



**MAGNETROL®**

# THERMATEL® TG1/TG2

Thermal  
dispersion switch

## DESCRIPTION

Thermatel® TG1/TG2 switches consist of electronics in a DIN rail housing and a remote sensor with aluminium or stainless steel sensor housing (max 500 m (1640 ft) away from electronics).

TG1/TG2 switches can easily be adjusted to detect flow (gases and liquids), level or liquid-liquid interface. Both units are 2-wire 24 V DC powered and intrinsically safe approved.

The TG1 offers standard LED flow indication, the TG2 offers LED flow indication per NAMUR NE 44.

## FEATURES

- Easy field calibration – pre-calibration from factory at request.
- Variable flow or Flow / No flow detection of gases and liquids.
- Excellent low flow sensitivity.
- Continuous diagnostics detect sensor fault.
- Continuous monitoring of flow rate versus setpoint via LED.
- mA output provides repeatable indication of flow rate and fault detection.
- Optional retractable fitting for dismantling under process conditions.
- Process conditions up to +450 °C (+850 °F) and 414 bar (6000 psi).
- Unique spherical tip design option ideal for liquids or high viscosity applications.
- Suited for SIL1 and SIL2 loops (full FMEDA report available).



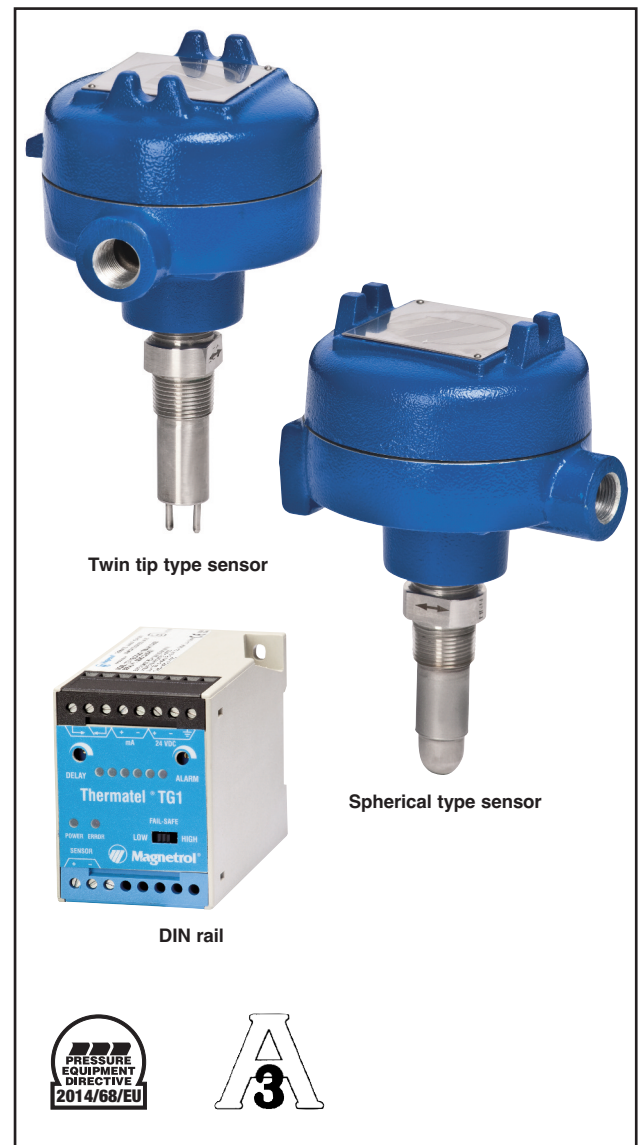
## APPLICATIONS

**MEDIA:** all types of gases and liquids.

**VESSELS:** pipe sizes down to 1/4". Max sensor length up to 3,3 m. Can be installed at any angle vertically/horizontally.

**CONDITIONS:** Can be used on conductive and non conductive media, very light density to heavy viscous media (up to 10.000 cP). Can be set to ignore foam, aeration, turbulence, and cavitation.

## For FLOW/LEVEL/INTERFACE applications



## AGENCY APPROVALS

| Agency | Approval  |
|--------|---|
| ATEX   | II 1 G EEx ia IIB T5  |
|        | Russian Authorisation Standards <sup>①</sup>                    |
|        | Other approvals are available, consult factory for more details |

<sup>①</sup> Consult factory for proper model numbers and classifications.

## TECHNOLOGY

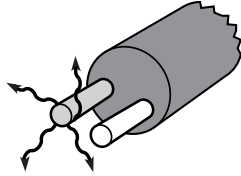
The unit utilises the proven thermal dispersion technology. The sensor consists of two RTD (Resistance Temperature Detector) elements. One is the reference and the second is heated to a temperature above the process temperature. The electronics detect the temperature difference between the two elements. The temperature difference is greatest in air, then decreases when cooling occurs due to a change in media. An increase in the flow rate further decreases the temperature difference.

The set point is adjusted for the switch to alarm at the desired temperature difference. Once the set point is reached, the relay will change state.

### Flow

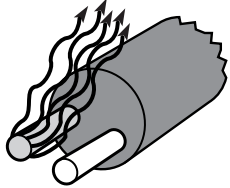
#### No Flow/Low Flow

In the absence of flow/low flow, the self-heated sensor creates a temperature differential between the two sensors.



#### Flow

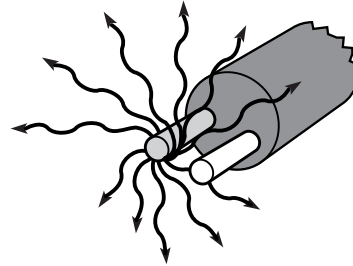
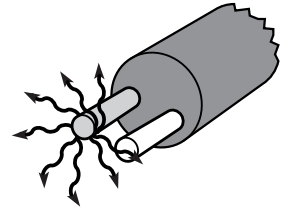
As media flows increases across the sensing assembly, heat is dissipated and temperature differential decreases.



### Level

#### Low Level

In the absence of media, the self-heated sensor tip creates a temperature differential between the two sensors.



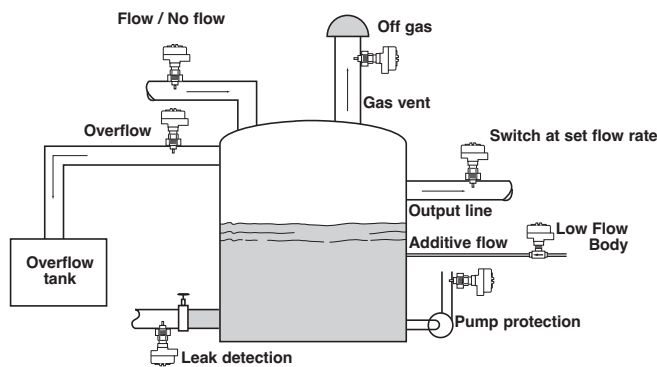
#### High Level

As media contacts the sensing assembly, heat is absorbed by the fluid, decreasing the temperature differential.

