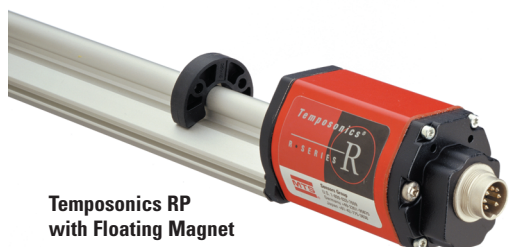


Product Specifications



**Temposonics RP
with Captive Sliding Magnet**



**Temposonics RP
with Floating Magnet**



**Temposonics RH
with Standard Ring Magnet**

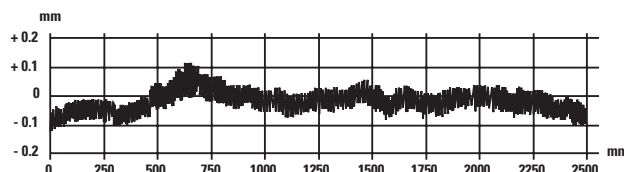
Features

- High-speed 2-wire digital data transmission
- Industrial standard communications protocol
- Up to 2 micron resolution
- Multiple (magnet) position sensing
- Programmable limit switch outputs
- Sensor-based intelligence & diagnostics
- Modular, non-contacting design
- Field replaceable sensor cartridge (Model RH only)
- CE Certified
- 2-year Warranty



PARAMETER SPECIFICATION

Measured Variable:	Displacement, Velocity
Resolution:	Up to 0.002 mm (0.00008 in.)
Non-Linearity:	< ± 0.01% of full stroke or ± 0.04 mm (0.0016 in.), whichever is greater*



Example: Sensor Type: Temposonics RP
Measuring Range: 2500 mm
Non-linearity (measured): ± 0.116 mm

Repeatability:	< ± 0.001% of full scale or ± 0.0025 mm (0.0001 in.), whichever is greater
Hysteresis (Magnetic**):	< 0.004 mm (0.00016 in.)
Output signal:	CAN Fieldbus System ISO-DIS 11898
Data Protocol:	CANopen Encoder Profile DS-406, CIA Standard DS-301 V3.0 or CANbasic CAN 2.0 A
Baud Rate:	1 Mbit/sec. maximum
Measuring Range:	Profile Style Sensors (RP): 25 to 5000 mm (1 to 196 in.) Rod Style Sensors (RH): 25 to 7600 mm (1 to 300 in.)
Operating Voltage:	+24 Vdc (+ 20%, - 15%)
Power Consumption:	100 mA (typical)
Operating Temperature:	Head Electronics: - 40 to 75°C (- 40 to 167°F) Sensing Element: - 40 to 105°C (- 40 to 221°F)
EMC Test:	DIN IEC 801-4, Type 4, CE Qualified DIN EN 50081-1 (Emissions), DIN EN 50082-2 (Immunity)
Shock Rating:	100 g (single hit)/IEC standard 68-2-27 survivability
Vibration Rating:	5 g/10-150 Hz/IEC standard 68-2-6

PROFILE STYLE (RP MODEL)

Electronic Head:	Aluminum die-cast housing
Sensor Stroke:	Aluminum profile
Sealing:	IP 65
Mounting:	Adjustable mounting feet or T-slot M5 nut in base channel
Magnet Type:	Captive sliding magnet or floating magnet

ROD STYLE (RH MODEL)

Electronic Head:	Aluminum die-cast housing
Sealing:	IP 67
Sensor Rod:	304L Stainless steel
Operating Pressure:	350 bar static, 690 bar spike (5000 psi static; 10,000 psi spike)
Mounting:	Threaded flange M18 x 1.5 or 3/4-16 UNF-3A
Typical Mounting Torque:	45 N-m (33 ft. - lbs.)
Magnet Type:	Ring or floating magnet

All specifications are subject to change. Please contact MTS for specifications critical to your needs.

* For all sensor models except the RP with style M magnet

** Does not include mechanical backlash on RP model sensors, style V and S magnets

Refer to **Installation Guide, Part No. 550573** for additional information, (www.mtssensors.com).

