Temposonics®

Magnetostrictive, Absolute, Non-contact Linear-Position Sensors

R-Series Models RP and RH
Profibus-DP Output

Data Sheet

Model RP Profile-style position sensor

Model RH Rod-style position sensor

FEATURES

- ■ **Linear, Absolute Measurement**
- ■ **LEDs For Sensor Diagnostics**
- ■ **Superior Accuracy, Resolution down to 1 µm**
- ■ **Non-Contact Sensing Technology**
- ■ **Linearity Deviation Less Than 0.01%**
- ■ **Repeatability Within 0.001%**
- ■ **Direct Profibus-DP Output (Position +Velocity)**
- ■ **Standard and Multi-magnet position measurements (up to 20 positions per sensor)**

BENEFITS

- ■ **Rugged Industrial Sensor**
- ■ **Fullfills All Requirements of Profibus-DP (EN 50170) Protocol**
- ■ **Profibus-DP Provides Powerful Functions for Diagnostics and Configuration**
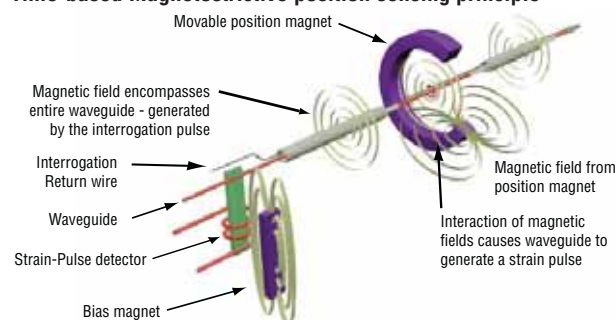- ■ **Linearity Correction Options**

APPLICATIONS

- ■ **Continuous Operation In Harsh Industrial Conditions**
- ■ **High Pressure Conditions**
- ■ **For Accurate, Multi-Magnet Position Measurement (up to 20 positions per sensor)**

TYPICAL INDUSTRIES

- ■ **Factory Automation**
- ■ **Fluid Power**
- ■ **Plastic Injection and Blow Molding**
- ■ **Material Handling and Packaging**

Time-based Magnetostrictive position sensing principle

Movable position magnet

Magnetic field encompasses entire waveguide - generated by the interrogation pulse

Interrogation Return wire

Waveguide

Strain-Pulse detector

Bias magnet

Magnetic field from position magnet

Interaction of magnetic fields causes waveguide to generate a strain pulse

Benefits of Magnetostriction

Temposonics linear-position sensors use the time-based magneto-strictive position sensing principle developed by Temposonics. Within the sensing element, a sonic-strain pulse is induced in a specially designed magnetostrictive waveguide by the momentary interaction of two magnetic fields. One field comes from a moveable permanent magnet that passes along the outside of the sensor. The other field comes from an "interrogation" current pulse applied along the waveguide. The resulting strain pulse travels at sonic speed along the waveguide and is detected at the head of the sensing element.

The position of the magnet is determined with high precision and speed by accurately measuring the elapsed time between the applica-tion of the interrogation pulse and the arrival of the resulting strain pulse with a high-speed counter. The elapsed time measurement is directly proportional to the position of the permanent magnet and is an absolute value. Therefore, the sensor's output signal corresponds to absolute position, instead of incremental, and never requires recalibration or re-homing after a power loss. Absolute, non-contact sensing eliminates wear, and guarantees the best durability and output repeatability.

R-Series Models RP/RH Sensors with Profibus-DP Output
Product Overview and Specifications

Product overview

R-Series model RH and RP sensors are extremely robust and are ideal for continuous operation under harsh industrial conditions. Temposonics offers two standard sensor housings, rod and profile extrusion. The rod housing is capable of withstanding high pressures such as those found in hydraulic cylinders. The profile extrusion housing provides convenient mounting options and captive sliding magnets which utilize slide bearings of special material that reduce friction, and help mitigate dirt build up. The sensor head contains the active signal conditioning and a complete integrated electronics interface. Double shielding is used to ensure EMI protection for unsurpassed reliability and operating safety.

Temposonics R-Series models RP and RH linear-position sensors fulfill all requirements of Profibus-DP (EN 50170) protocol. They also provide absolute position data to Profibus control units by using a serial, bit synchronous, RS-485 format at a baud rate up to 12 Mbps maximum.

In addition to data transmission, Profibus-DP provides powerful functionality for diagnostics and configuration, which is loaded into the bus using the GSD electronic device data sheet file. The downloadable .gsd file for Temposonics Profibus model sensors is available at www.temposonics.com.

Product specifications

Parameters	Specifications
OUTPUT	
Measured output variables:	Position, up to 20 magnet positions simultaneously Position + Velocity, up to 5 magnets simultaneously
Resolution:	1 µm, other values are selectable when using the .gsd file
Update times:	0.5 ms at 500 mm, 1 ms at 2000 mm, 2 ms at 4500 mm, 3.1 ms at 7600 mm stroke length. For each additional magnet add 0.05 ms,. Add 0.03 ms for approximate values for velocity measurements.
Linearity deviation:	< ± 0.01% full stroke (minimum ± 50 µm) *(Linearity Correction Option (LCO) available)*
Repeatability:	< ± 0.001% full stroke (minimum ± 2.5 µm)
Hysteresis:	< 4 µm
Outputs:	**Interface:** Profibus-DP system ISO 74498 **Data format:** Profibus-DP (EN 50 170)
Data transmission rates:	12 MBd 1.5 MBd 500 kBd 187.5 kBd ≤93.75 kBd
Cable length, m:	<100 <200 <400 <1000 <1200
Stroke length:	**Range (Profile style):** 25 mm to 5080 mm (1 in. to 200 in.) **Range (Rod style):** 25 mm to 7620 mm (1 in. to 300 in.)
ELECTRONICS	
Operating voltage:	**+24 Vdc nominal:** -15% or +20%* **Polarity protection:** up to -30 Vdc **Over voltage protection:** up to 36 Vdc **Current drain:** 90 mA typical **Dielectric withstand voltage:** 500 Vdc (DC ground to machine ground)