## APPLICATIONS

### FLOW

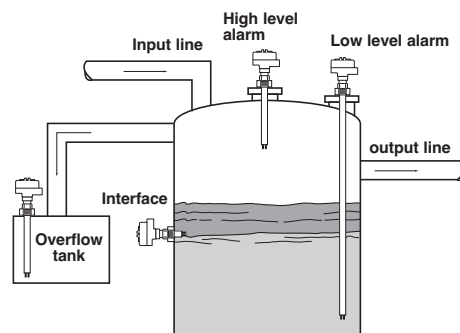
Thermatel® TG1/TG2 switches may be installed in a variety of flow applications as shown in the illustration below. Flow/No Flow can be detected in an input line to a primary tank, or in an output line. They may be installed for overflow detection in a pipe connected to an overflow tank or installed in a drain line for Wet/Dry indication. In addition, due to the capability to detect liquids or gases, the Thermatel® flow switch may be installed in a gas vent to detect off-gas from the primary tank.



- Liquid or Gas flow detection
- Maintain a minimum flow rate
  - Pump protection
  - Cooling air/water
  - Lubrication systems
  - Chemical feed pumps
- Detect presence of flow
  - Relief valves
  - Flare lines
- Water for injection (WFI)
- Filtration systems
- Separation systems
- CIP systems
- Air, CO<sub>2</sub>, N<sub>2</sub> flow

### LEVEL

Thermatel® TG1/TG2 switches can be installed in a variety of level applications as shown in the illustration below. High or low level alarm applications can be installed in either vertical or horizontal mountings.



- High level
- Low level
- Interface between different media
  - Oil/water
  - Liquid/foam
- Suitable for any liquid level detection including:
  - High viscosity
  - High solids content
  - Aeration
  - Foam
- Insensitive to dielectric, specific gravity, viscosity

## SENSOR DESIGNS

Thermatel offers two sensor tip designs: the twin tip and the unique spherical tip. Both designs have similar operating ranges. Both detect flow or level at approximately the same rate. However, the spherical tip responds faster to a loss of flow or a dry condition.



### SPHERICAL TIP

The sensing elements are bonded directly to the wall of the tip, providing protection of the sensors.

The spherical tip is recommended for all types of applications: general purpose use, liquid flow applications, high viscosity, full vacuum and applications where buildup can occur. The spherical tip is suitable for process pressures up to 41,4 bar (600 psi) and can handle process temperatures up to +200 °C (+400 °F).

### TWIN TIP

The sensing elements are mounted at the end of each tip.

The twin tip is preferred for air flow applications and is available in corrosion resistant materials including Hastelloy C and Monel. The twin tip is suitable for process pressures up to 207 bar (3000 psi) and can handle process temperatures up to +200 °C (+400 °F).

### HIGH TEMPERATURE/HIGH PRESSURE (TMH)

This twin tip sensor is suitable for process pressures up to 414 bar (6000 psi) and can handle process temperatures up to +450 °C (+850 °F).

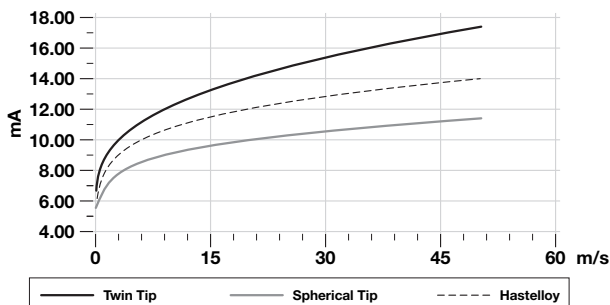
### MINI SENSOR (TMM)

This twin tip sensor is suitable for installing in smaller pipe sizes. Available with 1/2", 3/4" and 1" NPT connections. The twin tip design provides minimal blockage of the pipe.

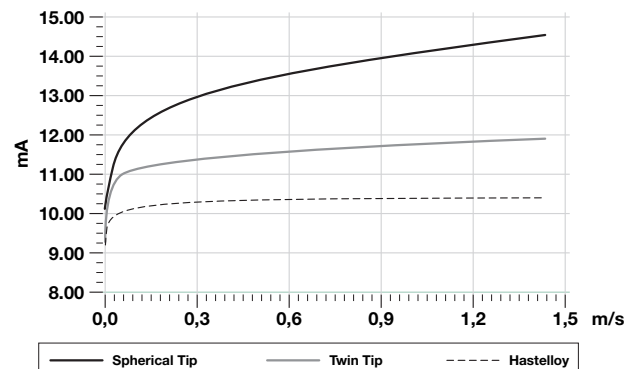
### LOW FLOW BODY (TML)

This version is used for even lower flow rates with 1/4" and 1/2" connections.