TEMPOSONICS R SERIES SENSORS WITH CANBUS COMMUNICATIONS

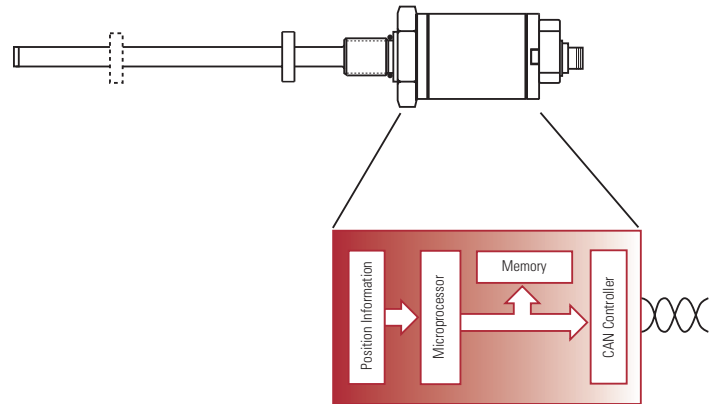
Temposonics R Series “smart” position sensors with CANbus, (Controller Area Network), fieldbus expand the functionality of our top of the line displacement sensing models. This enables customers to apply highly reliable, accurate and responsive position sensing to a simple, low cost fieldbus network. CANbus is a bus architecture that includes high-speed data processing suitable for motion control in industrial automation applications, multi-tasking capabilities, simplified bus wiring, sensor-based diagnostics, and easy expandability, all on a single data highway.

R Series sensors offer modular construction and non-contacting magnetostrictive technology. Two application housings are available: rod-style (Model RH) and profile-style (Model RP). The Model RH sensor cartridge can be quickly replaced in the field for sensor lengths up to 72 inches (1830 mm).

About Temposonics CANbus

The CANbus interface is enabled in the R Series product through the use of a CANbus microcontroller resident within the standard sensor housing. This device level intelligence also provides flexible data processing, programming and diagnostics functionality appropriate to the application. Also, displacement outputs are absolute which means that position information is immediately available upon recovery from power loss.

Sensor Block Diagram



BENEFITS

- Sensor-based intelligence, built-in diagnostics
- Reliable high speed data transmission over 2-wire bus
- High baud rate (up to 1 Mbit/second)
- Up to 32 devices per bus system
- Mode Selection
- Priority adjustability
- Easy expandability

CANBUS 2.0 MTS STANDARD

The MTS CAN standard protocol offers a full array of methods for providing displacement, velocity and limit switching output data. There are three portions to the data message. The first portion holds position data (3 bytes), the next portion holds limit switch data (1 byte), and last holds velocity data (2 bytes). There is also an option for setting and selecting these portions. It is possible to include position data output only, or all three outputs. There are five limit switch set points, two that are static (remain fixed once power is applied), and the remaining three that are dynamic (programmable after power up).

All of the programming is done on the CANbus communication lines. In the

master mode, the sensor provides an accurate velocity measurement based on resolution of the position. In the slave mode the velocity would be based on the timing of each *request for data* message.

It should be noted that in fieldbus systems, devices are identified by their node ID or address. Since there are many devices and possibly multiple Temposonics sensors within a given system, the node address must be programmable. For MTS CANbus systems, the default value is 00.

FEATURES

- Standard MTS protocol offers displacement, velocity and limit switching
- Up to 5 limit switch settings
- CANbus 2.0 supports up to 1 Mbit/sec rate.
- As a master device the sensor provides a velocity output based on resolution of the displacement, as shown in the table (right).

