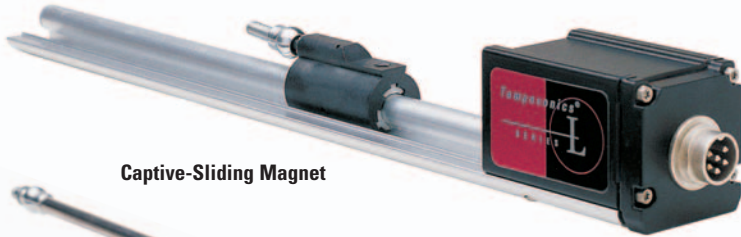


Product Specifications

The Temposonics LS position sensor is the latest addition to the L-Series line of magnetostrictive sensors. Like all L-Series products, the LS sensor uses a modular, non-contacting design and offers excellent resolution and repeatability.

Mechanically, the LS sensor resembles a potentiometer but provides much higher performance, durability, and value. Because the LS sensors are non-contacting, the sensing elements and the electronics are fully encapsulated and are not affected by contaminants common to industrial applications. The LS sensor offers mounting flexibility with two easy-to-install magnet configurations: floating bar magnet and captive sliding magnet. Stroke lengths up to 144 inches (3650 mm) are available (output dependent). Durable construction provides a high level of resistance to the effects of shock and vibration and provides long-term reliability.

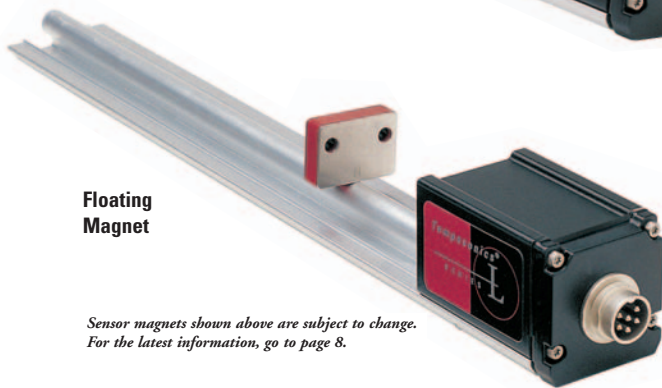
Outputs from the Temposonics LS sensors are absolute rather than incremental, eliminating the need to re-home in a power-down situation. A selection of analog and digital outputs (i.e., voltage, current, PWM, and Start/Stop) are available to meet most application interface requirements.



Captive-Sliding Magnet



Captive-Sliding Magnet with optional extension rod



Floating Magnet

Sensor magnets shown above are subject to change. For the latest information, go to page 8.

Features

- Modular, non-contacting design
- Excellent resolution and repeatability
- Absolute linear position measurement
- Analog and digital outputs
- Easy to install
- Shock and vibration resistant
- Mounting flexibility
- CE certified
- 2-year warranty



PARAMETER SPECIFICATION

Measured Variable:	Displacement
Resolution:	Analog: Infinite Digital: 1 ÷ [gradient x crystal freq. (MHz) x circulation]
Non-Linearity:*	Captive-sliding magnet: ± 0.02% or ± 0.05 mm (0.002 in.), whichever is greater Floating magnet: ± 0.02% or ± 0.15 mm (0.006 in.), whichever is greater
Repeatability:	< ± 0.001% of full scale or ± 0.0025 mm (0.0001 in.), whichever is greater
Hysteresis:	< 0.02 mm (0.0008 in.) **
Outputs:	Analog: Voltage or current Digital: Start/Stop or PWM
Measuring Range:	Analog: 25 to 2540 mm (1 to 100 in.) Digital: 25 to 3650 mm (1 to 144 in.)
Operating Voltage:	+ 13.5 to 26.4 Vdc (± 0%); Strokes ≤ 1525 mm (60 in.) + 24 Vdc (± 10%); Strokes > 1525 mm (60 in.)
Power Consumption:	100 mA max.
Operating Temperature:	Head electronics: - 40 to 85 °C (- 40 to 185 °F) Sensing element: - 40 to 105 °C (- 40 to 221 °F)
EMC Test:	DIN IEC 801-4, Type 4, CE Certified; DIN EN 50081-1 (Emissions), DIN EN 50082-2 (Immunity)
Shock Rating:	100 g (single hit)/IEC standard 68-2-27 (survivability)
Vibration Rating:	20 Grms/2-10 KHz, 6 axis IEC standard 68-2-6
Update Time:	Analog: < 1 ms (typical) Digital: Minimum = [Stroke (in inches) + 3] x 9.1 μs
Housing Style/Enclosure:	IP67
Magnet Type:	Floating magnet & captive-sliding magnet