#### Typical air flow

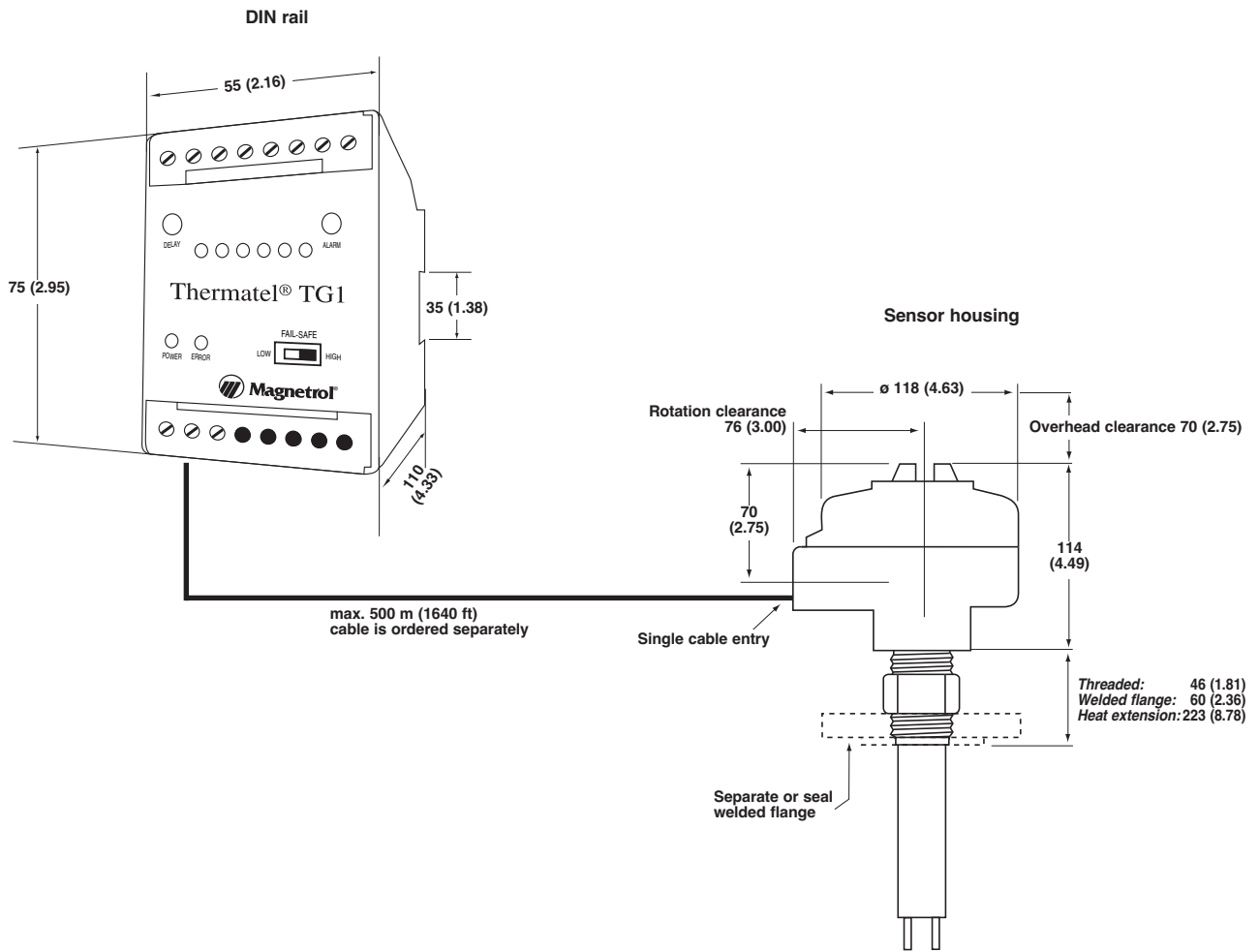


#### Typical water flow



| Model | Sensor design | Recommended for   |
|-------|---------------|---|
| TMA   | Spherical tip | Best sensitivity for liquid flows / suitable for gas flow – resists heavy coating |
| TMB   | Spherical tip | Same as TMA but can be used with integral electronics up to +200 °C (+400 °F)     |
| TMC   | Twin tip      | Best sensitivity for air/gas flows – resists light coating                        |
| TMD   | Twin tip      | Same as TMC but can be used with integral electronics up to +200 °C (+400 °F)     |
| TMH   | Twin tip      | High temperature and/or high pressure conditions – resists light coating          |
| TMM   | Mini twin tip | Installation in small pipe sizes – resists light coating                          |
| TML   | Low flow body | Detection/control of extreme low flows – resists light coating                    |

DIMENSIONS IN mm (inches)



**QUICK RESPONSE CELL (QRC)**

Several models are available for extra quick shipment, within max. 15 days after factory receipt of purchase order, through the Quick Response Cell (QRC). Models covered by QRC service are conveniently green coded in the selection data charts. QRC delivery is limited to a maximum of 10 units per order. Contact your local representative for lead times on larger volume orders, as well as other products and options.

**SELECTION DATA**

**A complete measuring system consists of:**

1. THERMATEL® DIN RAIL electronics and sensor housing
2. Connecting cable
3. THERMATEL® sensor
4. Optional: Order code for thread-on mounting flanges
5. Optional: Retractable probe assembly, consult factory for details
6. Optional: Factory calibration, consult factory

**1. Order code for Thermatel® DIN RAIL ELECTRONICS**

|       |  |
|-------|--|
| T G 1 | Electronics with standard LED flow indication        |
| T G 2 | Electronics with LED flow indication per NAMUR NE 44 |

**OUTPUT**

|   |   |
|---|---|
| 1 | 2 Amp SPDT alarm relay with mA output signal (non linear / non scaleable) |
|---|---|

**POWER SUPPLY**

|   |         |
|---|---------|
| 2 | 24 V DC |
|---|---------|

**MOUNTING**

|     |                                     |
|-----|-------------------------------------|
| 0 D | Remote DIN rail mounted electronics |
|-----|-------------------------------------|

**SENSOR HOUSING / CABLE ENTRY**

|   |   |
|---|---|
| T | IP 65, Cast aluminium, M20 x 1,5 cable entry      |
| 2 | IP 65, Cast aluminium, 3/4" NPT cable entry       |
| 6 | IP 65, Cast stainless steel, 3/4" NPT cable entry |

**APPROVAL**

|     |   |
|-----|---|
| A 0 | ATEX II 1 G EEx ia IIB T5, intrinsically safe |
|-----|---|

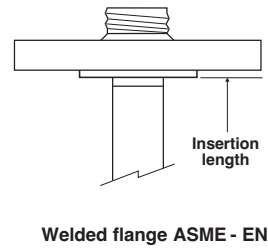
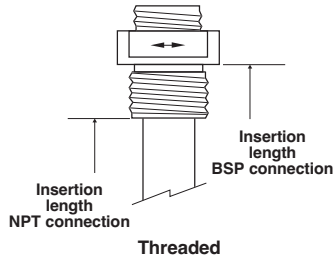


**2. Order code for connecting cable (standard 2-wire shielded instrument cable – 0,50 mm²)**

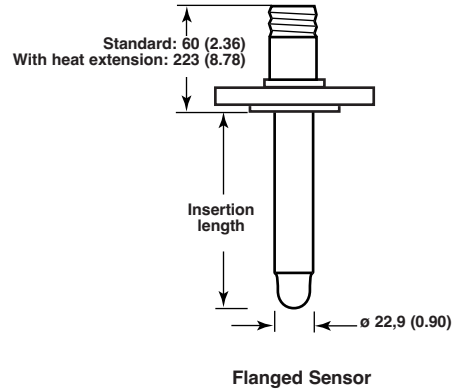
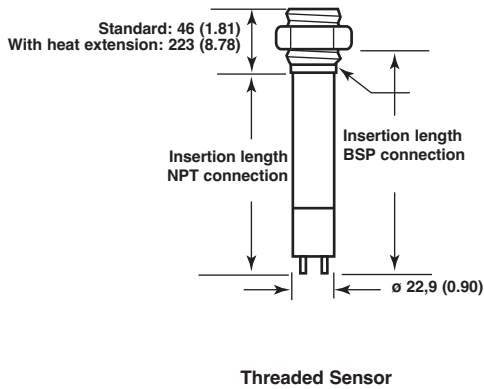
|               |   |
|---------------|---|
| 0 0 1 - 5 0 0 | From 1 m (3.28 ft) min. to 500 m (1640 ft) max.<br>Specify in increments of 1 m (3.28 ft) |
|---------------|---|



