



# THERMATEL® TD2

## Thermal dispersion switch

FOR HYGIENIC USE

### DESCRIPTION

Thermatel TD2 switches can easily be adjusted to detect flow (gases and liquids), level or liquid-liquid interface. The TD2 is either V DC or V AC line powered and offers additionally LED indication, time delay and mA output for diagnostics and trending.

The Thermatel series have both 3A and EHEDG approval for use in hygienic applications.

### 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.
- Automatic temperature compensation for repeatable alarm under varying process temperatures.
- 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.
- Flow can be measured over test points.
- Suited for SIL1 loops (full FMEDA report available).



### APPLICATIONS

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

**VESSELS:** 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<sup>①</sup>

| Agency | Approval   |
|--------|--|
| TNO    | Hygienic Machinery Directive 98/37/EC annex 1, section 2.1<br>EN 1672 part 2, Hygienic requirements<br>EHEDG doc. 2 (second edit. March 2000) and doc. 8 (July 1993) |

<sup>①</sup> Refer to bulletin BE 54-110 and BE 54-105 for ATEX/FM/CSA approved units.

## ADVANCED FEATURES

### mA output

- for trending: the calibrated setpoint corresponds with a specific mA value but although not linear, it provides important process information. With increasing flow or immersed sensor, the mA signal increases.
- for diagnostics: either 3,6 mA (Low Level Fail-safe) or 22 mA (High Level Fail-safe) output, indicates for an instrument failure (sensor).

### Test points:

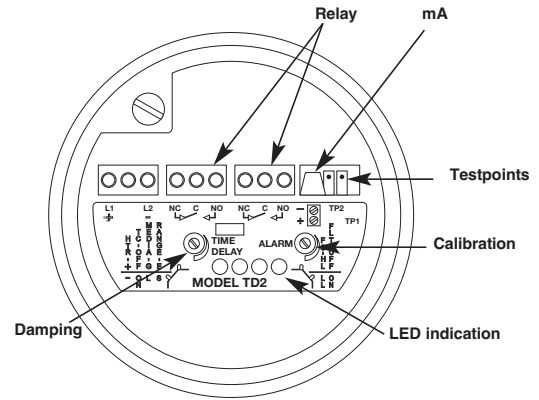
Allow the user to periodically check the setpoint and verify for set point drift. The setpoints read voltage units.

### LED indication:

The LED's show progressively actual flow/level versus the calibrated setpoint.

### Factory calibration:

TD2 can be delivered pre-calibrated at a fixed setpoint. TD2 can be delivered with a complete calibration curve, allowing the customer to field adjust the setpoint by using a voltmeter at the test points.



## TECHNOLOGY

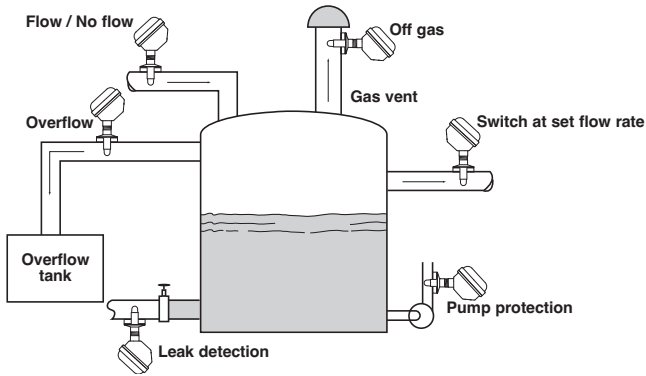
The unit utilizes Magnetrol's proven thermal dispersion technology. The sensor consists of two RTD (Resistance Temperature Detector) elements. One is the reference and the second is heated to a temperature above the process temperature. The electronics detect the temperature difference between the two 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.

## APPLICATIONS

### FLOW

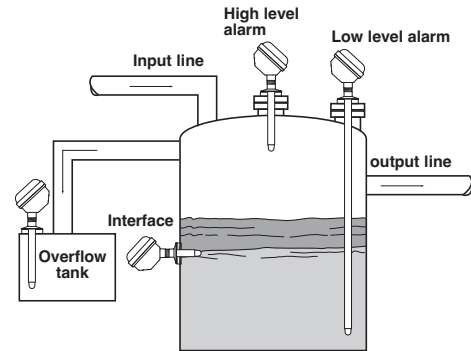
Thermatel® TD2 switches may be installed in a variety of flow applications as shown in the illustration below. Flow/No Flow can be detected in an input line to a primary tank, or in an output line. They may be installed for overflow detection in a pipe connected to an overflow tank or installed in a 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.