** Does not include mechanical backlash, power supply dependent.
* Non-linearity increases with multiple circulations.
All specifications are subject to change. Please contact MTS for specifications critical to your needs.
Analog specifications are based on the assumption that output ripple is averaged by the measuring device as with any typical analog device.
For installation information, refer to part no. 550713.



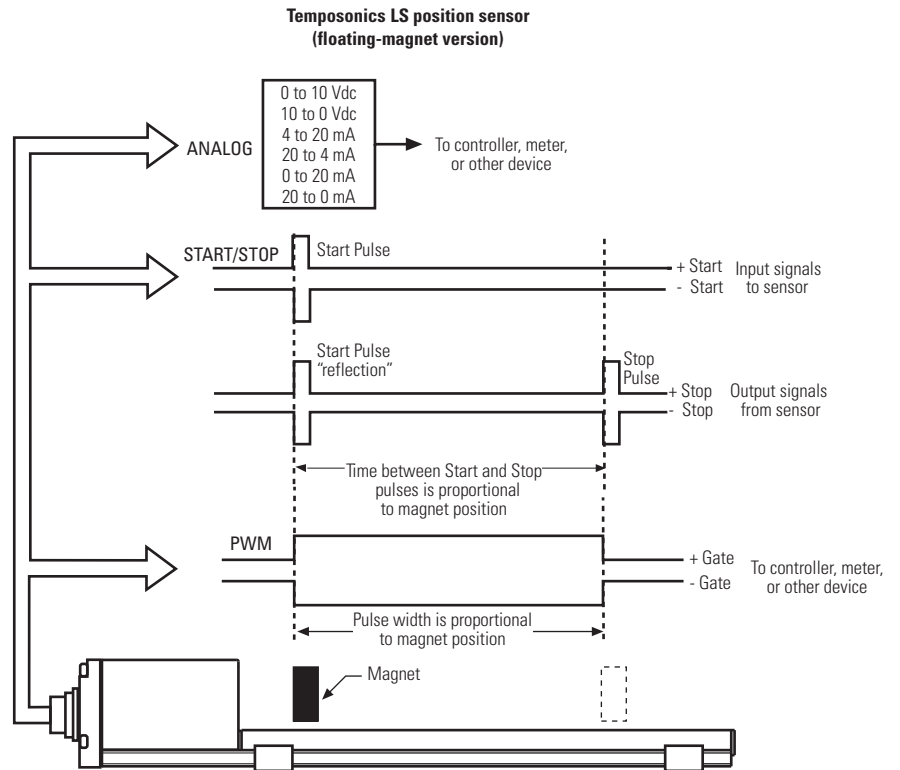
ANALOG & DIGITAL OUTPUTS

Temposonics L-Series LS position sensors provide direct analog or digital outputs.

Analog outputs include: voltage (0 to 10 Vdc; forward & reverse acting) and current (4 to 20 mA or 0 to 20 mA, forward or reverse acting).

If a digital format is required, Start/Stop or Pulse-Width Modulated (PWM) outputs are also available. The Start/Stop output requires a customer-supplied 1µs interrogation signal.