Displacement	CANopen		CANbasic	
Resolution:	5 μ m	2 μ m	5 μ m	2 μ m
Velocity:	0.5 mm/s	0.2 mm/s	1.0 mm/s	0.1 mm/s

CANBUS 2.0 MULTI-MAGNET

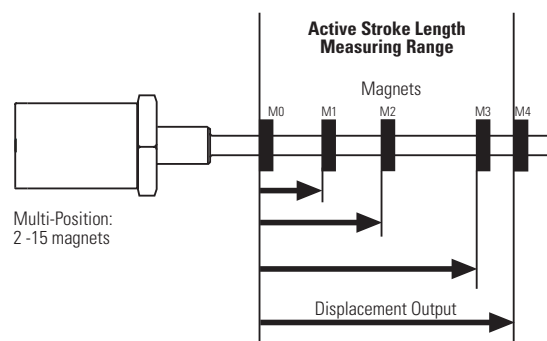
The CANbus 2.0 multi-magnet option offers a set of data messages to provide position data for up to 15 magnets. (Using more than 15 magnets is possible depending on the application, and requires approval from MTS Applications Engineering.) Each packet of data consists of position data for two magnets at three bytes each. There is also an additional byte for status indication of the mag-

nets. The message works with an option in CANbus 2.0 called *remote frame*.

Remote frame provides the ability to accept a message over the bus outside of the normal 8-byte response. When ordering this option you would need to specify the maximum number of magnets used. This type of sensor is a slave and must be polled to retrieve the data.

FEATURES

- The multi-magnet protocol supports up to 15-magnet positions, (if more are needed contact factory).
- The protocol uses *remote frame*.
- Specifying the number of magnets at time of order is a must.



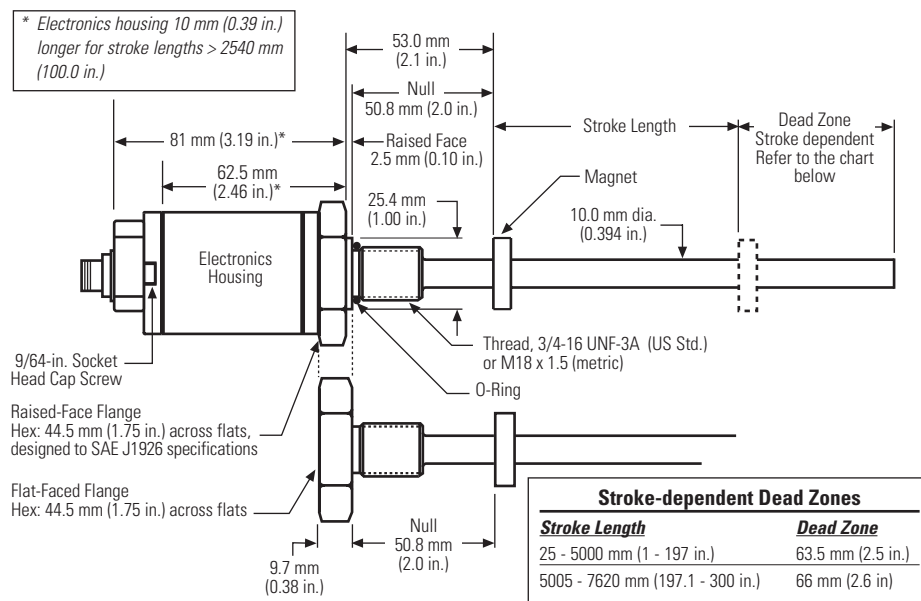
NOTE:
A gap of at least 3.9 in. (100 mm) must be maintained between the magnets.

DIMENSIONS RH

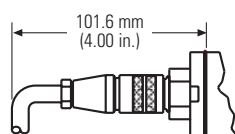
ROD-STYLE (MODEL RH)

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

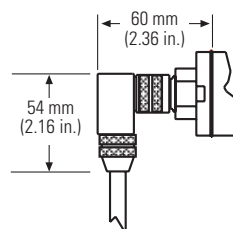
In addition, the RH housing offers the ability to quickly and easily replace the sensor cartridge in the field (up to 72 inches).



