

# Temposonics®

Magnetostrictive Linear Position Sensors

## TH SSI Data Sheet

- ATEX / IECEx / CEC / NEC / EAC Ex certified / Japanese approval
- Continuous operation under harsh industrial conditions
- Flameproof / Explosionproof / Increased safety



## MEASURING TECHNOLOGY

The absolute, linear position sensors provided by MTS Sensors rely on the company's proprietary Temposonics® magnetostrictive technology, which can determine position with a high level of precision and robustness. Each Temposonics® position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the end of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

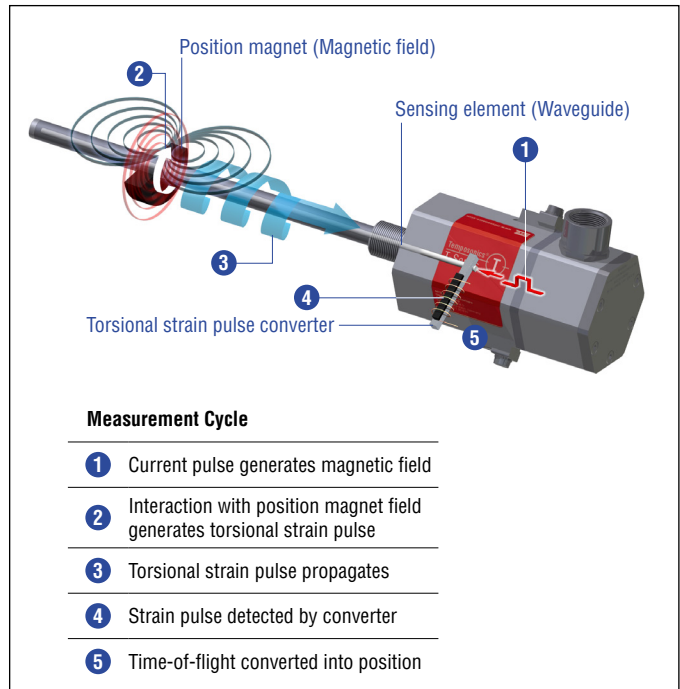


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

## TH SENSOR

Robust, non-contact and wear free, the Temposonics® linear position sensors provide best durability and accurate position measurement solutions in harsh industrial environments. The position measurement accuracy is tightly controlled by the quality of the waveguide which is manufactured by MTS Sensors. The position magnet is mounted on the moving machine part and travels contactlessly over the sensor rod with the built-in waveguide.

The TH sensor is extremely robust and ideal for continuous operation under harsh industrial conditions. T-Series sensors are certified for hazardous areas in Zone 0/1, Zone 1, Zone 2, Zone 21 and Zone 22 for Europe (ATEX), the global (IECEX), the Russian (EAC Ex) and the Japanese market, as well as for use in Class I, II, III, Division 1, Division 2 for Canada (CEC) and USA (NEC). The sensor electronics housing contains the active signal conditioning and a complete integrated electronics interface. The sensor rod is capable of withstanding high pressures such as those found in hydraulic cylinders. Furthermore the sensor is also suitable for petro chemical plants and caustic environments.



Fig. 2: Typical application: Tank systems

## TECHNICAL DATA

Output	
Interface	SSI (Synchronous Serial Interface) – differential signal in SSI standard (RS 422)
Data format	Binary or gray, optional parity and error bit or temperature of sensor electronics
Data length	8...32 bit
Data transmission rate	70 kBaud <sup>1</sup> ...1 MBaud, depending on cable length: Cable length < 3 m < 50 m < 100 m < 200 m < 400 m Baud rate 1 MBd < 400 kBd < 300 kBd < 200 kBd < 100 kBd
Measured value	Position, differentiation measurement, velocity, temperature of sensor electronics
Measurement parameters	
Resolution	Position: 0.5 µm, 1 µm, 2 µm, 5 µm, 10 µm, 20 µm, 50 µm, 100 µm / Velocity over 10 measured values: 0.1 mm/s (at 1 ms cycle time)
Cycle time	Stroke length 300 mm 750 mm 1000 mm 2000 mm 5000 mm Measurement rate 3.7 kHz 3.0 kHz 2.3 kHz 1.2 kHz 0.5 kHz
Linearity <sup>2</sup>	< ±0.01 % F.S. (minimum ±40 µm)
Repeatability	< ±0.001 % F.S. (minimum ±2.5 µm) typical
Hysteresis	< 4 µm typical
Temperature coefficient	< 15 ppm/K typical
Operating conditions	
Operating temperature	-40...+75 °C (-40...+167 °F)
Humidity	90 % relative humidity, no condensation
Ingress protection	Version D, G, and E: IP66 / IP67 (if properly connected by means that support IP66 / IP67 (pipe, gland, etc.)) Version N: IP66, IP67, IP68, IP69K, NEMA 4X, depending on cable gland
Shock test	100 g / 6 ms according to IEC 60068-2-27
Repeated shock events	160 g / 2 ms according to IEC 60068-2-27 (for shock improved option <b>A</b> , see order code for Operating Voltage on page 13)
Vibration test	15 g / 10...2000 Hz according to IEC 60068-2-6 (excluding resonant frequencies)
EMC test	Electromagnetic emission according to EN 61000-6-3 Electromagnetic immunity according to EN 61000-6-2 The sensor meets the requirements of the EU directives and is marked with <b>CE</b>
Operating pressure	350 bar static (5076 psi static)
Magnet movement velocity <sup>3</sup>	Any
Design / Material	
Sensor electronics housing	Stainless steel 1.4305 (AISI 303); option: Stainless steel 1.4404 (AISI 316L)
Flange	See "Table 1: TH rod sensor threaded flange type references" on page 7
Sensor rod	Stainless steel 1.4306 (AISI 304L); option: Stainless steel 1.4404 (AISI 316L)
Stroke length	25...7620 mm (1...300 in.) (for shock improved option <b>A</b> , see order code on page 13: 25...3760 mm (1...148 in.))
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings and the operation manual (document number: <a href="#">551902</a> )