Parameters	Specifications
ENVIRONMENTAL	
Operating conditions:	**Operating temperature:** -40 °C (-40 °F) to 75 °C (167 °F) **Relative humidity:** 90% no condensation **Temperature coefficient:** < 15 ppm/ °C
EMC test:	**Electromagnetic emission:** IEC/EN 50081-1 **Electromagnetic susceptibility:** IEC/EN 50082-2, IEC/EN 61000-4-2/3/4/6, level 3/4 criterium A, CE qualified
Shock rating:	100 g (single hit)/IEC standard 68-2-27 (survivability)
Vibration rating:	15 g / 10 to 2000 Hz / IEC standard 68-2-6
WIRING	
Connection type:	**D63 option:** Two 6-pin (M16) connectors one male and one female **D53 option:** Two 5-pin (M12) connectors one male and one female. plus one 4-pin connector (M8) male
PROFILE STYLE SENSOR (MODEL RP)	
Electronic head:	Aluminum housing with diagnostic LED display (LEDs located beside connectors)
Sealing:	IP 65**
Sensor extrusion:	Aluminum (Temposonics profile style)
Mounting:	Any orientation. Adjustable mounting feet or T-Slot nut (M5 threads) in bottom groove
Magnet types:	Captive-sliding magnet or open-ring magnet
ROD STYLE SENSOR (MODEL RH)	
Electronic head:	Aluminum housing with diagnostic LED display (LEDs located beside connectors)
Sealing:	IP 67**
Sensor rod:	304L stainless steel
Operating pressure:	350 bar static, 690 bar peak (5000 psi static, 10,000 psi peak)
Mounting:	Any orientation. Threaded flange M18x1.5 or 3/4-16 UNF-3A
Typical mounting torque:	45 N-m (33 ft. - lbs.)
Magnet types:	Ring magnet, open-ring magnet, or magnet float

* 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.

** The IP rating is not part of the UL Recognition.

R-Series Models RP and RH Temposonics® Linear-Position Sensors - Profibus-DP Output
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Enhanced monitoring and diagnostics

SENSOR STATUS AND DIAGNOSTIC DISPLAY

Integrated diagnostic LEDs (green/red), located beside sensor connectors *(see 'Figure 1')*, provide basic visual monitoring for normal sensor operation and troubleshooting. diagnostic display LEDs indicate four modes described in *'Table 1'*.

Figure 1. R-Series sensor Integrated diagnostic LEDs

Green	Red	Operation status/mode
ON	OFF	Normal function (operation mode)
ON	ON	Magnet not detected or wrong quantity of magnets
Flashing	OFF	Waiting for master parameters
Flashing	ON	Programming mode

Table 1. Diagnostic display indicator modes

Profibus-DP output parameters

R-Series sensors with Profibus-DP output are compliant with Profibus DP slave class 2 and have the following features:

Selectable outputs:
- Absolute position measurement
- Velocity measurement
- Sensor Status
- Error detection (e.g. magnet status)

Selectable parameters:
- Offset / preset for each magnet
- Measuring direction; forward and reverse acting
- Intel® and Motorola® data format transfers

OPERATION MODES

R-Series sensors with Profibus-DP protocol provide the following single or multi-magnet measurements:

Standard measurement (P102 output code):
- Position (using one magnet)

Multi-magnet measurement (P101 output code):
- Position (using up to 20 magnets simultaneously)

Multi-magnet measurement (P103 output code):
- Position + velocity (using up to 5 magnets simultaneously)

When using multiple magnets, the minimum allowed distance between magnets is 75 mm (3. in.) to maintain proper sensor output *(see 'Figure 2')*.
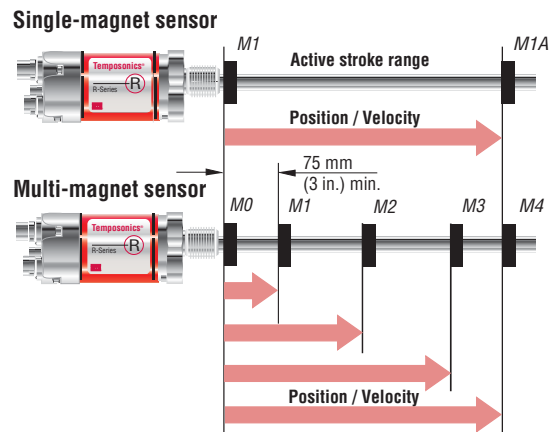
Figure 2. Single and multi-magnet output diagram

Profibus-DP communication and functionality

DATA EXCHANGE

For multi-magnet measurement, 1 status byte and 3 bytes of position data for each position are transmitted. The status byte contains an error bit and the position number for the following measurement value. Dependent on sensor parameters, sensor data can be transferred in different data formats, (e.g. Intel® or Motorola®)

LINEARITY CORRECTION OPTION (LCO)

The Linearity Correction Option (LCO) provides improved sensor output accuracy. For most stroke lengths linearity accuracy is improved up to a factor of 5, resulting in deviations from actual position of less than ± 20 microns (0.0008 in.). For stroke lengths over 5000 mm (197 in.) the linearity accuracy is improved up to a factor of 10. Selecting the sensor style and magnet is important (both must be matched together). Contact the factory for assistance when designing for the LCO in your application.

Profibus-DP handheld address programmer

The *Profibus-DP Handheld Address Programmer (see 'Figure 3')* is offered as an accessory used to setup the *Slave Address* via the Profibus-DP interface. Addressing is usually performed by the Profibus-DP SetSlaveAddress command. If the master system or controller does not support this service, connecting the Profibus-DP Handheld Address Programmer to the sensor will bypass the service and allow direct setup.

When ordering the *Profibus-DP Node and Field Address Programmer* accessory, for D53 and D63 style connections, order part no.: 280640. The Profibus-DP Node and Address Programmer Installation instructions (document part no.: 551193) is available in PDF format at www.temposonics.com.