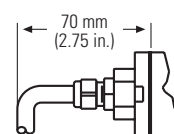
**D60 Connector
w/Straight Exit
D6 Mating Connector**



**D60 Connector
w/ 90° Mating Connector**

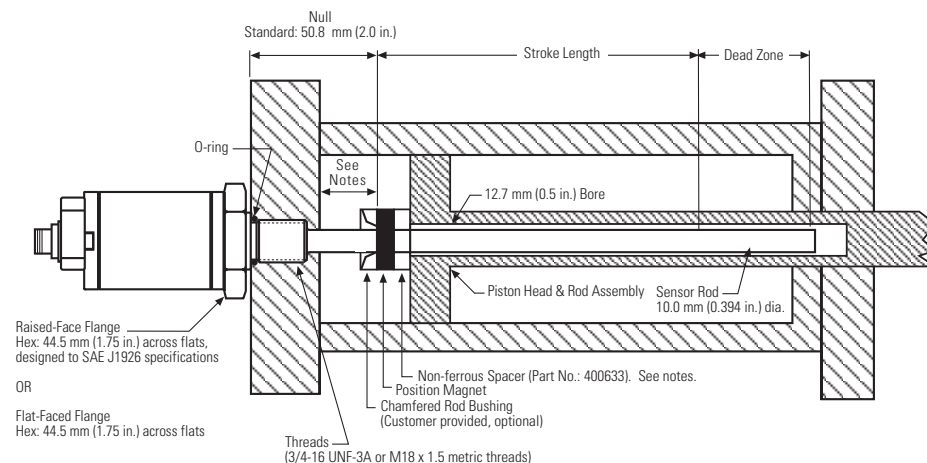


P Integral Cable



CYLINDER INSTALLATION

The rod-style Temposonics R Series position sensors (Model RH) are designed for installation into hydraulic cylinders. The sensor's high-pressure, stainless steel tube installs into a 1/2 inch bore in the piston head and rod assembly as illustrated (right).



NOTES:

- 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 provided by the non-ferrous spacer, i.e. 3.2 mm, (0.125 in.).
- The illustration above represents a typical installation. Some installation requirements may be application specific.

DIMENSIONS RP

PROFILE-STYLE (MODEL RP)

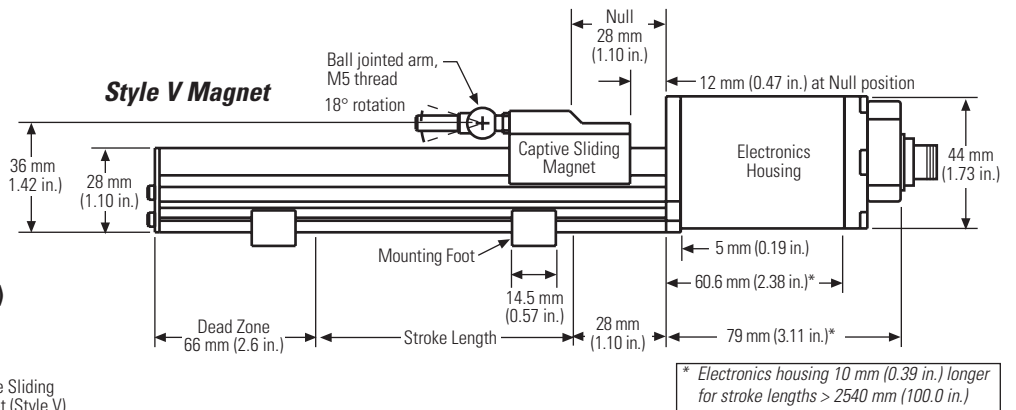
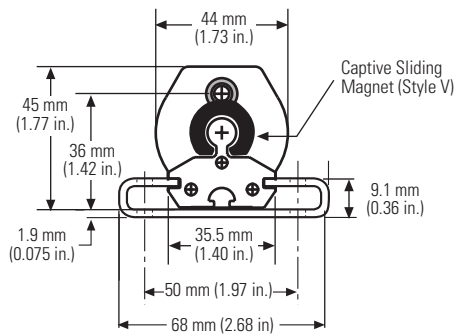
The Temposonics RP profile-style position sensors offer modular construction, flexible mounting configurations, and easy installation. A choice of two magnet mounting configurations are available with the profile housing: captive sliding magnet or floating magnet.