See next page for "Electrical connection"

1/ With standard one shot of 16 µs

2/ With position magnet # 201 542-2

3/ If there is contact between the moving magnet including the magnet holder and the sensor rod, make sure that the maximum speed of the moving magnet is ≤ 1 m/s (Safety requirement due to ESD [Electro Static Discharge])

Electrical connection	
Connection type	T-Series terminal
Operating voltage	+24 VDC (-15 / +20 %)
Ripple	$\leq 0.28 V_{pp}$
Current consumption	100 mA typical
Dielectric strength	700 VDC (DC ground to machine ground)
Polarity protection	Up to -30 VDC
Overvoltage protection	Up to 36 VDC

## CERTIFICATIONS

Certification required	Version E	Version D	Version G	Version N
IECEX / ATEX (IECEX: Global market; ATEX: Europe)	Ex db eb IIC T4 Ga/Gb Ex tb IIIC T130°C Ga/Db Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	Ex db IIC T4 Ga/Gb Ex tb IIIC T130°C Ga/Db Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	Ex db IIC T4 Ga/Gb Ex tb IIIC T130°C Ga/Db Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	No hazardous area approval
NEC (USA)	—	—	<b>Explosionproof</b> Class I Div. 1 Groups A, B, C, D T4 Class II/III Div. 1 Groups E, F, G T130°C -40 °C ≤ Ta ≤ 75 °C  <b>Flameproof</b> Class I Zone 0/1 AEx d IIC T4 Class II/III Zone 21 AEx tb IIIC T130°C -40 °C ≤ Ta ≤ 75 °C	No hazardous area approval
CEC (Canada)	—	—	<b>Explosionproof</b> Class I Div. 1 Groups B, C, D T4 Class II/III Div. 1 Groups E, F, G T130°C -40 °C ≤ Ta ≤ 75 °C  <b>Flameproof</b> Class I Zone 0/1 Ex d IIC T4 Ga/Gb Class II/III Zone 21 Ex tb IIIC T130°C Db -40 °C ≤ Ta ≤ 75 °C	No hazardous area approval
EAC Ex (Russian market)	Ga/Gb Ex db eb IIC T4 X Da/Db Ex tb IIIC T130°C X Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	Ga/Gb Ex db IIC T4 X Da/Db Ex tb IIIC T130°C X Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	Ga/Gb Ex db IIC T4 X Da/Db Ex tb IIIC T130°C X Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	No hazardous area approval
Japanese approval	Ex d e IIC T4 Ga/Gb Ex t IIIC T130°C Db Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	Ex d IIC T4 Ga/Gb Ex t IIIC T130°C Db Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	Ex d IIC T4 Ga/Gb Ex t IIIC T130°C Db Zone 0/1, Zone 21 -40 °C ≤ Ta ≤ 75 °C	No hazardous area approval