Figure 3. R-Series Profibus-DP Handheld Address Programmer, part no.: 280640

Programming accessory	Function	Part number
Profibus handheld address programmer	For sensors with the D63 connection type	280640
Profibus handheld address programmer	For sensors with the D53 connection type	280640
Profibus master simulator	Check sensor operation using Bihl + Wiedemann, Model 1131	401727
Master simulator cable	For sensors with the D63 connection type	401726
Master simulator cable	For sensors with the D53 connection type	252383
Profibus noise filter box	Junction box with noise filter for connecting 24 Vdc input power on to the bus when using the hybrid Profibus cable, (D63 connection type).	252916

Model RP profile-style sensor dimension references

MODEL RP, PROFILE-STYLE SENSOR WITH STYLE S CAPTIVE-SLIDING MAGNET

Drawing is for reference only, contact applications engineering for tolerance specific information.
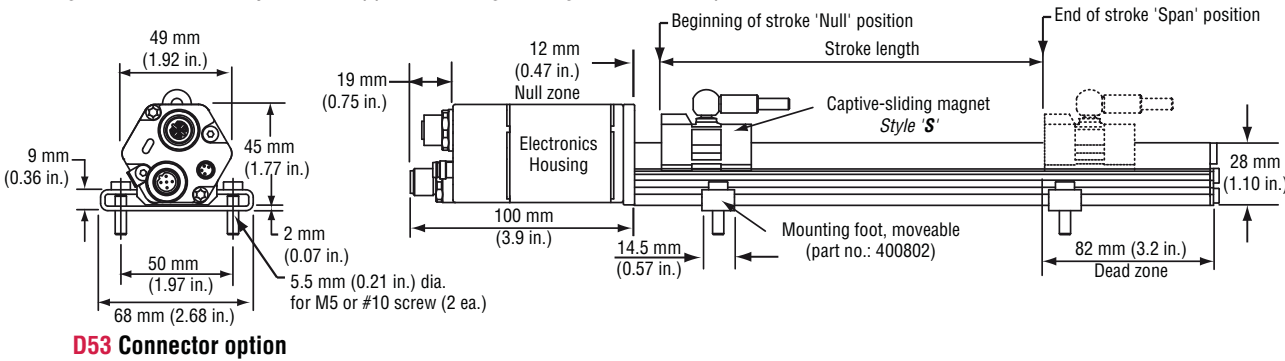
Figure 4. R-Series Model RP Profile-style sensor dimension reference (Shown with the *D53* connector option)

MODEL RP, PROFILE-STYLE SENSOR WITH STYLE M OPEN-RING MAGNET

Drawing is for reference only, contact applications engineering for tolerance specific information.
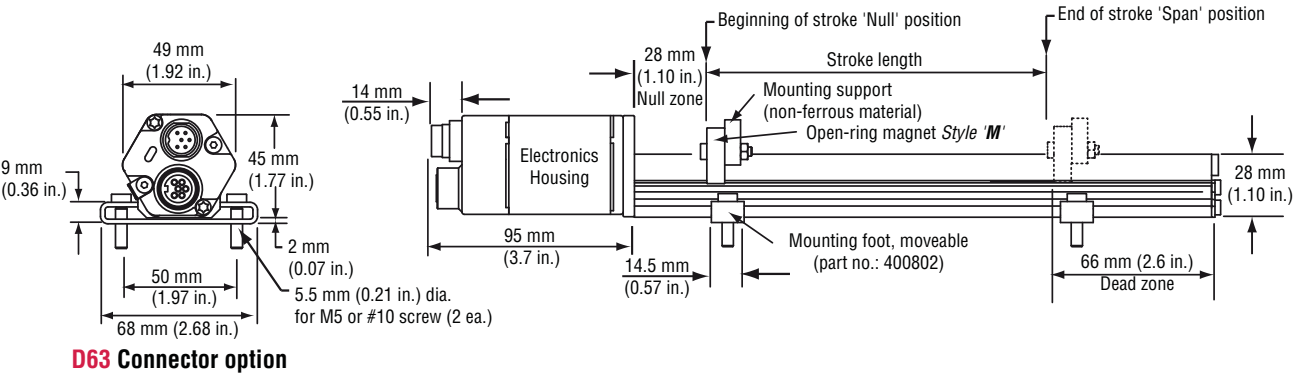
Figure 5. R-Series Model RP Profile-style sensor dimension reference (Shown with the *D63* connector option)

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MODEL RP, PROFILE-STYLE SENSOR WITH STYLE V CAPTIVE-SLIDING MAGNET *Drawing is for reference only, contact applications engineering for tolerance specific information.*
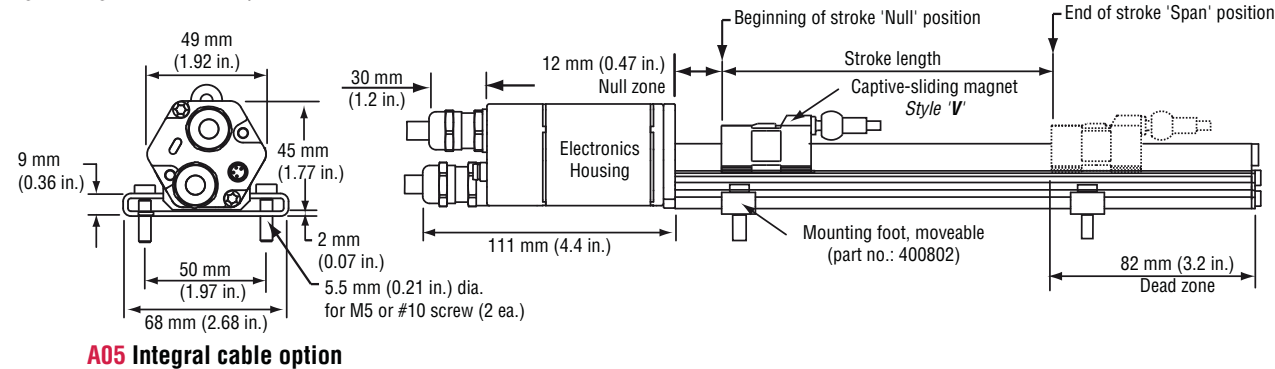
Figure 6. R-Series Model RP Profile-style sensor dimension reference (Shown with the **A05** integral cable option)

Standard magnet selections (Model RP)

SELECTION OF POSITION MAGNETS (ONE MAGNET INCLUDED WITH MODEL RP SENSOR)

A choice of two magnet mounting configurations are available with the profile-style sensor; A *'captive-sliding'* magnet, *Styles S* or *V* or an *'open-ring'* magnet, *Style M*. Captive-sliding magnets utilize slide bearings of special material that reduce friction, and if required, help mitigate dirt build up. The slide bearings are designed to operate dry, requiring no external lubrication or maintenance.