NOTE:

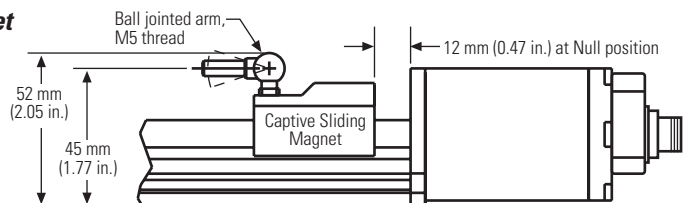
Temposonics RP Sensors include two mounting feet (Part No. 400802) for sensors up to 1250 mm (50 in.). One additional mounting foot is included for every additional 500 mm (20 in.).

CAPTIVE SLIDING MAGNET

**Captive Sliding Magnet, Style V, End View
(Shown with standard mounting feet)**

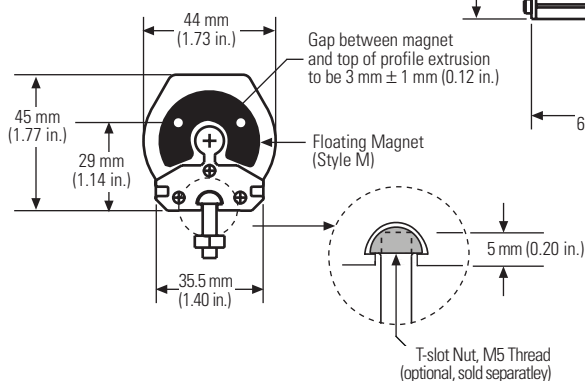


Style S Magnet

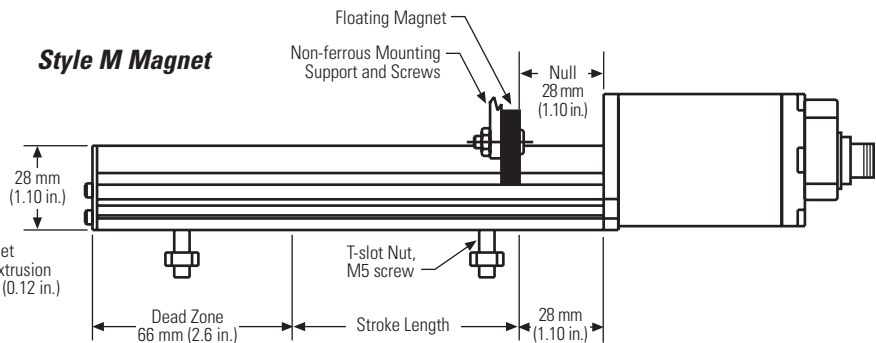


FLOATING MAGNET

**Floating Magnet, End View
(Shown with optional T-slot mounting)**



Style M Magnet



NOTE:

Cable and mating connector dimensions same as shown on page 4.

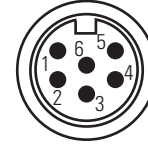
SENSOR INTEGRAL CONNECTOR (D60/D62 Male):

Pinout/Wire Color Code (Integral or Extension Cable)

Pin No.	Wire Color	Function
1	Gray	CAN-L (dominant low)
2	Pink	CAN-H (dominant high)
3	Yellow	No Connection
4	Green	No Connection
5	Red or Brown	+ 24 Vdc, (Customer supplied)
6	White	DC Ground

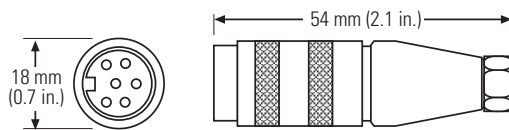
Integral D60 Connector (Male) or Integral D62 Dual Connectors (Both Male)

(As Viewed from End of Sensor)

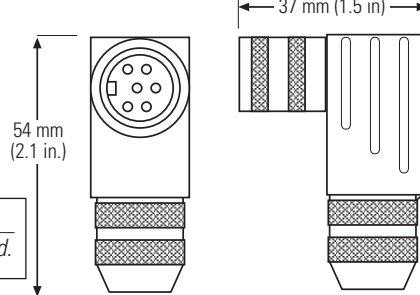


CABLE CONNECTORS (Field-installable D6 Female) Mates with Sensor's Integral Connector