# CONNECTIONS



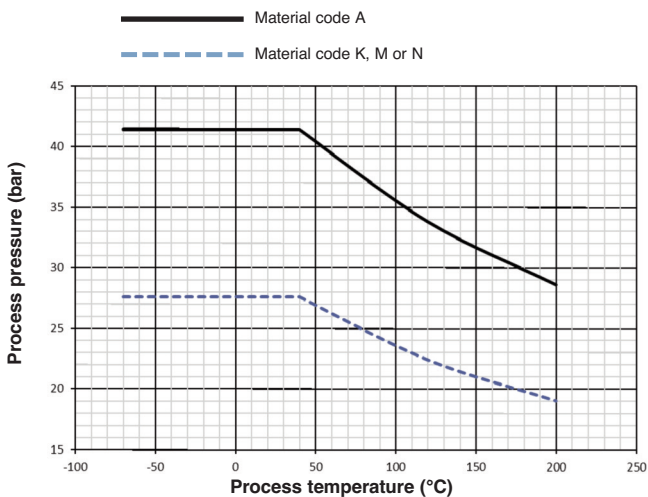
## DIMENSIONS IN mm (inches) – TMA/TMB/TMC/TMD



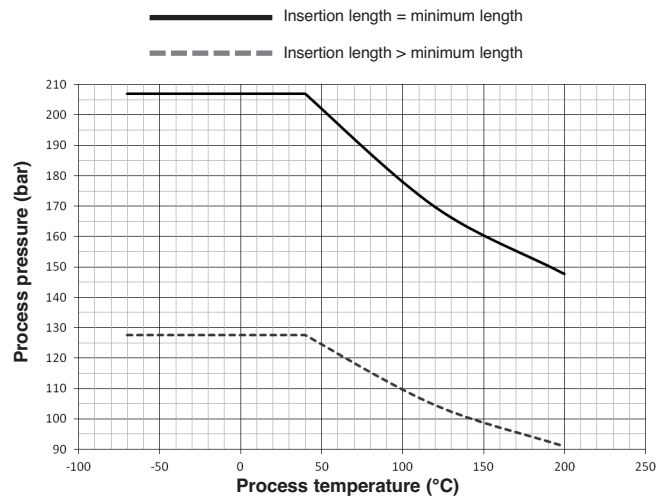
## PRESSURE/TEMPERATURE RATING – TMA/TMB/TMC/TMD

| Sensor   | Material code | Insertion length | Maximum process pressure |                     |                     |
|----------|---------------|------------------|--------------------------|---------------------|---------------------|
|          |               |                  | @ +40 °C (+100 °F)       | @ +120 °C (+250 °F) | @ +200 °C (+400 °F) |
| TMA, TMB | A             | All              | 41,4 bar (600 psi)       | 33,8 bar (490 psi)  | 28,6 bar (415 psi)  |
|          | K, M, N       | All              | 27,6 bar (400 psi)       | 22,4 bar (325 psi)  | 19,0 bar (275 psi)  |
| TMC, TMD | A, D, K, M, N | = minimum length | 207 bar (3000 psi)       | 170 bar (2460 psi)  | 148 bar (2140 psi)  |
|          |               | > minimum length | 128 bar (1850 psi)       | 105 bar (1517 psi)  | 91,0 bar (1320 psi) |
| TMC, TMD | B, F          | = minimum length | 207 bar (3000 psi)       | 181 bar (2627 psi)  | 161 bar (2340 psi)  |
|          |               | > minimum length | 103 bar (1500 psi)       | 90,6 bar (1313 psi) | 80,7 bar (1170 psi) |
| TMC, TMD | C, G          | = minimum length | 172 bar (2500 psi)       | 147 bar (2125 psi)  | 137 bar (1980 psi)  |
|          |               | > minimum length | 82,8 bar (1200 psi)      | 70,3 bar (1020 psi) | 65,5 bar (950 psi)  |

TMA/TMB sensors



TMC/TMD sensors with material code A or D



# SELECTION DATA (CONT.)

## 3. Order code for Thermatel® TG1/TG2 – STANDARD SENSOR

|       |                                     |                       |
|-------|-------------------------------------|-----------------------|
| T M A | Spherical tip - standard            | max +120 °C (+250 °F) |
| T M B | Spherical tip - with heat extension | max +200 °C (+400 °F) |
| T M C | Twin tip - standard                 | max +120 °C (+250 °F) |
| T M D | Twin tip - with heat extension      | max +200 °C (+400 °F) |

### MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

|   |   |
|---|---|
| A | 316/316L (1.4401/1.4404) stainless steel <sup>①</sup>         |
| B | Hastelloy® C (2.4819) – TMC/TMD only                          |
| C | Monel® (2.4360) – TMC/TMD only                                |
| D | 316/316L (1.4401/1.4404) stainless steel – TMC/TMD only       |
| F | Hastelloy® C (2.4819), NACE                                   |
| G | Monel® (2.4360), NACE   |
| K | 316/316L (1.4401/1.4404) stainless steel, ASME B31.3          |
| M | 316/316L (1.4401/1.4404) stainless steel, ASME B31.3 and NACE |
| N | 316/316L (1.4401/1.4404) stainless steel, NACE                |

① Not suitable for zone 0 applications in combination with hermetically sealed relay; use in this case material code D.

### PROCESS CONNECTION – SIZE/TYPE

#### Threaded

|       |               |
|-------|---------------|
| 1 1 0 | 3/4" NPT      |
| 2 1 0 | 1" NPT        |
| 2 2 0 | 1" BSP (G 1") |

**No threads** – only for use with compression fitting

|       |   |
|-------|---|
| 0 0 0 | Compression fitting (customer-supplied) |
|-------|---|

#### ASME flanges

|       |        |                 |
|-------|--------|-----------------|
| 2 3 0 | 1"     | 150 lbs ASME RF |
| 2 4 0 | 1"     | 300 lbs ASME RF |
| 2 5 0 | 1"     | 600 lbs ASME RF |
| 3 3 0 | 1 1/2" | 150 lbs ASME RF |
| 3 4 0 | 1 1/2" | 300 lbs ASME RF |

|       |        |                 |
|-------|--------|-----------------|
| 3 5 0 | 1 1/2" | 600 lbs ASME RF |
| 4 3 0 | 2"     | 150 lbs ASME RF |
| 4 4 0 | 2"     | 300 lbs ASME RF |
| 4 5 0 | 2"     | 600 lbs ASME RF |

#### EN flanges

|       |       |             |           |         |
|-------|-------|-------------|-----------|---------|
| B B 0 | DN 25 | PN 16/25/40 | EN 1092-1 | Type A  |
| B C 0 | DN 25 | PN 63/100   | EN 1092-1 | Type B2 |
| C B 0 | DN 40 | PN 16/25/40 | EN 1092-1 | Type A  |
| C C 0 | DN 40 | PN 63/100   | EN 1092-1 | Type B2 |
| D A 0 | DN 50 | PN 16       | EN 1092-1 | Type A  |
| D B 0 | DN 50 | PN 25/40    | EN 1092-1 | Type A  |
| D D 0 | DN 50 | PN 63       | EN 1092-1 | Type B2 |
| D E 0 | DN 50 | PN 100      | EN 1092-1 | Type B2 |

