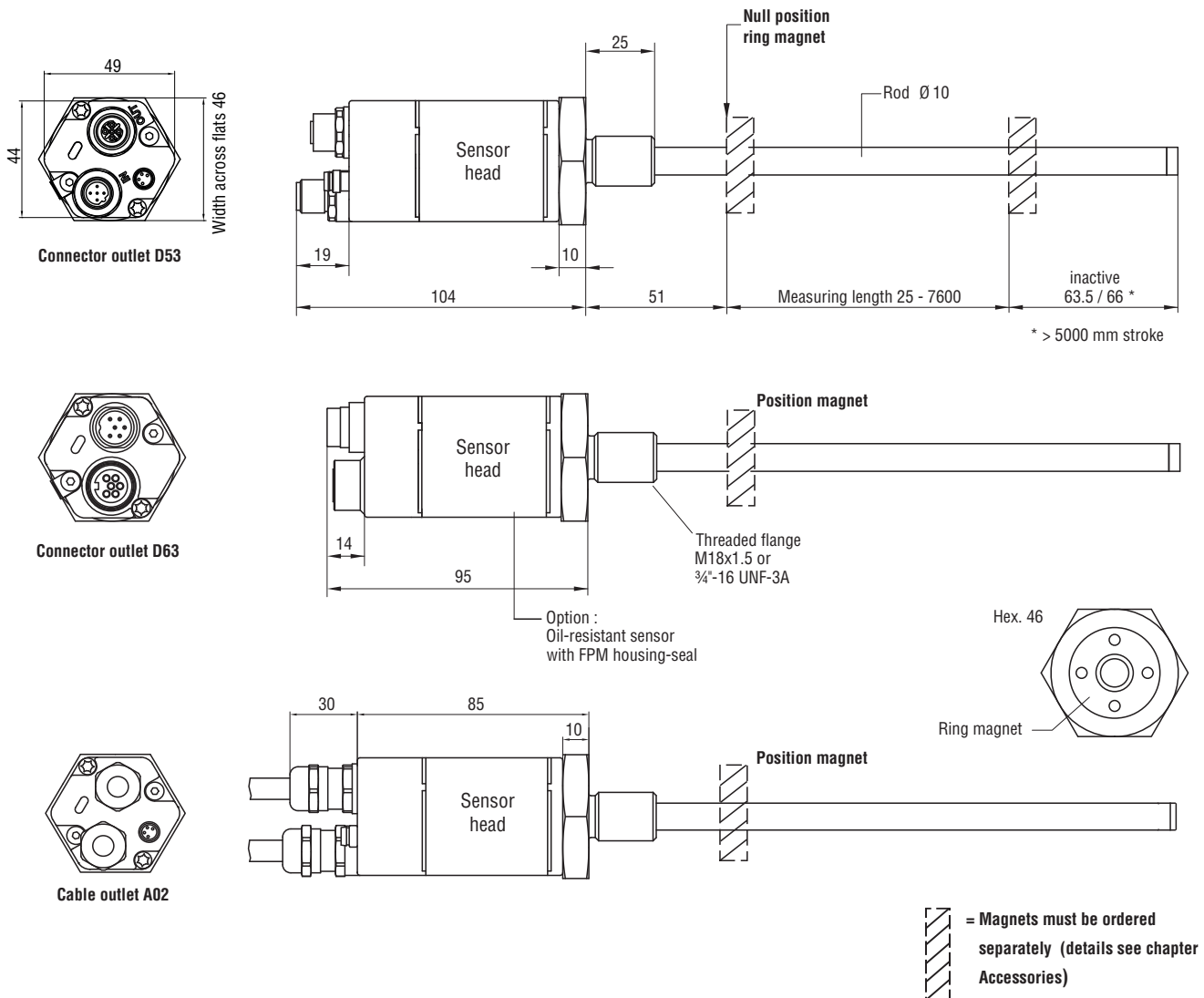
- 5 pin female connector M12-B (part no. 560 885)
- 5 pin male connector M12-B (part no. 560 884)
- 4 pin cable connector M8, 90° (part no. 560 886)

## High pressure rod design

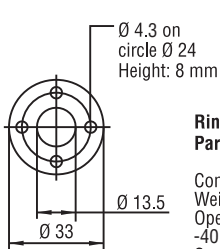
**Temposonics® RH** with a pressure-resistant stainless steel flange and sensing rod is suitable for use in hydraulic cylinders and externally in all applications where space is a problem. Position measurement is via ring or U-magnets travelling along the sensing rod without any mechanical contact.

## Advantage...

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

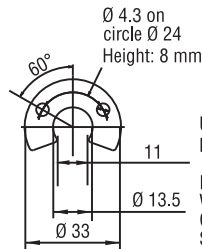


**Standard position magnets** (not included in delivery, please order separately)



**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/mm<sup>2</sup>  
Fastening Torque for M4 screws max. 1 Nm



**U-magnet OD33**  
Part No. 251 416-2

PA-Ferrit-GF20  
Weight ca. 11 g  
Operating temperature: -40...+100 °C  
Surface pressure max. 40 N/mm<sup>2</sup>  
Fastening torque for M4 screws max. 1 Nm

All dimensions in mm

**Standard position magnet not included in delivery (see chapter accessories)**

### Position magnets

Ring magnet OD33 (part no. 201 542-2)  
Ring magnet OD25,4 (part no. 400 533)  
U-magnet OD33 (part no. 251 416-2)

### Connection types

5 pin female connector M12-B (part no. 560 885)  
5 pin male connector M12-B (part no. 560 884)  
4 pin cable connector M8, 90° (part no. 560 886)