D6 Straight-exit Connector Part No. 560700



D6 90° Connector Part No. 560778



Cable Length Limitations

Baud Rate	Maximum Bus Distance
1.0 MBd	80 ft. (25 m)
500 kBd	320 ft. (100 m)
250 kBd	820 ft. (250 m)
125 kBd	1640 ft. (500 m)

NOTE:

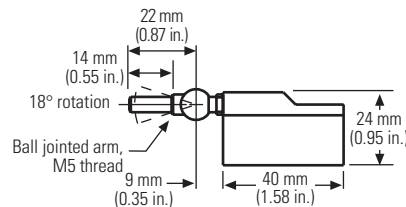
Appropriate grounding of cable shield is required at the controller end.

MAGNETS

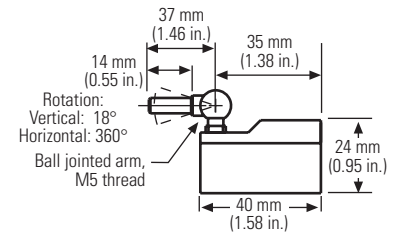
Magnets must be ordered separately with Temposonics RH sensors. The standard ring magnet (Part No. 201542) is suitable for most applications.

Magnets are included with the order of the Temposonics RP sensors. The Temposonics RP can be configured with one of two magnet configurations: captive sliding magnet or floating magnet.

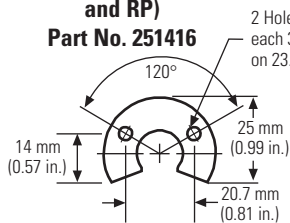
Captive Sliding Magnet, Style V Part No. 252111-1



Captive Sliding Magnet, Style S Part No. 252110-1

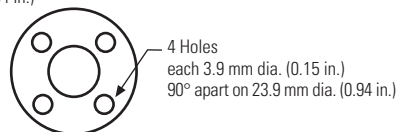


Floating Magnet, Style M (May be used with Temposonics RH and RP) Part No. 251416



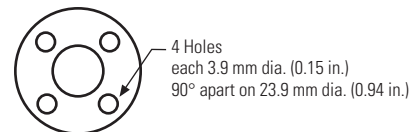
ID: 13.5 mm (0.53 in.)
OD: 32.8 mm (1.29 in.)
Thickness: 7.9 mm (0.312 in.)

Standard Ring Magnet Part No. 201542



ID: 13.5 mm (0.53 in.)
OD: 32.8 mm (1.29 in.)
Thickness: 7.9 mm (0.312 in.)

Magnet Spacer (Non-ferrous Spacer for Use with Standard Ring Magnet) Part No. 400633



ID: 14.3 mm (0.56 in.)
OD: 31.8 mm (1.25 in.)
Thickness: 3.2 mm (0.125 in.)

Ring Magnet Part No. 400533



ID: 13.5 mm (0.53 in.)
OD: 25.4 mm (1.0 in.)
Thickness: 7.9 mm (0.312 in.)
(For use with strokes
≤ 3050 mm or 120 in.)

HOW TO ORDER

POSITION SENSOR

When placing an order, build the desired model number using the model number guide (right). A wide range of R Series sensor configurations are available to meet the demands of your particular application. See the next page for how to order accessories.

If you have any questions about how to apply MTS position sensors, please contact one of our Application Engineers or your local MTS distributor—they are available to help you design an effective position sensing system to fit your application.

NOTES:

* CANbus EDS file and operation manuals are available at www.mtssensors.com. See Accessories for part numbers.

** Specify number of magnets utilized at time of order. (More than 15 requires MTS Application Engineering approval)

SENSOR MODEL

RH = Hydraulic Rod-style
RP = Profile-style

HOUSING STYLE

Tempsonics RH only (magnet must be ordered separately):

T = US customary threads, raised-faced hex, and pressure tube
S = US customary threads, flat-faced hex, and pressure tube
M = Metric threads, flat-faced hex, and pressure tube
N = Metric threads, raised-faced hex, and pressure tube
B = Sensor cartridge only (No application housing, stroke lengths ≤ 72 in.)