The *Style M 'open-ring'* magnet mounts on the moving machine part and travels just above the sensor's profile extrusion. The open-ring magnet requires a minimum distance away from ferrous metals to allow proper sensor output. It must be mounted using non-ferrous screws and a non-ferrous support bracket, or utilize a non-ferrous spacer of at least 5 mm (0.2 in.) thickness.

POSITION MAGNET SELECTIONS *(Drawing dimensions are for reference only)*

Magnet dimensions and mounted magnet dimensions	Description	Part number
	Captive-sliding magnet, Style S For Model RP profile-style sensor	252182
	Captive-sliding magnet, Style V For Model RP profile-style sensor	252184
	Open-ring magnet, Style M **I.D.:** 13.5 mm (0.53 in.) **O.D.:** 33 mm (1.3 in.) **Thickness:** 8 mm (0.31 in.) **Operating temperature:** - 40 °C to 100 °C This magnet may influence the sensor performance specifications for some applications.	251416-2
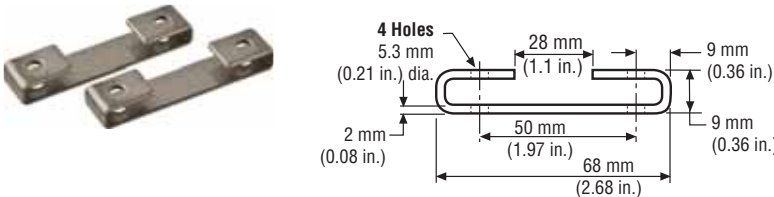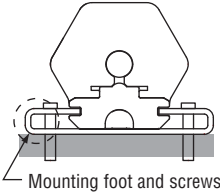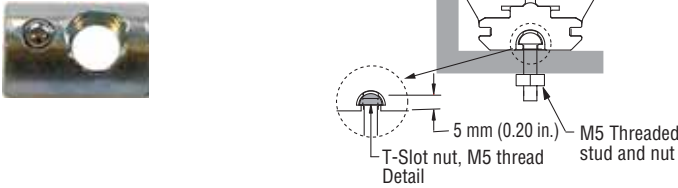
Model RP Sensor mounting

MODEL RP PROFILE-STYLE SENSOR MOUNTING Flexible installation in any position!

Temposonics Model RP profile-style sensors offer two basic mounting methods; side grooves for use with mounting feet or a bottom groove that accepts special T-Slot nuts. Both the mounting feet and T-Slot nuts can be positioned along the sensor extrusion to best secure the sensor for each particular application.

Notes:

1. Model RP sensors include two mounting feet (part no. 400802) for sensors stroke lengths up to 1250 mm (50 in.)
2. One additional mounting foot is included for stroke lengths over 1250 mm (50 in.) and for each additional 500 mm (20 in.), thereafter.
3. Temposonics recommends using 10-32 cap screws *(customer supplied)* at a maximum torque of 44 in. lbs. when fastening mounting feet.

Profile-Style sensor mounting and installation reference		Mounting method	Part number
(Width = 14.5 mm (0.57 in.))	**4 Holes** 5.3 mm (0.21 in.) dia. / 28 mm (1.1 in.) / 9 mm (0.36 in.) / 2 mm (0.08 in.) / 50 mm (1.97 in.) / 9 mm (0.36 in.) / 68 mm (2.68 in.)	**Mounting feet, standard (304 SS)** Profile-style sensor mounting for sensor model RP	400802
10 - 32 Cap screws Recommended (Customer supplied)	Mounting foot and screws	**Mounting feet and screws** Profile-style sensor foot installation	*See Mounting Feet part number: 400802*
	5 mm (0.20 in.) T-Slot nut, M5 thread Detail / M5 Threaded stud and nut	**T-Slot nut** Nut for mounting model RP sensor M5 thread *(Optional, ordered separately)*	401602

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Model RH rod-style sensor dimension reference

The Temposonics R-Series rod-style sensor (Model RH) offers modular construction, flexible mounting configurations, and easy installation. The Model RH sensor is designed for mounting in applications where high pressure conditions exist (5000 psi continuous, 10,000 psi spike), such as inside hydraulic cylinders. The Model RH sensor *(see Figures 7, 8 and 9)* may also be mounted externally in many applications.

Stroke-dependent Dead Zones:

Stroke length:	Dead zone:
25 mm (1 in.) - 5000 mm (197 in.)	63.5 mm (2.5 in.)
5005 mm (197 in.) - 7620 mm (300 in.)	66 mm (2.6 in.)