Fig. 3: Certifications

## TECHNICAL DRAWING

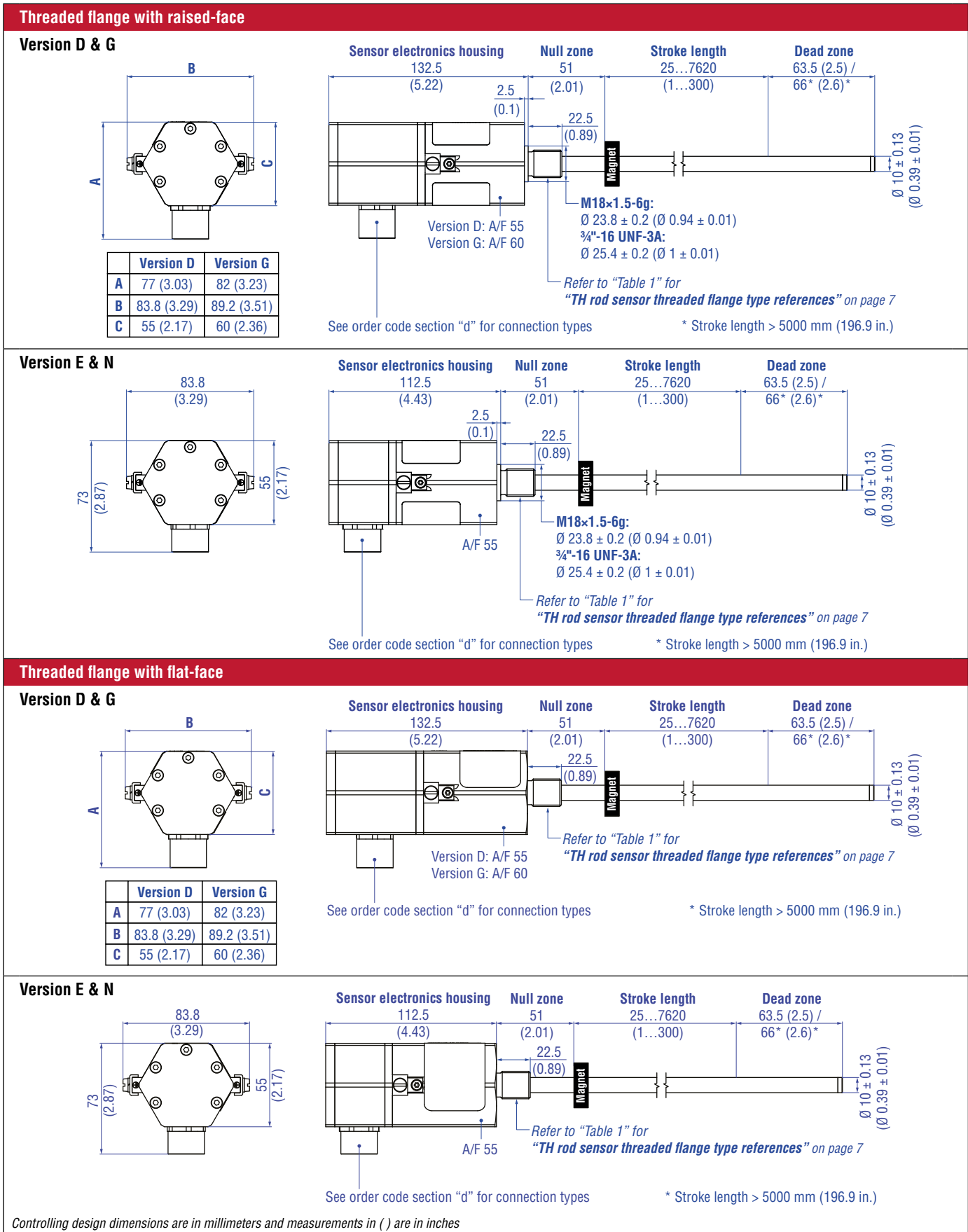


Fig. 4: Temposonics® TH with ring magnet

## CONNECTION OPTIONS

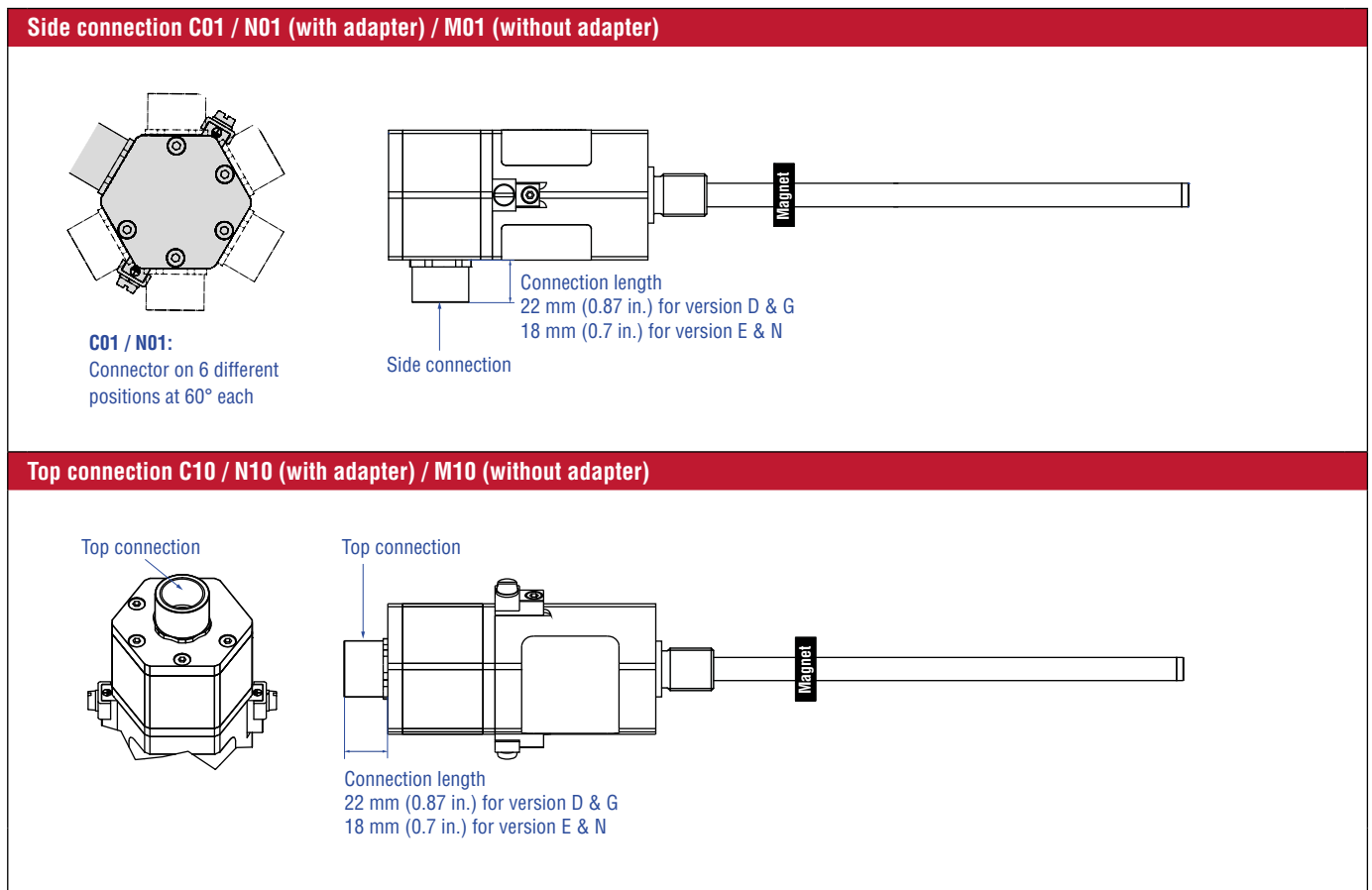


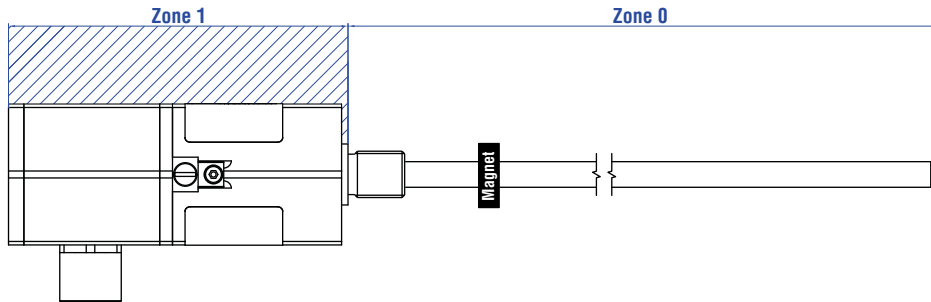
Fig. 5: Temposonics® TH connection options

Threaded flange type	Description	Threaded flange
F	Threaded flange with flat-face Stainless steel 1.4404 (AISI 316L)	¾"-16 UNF-3A
G	Threaded flange with raised-face Stainless steel 1.4404 (AISI 316L)	¾"-16 UNF-3A
M	Threaded flange with flat-face Stainless steel 1.4305 (AISI 303)	M18×1.5-6g
N	Threaded flange with raised-face Stainless steel 1.4305 (AISI 303)	M18×1.5-6g
S	Threaded flange with flat-face Stainless steel 1.4305 (AISI 303)	¾"-16 UNF-3A
T	Threaded flange with raised-face Stainless steel 1.4305 (AISI 303)	¾"-16 UNF-3A
W	Threaded flange with flat-face Stainless steel 1.4404 (AISI 316L)	M18×1.5-6g

Table 1: TH rod sensor threaded flange type references

## ZONE CLASSIFICATION

**Version D & G (example: Threaded flange with raised-face)**  
Flameproof (explosionproof) housing with flameproof (explosionproof) connection chamber  
Version D: ATEX / IECEx / EAC Ex / Japanese Approval  
Version G: ATEX / IECEx / CEC / NEC / EAC Ex / Japanese Approval



**Version E (example: Threaded flange with raised-face)**  
Flameproof housing with increased safety connection chamber  
ATEX / IECEx / EAC Ex / Japanese Approval