### INSERTION LENGTH – MINIMUM

|       |                | Sensor   | Process connection |
|-------|----------------|----------|--------------------|
| 0 0 5 | 5 cm (2")      | TMA, TMB | NPT                |
| 0 0 6 | 5,5 cm (2.17") |          | flanged            |
| 0 0 7 | 7 cm (2.76")   |          | BSP                |
| 0 0 6 | 5,5 cm (2.17") | TMC, TMD | NPT, flanged       |
| 0 0 8 | 7,5 cm (3")    |          | BSP                |

### INSERTION LENGTH – SELECTABLE – Specify per cm (0.39") increment

|       |                       | Sensor   | Process connection |
|-------|-----------------------|----------|--------------------|
| 0 0 6 | Minimum 6 cm (2.36")  | TMA, TMB | NPT                |
| 0 0 7 | Minimum 7 cm (2.76")  |          | flanged            |
| 0 0 8 | Minimum 8 cm (3.15")  |          | BSP                |
| 0 0 7 | Minimum 7 cm (2.76")  | TMC, TMD | NPT, flanged       |
| 0 0 9 | Minimum 9 cm (3.54")  |          | BSP                |
| 3 3 0 | Maximum 330 cm (130") | all      | all                |



**complete order code for Thermatel® TG1/TG2 STANDARD SENSOR**

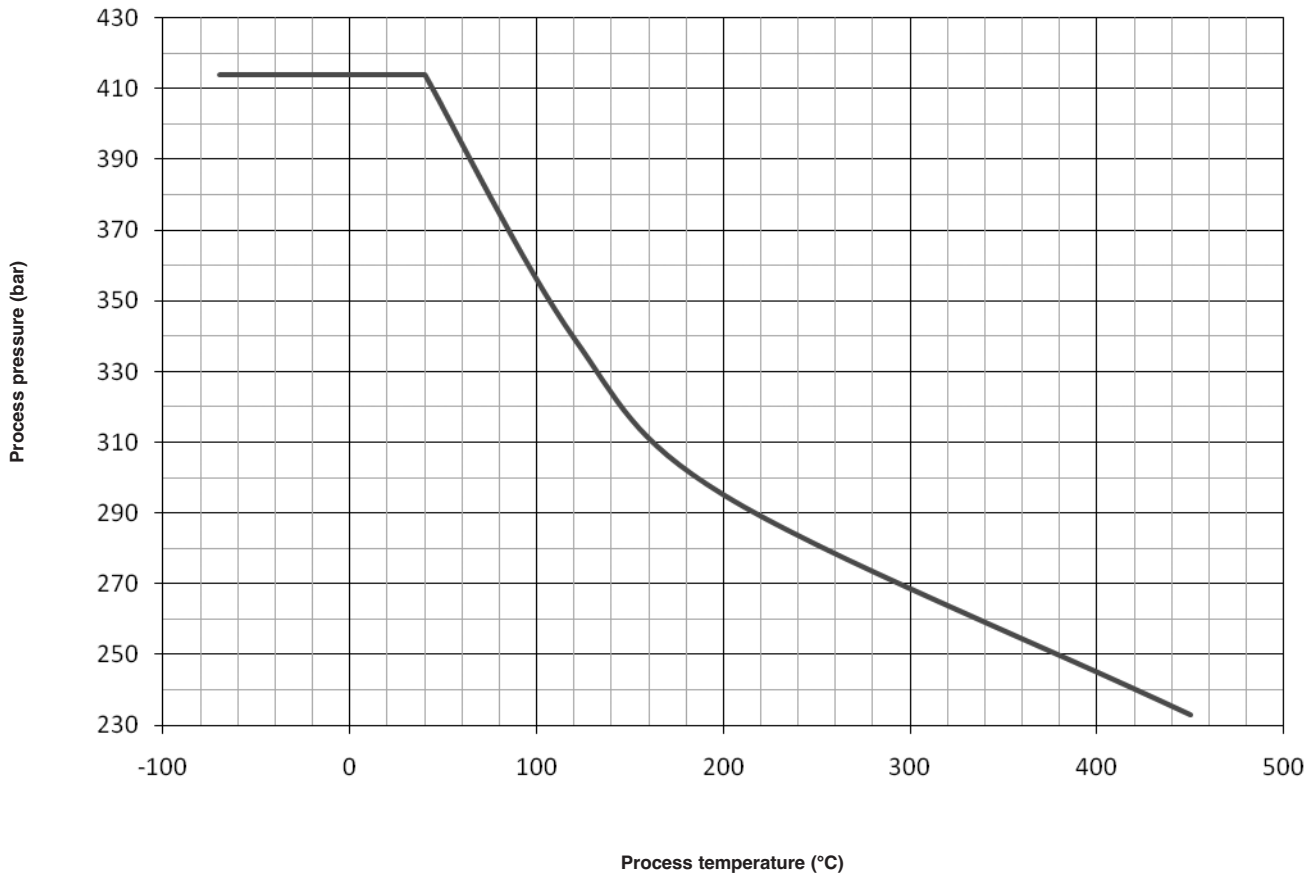
→ X = product with a specific customer requirement

DIMENSIONS IN mm (inches) – TMH



PRESSURE/TEMPERATURE RATING – TMH

| Maximum process pressure |                     |                     |                     |
|--------------------------|---------------------|---------------------|---------------------|
| @ +40 °C (+100 °F)       | @ +120 °C (+250 °F) | @ +200 °C (+400 °F) | @ +450 °C (+850 °F) |
| 414 bar (6000 psi)       | 339 bar (4920 psi)  | 295 bar (4280 psi)  | 233 bar (3380 psi)  |





# SELECTION DATA (CONT.)

## 3. Order code for Thermatel® TG1/TG2 – HIGH TEMPERATURE / HIGH PRESSURE SENSOR

|       |   |
|-------|---|
| T M H | High temperature / high pressure twin tip – max +450 °C (+850 °F) / max 414 bar (6000 psi) <sup>①</sup> |
|-------|---|

① Not available with retractable probe assembly.

### MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

|   |   |
|---|---|
| A | 316/316L (1.4401/1.4404) stainless steel <sup>②</sup>         |
| B | Hastelloy® C (2.4819)   |
| D | 316/316L (1.4401/1.4404) stainless steel                      |
| F | Hastelloy® C (2.4819), NACE                                   |
| K | 316/316L (1.4401/1.4404) stainless steel, ASME B31.3          |
| M | 316/316L (1.4401/1.4404) stainless steel, ASME B31.3 and NACE |
| N | 316/316L (1.4401/1.4404) stainless steel, NACE                |

② Not suitable for zone 0 applications in combination with hermetically sealed relay; use in this case material code D.