- Water for Injection (WFI)
- Filtration systems
- Separation systems
- CIP systems
- Air, CO<sub>2</sub>, N<sub>2</sub> flow

### LEVEL

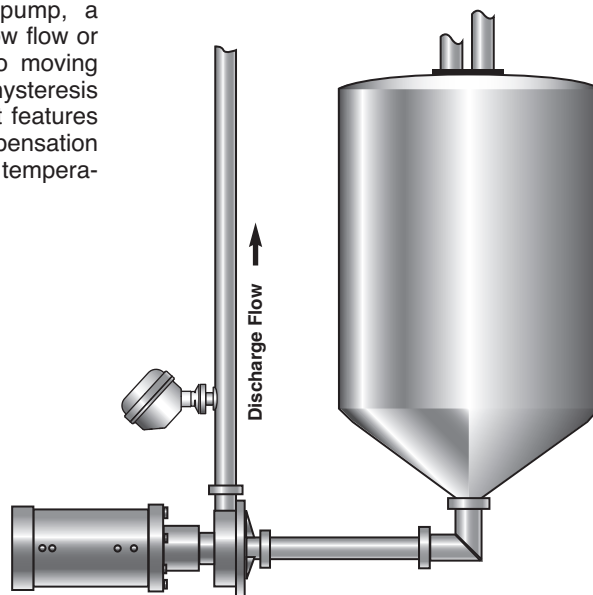
Thermatel® TD2 switches can be installed in a variety of level applications as shown in the illustration below. High or low level alarm applications can be installed in either vertical or horizontal mountings.



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

### PUMP PROTECTION

Installed on the suction or discharge of a pump, a Thermatel switch provides rapid indication of a low flow or no flow condition to prevent pump damage. No moving parts, excellent low flow sensitivity, and low hysteresis between alarm and reset points are all important features in this application. Enhanced temperature compensation minimizes set point drift due to varying process temperatures.



Centrifugal pump protection

# SELECTION DATA

A complete measuring system consists of:

1. THERMATEL® electronics
2. THERMATEL® sensor
3. Option: Factory calibration, consult factory

## 1. Order code for Thermatel® electronics

BASIC MODEL NUMBER

|   |   |   |  |
|---|---|---|--|
| T | D | 2 | Electronics with continuous LED indication and mA output |
|---|---|---|--|

POWER

|   |                         |
|---|-------------------------|
| 7 | 240 V AC (100-264 V AC) |
| 8 | 24 V DC (± 20 %)        |

OUTPUT

|   |   |                                    |
|---|---|------------------------------------|
| D | 0 | 8 A DPDT relay                     |
| H | 0 | 1 A Hermetically sealed DPDT relay |

ACCESSORIES

|   |                                 |
|---|---------------------------------|
| 0 | Blind housing cover             |
| 1 | Housing cover with glass window |

MOUNTING / HOUSING MATERIAL / APPROVAL <sup>① ②</sup>

**Integral mount electronics**  
304 SST – IP 67

|   |   |              |
|---|---|--------------|
| 0 | 7 | Weatherproof |
|---|---|--------------|

- <sup>①</sup> Other housing materials / approvals are available; refer to bulletin BE 54-110 and BE 54-105.
- <sup>②</sup> Consult factory for FM, CSA or other approvals.

CABLE ENTRY

|   |                                   |
|---|-----------------------------------|
| 5 | M20 x 1,5 (2 entries – 1 plugged) |
|---|-----------------------------------|

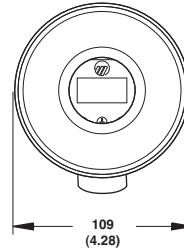
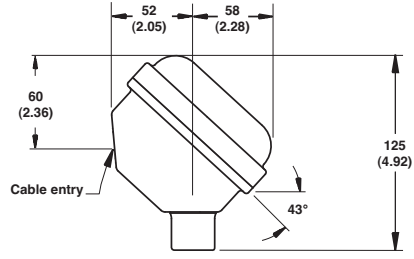
|   |   |   |  |  |   |  |  |   |   |   |
|---|---|---|--|--|---|--|--|---|---|---|
| T | D | 2 |  |  | 0 |  |  | 0 | 7 | 5 |
|---|---|---|--|--|---|--|--|---|---|---|

**complete order code for Thermatel® electronics**

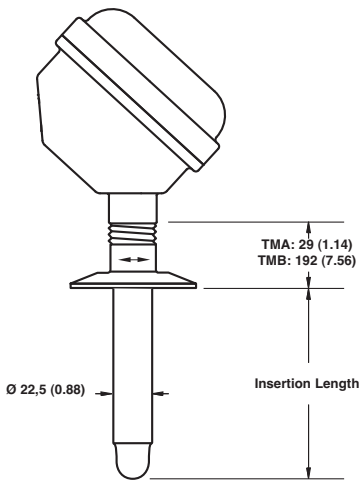
X = if there are any deviations from a standard part number



