

Thermatel® TG1/TG2 series is a two wire, intrinsically safe switch for gaseous or liquid flow, level or interface detection using a proven thermal dispersion technology.

The unit consists of electronics in a DIN rail housing and a remote sensor with aluminium or stainless steel sensor housing (max. 500 m (1650') away from electronics). The TG1/TG2 electronics are compatible with a range of sensors designed for specific applications such as:

- extreme low flow detection
- high temperature/pressure applications
- integration in small pipe diameters
- coating/sanitary applications

The Thermatel TG1/TG2 series has no moving parts, is easy to install and adjust and provides reliable operation requiring little or no maintenance.

FEATURES

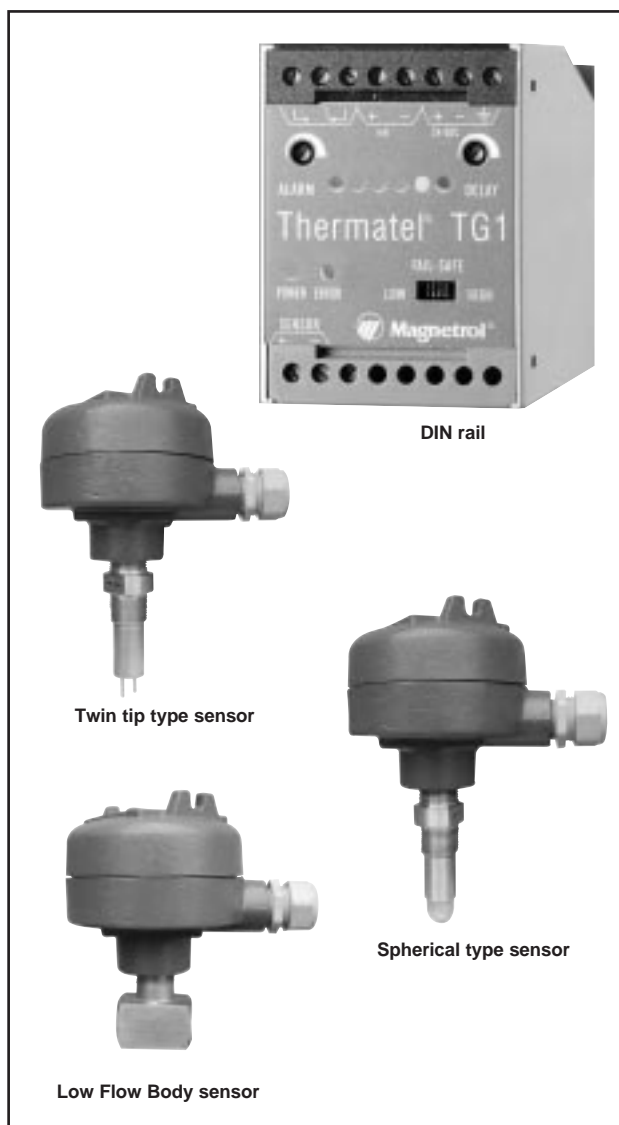
Electronics

- * Two wire intrinsically safe design.
- * Integral intrinsically safe barrier.
- * Indication:
 - LED indication: provides continuous monitoring of flow rate compared to switch point
 - TG1: standard LED indication
 - TG2: LED indication per NAMUR NE 44
 - Green power LED and red error LED.
- * Output:
 - 2 A SPDT alarm relay with goldflash contacts (also useable for low current applications)
 - mA output signal for diagnostic (fault indication per NAMUR NE43) and non linear flow monitoring.
- * High/Low fail safe selection.
- * Adjustable time delay (0 to 120 s).

Sensors

- * Standard twin tip sensor:
 - Corrosive resistant materials
 - Pressures to 207 bar (3000 psi)
 - Optional mini sensor fits directly in 1/2" "T" piece.
- * Standard spherical tip sensor:
 - General purpose service
 - 3A sanitary design available
 - Stainless steel only.
- * High temperature sensor:
 - Temperatures up to 450° C (850° F)
 - Pressures up to 413 bar (6000 psi)
 - Only available in Twin Tip Style
- * Low flow body sensor
 - Flow rates of 0,3 liters/hour (8 quarts/day) to 113,5 liters/hour (0.08 to 30 gph)
 - 1/4" and 1/2" connections
 - Suitable for chemical feed pumps

For FLOW/LEVEL/INTERFACE applications



AGENCY APPROVALS

Agency	Approval
ATEX	II 1G EEx ia II B T5
CENELEC	EEx ia II B T5, intrinsically safe

APPLICATIONS

- Chemical
- Pharmaceutical
- Metal
- Petroleum
- Food
- Paper

PRINCIPLE OF OPERATION

The Thermatel® switch consists of DIN rail mounted electronics with a remote mounted sensor which may be located up to 500 m (1650') away from the electronics.

The sensing assembly contains 2 miniature RTD's (Resistance Temperature Detector) tightly encased within a 316L stainless steel, Hastelloy C or Monel tube.