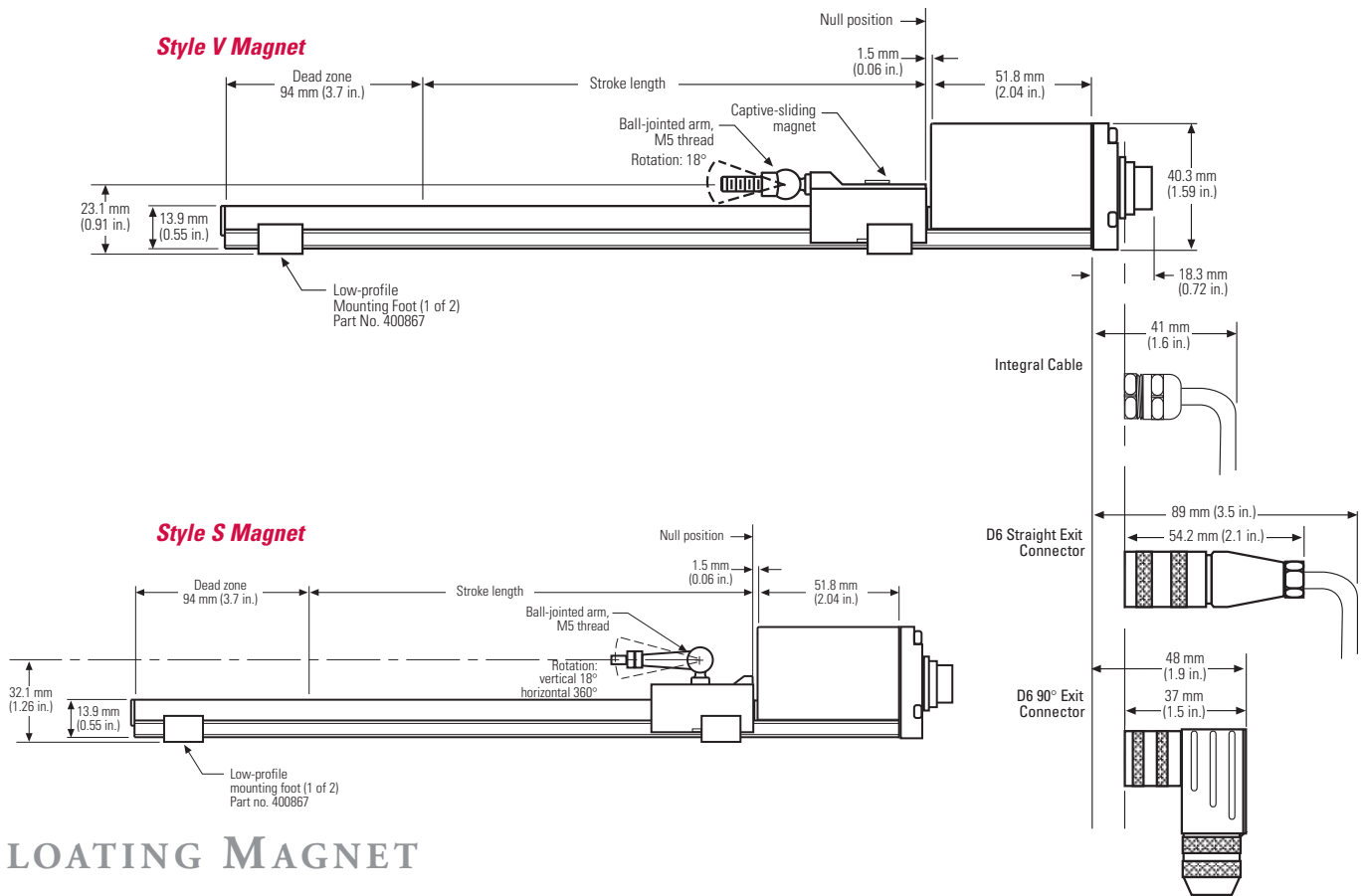
Since both the analog and digital outputs are direct, no signal-conditioning electronics are needed when interfacing with controllers or meters.



