Technical Information
TI014A/05/e/03.01

t-switch

Flow switch for liquid and gas







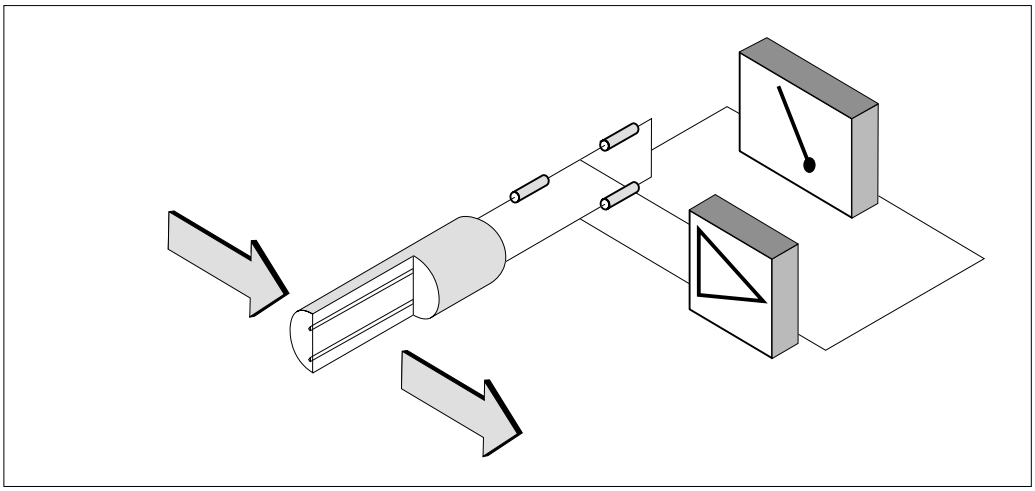


Endress+Hauser
The Power of Know How

Online
www.endress.com

Measuring Principle

Thermal technology is a well established operating principle in the process industry used on a wide variety of applications. It operates by monitoring the cooling effect of a fluid stream as it passes over a heated transducer (RTD). The fluid flows over two RTD elements one of which senses the actual fluid temperature and provides a reference whilst the other is heated to ensure a constant differential temperature above the fluid temperature. The applied power needed to maintain this differential is proportional to the mass flow of the fluid.



Features and Benefits

- Single device for liquids and gas
- Wide dynamic rangeability
- No moving parts – reduced maintenance
- Simple and reliable to install and programme
- Wide selection of process connections
- Incorporates fuzzy logic control algorithm allowing manual adjustment of meter sensitivity to suit application requirements

Applications

Process Plant

- Dry run protection for pumps
- Control of cooling systems for pumps, turbines, compressors and heat exchangers

Chemical Industry

- Chemical dosing
- Monitoring pump function

Water Treatment

- Status indication of valves in water distribution systems
- Chemical dosing
- Air injection

Beverage Industry

- Filter control
- Monitoring cleaning processes

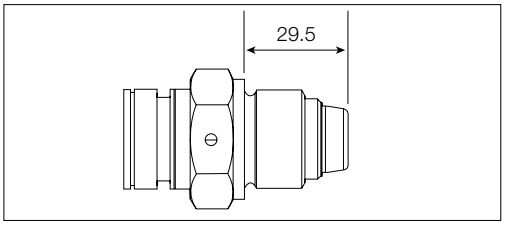
Dairy Industry

- Cooling systems in refrigeration plants

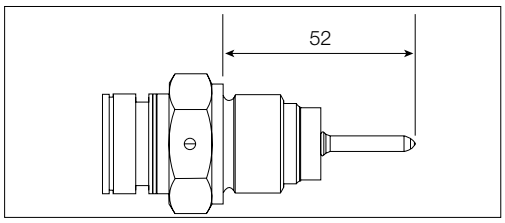
Performance and Selection

Sensor Type

Liquid (flat face)
Figures referenced to water
Ranged 0-1.5m/sec (provisional)
Time Response: 5 sec rising
< 5 sec falling
(0-66% step change)