### PROCESS CONNECTION – SIZE/TYPE

#### Threaded

|   |   |   |               |
|---|---|---|---------------|
| 1 | 1 | 0 | 3/4" NPT      |
| 2 | 1 | 0 | 1" NPT        |
| 2 | 2 | 0 | 1" BSP (G 1") |

#### ASME flanges

|   |   |   |        |              |         |   |   |   |        |              |         |
|---|---|---|--------|--------------|---------|---|---|---|--------|--------------|---------|
| 2 | 3 | 0 | 1"     | 150 lbs      | ASME RF | 3 | 7 | 0 | 1 1/2" | 900/1500 lbs | ASME RF |
| 2 | 4 | 0 | 1"     | 300 lbs      | ASME RF | 3 | 8 | 0 | 1 1/2" | 2500 lbs     | ASME RF |
| 2 | 5 | 0 | 1"     | 600 lbs      | ASME RF | 4 | 3 | 0 | 2"     | 150 lbs      | ASME RF |
| 2 | 7 | 0 | 1"     | 900/1500 lbs | ASME RF | 4 | 4 | 0 | 2"     | 300 lbs      | ASME RF |
| 3 | 3 | 0 | 1 1/2" | 150 lbs      | ASME RF | 4 | 5 | 0 | 2"     | 600 lbs      | ASME RF |
| 3 | 4 | 0 | 1 1/2" | 300 lbs      | ASME RF | 4 | 7 | 0 | 2"     | 900/1500 lbs | ASME RF |
| 3 | 5 | 0 | 1 1/2" | 600 lbs      | ASME RF | 4 | 8 | 0 | 2"     | 2500 lbs     | ASME RF |

#### EN flanges

|   |   |   |       |             |                   |
|---|---|---|-------|-------------|-------------------|
| B | B | 0 | DN 25 | PN 16/25/40 | EN 1092-1 Type A  |
| B | C | 0 | DN 25 | PN 63/100   | EN 1092-1 Type B2 |
| B | G | 0 | DN 25 | PN 250      | EN 1092-1 Type B2 |
| C | B | 0 | DN 40 | PN 16/25/40 | EN 1092-1 Type A  |
| C | C | 0 | DN 40 | PN 63/100   | EN 1092-1 Type B2 |
| C | G | 0 | DN 40 | PN 250      | EN 1092-1 Type B2 |
| C | J | 0 | DN 40 | PN 400      | EN 1092-1 Type B2 |
| D | A | 0 | DN 50 | PN 16       | EN 1092-1 Type A  |
| D | B | 0 | DN 50 | PN 25/40    | EN 1092-1 Type A  |
| D | D | 0 | DN 50 | PN 63       | EN 1092-1 Type B2 |
| D | E | 0 | DN 50 | PN 100      | EN 1092-1 Type B2 |
| D | G | 0 | DN 50 | PN 250      | EN 1092-1 Type B2 |
| D | J | 0 | DN 50 | PN 400      | EN 1092-1 Type B2 |

### INSERTION LENGTH – MINIMUM

|   |   |                    |                |         |
|---|---|--------------------|----------------|---------|
|   |   | Process connection |                |         |
| 0 | 0 | 6                  | 5,5 cm (2.17") | NPT     |
| 0 | 0 | 7                  | 7 cm (2.76")   | flanged |
| 0 | 0 | 8                  | 7,5 cm (3")    | BSP     |

### INSERTION LENGTH – SELECTABLE – Specify per cm (0.39") increment

|   |   |                    |                      |         |
|---|---|--------------------|----------------------|---------|
|   |   | Process connection |                      |         |
| 0 | 0 | 7                  | Minimum 7 cm (2.76") | NPT     |
| 0 | 0 | 8                  | Minimum 8 cm (3.15") | flanged |
| 0 | 0 | 9                  | Minimum 9 cm (3.54") | BSP     |
| 0 | 9 | 1                  | Maximum 91 cm (36")  | all     |



**complete order code for Thermatel® TG1/TG2  
HIGH TEMPERATURE /HIGH PRESSURE SENSOR**

➔ X = product with a specific customer requirement

## SELECTION DATA (CONT.)

### 3. Order code for Thermatel® TG1/TG2 – MINI SENSOR

|       |                                       |
|-------|---------------------------------------|
| T M M | Mini twin tip – max +120 °C (+250 °F) |
|-------|---------------------------------------|

#### MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

|   |   |
|---|---|
| A | 316/316L (1.4401/1.4404) stainless steel (CRN Available) <sup>①</sup> |
| N | 316/316L (1.4401/1.4404) stainless steel, NACE (CRN Available)        |

<sup>①</sup> Not suitable for zone 0 applications in combination with hermetically sealed relay.

#### PROCESS CONNECTION – SIZE/TYPE

##### Threaded

|       |          |
|-------|----------|
| 0 1 0 | 1/2" NPT |
| 1 1 0 | 3/4" NPT |
| 2 1 0 | 1" NPT   |

#### INSERTION LENGTH – MINIMUM

|       |             |
|-------|-------------|
| 0 0 3 | 2,5 cm (1") |
|-------|-------------|

#### INSERTION LENGTH – SELECTABLE – Specify per cm (0.39") increment

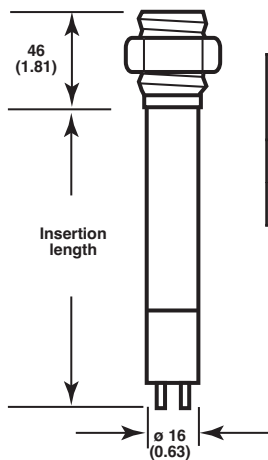
|       |                       |
|-------|-----------------------|
| 0 0 5 | Minimum 5 cm (2")     |
| 3 3 0 | Maximum 330 cm (130") |



complete order code for Thermatel® TG1/TG2 MINI SENSOR

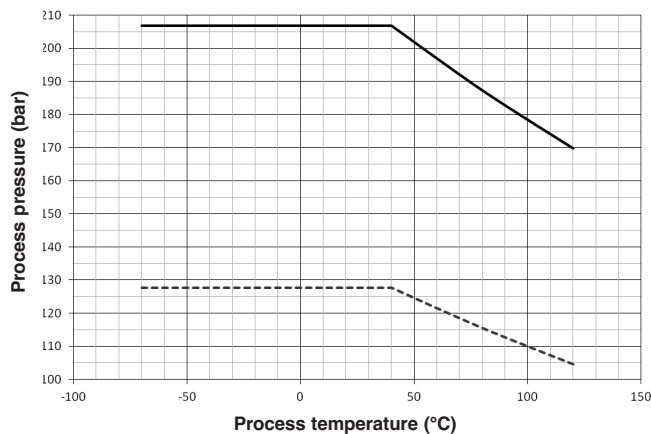
X = product with a specific customer requirement