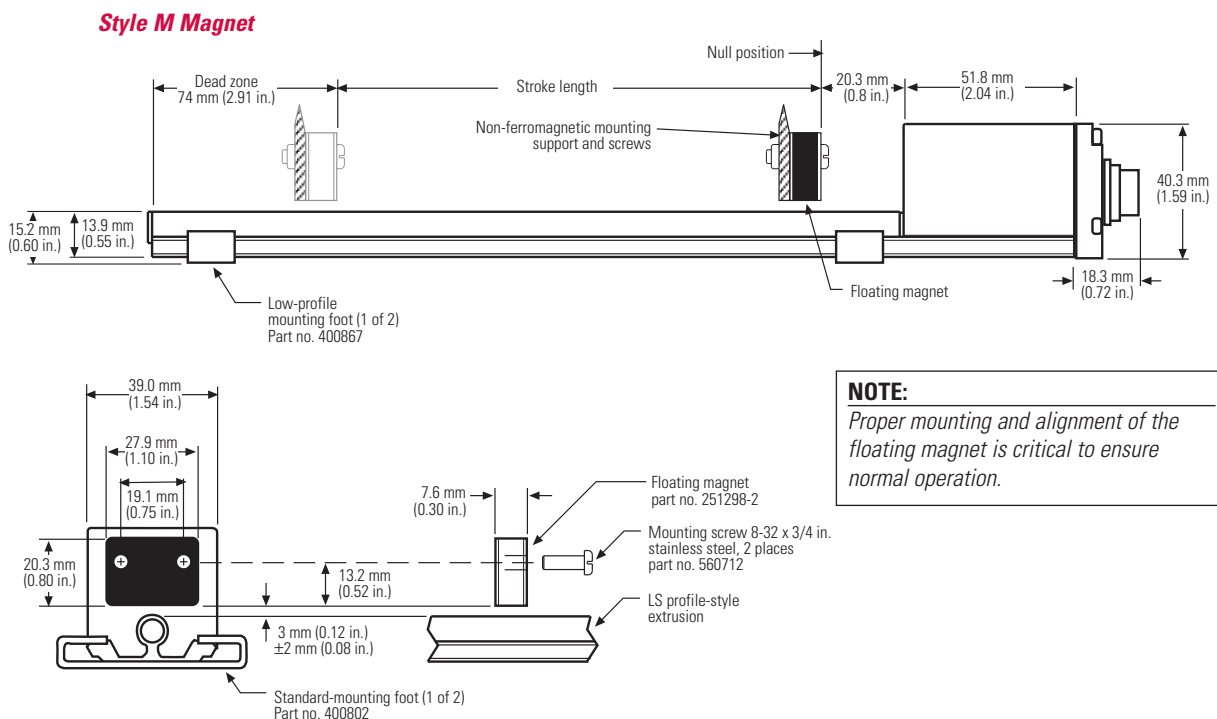
FEATURES

- Outputs include:
 - Voltage
 - Current
 - Start/Stop
 - Pulse Width Modulated (PWM)
- Rugged construction
- Direct outputs
- No signal-conditioning required
- High resolution
- Absolute measurement
- No need to re-home after power loss

CAPTIVE-SLIDING MAGNET



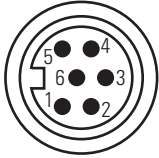
FLOATING MAGNET



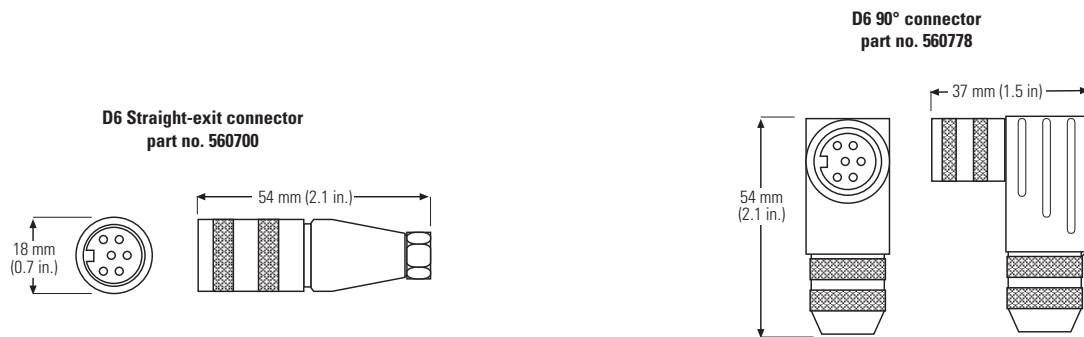
NOTE:
Proper mounting and alignment of the floating magnet is critical to ensure normal operation.