Tempsonics RP only (magnet included):

M = Floating Magnet, (Open ring) (Part No. 251416)
S = Captive sliding magnet with joint at top (Part No. 252110-1)
V = Captive sliding magnet with joint at front (Part No. 252111-1)

STROKE LENGTH

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

or

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

CONNECTION TYPE

Connectors

D60 = 6-pin DIN, integral, standard
D62 = 6-pin DIN, integral, dual connectors

Integral Cables

P = Integral high performance cable with pigtail termination

Cable Length

— — — = Encode in feet if using US customary stroke length, encode in meters if using metric stroke length
Range = 1 (01) to 99 (99) ft. or 1 (01) to 30 (30) meters

INPUT VOLTAGE

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

OUTPUT

C — — — — — = CANbus output (Fill in the six blanks with the following codes.) *

a) Hardware

1 = Standard
2 = Standard (Multi-magnet)
3 = CANopen

b, c) CANbus Protocol Code

01 = Single Magnet
04 = CANopen
07 = Multi-Magnet**

d) Baud Rate

1 = 1000 kBits/s
2 = 500 kBits/s
3 = 250 kBits/s
4 = 125 kBits/s

e) Resolution

1 = 0.0002 in. (0.005 mm)
2 = 0.00008 in. (0.002 mm)

f) Cycle Time

1 = Standard

R — — — — — **1** **C** — — — — — **0** — — — — — **1**

PRESSURE HOUSING (RH Spare Only)

H — — — — —

SENSORS CONNECTION TYPE

S = US customary threads, flat-faced hex
T = US customary threads, raised-face hex
M = Metric threads, flat-faced hex
N = Metric threads, raised-face hex

STROKE LENGTH

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

or

M — — — — — = Millimeters (Encode in 5 mm increments)

NOTE:

RH spare pressure housing for stroke lengths 1 to 72 in. (25 to 1825 mm) only.

EXTENSION CABLE WITH CONNECTOR(S) FOR THE D6, (D60), CONNECTION TYPE (USES STANDARD TYPE CABLE)

— — — — —

SENSORS CONNECTION TYPE

D6 = Female connector (straight-exit) for sensors with D6 (D60) connector
DA = Female connector (90° exit) for sensors with D6 (D60) connector

CABLE LENGTHS

For standard length cables up to 100 ft.

005 = 5 ft. **050** = 50 ft.
015 = 15 ft. **100** = 100 ft.
025 = 25 ft.

For custom length cables over 100 ft.

— — — — — = Cable length (maximum cable length is dependent on the output selected; consult MTS Applications Engineering.)

CABLE TERMINATION

PO = Pigtail connection
D6M = 6-pin D6 Male connector (straight exit)

HOW TO ORDER

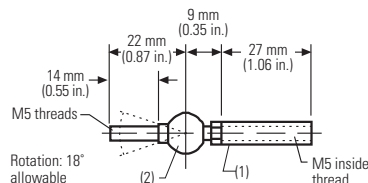
ACCESSORIES

Description	Part No.	Notes
O-Ring (spare)	560315	For use with Temposonics RH sensors
Hex Jam-nut (w/ 3/4-16 UNF threads)	500015	For use with Temposonics RH sensors
Hex Jam-nut (w/ M18 x 1.5 threads)	500018	For use with Temposonics RH sensors
Magnet Spacer	400633	For use with Standard Ring Magnet Part No. 201542
Magnet Mounting Screws	560357	Used to mount Standard Ring Magnet Part No. 201542 (4 screws required)
Floating Magnet, Style M	251416	Spare for Temposonics RP sensors
Captive Sliding Magnet, Style V	252111-1	Spare for Temposonics RP sensors, Rod joint at front of magnet
Captive Sliding Magnet, Style S	252110-1	Spare for Temposonics RP sensors, Rod joint at top of magnet
Joint Rod Sleeve	401603	Optional accessory for Temposonics RP sensors
Ball jointed arm	401913	Optional accessory for Temposonics RP sensors
Power Supply (24/28 Vdc, 0.5 A)	380009	Open frame style
Mounting Feet, Standard (spares for RP sensors)	400802	Temposonics RP sensors are provided with Mounting Feet, see page 3
Mounting Feet, Low-profile	400867	Optional accessory for Temposonics RP sensors
T-slot M5 Nut	401602	Optional accessory for mounting Temposonics RP sensors
D6 Field-installable Connector	560700	Female, straight-exit, see page 6
D6 Field-installable Connector	560778	Female, 90°, see page 6
Cable, Standard type	530026	3 twisted pairs, shielded, PVC jacket, specify desired length in feet.
Cable, high performance type	530029	7 conductor, EMC shielded; oil resistant jacket. Specify desired length in feet.
Operation Manual, Single Magnet CANbus	550744	Available at www.mtssensors.com
Operation Manual, Multi-magnet CANbus	550755	Available at www.mtssensors.com
Operation Manual, CANOpen	991005	Available at www.mtssensors.com