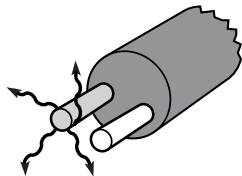
The first RTD (unheated) provides a reference temperature of the process conditions over the entire operating range of -70°C to +200°C (-100°F to +390°F).

High temperature design is suitable for temperatures ranging from -70°C to +450°C (-100°F to +850°F).

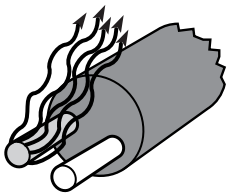
The second RTD is internally heated to establish a temperature differential above the process temperature. The cooling effect on the heated RTD, caused by the presence of flow or level, decreases the differential temperature between the two RTD's. The change in differential temperature is then converted to a pulse signal that is superimposed on the 2 wires carrying the 24 V DC power to the probe. The compact DIN rail electronics monitor this pulse signal, convert it to an LED indication and non-linear mA output.

Flow

No Flow/Low Flow
In the absence of flow/low flow, the self-heated sensor creates a temperature differential between the two sensors.

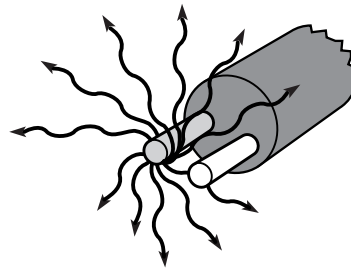
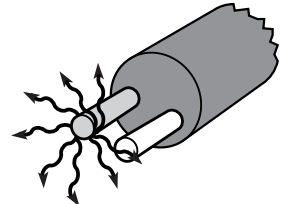


Flow
As media flows increases across the sensing assembly, heat is dissipated and temperature differential decreases.



Level

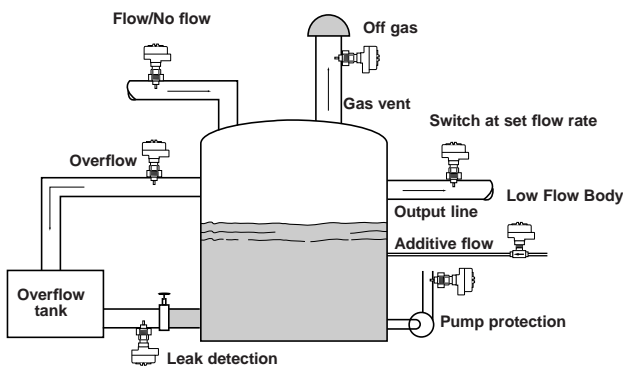
Low Level
In the absence of media, the self-heated sensor tip creates a temperature differential between the two sensors.



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.

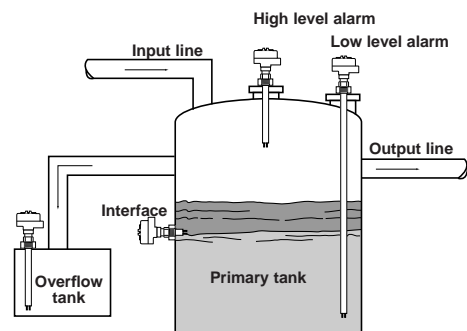


- Liquid or Gas flow detection
- Maintain a minimum flow rate
 - Pump protection
 - Cooling air/water
- Detect presence of flow
 - Relief valves
 - Flare lines

APPLICATIONS LEVEL SWITCH

Thermatel® series 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.

Sensors are available in lengths from 50 to 3300 mm (2" to 130") for a wide variety of applications.



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

EXPEDITE SHIP PLAN (ESP)

Several Thermatel switches are available for quick shipment, within max. 3 weeks after factory receipt of purchase order, through the Expedite Ship Plan (ESP).

Models covered by ESP service are conveniently colour coded in the selection data charts.

To take advantage of ESP, simply match the colour coded model number codes (standard dimensions apply).

ESP service may not apply to orders of ten units or more. Contact your local representative for lead times on larger volume orders, as well as other products and options.