## DIMENSIONS IN mm (inches) & PRESSURE/TEMPERATURE RATING – TMM



| Insertion length | Maximum process pressure |                     |
|------------------|--------------------------|---------------------|
|                  | @ +40 °C (+100 °F)       | @ +120 °C (+250 °F) |
| = 2,5 cm (1")    | 207 bar (3000 psi)       | 170 bar (2460 psi)  |
| > 2,5 cm (1")    | 126 bar (1850 psi)       | 105 bar (1517 psi)  |

— Insertion length = minimum length  
 - - - Insertion length > minimum length



## RECOMMENDED FLOW RANGES – TMM

| Pipe size | Water                            | Air   |
|-----------|----------------------------------|---|
| 1/2"      | 0,75 to 680 l/h (0.2 to 180 GPH) | 0,85 to 120 Nm <sup>3</sup> /h (0.5 to 70 SCFM) |
| 3/4"      | 2 to 900 l/h (0.5 to 240 GPH)    | 2,5 to 170 Nm <sup>3</sup> /h (1.5 to 100 SCFM) |
| 1"        | 3,8 to 1600 l/h (1 to 420 GPH)   | 5 to 290 Nm <sup>3</sup> /h (3 to 170 SCFM)     |

# SELECTION DATA (CONT.)

## 3. Order code for Thermatel® TG1/TG2 – LOW FLOW BODY SENSOR

|       |  |
|-------|--|
| T M L | Low flow body – max +120 °C (+250 °F) / max 400 bar (5800 psi) |
|-------|--|

### MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

|   |  |
|---|--|
| A | 316/316L (1.4401/1.4404) stainless steel |
|---|--|

### PROCESS CONNECTION – SIZE/TYPE

#### Threaded

|     |                            |
|-----|----------------------------|
| T 1 | 1/4" NPT-F (CRN Available) |
| V 1 | 1/2" NPT-F (CRN Available) |
| T 0 | 1/4" BSP (G 1/4")          |
| V 0 | 1/2" BSP (G 1/2")          |

### SENSITIVITY

|   |                               |
|---|-------------------------------|
| 0 | Standard                      |
| 1 | High Sensitivity <sup>①</sup> |

<sup>①</sup> Only available for gas applications and when digit 5 = T.

### MOUNTING BRACKET

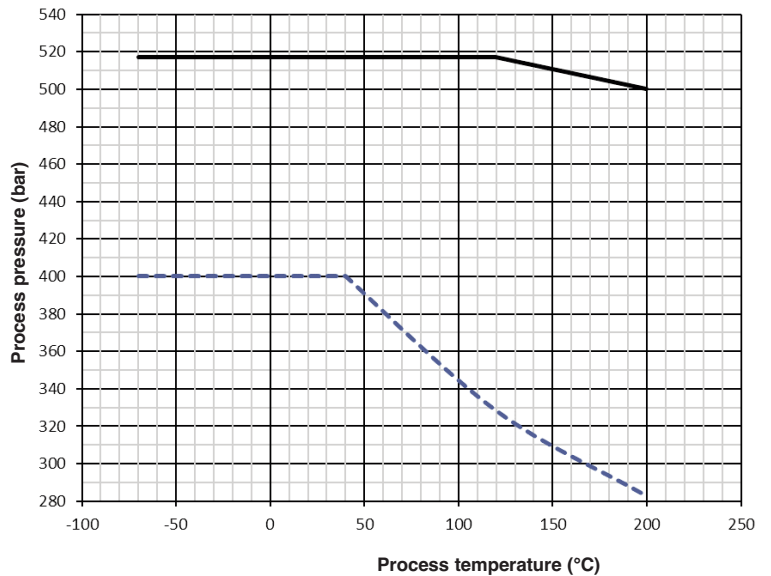
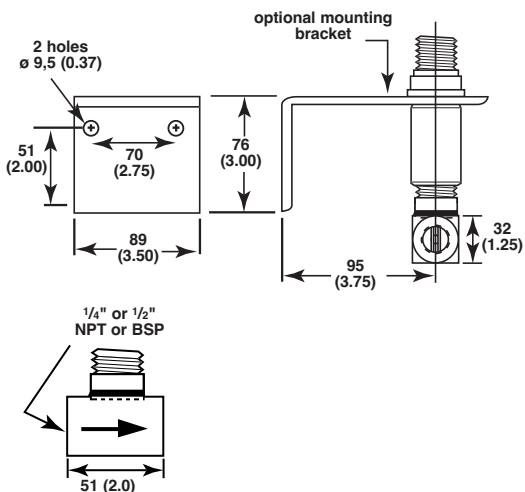
|       |                                    |
|-------|------------------------------------|
| 0 0 0 | None                               |
| 1 0 0 | With carbon steel mounting bracket |



X = product with a specific customer requirement

| Sensitivity (refer to digit 7) | Maximum process pressure |                     |                     |
|--------------------------------|--------------------------|---------------------|---------------------|
|                                | @ +40 °C (+100 °F)       | @ +120 °C (+250 °F) | @ +200 °C (+400 °F) |
| Standard sensitivity           | 517 bar (7500 psi)       | 517 bar (7500 psi)  | 500 bar (7250 psi)  |
| High sensitivity               | 400 bar (5800psi)        | 328 bar (4760 psi)  | 283 bar (4100 psi)  |

— Standard sensitivity  
 - - - High sensitivity



## RECOMMENDED FLOW RANGES – TML

| Size           | Water                               | Air  |
|----------------|-------------------------------------|--|
| 1/4" flow body | 0,02 to 5,7 l/h (0.0055 to 1.5 GPH) | 0,071 to 5,75 Nm³/h (2.5 to 200 SCFH) <sup>②</sup> |
| 1/2" flow body | 0,04 to 11,5 l/h (0.01 to 3 GPH)    | 0,071 to 11,5 Nm³/h (2.5 to 400 SCFH)              |

<sup>②</sup> For 0,0078 to 0,0708 Nm³/h (0.064 to 2.5 SCFH) use high sensitivity low flow body sensor.

## SELECTION DATA (CONT.)

### 4. Optional sensor mounting flanges

Thread-on mounting flanges can only be used in combination with 3/4" NPT process connection sensor. Consult factory for other sizes or materials.