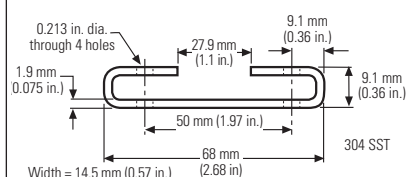
OPTIONAL EXTENSION RODS (for use with Captive Sliding Magnet)

Extension Rod Lengths	Part No.	Extension Rod Lengths	Part No.
60.3 mm (2.375 in.)	401768-2	390.5 mm (15.375 in.)	401768-15
85.7 mm (3.375 in.)	401768-3	466.7 mm (18.375 in.)	401768-18
111.1 mm (4.375 in.)	401768-4	517.5 mm (20.375 in.)	401768-20
161.9 mm (6.375 in.)	401768-6	542.9 mm (21.375 in.)	401768-21
187.3 mm (7.375 in.)	401768-7	619.1 mm (24.375 in.)	401768-24
212.7 mm (8.375 in.)	401768-8	771.5 mm (30.375 in.)	401768-30
238.1 mm (9.375 in.)	401768-9	923.9 mm (36.375 in.)	401768-36
263.5 mm (10.375 in.)	401768-10	1076.3 mm (42.375 in.)	401768-42
314.3 mm (12.375 in.)	401768-12	1228.7 mm (48.375 in.)	401768-48
365.1 mm (14.375 in.)	401768-14	1533.5 mm (60.375 in.)	401768-60

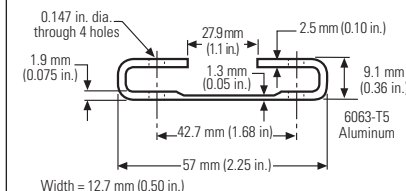
Joint Rod Used with Captive Sliding Magnets (1) Sleeve, Part No. 401603 (2) Ball jointed arm, Part No. 401913



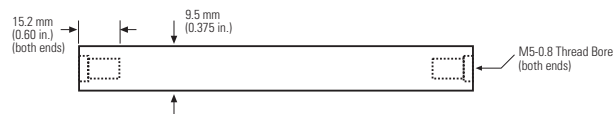
Mounting Feet Standard Mounting Foot Part No. 400802



Low-profile Mounting Foot Part No. 400867



Extension Rod Part No. 401768-XX



SENSORS
GROUP

Pioneers,
Innovators,
Leaders in
Magnetostriuctive
Sensing

UNITED STATES
MTS Systems Corporation
Sensors Division
3001 Sheldon Drive
Cary, NC 27513
Tel: 800.633.7609
Fax: 919.677.0200
Web: www.mtssensors.com
Email:
displacement@mtssensors.com

GERMANY
MTS Systems Corporation
Sensors Technologie
Auf dem Schuffel 9, D-58513 Lüdenscheid, Germany
Postfach 8130 D-58489 Lüdenscheid, Germany
Tel: + 49.2351.95870
Fax: + 49.2351.56491
Web: www.mtssensor.de

JAPAN
MTS Systems Corporation
Sensors Technologie Japan
Ushikubo Bldg.
737 Aihara-cho, Machida-shi
Tokyo 194-0211, Japan
Tel: + 81 (42) 775.3838
Fax: + 81 (42) 775.5512