SENSOR INTEGRAL CONNECTOR (D6 Male):

(As viewed from end of sensor)



CABLE CONNECTORS (Field-installed D6 Female): Mates with Sensor Integral Connector



D6 CONNECTOR PINOUT / WIRE COLOR CODE (Integral Cable or Extension Cable)

Analog Output: (Voltage or Current)

Pin no.	Wire color	Function
1	Gray	0 to 10 Vdc, 4 to 20 mA, 0 to 20 mA
2	Pink	Return for pin 1
3	Yellow	10 to 0 Vdc, 20 to 4 mA, or 20 to 0 mA
4	Green	Return for Pin 3
5	Red or Brown	Customer supplied power (+ Vdc)*
6	White	DC ground

Digital Output: (PWM)

Pin no.	Wire color	Function
1	Gray	(-) Gate
2	Pink	(+) Gate
3	Yellow	(+) Interrogation
4	Green	(-) Interrogation
5	Red or Brown	Customer supplied power (+ Vdc)*
6	White	DC ground

Digital Output: (Start/Stop)

Pin no.	Wire color	Function
1	Gray	(-) Stop
2	Pink	(+) Stop
3	Yellow	(+) Start
4	Green	(-) Start
5	Red or Brown	Customer supplied power (+ Vdc)*
6	White	DC ground

* Power requirements are stroke length dependent.
+ 13.5 to 26.4 Vdc ($\pm 0\%$): Stroke lengths ≤ 1525 mm (60 in.)
+ 24 Vdc ($\pm 10\%$): Stroke lengths > 1525 mm (60 in.)

NOTE:

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

For Analog Output:

- 2) Minimum load impedance for voltage outputs is 5K Ω .
- 3) Maximum load impedance for current output is 500 Ω
(Reference to ground only).

For PWM Output:

- 4) For single-ended interrogation, the unused interrogation lead must be connected to DC ground at the controller.
- 5) When using PWM with internal interrogation, both interrogation leads must be connected to DC ground.

EXTENSION CABLE WITH CONNECTOR(S) FOR D6 CONNECTION STYLE:



SENSOR CONNECTION TYPE _____

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

CABLE LENGTHS _____

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 the output selected; consult MTS Applications Engineering.)

CABLE TERMINATION _____

- PO** = Pigtail connection
- D6M** = 6-pin D6 Male connector

2-4 digit code, depending on the output selected

POSITION SENSOR

Before you place an order, use the model number guide (right) to build the desired sensor model number. A selection of Temposonics LS sensor configurations are available to meet the demands of your particular application.

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

L	S																		
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SENSOR MODEL _____

LS = Profile style

MAGNET CONFIGURATION (magnet included) _____

M = Floating magnet (Bar type, Part No. 251298-2)

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

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

CONNECTION TYPE _____

Connectors

D6 = 6-pin DIN, integral, standard

Integral Cables

RO = Integral cable with pigtail termination

INTEGRAL CABLE LENGTH _____

00 = No integral cable (i.e., sensor with integral connector)

02 = 2 meter integral cable; standard with metric stroke lengths (i.e., millimeters)

05 = 5 ft. integral cable; standard with US stroke lengths (i.e., inches and tenths)

01 - 99 = Custom cable length 1 to 99 ft. (or 1 to 30 meters) (Encode length in feet if using US customary stroke length, in meters if using metric stroke length)

CABLE LENGTH NOTES:
 Use the maximum integral cable length (10 meters or 33 feet).
 Cables are available in lengths greater than 10 meters, however, proper care must be taken during handling and installation.