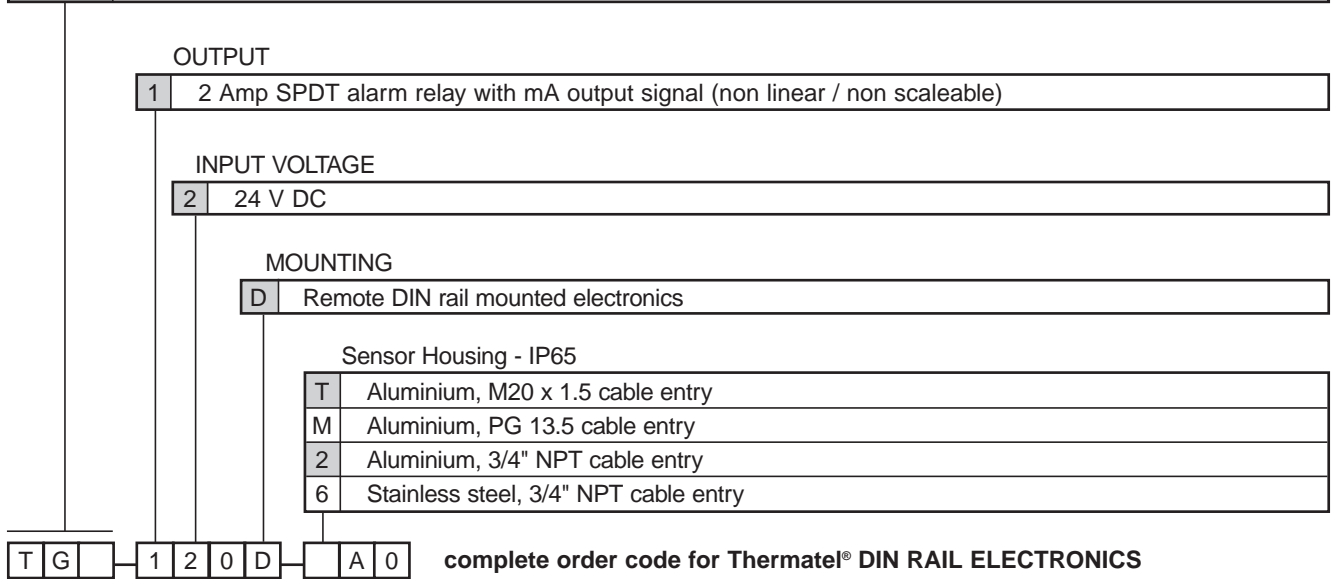
SELECTION DATA

A complete Thermatel® system consists of:

1. THERMATEL® DIN RAIL electronics
2. Connecting cable
3. THERMATEL® sensor, incl. sensor housing (see pages 5, 6 and 7)
4. Optional: Mounting flanges (compatible with 3/4" threaded sensors)
5. Optional: hot tap process connection, consult factory for details

1. Order code for Thermatel® DIN RAIL ELECTRONICS

T	G	1	Intrinsically safe Thermatel electronics with standard LED flow indication
T	G	2	Intrinsically safe Thermatel electronics with LED flow indication per NAMUR NE 44



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

0 0 1 - 5 0 0	From 1 m (3.28') min. to 500 m (1650') max. Specify in increments of 1 m (3.28') consult factory for longer distances
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Use	Spherical Tip	Twin Tip	High Temperature	Low Flow Body
For	General purpose High viscosity	General purpose Corrosive material	High temperatures High pressures	Low flow detection
Medium adhesivity	Coating	Mild coating	Mild coating	Mild coating
Process connection: Thread	3/4" NPT, 1" BSP/NPT	1/2" NPT, 3/4" NPT, 1" BSP/NPT	3/4" NPT, 1" BSP/NPT	1/4", 1/2" NPT 1/4", 1/2" BSP
Flange	ANSI, DIN	ANSI, DIN	ANSI, DIN	
Maximum temperature	200 °C (390 °F)	200 °C (390 °F)	450 °C (850 °F)	120 °C (250 °F)
Maximum pressure	41 bar (600 psi)	207 bar (3000 psi)	413 bar (6000 psi)	400 bar (5800 psi)
Probe length	5 to 330 cm	3 to 330 cm	5 to 90 cm	Not applicable

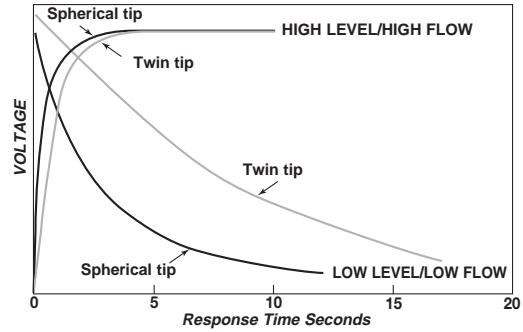
TWO SENSOR TIP DESIGNS

Thermatel offers two sensor tip designs: the sensor twin tip and the unique spherical tip. Both designs have similar operating ranges. Response time to a change in flow is depicted for both tips in the chart at right.



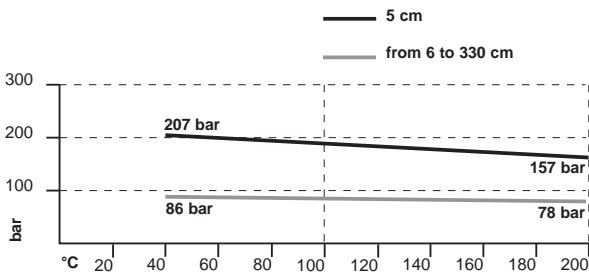
The spherical tip is recommended for all types of applications: general purpose, high viscosity and applications where buildup can occur.

RESPONSE TIME: SPHERICAL TIP VERSUS TWIN TIP

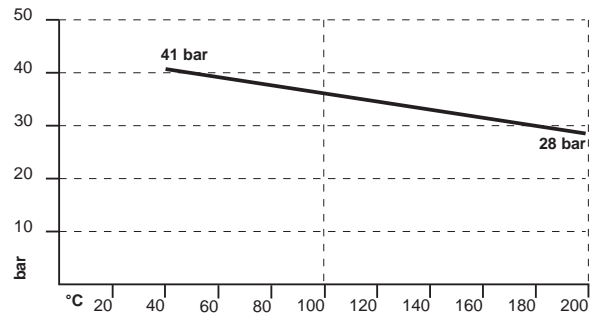


Both sensors detect flow or level at approximately the same rate. However, the spherical tip responds faster to a loss of flow or a dry condition.