MODEL RH, ROD-STYLE SENSOR DIMENSION REFERENCE
Drawing is for reference only, contact applications engineering for tolerance specific information.
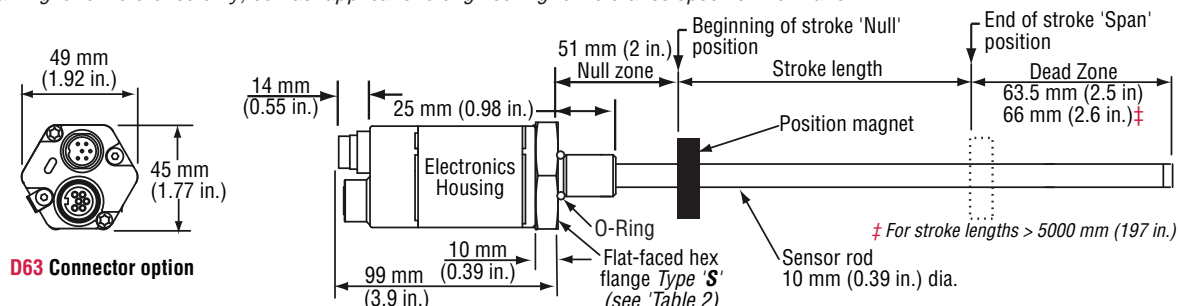
Figure 7. Model RH Rod-style sensor dimension reference (shown with *D63* connector option)

MODEL RH, ROD-STYLE SENSOR WITH RING MAGNET (MAGNET ORDERED SEPARATELY)
Drawing is for reference only, contact applications engineering for tolerance specific information.
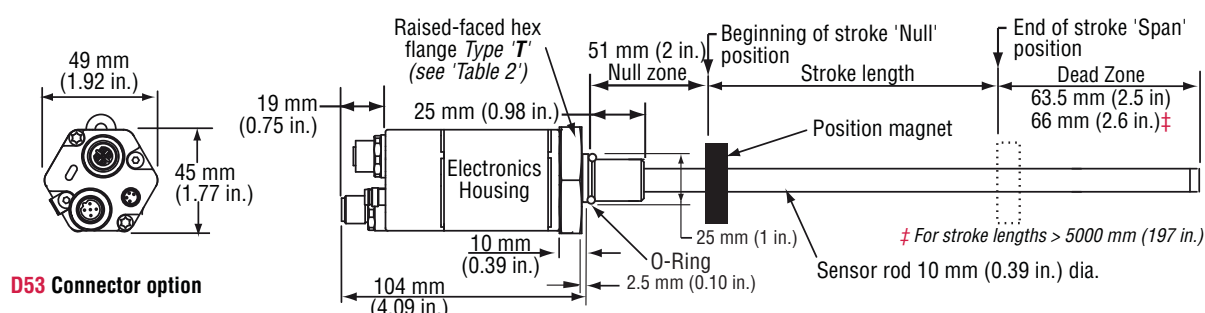
Figure 8.   Model RH Rod-style sensor dimension reference (shown with *D53* connector option)

MODEL RH, ROD-STYLE SENSOR WITH RING MAGNET (MAGNET ORDERED SEPARATELY)
Drawing is for reference only, contact applications engineering for tolerance specific information.
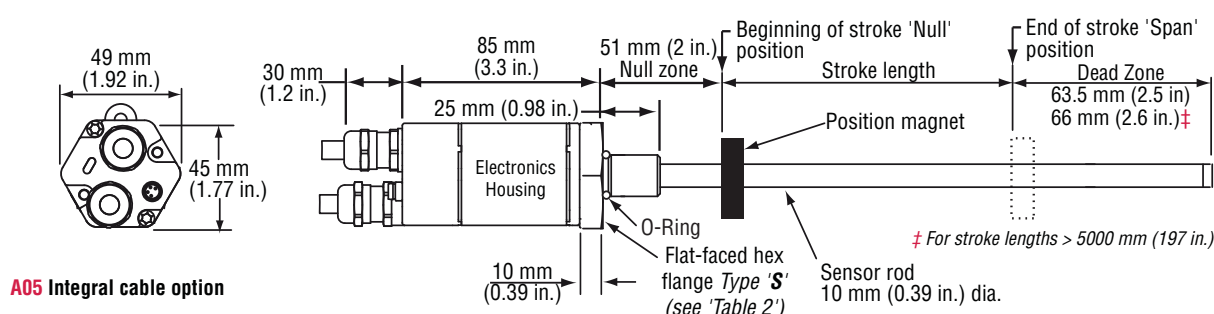
Figure 9.   Model RH Rod-style sensor dimension reference (Shown with the *A05* Integral cable connection type option)

Housing style Flange type	Description	(A) Flange threads	(B) Dimensions	(C) Dimensions	
T	US customary threads with raised-face flange	3/4" - 16 UNF-3A	1.75 in.	2 in.	
S	US customary threads with flat-faced flange	3/4" - 16 UNF-3A	1.75 in.	2 in.	
M	Metric threads with flat-faced flange	M18 x 1.5	46 mm	53 mm	
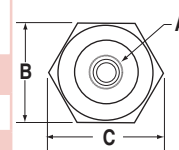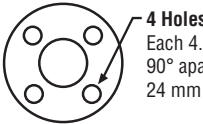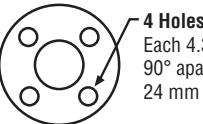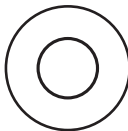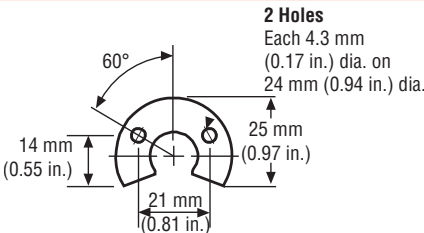
Table 2. Model RH Rod-style sensor housing style and flange type references

Model RH Rod-Style Sensor
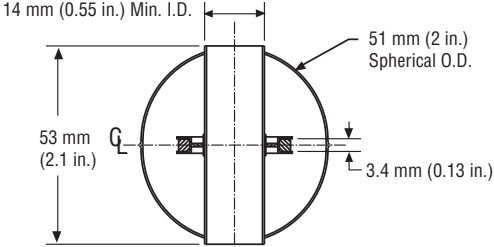**Standard Magnet Selections**

Standard magnet options (Model RH)

Magnets must be ordered separately with Model RH position sensors. The standard ring magnet (part number 201542-2) is suitable for most applications.