STROKE LENGTH _____

U _____ Inches and tenths (Encode length in 0.1 in. increments)

M _____ Millimeters (Encode length in 5 mm increments)

STROKE LENGTH NOTES:
 LS sensors with Analog outputs have a stroke range = 1-100 in. (25 - 2540 mm).
 LS sensors with Start/Stop and PWM outputs have a stroke range = 1 -144 in. (25 - 3660 mm).

INPUT VOLTAGE _____

1 = +13.5 to 26.4 Vdc (± 0%) for strokes ≤60 inches

2 = +24 (± 10%) for strokes > 60 inches

OUTPUT _____

V0 = Voltage (0 to +10 Vdc or +10 to 0 Vdc)

A0 = 4 to 20 mA

A1 = 20 to 4 mA

A2 = 0 to 20 mA

A3 = 20 to 0 mA

RO = Start/Stop

D _____ = Pulse-Width Modulated (PWM) (Fill in the three blanks with the following codes.)

a b c

NOTES:

- Magnet included with unit as defined by model number.
- Temposonics LS 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.).
- See the "Accessories" section of this document for optional extension rods that are used with Temposonics sensors with captive-sliding magnets.

a) Interrogation **b, c) Circulations**

E = External _____ = Desired number of circulations
I = Internal (Range = 1 to 15; encode as **01** to **15**. Refer to Tables A and B.)

TABLE A:
Circulation count vs. resolution for PWM output (based on 28 MHz counter)

Resolution	Circulation count*
0.00026 in. (0.0066 mm)	15
0.0005 in. (0.0127 mm)	8
0.001 in. (0.025 mm)	4
0.002 in. (0.051 mm)	2
0.004 in. (0.102 mm)	1

TABLE B:
Maximum circulation count vs. stroke for PWM output w/internal interrogation

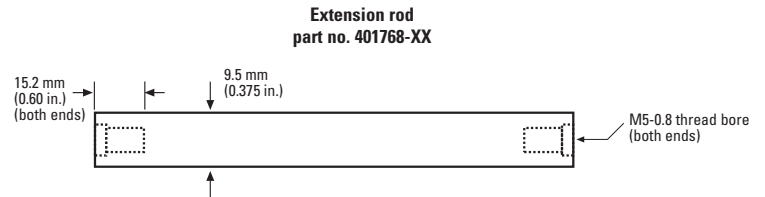
Stroke	Maximum circulation count
≤ 84 in. (2134 mm)	15
> 84 in. (2136 mm)	1

* Limited by stroke length for sensors configured for **internal** interrogation. (Refer to Table B)

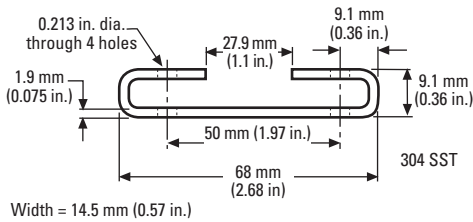
Description	Part no.	Notes
Captive-sliding magnet, style V	252184	Spare magnet, rod joint at front of magnet, see drawing next page.
Captive-sliding magnet, style S	252182	Spare magnet, rod joint at top of magnet, see drawing next page.
Floating magnet, style M	251298-2	Spare magnet, see drawing next page.
Mounting screws (8/32 x 3/4 in. stainless steel)	560712	Used for mounting the floating magnet, part no. 251298-2.
Joint-rod sleeve	401603	Optional accessory, see drawing next page.
Ball jointed arm	401913	Optional accessory, see drawing next page.
Power supply (24/28 Vdc, 0.5 A)	380009	Open-frame style.
Mounting feet, standard	400802	2 spare feet, see drawing next page.
Mounting feet, low profile	400867	Optional accessory, see drawing next page.
Male-rod end	401872	Optional accessory mates with extension rod, see drawing next page.
D6 straight-exit connector	560700	See drawing on page 4.
D6 90° connector	560778	See drawing on page 4.