PRESSURE/TEMPERATURE RATING

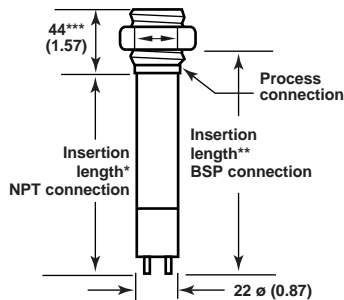


Standard Twin Tip Probe (TMC/TMD)

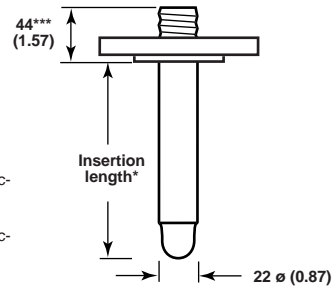


Standard Spherical Probe (TMA/TMB)

DIMENSIONS IN MM (INCHES)



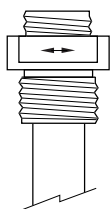
Standard Threaded Twin Tip Sensor (TMC/TMD)



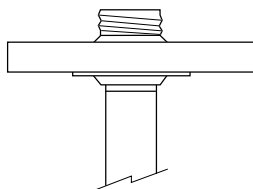
Standard Flanged Spherical Tip Sensor (TMA/TMB)

- * Insertion length: 50 to 3300 mm in 10 mm increments (2" to 130"). Consult factory for longer lengths.
- ** Insertion length: 80 to 3300 mm in 10 mm increments (3" to 130"). Consult factory for longer lengths.
- *** For units with heat extension: 223 mm (8.78")

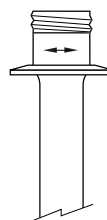
CONNECTIONS



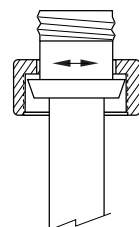
Threaded
1" NPT / 3/4" NPT - 1" BSP



Welded flange ANSI / DIN



Sanitary 3A



Sanitary DIN 11851

SELECTION DATA (cont.)

3. Order code for TG1/TG2 Thermatel® STANDARD SENSOR FOR FLOW/LEVEL INTERFACE

BASIC MODEL NUMBER – SENSOR

T M A	Standard spherical tip	max 120 °C (250 °F) / max 41 bar (600 psi)
T M B	Standard spherical tip - with heat extension	max 200 °C (390 °F) / max 41 bar (600 psi)
T M C	Standard twin tip	max 120 °C (250 °F) / max 207 bar (3000 psi)
T M D	Standard twin tip - with heat extension	max 200 °C (390 °F) / max 207 bar (3000 psi)

MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

A	316/316 L (1.4401/1.4404) stainless steel
B	Hastelloy C (2.4819) - only available for twin tip sensors (TMC/TMD)
C	Monel (2.4360) - only available for twin tip sensors (TMC/TMD)
D	316 Ti (1.4571) stainless steel - only available for twin tip sensors (TMC/TMD)

PROCESS CONNECTION SIZE

1	1	Threaded 3/4" NPT
2	1	Threaded 1" NPT
2	2	Threaded G1 (1" BSP)

ANSI FLANGED (consult factory for other materials than 316/316L (1.4401/1.4404))

2	3	1"	150 lbs ANSI RF flange
2	4	1"	300 lbs ANSI RF flange
2	5	1"	600 lbs ANSI RF flange
3	3	1 1/2"	150 lbs ANSI RF flange
3	4	1 1/2"	300 lbs ANSI RF flange
3	5	1 1/2"	600 lbs ANSI RF flange
4	3	2"	150 lbs ANSI RF flange
4	4	2"	300 lbs ANSI RF flange
4	5	2"	600 lbs ANSI RF flange

DIN FLANGED (consult factory for other materials than 316/316L (1.4401/1.4404))

B	A	DN 25	PN 16	DIN 2527, Form B
B	B	DN 25	PN 25/40	DIN 2527, Form B
B	C	DN 25	PN 64/100	DIN 2527, Form E
C	A	DN 40	PN 16	DIN 2527, Form B
C	B	DN 40	PN 25/40	DIN 2527, Form B
C	C	DN 40	PN 64/100	DIN 2527, Form E
D	A	DN 50	PN 16	DIN 2527, Form B
D	B	DN 50	PN 25/40	DIN 2527, Form B
D	D	DN 50	PN 64	DIN 2527, Form E
D	E	DN 50	PN 100	DIN 2527, Form E

**SANITARY FLANGED – ONLY AVAILABLE FOR STANDARD SPHERICAL SENSOR (TMA/TMB)
(consult factory for other materials than 316/316L (1.4401/1.4404))**