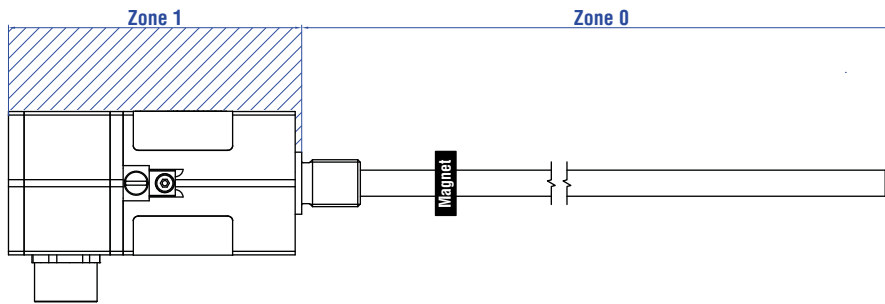


Fig. 6: Temposonics® TH Zone classification

### NOTICE

Seal sensor according to ingress protection IP67 between Zone 0 and Zone 1.



## CONNECTOR WIRING

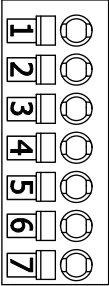
Version D & G suitable for connection types: C01, C10, N01, N10		
Signal + power supply		
Terminal	Pin	Function
	1	Data (-)
	2	Data (+)
	3	Clock (+)
	4	Clock (-)
	5	+24 VDC (-15 / +20 %)
	6	DC Ground (0 V)
	7	Cable shield

Fig. 7: TH (version D & G) wiring diagram (2.5 mm<sup>2</sup> conductor)

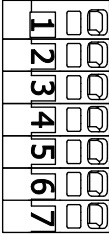
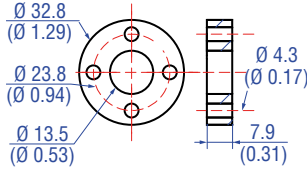
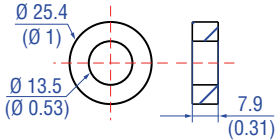
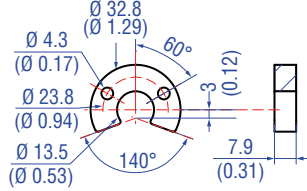
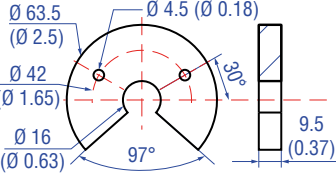
Version E & N suitable for connection types: C01, C10, M01, M10, N01, N10		
Signal + power supply		
Terminal	Pin	Function
	1	Data (-)
	2	Data (+)
	3	Clock (+)
	4	Clock (-)
	5	+24 VDC (-15 / +20 %)
	6	DC Ground (0 V)
	7	Cable shield

Fig. 8: TH (version E & N) wiring diagram (1.5 mm<sup>2</sup> conductor)

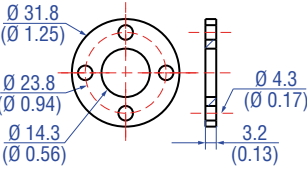
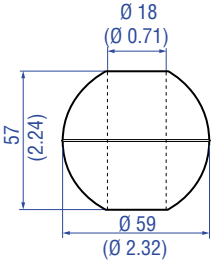
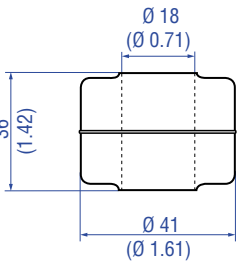
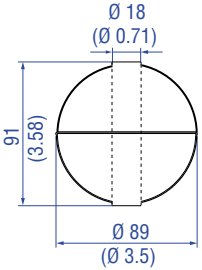
**FREQUENTLY ORDERED ACCESSORIES** – Additional options available in our [Accessories Guide](#)  [551444](#)

**Position magnets**

			
<p><b>Ring magnet OD33</b> <b>Part no. 201 542-2</b></p> <p>Material: PA ferrite GF20 Weight: Approx. 14 g Surface pressure: Max. 40 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p><b>Ring magnet OD25.4</b> <b>Part no. 400 533</b></p> <p>Material: PA ferrite Weight: Approx. 10 g Surface pressure: Max. 40 N/mm<sup>2</sup> Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p><b>U-magnet OD33</b> <b>Part no. 251 416-2</b></p> <p>Material: PA ferrite GF20 Weight: Approx. 11 g Surface pressure: Max. 40 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p><b>U-magnet OD63.5</b> <b>Part no. 201 553</b></p> <p>Material: PA 66-GF30, magnets compound-filled Weight: Approx. 26 g Surface pressure: 20 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+75 °C (-40...+167 °F)</p>