OPTIONAL EXTENSION RODS (For Use with Captive Sliding Magnet)

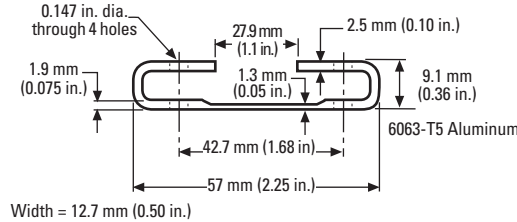
Extension Rod Lengths	Part No.	Extension Rod Lengths	Part No.
60.3 mm (2.375 in.)	401768-2	390.5 mm (15.375 in.)	401768-15
85.7 mm (3.375 in.)	401768-3	466.7 mm (18.375 in.)	401768-18
111.1 mm (4.375 in.)	401768-4	517.5 mm (20.375 in.)	401768-20
161.9 mm (6.375 in.)	401768-6	542.9 mm (21.375 in.)	401768-21
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



Standard-mounting foot
part no. 400802



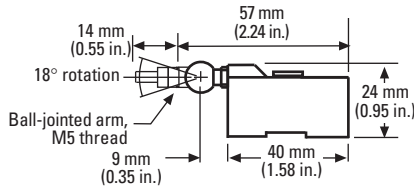
Low-profile mounting foot
part no. 400867



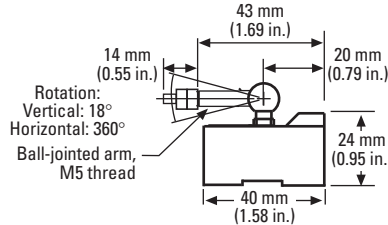
NOTES:

- 1) Use the optional sleeve (part no. 401603) or extension rod (part no. 401768-xx) with ball-jointed arm (part no. 401913) to ensure maximum mounting flexibility and to compensate for mechanical misalignments when interfacing with a machine.
- 2) Extension rod (part no. 401768-xx), ball-jointed arm (part no. 401913), and sleeve (part no. 401603) are sold separately.

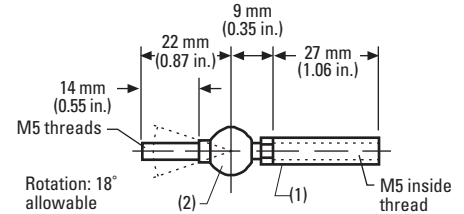
Captive-sliding magnet, style V
part no. 252184



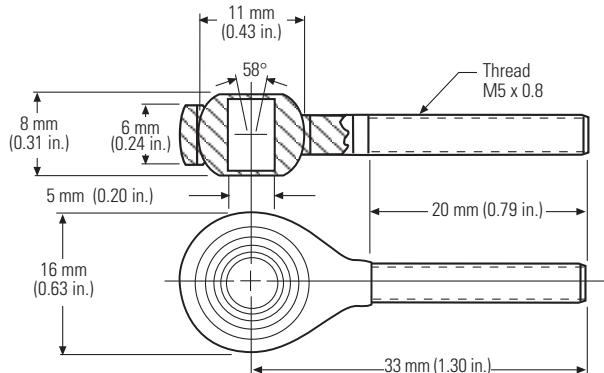
Captive-sliding magnet, style S
part no. 252182



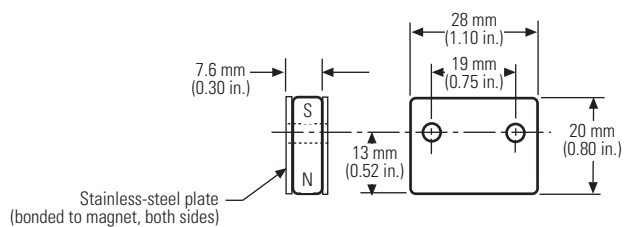
Joint rod
(used with captive-sliding magnet)
(1) Sleeve, part no. 401603
(2) Ball-jointed arm, part no. 401913



Male-rod end
part no. 401872
(mates with extension rod)



Floating magnet, style M
part no. 251298-2



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