3	T	1" and 1 1/2"	3A compatible
4	T	2"	3A compatible
B	S	DIN 11.851	DN 25
C	S	DIN 11.851	DN 40
D	S	DIN 11.851	DN 50

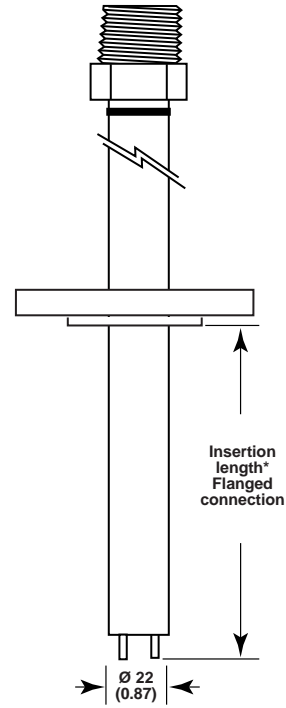
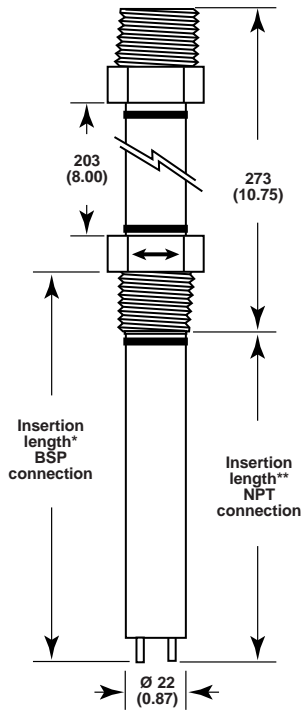
INSERTION LENGTH – SPECIFY FOR INCREMENTS OF 10 mm (0.39")

0	0	5	Minimum length 50 mm (2")
0	0	8	Minimum length 80 mm (3") – sensors with BSP (G1) connection
3	3	0	Maximum length 3300 mm (130")



complete order code for TG1/TG2 Thermatel® STANDARD SENSOR

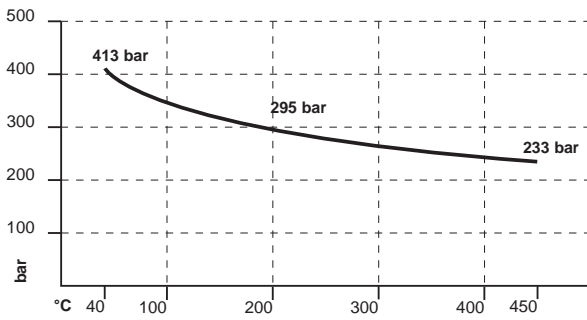
DIMENSIONS IN MM (INCHES)



* Insertion length: 50 to 900 mm in 10 mm increments (2" to 35.4").
 ** Insertion length: 80 to 900 mm in 10 mm increments (3" to 35.4").

High Temperature Sensor (TMH)

PRESSURE/TEMPERATURE RATING



SELECTION DATA (cont.)

3. Order code for TG1/TG2 Thermatel® HIGH TEMPERATURE / HIGH PRESSURE SENSOR FOR FLOW/LEVEL INTERFACE

T M H	High temperature / high pressure twin tip – max 450 °C (850 °F) / max 413 bar (6000 psi)
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MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

A	316/316 L (1.4401/1.4404) stainless steel
B	Hastelloy C (2.4819)
D	316 Ti (1.4571) stainless steel

PROCESS CONNECTION SIZE

1	1	Threaded 3/4" NPT
2	1	Threaded 1" NPT
2	2	Threaded G1 (1" BSP)

ANSI FLANGED (consult factory for other materials than 316/316L (1.4401/1.4404))

2	3	1"	150 lbs ANSI RF flange
2	4	1"	300 lbs ANSI RF flange
2	5	1"	600 lbs ANSI RF flange
2	7	1"	900/1500 lbs ANSI RF flange
3	3	1 1/2"	150 lbs ANSI RF flange
3	4	1 1/2"	300 lbs ANSI RF flange
3	5	1 1/2"	600 lbs ANSI RF flange
3	7	1 1/2"	900/1500 lbs ANSI RF flange
3	8	1 1/2"	2500 lbs ANSI RF flange
4	3	2"	150 lbs ANSI RF flange
4	4	2"	300 lbs ANSI RF flange
4	5	2"	600 lbs ANSI RF flange
4	7	2"	900/1500 lbs ANSI RF flange
4	8	2"	2500 lbs ANSI RF flange

DIN FLANGED (consult factory for other materials than 316/316L (1.4401/1.4404))

B	A	DN 25	PN 16	DIN 2527, Form B
B	B	DN 25	PN 25/40	DIN 2527, Form B
B	C	DN 25	PN 64/100	DIN 2527, Form E
B	G	DN 25	PN 250	DIN 2527, Form E
C	A	DN 40	PN 16	DIN 2527, Form B
C	B	DN 40	PN 25/40	DIN 2527, Form B
C	C	DN 40	PN 64/100	DIN 2527, Form E
C	G	DN 40	PN 250	DIN 2527, Form E
C	J	DN 40	PN 400	DIN 2527, Form E
D	A	DN 50	PN 16	DIN 2527, Form B
D	B	DN 50	PN 25/40	DIN 2527, Form B
D	D	DN 50	PN 64	DIN 2527, Form E
D	E	DN 50	PN 100	DIN 2527, Form E
D	G	DN 50	PN 250	DIN 2527, Form E
D	J	DN 50	PN 400	DIN 2527, Form E

INSERTION LENGTH – SPECIFY FOR INCREMENTS OF 10 mm (0.39")

0	0	5	Minimum length 50 mm (2")
0	0	8	Minimum length 80 mm (3") – sensors with BSP (G1) connection
0	9	0	Maximum length 900 mm (35.4")



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

SELECTION DATA (cont.)