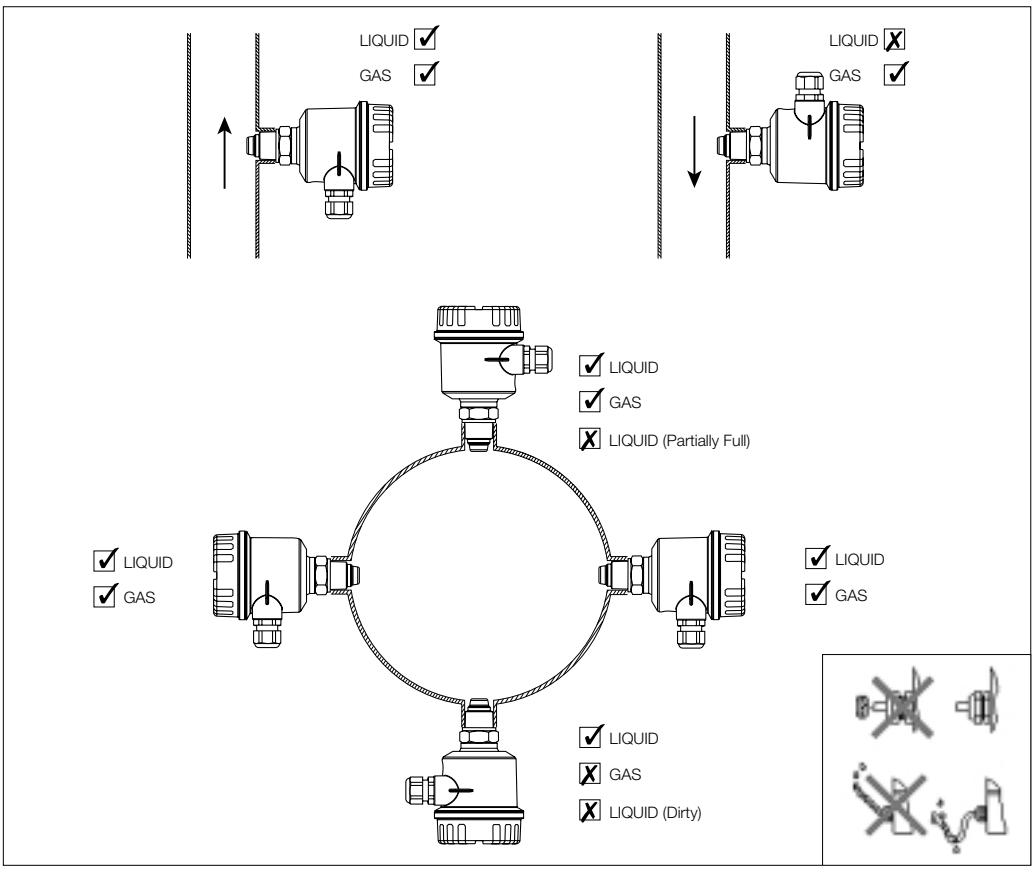
Gas (probe)
Figures referenced to Air
Ranged 0-30m/sec (provisional)
Time Response: 15 sec rising
10 sec falling
(0-66% step change)



Extended versions available with alternative process connections.

Planning and Installation Guidelines

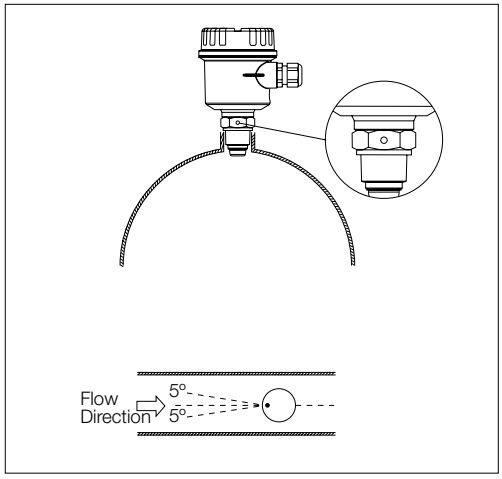
- Mount upstream of control valves, hand or isolation valves
- Ensure sensor is aligned with direction of flow (see manual)
- For liquids ensure full pipes
- Avoid areas of cavitation (liquids)
- For gases avoid areas where condensate collects
- Avoid applications with large process temperature changes
- Avoid mounting device where exposure to extreme ambient temperature changes occurs e.g. direct sunlight



Planning and Installation Guidelines

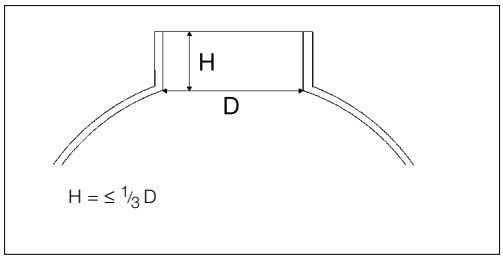
Sensor Orientation

- Each process connection has an orientation mark, this should be positioned in line facing the oncoming flow.
- Sensor should be installed such that the sensing surface is in contact with the flowing medium at all times.
- There is an allowed orientation tolerance of +/- 5° from centre.



Sanitary Sensor

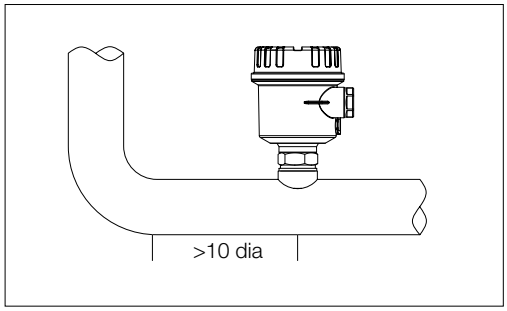
- It is the responsibility of the user to ensure that the volume enclosed by the mounting boss has sufficient dimensions to ensure adequate cleaning takes place.