**Magnet spacer**

**Floats<sup>4</sup>**

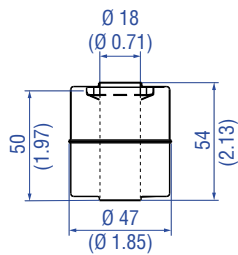
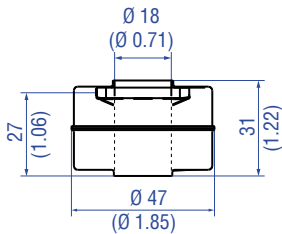
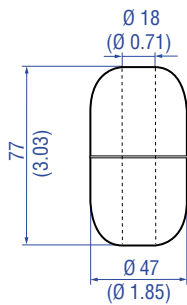
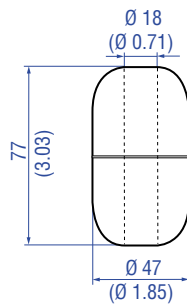
			
<p><b>Magnet spacer</b> <b>Part no. 400 633</b></p> <p>Material: Aluminum Weight: Approx. 5 g Surface pressure: Max. 20 N/mm<sup>2</sup> Fastening torque for M4 screws: 1 Nm</p>	<p><b>Float</b> <b>Part no. 251 387-2</b></p> <p>Material: Stainless steel (AISI 316L) Weight offset: Yes Pressure: 22.4 bar (325 psi) Magnet offset: No Specific gravity: Max. 0.48 Operating temperature: -40...+125 °C (-40...+257 °F)</p>	<p><b>Float</b> <b>Part no. 200 938-2</b></p> <p>Material: Stainless steel (AISI 316L) Weight offset: Yes Pressure: 8.6 bar (125 psi) Magnet offset: No Specific gravity: Max. 0.74 Operating temperature: -40...+125 °C (-40...+257 °F)</p>	<p><b>Float</b> <b>Part no. 251 469-2</b></p> <p>Material: Stainless steel (AISI 316L) Weight offset: Yes Pressure: 29.3 bar (425 psi) Magnet offset: No Specific gravity: Max. 0.45 Operating temperature: -40...+125 °C (-40...+257 °F)</p>

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

- 4/
- Be sure that the float specific gravity is at least 0.05 less than that of the measured liquid as a safety margin at ambient temperature
  - For interface measurement: A minimum of 0.05 specific gravity differential is required between the upper and lower liquids

- When the magnet is not shown, the magnet is positioned at the center line of float
- An offset weight is installed in the float to bias or tilt the float installed on the sensor tube. So the float remains in contact with the sensor tube at all times and guarantees permanent potential equalization of the float. The offset is required for installations that must conform to hazardous location standards

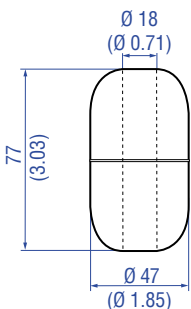
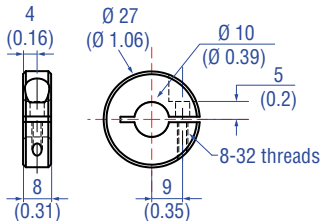
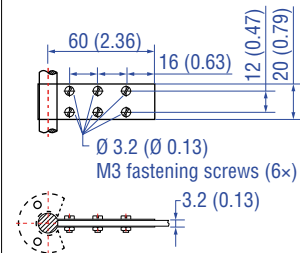
**Floats<sup>5</sup>**

			
<p><b>Float<sup>6</sup></b> <b>Part no. 201 605-2</b></p> <p>Material: Stainless steel 1.4571 (AISI 316 Ti) Weight offset: Yes Pressure: 4 bar (60 psi) Magnet offset: Yes Specific gravity: Max. 0.6 Operating temperature: -40...+125 °C (-40...+257 °F)</p>	<p><b>Float<sup>6</sup></b> <b>Part no. 201 606-2</b></p> <p>Material: Stainless steel 1.4571 (AISI 316 Ti) Weight offset: Yes Pressure: 4 bar (60 psi) Magnet offset: Yes Specific gravity: 0.93 ± 0.01 Operating temperature: -40...+125 °C (-40...+257 °F)</p>	<p><b>Float</b> <b>Part no. 251 982-2</b></p> <p>Material: Stainless steel (AISI 316L) Weight offset: Yes Pressure: 29.3 bar (425 psi) Magnet offset: No Specific gravity: 0.93 ± 0.01 Operating temperature: -40...+125 °C (-40...+257 °F)</p>	<p><b>Float</b> <b>Part no. 251 983-2</b></p> <p>Material: Stainless steel (AISI 316L) Weight offset: Yes Pressure: 29.3 bar (425 psi) Magnet offset: No Specific gravity: 1.06 ± 0.01 Operating temperature: -40...+125 °C (-40...+257 °F)</p>