#### Thread-on flanges for use with 3/4" NPT-M connections

| ASME B16.5 flanges |            | Part No.     |              |              |
|--------------------|------------|--------------|--------------|--------------|
|                    |            | Carbon steel | 316/316L SST | Hastelloy C  |
| 1"                 | 150 lbs RF | 004-5867-041 | 004-5867-043 | 004-5867-052 |
| 1 1/2"             | 150 lbs RF | 004-5867-021 | 004-5867-001 | 004-5867-031 |
| 2"                 | 150 lbs RF | 004-5867-022 | 004-5867-002 | 004-5867-032 |
| 3"                 | 150 lbs RF | 004-5867-023 | 004-5867-003 | 004-5867-033 |
| 4"                 | 150 lbs RF | 004-5867-024 | 004-5867-004 | 004-5867-034 |
| 6"                 | 150 lbs RF | 004-5867-025 | 004-5867-005 | 004-5867-035 |
| 1"                 | 300 lbs RF | 004-5867-042 | 004-5867-044 | 004-5867-053 |
| 1 1/2"             | 300 lbs RF | 004-5867-026 | 004-5867-006 | 004-5867-036 |
| 2"                 | 300 lbs RF | 004-5867-027 | 004-5867-007 | 004-5867-037 |
| 3"                 | 300 lbs RF | 004-5867-028 | 004-5867-008 | 004-5867-038 |
| 4"                 | 300 lbs RF | 004-5867-029 | 004-5867-009 | 004-5867-039 |
| 6"                 | 300 lbs RF | 004-5867-030 | 004-5867-010 | 004-5867-040 |
| 1"                 | 600 lbs RF | 004-5867-051 | 004-5867-050 | 004-5867-054 |
| 1 1/2"             | 600 lbs RF | 004-5867-046 | 004-5867-045 | 004-5867-055 |
| 2"                 | 600 lbs RF | 004-5867-049 | 004-5867-048 | 004-5867-056 |

## ELECTRONICS SPECIFICATIONS

| Description                  |                 | Specifications   |
|------------------------------|-----------------|--|
| Power supply                 |                 | 19,2 to 28,8 V DC  |
| Power consumption            |                 | 5 W max.   |
| Flow range                   | Water           | 0,01 to 5,0 FPS (0,003 to 1,5 m/s)(spherical tip and twin tip sensors)<br>0,01 to 1,0 FPS (0,003 to 0,3 m/s)(HTHP, Hastelloy, Monel sensors)   |
|                              | Air             | 0,01 to 500 SFPS (0,03 to 150 Nm/s)  |
| Output                       | Alarm           | 2 A SPDT relay   |
|                              | Continuous      | mA output (non linear, non scaleable)  |
|                              | Error           | 3,6 mA (Low Level Fail-Safe) – 22 mA (High Level Fail-safe)  |
| User interface               | Set point       | Adjustable via potentiometer located on DIN Rail housing   |
|                              | Range selection | Selectable in probe electronics  |
| LED indication               | Power           | LED's for Power/Alarm status   |
|                              | Error           | Red LED blinks in case of error  |
|                              | Alarm           | 4 x green LED's – for safe/ (normal) condition<br>1 x yellow LED – indicates when flow or level is approaching the alarm set point<br>1 x red LED – indicates an alarm condition (TG1)<br>all LED's OFF – indicates an alarm condition (TG2) |
| Approvals                    |                 | ATEX II 1 G EEx ia IIB T5<br>Other approvals are available, consult factory for more details   |
| SIL (Safety Integrity Level) |                 | Functional safety to SIL1 as 1oo1 / SIL2 as 1oo2 in accordance to IEC 61508 – SFF of 79,4 % – full FMEDA reports and declaration sheets available  |
| Housing material             |                 | DIN Rail: IP 20, polycarbonate / Sensor housing: IP 65, Aluminium or Stainless Steel   |
| Net weight                   |                 | Aluminium: 1,6 kg (3.5 lbs) – electronics only<br>Stainless steel: 4,0 kg (8.8 lbs) – electronics only   |

## PERFORMANCE

| <b>Description</b>            | <b>Specification</b>  |
|-------------------------------|---|
| Response time                 | 1-10 s typical (dependent on sensor type, application and set point)                  |
| Repeatability                 | < 1 % @ constant temperature  |
| Ambient temperature           | -40 °C to +70 °C (-40 °F to +160 °F)<br>Storage: -50 °C to +75 °C (-58 °F to +170 °F) |
| Humidity                      | 0-99 %, non-condensing  |
| Electromagnetic compatibility | Meets CE requirements (EN 61326: 1997 + A1 + A2)                                      |

## SENSOR SPECIFICATIONS

| <b>Description</b>   | <b>Spherical tip - Twin tip sensors<br/>INDUSTRIAL TMA/TMB - TMC/TMD</b>                           | <b>HTHP sensor<br/>TMH</b>                        |
|----------------------|--|---|
| Materials            | 316/316L (1.4401/1.4404)<br>Hastelloy® C (2.4819) – TMC/TMD only<br>Monel® (2.4360) – TMC/TMD only | 316/316L (1.4401/1.4404)<br>Hastelloy® C (2.4819) |
| Sensor diameter      | 22,9 mm (0.90")  | 21,9 mm (0.86")                                   |
| Process connection   | Threaded: NPT or BSP<br>Flanged: various ASME or EN flanges  |   |
| Sensor length        | 5 - 330 cm (2" - 130")   | 5,5 - 91 cm (2.17" - 36")                         |
| Process temperature  | TMA/TMC: -70 °C to +120 °C (-100 °F to +250 °F)<br>TMB/TMD: -70 °C to +200 °C (-100 °F to +400 °F) | -70 °C to +450 °C (-100 °F to +850 °F)            |
| Max process pressure | See info on page 6   | See info on page 8                                |

| <b>Description</b>   | <b>Mini twin tip sensor<br/>TMM</b>    | <b>Low flow body<br/>TML</b>        |
|----------------------|--|-------------------------------------|
| Materials            | 316/316L (1.4401/1.4404)               |                                     |
| Sensor diameter      | 16 mm (0.63")                          | 1/4" or 1/2" pipe size              |
| Process connection   | Threaded: 1/2", 3/4" or 1" NPT         | Threaded: 1/4" or 1/2" NPT-F or BSP |
| Sensor length        | 2,5 - 330 cm (1" - 130")               | Not applicable                      |
| Process temperature  | -70 °C to +120 °C (-100 °F to +250 °F) |                                     |
| Max process pressure | See info on page 10                    | See info on page 11                 |







#### QUALITY ASSURANCE - ISO 9001

THE QUALITY ASSURANCE SYSTEM IN PLACE AT MAGNETROL GUARANTEES THE HIGHEST LEVEL OF QUALITY DURING THE DESIGN, THE CONSTRUCTION AND THE SERVICE OF CONTROLS. OUR QUALITY ASSURANCE SYSTEM IS APPROVED AND CERTIFIED TO **ISO 9001** AND OUR TOTAL COMPANY IS COMMITTED TO PROVIDING FULL CUSTOMER SATISFACTION BOTH IN QUALITY PRODUCTS AND QUALITY SERVICE.

#### PRODUCT WARRANTY

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June 2017

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