3. Order code for TG1/TG2 Thematel® MINI SENSOR FOR FLOW/LEVEL INTERFACE - 1/2" NPT process connection

T	M	M	Mini twin tip (16 mm diam.) – max 120 °C (250 °F) / max 207 bar (3000 psi) for standard sensor length max 120 °C (250 °F) / max 127 bar (1850 psi) for sensors ≥ 50 mm
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MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

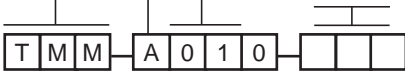
A	316/316 L (1.4401/1.4404) stainless steel
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PROCESS CONNECTION SIZE

0	1	Threaded 1/2" NPT
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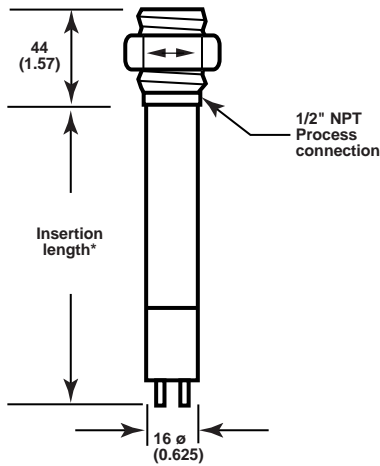
INSERTION LENGTH – SPECIFY FOR INCREMENTS OF 10 mm (0.39")

0	0	3	Standard length 25 mm (1")
0	0	5	Minimum selectable length 50 mm (2")
1	5	0	Maximum selectable length 1500 mm (59")



complete order code TG1/TG2 Thematel® MINI SENSOR

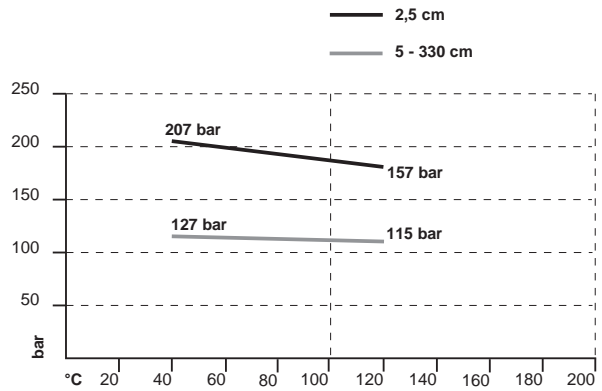
DIMENSIONS IN MM (INCHES)



* Insertion length:
25 mm (1") minimum.
50 to 1500 mm (2" to 60") available

Mini Sensor (TMM)

PRESSURE/TEMPERATURE RATING



SELECTION DATA (cont.)

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

T M L	Low flow body – max 120 °C (250 °F) / max 400 bar (5800 psi)
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MATERIAL OF CONSTRUCTION FOR SENSOR AND PROCESS CONNECTION

A	316/316 L (1.4401/1.4404) stainless steel
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PROCESS CONNECTION SIZE

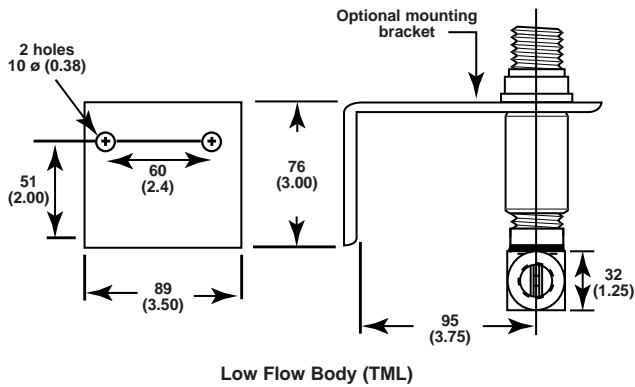
		Liquid flow rates	Gas flow rates
T 1	Threaded 1/4" NPT	from 0,3 l/h up to 38 l/h (0.08 - 10 GPH)	from 0,2 l/min (0.42 SCFH)
V 1	Threaded 1/2" NPT	from 3,8 l/h up to 115 l/h (1.0 - 30 GPH)	from 1,0 l/min (2.1 SCFH)
T 0	Threaded G 1/4 (1/4" BSP)	from 0,3 l/h up to 38 l/h (0.08 - 10 GPH)	from 0,2 l/min (0.42 SCFH)
V 0	Threaded G 1/2 (1/2" BSP)	from 3,8 l/h up to 115 l/h (1.0 - 30 GPH)	from 1,0 l/min (2.1 SCFH)

MOUNTING BRACKET

0 0 0	None
1 0 0	With mounting bracket

T M L A 0 complete order code for TG1/TG2 Thermatel® LOW FLOW BODY SENSOR

DIMENSIONS IN MM (INCHES)



PRESSURE/TEMPERATURE RATING

Max 280 bar (4100 psi) @ max 120 °C (250 °F)

Max 400 bar (5800 psi) @ 40 °C (100 °F)

OPTIONAL TRANSDUCER MOUNTING FLANGES

Raised face mounting flanges are available in the sizes and materials shown below.