**Float<sup>5</sup>**

**Collar**

**Optional installation hardware**

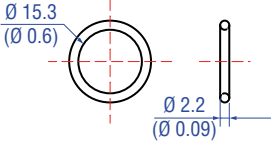
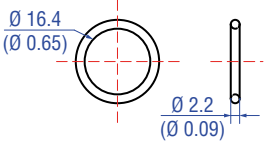

		
<p><b>Float</b> <b>Part no. 251 981-2</b></p> <p>Material: Stainless steel (AISI 316L) Weight offset: Yes Pressure: 29.3 bar (425 psi) Magnet offset: No Specific gravity: Max. 0.67 Operating temperature: -40...+125 °C (-40...+257 °F)</p>	<p><b>Stop collar</b> <b>Part no. 560 777</b></p> <p>Provides end of stroke stops for float Material: Stainless steel 1.4301 (AISI 304) Weight: Approx. 30 g Hex key 7/64" required</p>	<p><b>Fixing clip for rod with Ø 10 mm</b> <b>Part no. 561 481</b></p> <p>Application: Used to secure sensor rods (Ø 10 mm (Ø 0.39 in.)) when using an U-magnet or block magnet Material: Brass, non-magnetic</p>

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

- 5/
- Be sure that the float specific gravity is at least 0.05 less than that of the measured liquid as a safety margin at ambient temperature
  - For interface measurement: A minimum of 0.05 specific gravity differential is required between the upper and lower liquids
  - When the magnet is not shown, the magnet is positioned at the center line of float

- An offset weight is installed in the float to bias or tilt the float installed on the sensor tube. So the float remains in contact with the sensor tube at all times and guarantees permanent potential equalization of the float. The offset is required for installations that must conform to hazardous location standards

- 6/ Standard float that can be expedited

O-rings		Programming tool <sup>7</sup>
		
<p><b>O-ring for threaded flange</b> <b>M18×1.5-6g</b> <b>Part no. 401 133</b></p>	<p><b>O-ring for threaded flange</b> <b>¾"-16 UNF-3A</b> <b>Part no. 560 315</b></p>	<p><b>Programming kit</b> <b>Part no. 253 135-1 (EU)</b> <b>Part no. 253 310-1 (US)</b></p>
<p>Material: Fluoroelastomer Durometer: 75 ± 5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)</p>	<p>Material: Fluoroelastomer Durometer: 75 ± 5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)</p>	<p>Kit includes: Interface converter box, power supply and cables</p> <p>Software is available at: <a href="http://www.mtssensors.com">www.mtssensors.com</a></p>

Manuals, Software & 3D Models available at:  
[www.mtssensors.com](http://www.mtssensors.com)

*Controlling design dimensions are in millimeters and measurements in ( ) are in inches*

<sup>7/</sup> The programming tool is not approved for use in hazardous environments

## ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
T	H										1			N	N	S									
a		b	c					d			e	f	g	h	i										

Optional

a	Sensor model
T H	Rod

b	Design
<b>Enclosure Type 3:</b> TH rod sensor with housing material stainless steel 1.4305 (AISI 303) and rod material stainless steel 1.4306 (AISI 304L)	

M	Threaded flange with flat-face (M18×1.5-6g)
N	Threaded flange with raised-face (M18×1.5-6g)
S	Threaded flange with flat-face (¾"-16 UNF-3A)
T	Threaded flange with raised-face (¾"-16 UNF-3A)

<b>Enclosure Type 3X:</b> TH rod sensor with housing material stainless steel 1.4404 (AISI 316L) and rod material stainless steel 1.4404 (AISI 316L)	
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F	Threaded flange with flat-face (¾"-16 UNF-3A)
G	Threaded flange with raised-face (¾"-16 UNF-3A)
W	Threaded flange with flat-face (M18×1.5-6g)

c	Stroke length
X X X X M	0025...7620 mm

Standard stroke length (mm)*	Ordering steps
25 ... 500 mm	5 mm
500 ... 750 mm	10 mm
750...1000 mm	25 mm
1000...2500 mm	50 mm
2500...5000 mm	100 mm
5000...7620 mm	250 mm

X X X X U	001.0...300.0 in.
-----------	-------------------

Standard stroke length (in.)*	Ordering steps
1 ... 20 in.	0.2 in.
20 ... 30 in.	0.4 in.
30 ... 40 in.	1.0 in.
40...100 in.	2.0 in.
100...200 in.	4.0 in.
200...300 in.	10.0 in.

d	Connection type
C 0 1	Side connection with thread ½"-14 NPT (All versions)

C 1 0	Top connection with thread ½"-14 NPT (All versions)
-------	---

M 0 1	Side connection with thread M16×1.5-6H (Version E & N)
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M 1 0	Top connection with thread M16×1.5-6H (Version E & N)
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N 0 1	Side connection with thread M20×1.5-6H (All versions)
-------	---