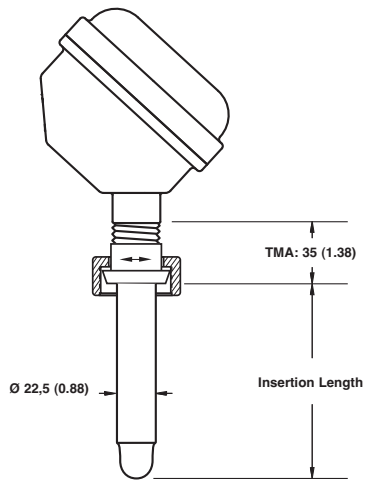
DIMENSIONS in mm (inches)



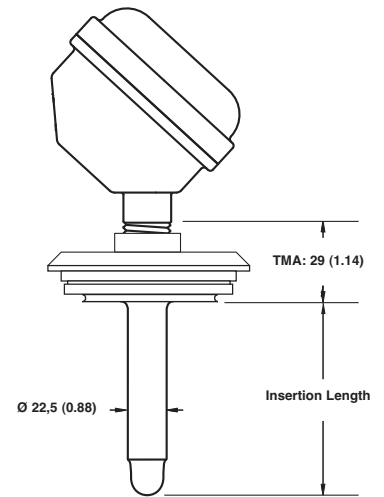
43° View



Tri-Clamp®



DIN 11851



Varivent®

## ELECTRONICS SPECIFICATIONS

| <b>Description</b>           |            | <b>Specification</b>   |
|------------------------------|------------|--|
| Power supply                 |            | 19,2 to 28,8 V DC<br>100 to 264 V AC, 50-60 Hz   |
| Power consumption            |            | 4 W @ 24 V DC or 5 W @ 264 V AC  |
| Flow range                   |            | 0,003 to 1,5 m/s (0.01 to 5.0 FPS) – water<br>0,03 to 150 m/s (0.1 to 500 FPS) – air   |
| Output                       | Alarm      | 8 A DPDT relay @ 30 V DC / 250 V AC<br>1 A hermetically sealed DPDT relay @ 28 V DC  |
|                              | Continuous | non-linear mA for trending   |
|                              | Error      | 3,6 mA (Low Level Fail-safe) – 22 mA (High Level Fail-safe) and alarm relay  |
| Time delay                   |            | 0 to 100 s adjustable (in addition to sensor response time)  |
| User interface               |            | - Local switches for gain setting, function setting and High/Low Level Fail-safe<br>- Calibration and time delay via potentiometer           |
| Display                      |            | 2 green LED's (safe condition)<br>1 yellow LED (alarm setpoint being approached)<br>1 red LED (alarm condition)                              |
| Approvals                    |            | EHEDG (per TNO) and 3A certification   |
| SIL (Safety Integrity Level) |            | Functional safety to SIL1 as 1oo1 in accordance to IEC 61508 – SFF of 73 %<br>Full FMEDA reports and declaration sheets available at request |
| Housing material             |            | 304 stainless steel, IP 67   |
| Net weight                   |            | 1,1 kg (2.4 lbs) - electronics only  |