Thread on mounting flanges can only be used in combination with 3/4" process connection transducer.

Specify the part number as an additional line item when placing an order. Consult factory (C/F) for additional flange sizes and materials such as Hastelloy C, Monel, etc...

ANSI Flange		Part Number			
Size	Rating	316/316L	Hastelloy C	304 SS	Carbon Steel
1 1/2"	150 lbs	04-5867-001	04-5867-031	04-5867-011	04-5867-021
2"		04-5867-002	04-5867-032	04-5867-012	04-5867-022
3"		04-5867-003	04-5867-033	04-5867-013	04-5867-023
4"		04-5867-004	04-5867-034	04-5867-014	04-5867-024
6"		04-5867-005	04-5867-035	04-5867-015	04-5867-025
1 1/2"	300 lbs	04-5867-006	04-5867-036	04-5867-016	04-5867-026
2"		04-5867-007	04-5867-037	04-5867-017	04-5867-027
3"		04-5867-008	04-5867-038	04-5867-018	04-5867-028
4"		04-5867-009	04-5867-039	04-5867-019	04-5867-029
6"		04-5867-010	04-5867-040	04-5867-020	04-5867-030
1 1/2"	600 lbs	04-5867-045	C/F	C/F	04-5867-046

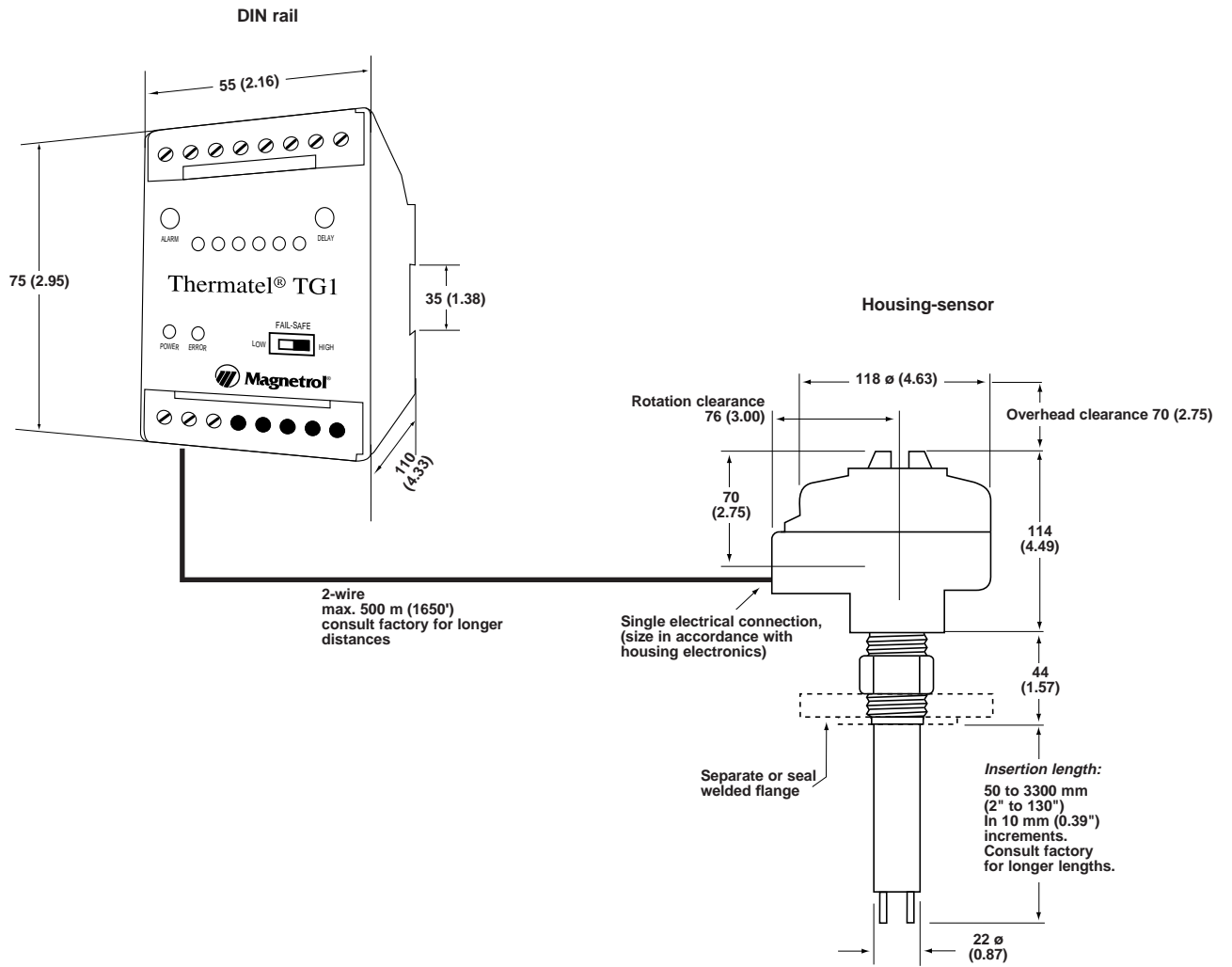
SPECIFICATIONS

Description	Specifications	
Supply voltage	24 V DC (± 20 %)	
Power consumption	5 W max.	
Output	Alarm	2 Amp SPDT relay
	Continuous	mA output (non linear, non scaleable)
	Error	22 mA in "HIGH" Fail-safe mode / 3,6 mA in "LOW" Fail-safe mode (as per NAMUR NE 43)
Failsafe	Switch selectable (slide switch)	
LED indication	Power	Green LED ON is powered
	Error	Red LED blinks in case of error
	Alarm	4 x green LED's – for safe/ (normal) condition 1 x yellow LED – indicates when flow or level is approaching the alarm set point 1 x red LED – indicates an alarm condition (TG1) all LED's OFF – indicates an alarm condition (TG2)
Set point	Adjustable via potentiometer located on DIN Rail housing	
Range selection	Selectable in probe electronics	
Flow Range	Insertion probes: 0 to 1,5 meters per second (0.01 to 5.0 fps) – water 0 to 75 meters per second (0.1 to 500 fps) – air 1/4" Low flow body: 0,3 to 38 l/h (0.08 to 10 GPH) for water – from 0,2 l/min (0.42 SCFH) for air/gas 1/2" Low flow body: 3,8 to 115 l/h (1.0 to 30 GPH) for water – from 1,0 l/min (2.1 SCFH) for air/gas	
Response time	1 to 10 sec. (typical - liquid)	
Time delay	0-120 seconds adjustable	
Repeatability	Less than 1% at constant temperature	