N 1 0	Top connection with thread M20×1.5-6H (All versions)
-------	--

e	Operating voltage
---	-------------------

1	+24 VDC (-15 / +20 %)
---	-----------------------

A	+24 VDC (-15 / +20 %) includes shock improved option stroke length 25...3760 mm (1...148 in.)
---	---

f	Version (see "Certifications" on page 5 for further information)
---	---

D	Ex db and Ex tb (A/F 55)
---	--------------------------

E	Ex db eb and Ex tb (A/F 55)
---	-----------------------------

G	Ex db and Ex tb (A/F 60) US & CA approval: Explosionproof (XP) (Note: Group A is not available for Canada)
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N	Not approved
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g	Functional safety type
---	------------------------

N	Not approved
---	--------------

h	Additional option type
---	------------------------

N	None
---	------

i	See next page
---	---------------

\* / Non standard stroke lengths are available; must be encoded in 5 mm / 0.1 in. increments

i		Output
<b>S (17) (18) (19) (20) (21) (22) (23) (24) (25)</b>		= Synchronous Serial Interface
<b>Data length (box no. 17)</b>		
<b>1</b>		25 bit
<b>2</b>		24 bit
<b>3</b>		26 bit
<b>Output format (box no. 18)</b>		
<b>B</b>		Binary
<b>G</b>		Gray
<b>Resolution (box no. 19)</b>		
<b>1</b>		0.005 mm
<b>2</b>		0.01 mm
<b>3</b>		0.05 mm
<b>4</b>		0.1 mm
<b>5</b>		0.02 mm
<b>6</b>		0.002 mm
<b>8</b>		0.001 mm
<b>9</b>		0.0005 mm
<b>Filtering performance (box no. 20)</b>		
<b>A</b>		No filter + error delay (4 cycles)
<b>C</b>		No filter + error delay (8 cycles)
<b>1</b>		Standard (no filters)
<b>8</b>		Noise reduction filter (8 measurements)
<b>D</b>		No filter + error delay (10 cycles)
<b>G</b>		Noise reduction filter (8 measurements) + error delay (10 cycles)
<b>K</b>		Peak reduction filter (8 measurements)
<b>N</b>		Peak reduction filter (8 measurements) + error delay (10 cycles)
<b>Signal options (box no. 21, 22)</b>		
<b>0</b>	<b>0</b>	Measuring direction forward, asynchronous mode
<b>0</b>	<b>1</b>	Measuring direction reverse, asynchronous mode
<b>0</b>	<b>2</b>	Measuring direction forward, synchronous mode 1
<b>0</b>	<b>5</b>	Measuring direction forward, asynchronous mode, bit 25 = alarm, bit 26 = parity even
<b>9</b>	<b>9</b>	Write "9" in box no. 21 and 22 for using further combinations in boxes <b>23, 24, 25</b>

i		Output (continued)
<b>Measurement contents (optional: Box no. 23)</b>		
<b>Note: Choose "9" in box no. 21 and 22</b>		
<b>1</b>		Position measurement
<b>2</b>		Differentiation measurement <sup>8</sup>
<b>3</b>		Velocity measurement
<b>4</b>		Position measurement + temperature measurement (only with data length = 24 bit)
<b>5</b>		Differentiation measurement <sup>8</sup> + temperature measurement (only with data length = 24 bit)
<b>6</b>		Velocity measurement + temperature measurement (only with data length = 24 bit)
<b>Direction and sync. mode (optional: Box no. 24)</b>		
<b>Note: Choose "9" in box no. 21 and 22</b>		
<b>1</b>		Measuring direction forward, asynchronous mode
<b>2</b>		Measuring direction forward, synchronous mode 1
<b>3</b>		Measuring direction forward, synchronous mode 2
<b>4</b>		Measuring direction forward, synchronous mode 3
<b>5</b>		Measuring direction reverse, asynchronous mode
<b>6</b>		Measuring direction reverse, synchronous mode 1
<b>7</b>		Measuring direction reverse, synchronous mode 2
<b>8</b>		Measuring direction reverse, synchronous mode 3
<b>Diagnostics (optional: Box no. 25)</b>		
<b>Note: Choose "9" in box no. 21 and 22</b>		
<b>0</b>		No further options
<b>2</b>		Additional alarm bit + parity even bit (not available for temperature output, only with data length = 24 bit)

#### NOTICE

Use magnets of the same type (e.g. 2 ring magnets with part no. 201 542-2 ) for differentiation measurement.

#### DELIVERY



Sensor

Accessories have to be ordered separately

Manuals, Software & 3D Models available at:  
[www.mtssensors.com](http://www.mtssensors.com)

8/ You need a second magnet for differentiation measurement

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