POSITION MAGNET SELECTIONS **(Magnet must be ordered separately)** *(Drawing dimensions are for reference only)*

Magnet and magnet dimensions	Description	Part number
4 Holes Each 4.3 mm (0.17 in.) dia. 90° apart on 24 mm (0.94 in.) dia.	**Standard ring magnet** **I.D.:** 13.5 mm (0.53 in.) **O.D.:** 33 mm (1.3 in.) **Thickness:** 8 mm (0.3 in.) **Operating temperature:** - 40 °C to 100 °C	201542-2
4 Holes Each 4.3 mm (0.17 in.) dia. 90° apart on 24 mm (0.94 in.) dia.	**Magnet spacer** (Non-ferrous, use with ring magnet Part number: 201542-2) **I.D.:** 14 mm (0.56 in.) **O.D.:** 32 mm (1.25 in.) **Thickness:** 3.2 mm (0.125 in.)	400633
	Ring magnet **I.D.:** 13.5 mm (0.53 in.) **O.D.:** 25.4 mm (1 in.) **Thickness:** 8 mm (0.3 in.) **Operating temperature:** - 40 °C to 100 °C	400533
2 Holes Each 4.3 mm (0.17 in.) dia. on 24 mm (0.94 in.) dia. 60° 14 mm (0.55 in.) 25 mm (0.97 in.) 21 mm (0.81 in.)	**Open-ring magnet, Style M** **I.D.:** 13.5 mm (0.53 in.) **O.D.:** 33 mm (1.3 in.) **Thickness:** 8 mm (0.3 in.) **Operating temperature:** - 40 °C to 100 °C This magnet may influence the sensor performance specifications for some applications.	251416-2

MAGNET FLOAT SELECTION *(Drawing dimensions are for reference only)*

14 mm (0.55 in.) Min. I.D. 51 mm (2 in.) Spherical O.D. 53 mm (2.1 in.) 3.4 mm (0.13 in.)	**Magnet float** (Level sensing applications) **Specific gravity:** 0.70 maximum **Pressure:** 870 psi maximum (This float is used with Model RH rod-style sensors for hydraulic fluid or fresh water applications only). Collar (part no.: 560777) is recommended for end of stroke stops.	251447

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Model RH Rod-Style sensor mounting

The position magnet requires minimum distances away from ferrous metals to allow proper sensor output. The minimum distance from the front of the magnet to the cylinder end cap is 15 mm (0.6 in.).

The minimum distance from the back of the magnet to the piston head is 3.2 mm (0.125 in.). However, a minimum distance of at least 5 mm (0.197 in.) is preferred for added performance margin. The non-ferrous spacer part no.: 400633) provides this minimum distance when used along with the standard ring magnet (part no.: 201542-2) as shown in *Figure 10*.
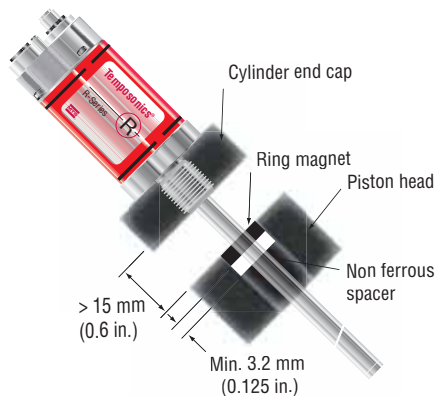
Figure 10. Model RH rod-style mounting

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 shown in *Figure 11*. This method guarantees a long-life 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.

The sensor's rod housing and flange can remain permanently installed in the cylinder

Ring magnet

The sensor cartridge consist of the electronics housing and sensing element and is easy to replace by removing (2) M4 thread 2.5 mm hex socket head screws
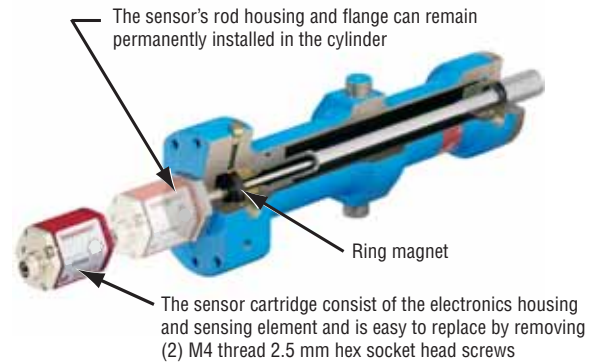
Figure 11. Fluid cylinder installation

Connections and wiring

BUS / INPUT VOLTAGE CONNECTION OPTIONS (DAISY-CHAIN TOPOLOGIES)

(D63) CONNECTOR OPTION

The shielded hybrid cable (5 wires; two bus, two power supply and 1 machine ground, part no.: 530040) is used for both bus and supply voltage (D63) connections. This provides convenient daisy-chain connections for applications with multiple Profibus-DP sensors.

(D53) CONNECTOR OPTION

For (D53) connection types, a separate 4-pin connector and cable is used for the supply voltage.
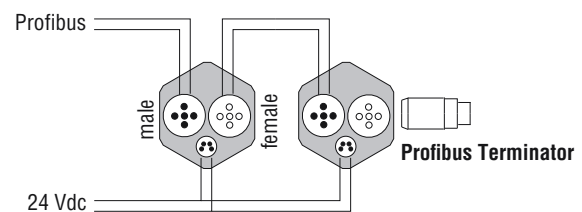
(D53) CONNECTOR OPTION WITH THE 'T' CONNECTOR

A 'T' connector is used with the separate bus cable to enable the bus to remain active when a sensor is disconnected.
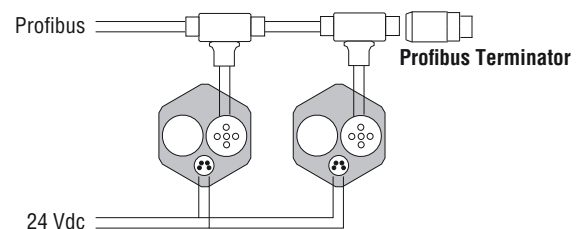
Connections and wiring (D63)

(D63) BUS CONNECTOR OPTION PINOUTS/FUNCTIONS
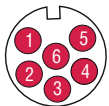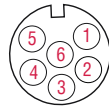
D63 Male
6-pin outlet