Operating temperature electronics	-40°C to +70°C (-40°F to +160°F)	
Operating temperature	<i>TMH sensors:</i> -70°C to +450°C (-100°F to +850°F) <i>TMM/TML sensors:</i> -70°C to +120°C (-100°F to +250°F) <i>TMx sensors:</i> -70°C to +200°C (-100°F to +390°F) ①	
Max. operating pressure @ 40°C (100°F)	<i>Twin tip sensor:</i> To 207 bar (3000 psi) standard length 50 mm (2") To 86 bar (1250 psi) extended length >50 mm (2") <i>Spherical tip sensor:</i> To 40 bar (600 psi) <i>Mini sensor:</i> To 207 bar (3000 psi) standard length 25 mm (1") To 127 bar (1850 psi) extended length >25 mm (1") <i>Low flow body sensor:</i> To 400 bar (5800 psi) <i>High temperature sensor:</i> To 413 bar (6000 psi)	
Materials of construction - wetted parts	<i>Twin tip sensor:</i> 316L SST (1.4401), 316 Ti (1.4571), Hastelloy C (2.4819) or Monel (2.4360) <i>Spherical/Mini and Low flow body sensor:</i> 316L SST (1.4401) <i>High temperature sensor:</i> 316L SST (1.4401), 316 Ti (1.4571), Hastelloy C (2.4819)	
Sanitary sensor finish	0,82 µm (32 micro inch) (electropolishing available, consult factory)	
Insertion length ② (consult factory for longer lengths)	<i>Twin tip/Spherical tip sensor:</i> min. 50 mm (2") - max. 3300 mm (130") <i>Mini sensor:</i> min. 25 mm (1") - max. 1500 mm (59") <i>High temperature sensor:</i> min. 50 mm (2") - max. 900 mm (35.4")	
Humidity	0 - 99 % non condensing	
Housing Materials	DIN Rail : IP 20, moulded / Sensor housing: IP 65, Aluminium or Stainless Steel	
Electromagnetic compatibility	Meets CE requirements (EN 50081-2, EN 50082-2)	
Approvals	ATEX II 1 G EEx ia II B T5, CENELEC EEx ia II B T5	
Shipping weight	2 kg. (4.6 lbs.) with 50 mm (2") sensor	

① Heat extension recommended for operating temperatures higher than +120°C (+250°F).

② For flow switches, insertion length must be long enough to locate the tip of the sensor at least 10% (of pipe Ø) inside pipe. Sensors longer than 760 mm (30"), must be secured within the pipe or duct by the customer to prevent movement of the sensor, consult factory for assistance.

DIMENSIONS IN mm (inches)





ISO-9001 REGISTERED FIRM
DNV Certification B.V., THE NETHERLANDS

QUALITY ASSURANCE - ISO 9001

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