## PERFORMANCE

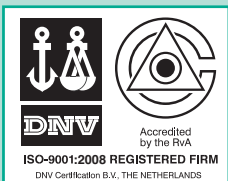
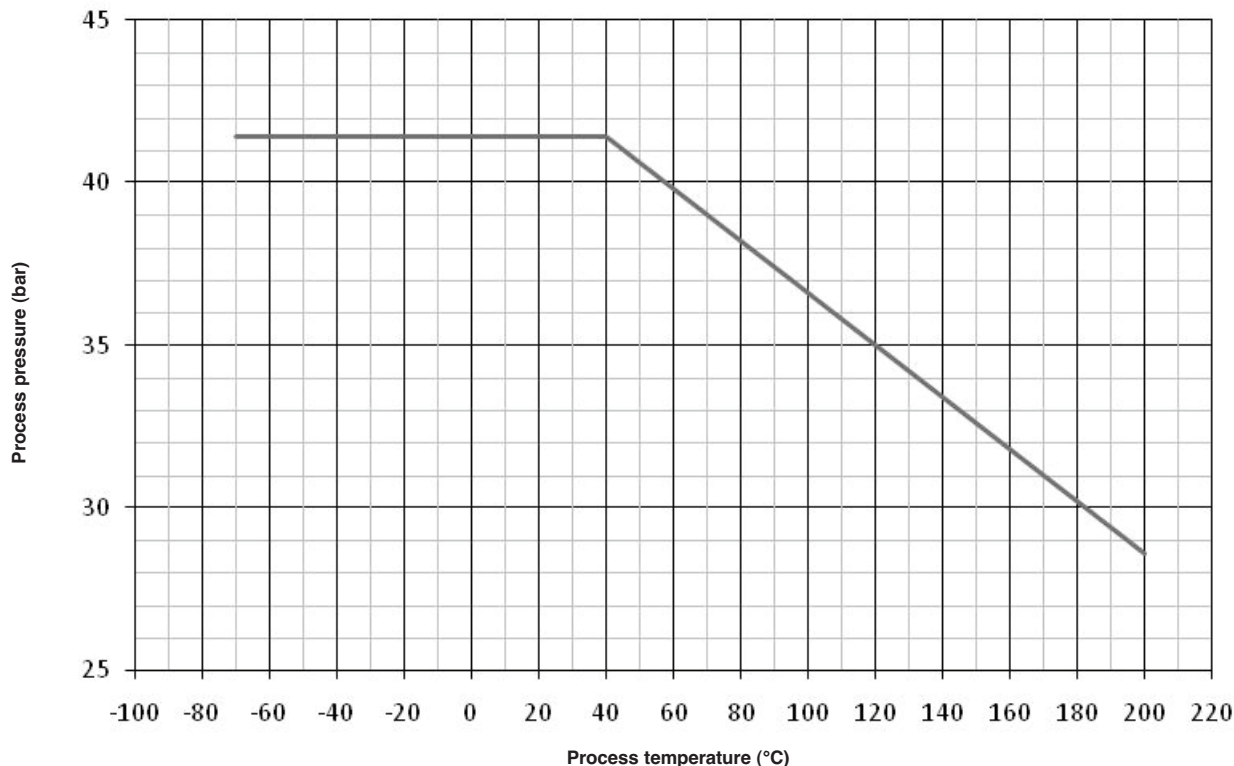
| <b>Description</b>            | <b>Specification</b>   |
|-------------------------------|--|
| Response time                 | 1-10 s typical (dependant on application and set point)                                  |
| Repeatability                 | < 1 % @ constant temperature   |
| Ambient temperature           | -40 to +70 °C (-40 to +158 °F) – operational<br>-50 to +76 °C (-58 to +170 °F) – storage |
| Humidity                      | 0-99, % non-condensing   |
| Electromagnetic compatibility | Meets CE requirements (EN 61326: 1997 + A1 + A2) and Namur NE 21                         |

## SENSOR SPECIFICATIONS

| <b>Description</b>    |     | <b>Specification</b>  |
|-----------------------|-----|---|
| Material              |     | 316/316L (1.4401/1.4404)  |
| Surface finish        |     | 0,82 µm Ra (32 Ra)  |
| Process connection    |     | Tri-Clamp®, DIN 11851, Varivent®  |
| Sensor diameter       |     | 22,5 mm (0.88")   |
| Sensor length         | Max | 330 cm (130")   |
|                       | Min | 7 cm (2.76")  |
| Process temperature   | Max | TMA: +120 °C (+250 °F); TMB: +200 °C (+400 °F)  |
|                       | Min | -70 °C (-100 °F)  |
| Max. process pressure |     | 41,4 bar @ +40 °C (600 psi @ +100 °F)<br>28,6 bar @ +200 °C (415 psi @ +400 °F)<br>Note: max. process pressure is downrated to the design pressure of the selected process connection |

# TEMPERATURE - PRESSURE RATING

Note: max. process pressure is downrated to the design pressure of the selected process connection.



### QUALITY ASSURANCE - ISO 9001:2008

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 9001:2008 AND OUR TOTAL COMPANY IS COMMITTED TO PROVIDING FULL CUSTOMER SATISFACTION BOTH IN QUALITY PRODUCTS AND QUALITY SERVICE.

### PRODUCT WARRANTY

ALL MAGNETROL ELECTRONIC AND ULTRASONIC LEVEL CONTROLS ARE WARRANTED FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR ONE FULL YEAR FROM THE DATE OF ORIGINAL FACTORY SHIPMENT. IF RETURNED WITHIN THE WARRANTY PERIOD; AND, UPON FACTORY INSPECTION OF THE CONTROL, THE CAUSE OF THE CLAIM IS DETERMINED TO BE COVERED UNDER THE WARRANTY; THEN, MAGNETROL INTERNATIONAL WILL REPAIR OR REPLACE THE CONTROL AT NO COST TO THE PURCHASER (OR OWNER) OTHER THAN TRANSPORTATION. MAGNETROL SHALL NOT BE LIABLE FOR MISAPPLICATION, LABOR CLAIMS, DIRECT OR CONSEQUENTIAL DAMAGE OR EXPENSE ARISING FROM THE INSTALLATION OR USE OF THE EQUIPMENT. THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED, EXCEPT, SPECIAL WRITTEN WARRANTIES COVERING SOME MAGNETROL PRODUCTS.



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UNDER RESERVE OF MODIFICATIONS

|                   |  |
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