D63 Female
6-pin outlet

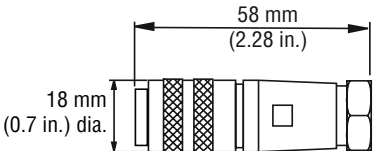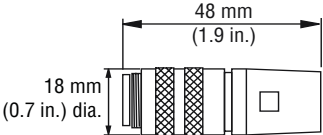### MALE/FEMALE, 6-PIN (D63) INTEGRAL CONNECTOR OPTION FOR SHIELDED HYBRID CABLE FOR BUS AND INPUT VOLTAGE

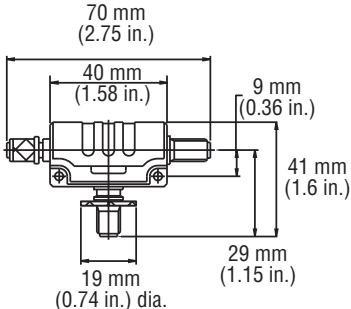**Male, 6-pin (M16) integral connector pin-out as viewed from the end of the sensor**

Female, 6-pin (M16) integral connector pin-out as viewed from the end of the sensor

Pin number	Cable wire color	Function
1	Green	RxD/TxD-N (Bus)
2	Red	RxD/TxD-P (Bus)
3	N/A	DGnd (Bus termination) *female connector only*
4	N/A	VP (Bus termination) *female connector only*
5	Black	+24 Vdc (-15/+20%)
6	Blue	DC ground (for supply)
N/A	Yellow/ Green	Shielding, machine ground

Connections and wiring (D53)

(D53) BUS CONNECTOR OPTION PINOUTS/FUNCTIONS

D53
Male, 4-pin
Input voltage

D53
Male
5-pin outlet

D53
Female
5-pin outlet

MALE/FEMALE, 5-PIN (D53) INTEGRAL CONNECTOR OPTION
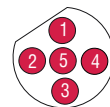
Male, 5-pin (M12) integral connector pin-out as viewed from the end of the sensor
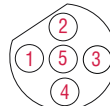
Female, 5-pin (M12) integral connector pin-out as viewed from the end of the sensor

Pin number	Cable wire color	Function
1	N/A	VP+5 (Bus termination) *female connector only*
2	Green	RxD/TxD-N (Bus)
3	N/A.	DGnd (Bus termination) *female connector only*
4	Red	RxxD / TxD-P (Bus)
5	Shield	Shield

(D53) INPUT VOLTAGE INTEGRAL CONNECTOR OPTION
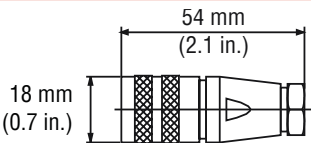
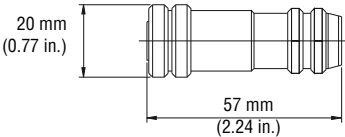**Input voltage, male, 4-pin (M8) integral connector pin-out as viewed from the end of the sensor**
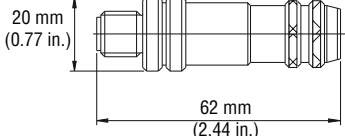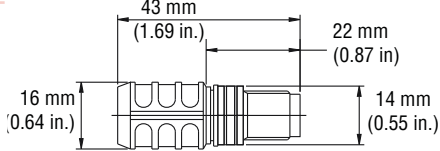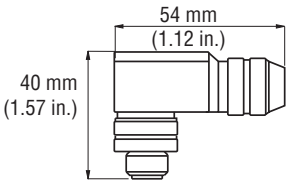
Pin number	Wire color	Function
1	Brown	+24 Vdc (-15/+20%)
2	White	No connection
3	Blue	DC ground (for supply)
4	Black	No connection

R-Series Models RP and RH Temposonics® Linear-Position Sensors - Profibus-DP Output
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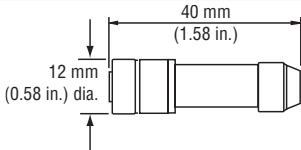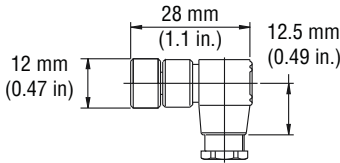
10

(D63) CABLE CONNECTOR OPTIONS (FIELD INSTALLABLE) *(Drawing dimensions are for reference only)*

Connector and connector dimensions	Description	Part number
54 mm (2.1 in.) 18 mm (0.7 in.)	**Cable connector, female, straight exit (field installation)** 6-pin DIN (M16) PG9 size strain relief	370423
58 mm (2.28 in.) 18 mm (0.7 in.) dia.	**Cable connector, male, straight exit (field installation)** 6-pin DIN (M16) PG9 size strain relief	370427
48 mm (1.9 in.) 18 mm (0.7 in.) dia.	**Profibus Bus terminator, male 6-pin DIN (M16)**	252347

(D53) CABLE CONNECTOR OPTIONS (FIELD INSTALLABLE)

Cable connectors and dimension references	Description	Part number
70 mm (2.75 in.) 40 mm (1.58 in.) 9 mm (0.36 in.) 41 mm (1.6 in.) 19 mm (0.74 in.) dia. 29 mm (1.15 in.)	**5-pin Profibus (M12) T connector** (D53 field installable)	560887
20 mm (0.77 in.) 57 mm (2.24 in.)	**5-pin Profibus female connector (M12)** (D53 field installable)	560885
20 mm (0.77 in.) 62 mm (2.44 in.)	**5-pin Profibus male connector (M12)** (D53 field installable)	560884
43 mm (1.69 in.) 22 mm (0.87 in) 16 mm (0.64 in.) 14 mm (0.55 in.)	**5-pin Profibus bus terminator (M12)** (D53 field installable)	560888
54 mm (1.12 in.) 40 mm (1.57 in.)	**5-pin male connector (M12) 90° exit** (Field installable)	370515

Model RP and RH Sensors
Cable connector options

Cable connectors and dimension references	Description	Part number
54 mm (2.12 in.) / 38 mm (1.5 in.)	**5-pin female connector (M12) 90° exit** (Field installable)	370514
40 mm (1.58 in.) / 12 mm (0.58 in.) dia.	**4-pin (M8) female connector straight exit** (Field installable)	370504
28 mm (1.1 in.) / 12.5 mm (0.49 in.) / 12 mm (0.47 in)	**4-pin (M8) female cable connector 90° exit, Adjustable** (Field installable)	560886

EXTENSION CABLE WITH CONNECTORS FOR (D63) CONNECTION TYPES

Extension cable and connector assemblies	Description	Connection type
	Hybrid Profibus Bus Cable, straight exit, 6-pin DIN female connector, with PG9 strain relief for (D63) sensor connection types *(Assembly Includes D63 Connector, Part no.: 370423 and Cable, Part no.:530040)*	Type DF
	Hybrid Profibus Bus Cable, straight exit, 6-pin DIN male connector with PG9 strain relief for (D63) sensor connection types *(Assembly Includes D63 Connector, Part no.: 370427 and Cable, Part no.:530040)*	Type DG

ORDERING INFORMATION - EXTENSION CABLE WITH CONNECTORS FOR (D63) CONNECTION TYPE

D							
1	2	3	4	5	6	7	8

SENSOR CONNECTION TYPES ———————————————————————— = | D | | | 1 - 2

DF = Female connector, straight exit (part no. 370423), and Profibus cable *(part no.: 530040)* with (D63) type connector
DG = Female connector, 90° exit (part no. 560778), and Profibus cable *(part no.: 530040)* with (D63) type connector

CABLE LENGTHS ———————————————————————— = | | | | 3 - 5

For standard length cables up to 100 ft.
005 = 5 ft.
015 = 15 ft.
025 = 25 ft.
050 = 50 ft.
100 = 100 ft.
For custom length cables over 100 ft.
— — — = Cable length (maximum cable length is dependent on baud rate).

CABLE TERMINATION ———————————————————————— = | | | | 6 - 8

P0 = Pigtail cable without connector
DFM = Male connector, (Straight exit). For daisy-chain connections of Profibus sensors with D63 connector.
DGM = Male connector, (90° exit). For daisy-chain connections of Profibus sensors with D63 connector.

R-Series Models RP and RH Temposonics® Linear-Position Sensors - Profibus-DP Output
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R												1	P							
1	2		3		4	5	6	7	8		9	10	11		12		13	14	15	16		17	18	19

SENSOR MODEL ────────────────────────────── = **R** ☐ **1-2**

RP = Profile style   RH = Hydraulic rod style

HOUSING STYLE ────────────────────────────── = ☐ **3**

Model RP profile-style sensor (includes one magnet):

S = Captive-sliding magnet with ball joint at top (Part no. 252182)

V = Captive-sliding magnet with ball joint at front (Part no. 252184)

M = Open-ring magnet (Part no. 251416-2)

Model RH rod-style sensor (magnet(s) must be ordered separately):

T = US customary threads, raised-faced flange and pressure tube, standard

U = Same as option "T", except uses fluoroelastomer seals for the electronics housing

B = Sensor cartridge only (no flange and pressure tube, stroke length < 1830 mm (72 in.))

S = US customary threads, flat-faced flange and pressure tube, standard

H = Same as option "S", except uses fluoroelastomer seals for the electronics housing

M = Metric threads, flat-faced flange and pressure tube, standard

V = Same as option "M", except uses fluoroelastomer seals for the electronics housing

STROKE LENGTH ────────────────────────────── = ☐ ☐ ☐ ☐ ☐ **4-8**

_ _ _ _ **M** = Millimeters *(Encode in 5 mm increments)*

_ _ _ . _ **U** = Inches and tenths *(Encode in 0.1 in. increments)*

Stroke Length Notes:

1. Profile-style sensor (model RP) stroke range = 25 mm (1 in.) - 5080 mm. (200 in.)
2. Rod-style sensor (model RH) stroke range = 25 mm (1 in.) - 7620 mm (300 in.)

CONNECTION TYPES ────────────────────────────── = ☐ ☐ ☐ **9-11**

Integral connector:

D63 = Two 6-pin DIN (M16), male/female, standard

D53 = Two 5-pin DIN (M12), male/female plus one 4-pin (M8) male

Integral cable:

A _ _ = Integral cable, Hybrid Profibus with pigtail termination

Cable length:
Encode in feet if using US customary stroke length
Encode in meters if using metric stroke length

➤ _ _ = 3 (**03**) to 98 (**98**) ft. *or* 1 (**01**) to 30 (**30**) meters.

Cable Length Note:

Temposonics recommends the maximum integral cable length to be 10 meters (33 ft.). Cables greater than 10 m (33 ft.) in length are available, however, proper care must be taken during handling and installation.

INPUT VOLTAGE ────────────────────────────── = ☐ **12**

1 = +24 Vdc (+20% - 15%)

OUTPUT *(13 - 16)* ────────────────────────────── = **P** ☐ ☐ ☐ **13-16**

P _ _ _
[1] [2] [3]
= Profibus-DP protocol - Enter the 3 digit output code (1-3) defined by the following selections

[1] [2] [3] Protocol

101 = Multi-magnet (multi-position measurement) max. 20 positions

102 = Single magnet measurement (standard)

103 = Position, velocity (max. 5 positions and 5 velocities)

202L = Multi-magnet, up to 20 magnets with Linearity Correction Option (LCO)

NUMBER OF MAGNETS *(17- 19) FOR MULTI-POSITION MEASUREMENT ONLY* ────────────── = **Z** ☐ ☐ **17-19**
Z + Enter a 2 digit code

Z _ _ = If output **P101** or **P202L** is entered, enter a number between (02 - 20).
[1] [2]   If output **P103** is entered, enter a number between (02 - 05)
(For multi-position measurements, additional magnets are ordered separately.)

Document Part Number:

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