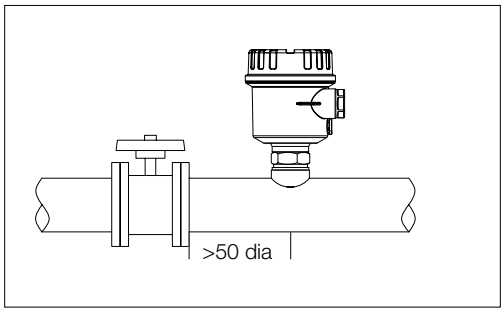
Mounting and Installation

Avoid installing in areas of extreme flow turbulence. For example:

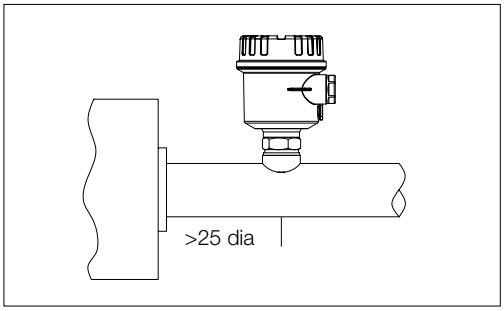
- Directly after bends or expansions/reductions.



- Directly downstream of isolation and control valves.



- Directly after pumps, fans and compressors.

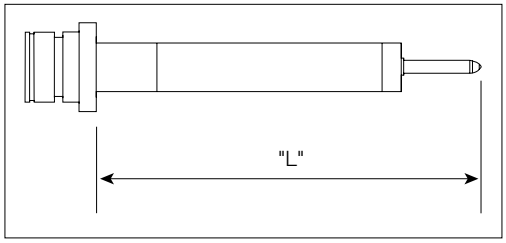


Note:

All downstream dimensions provided only as a guideline and wherever possible greater dimensions should be considered.

Insertion Sensor

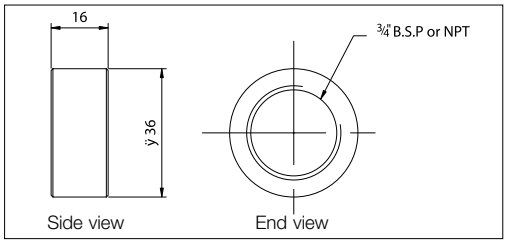
Process Connection
Extended Sensor



Dimensions of extended versions (L in mm)		
Sensor Option	Insertion 125mm	Insertion 235mm
Flat-Face	125	235
Probe	125	235

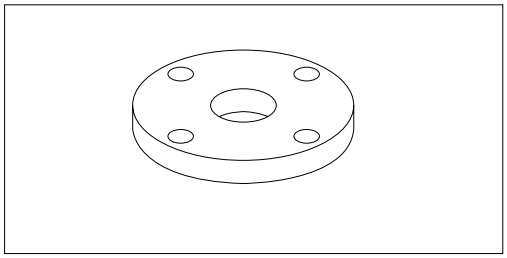
Mounting Boss

For BSP and NPT threads

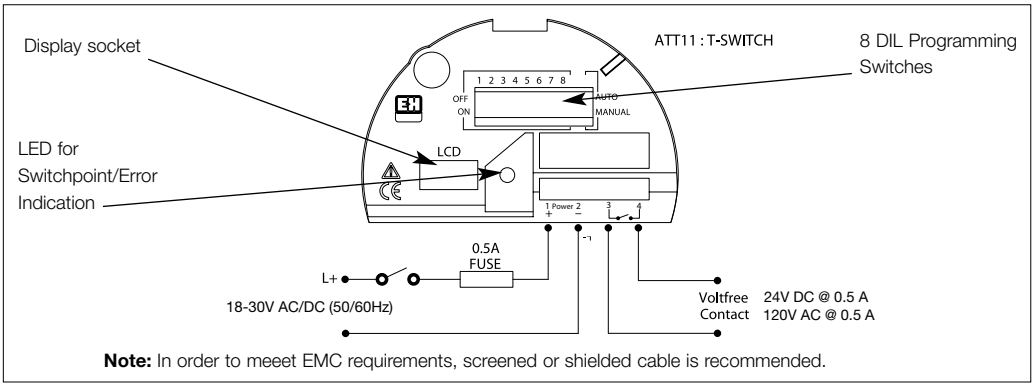


Accessories

Threaded Flanges
with G 3/4 BSP or 3/4 NPT thread for mounting a t-switch.
Available sizes: DN25 PN25
ANSI 1" 150lbs
DN40 PN25
ANSI 1 1/2" 150lbs
DN50 PN25
ANSI 2" 150lbs



Electrical Connection



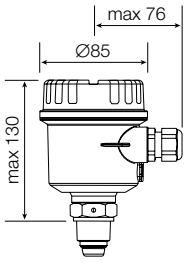
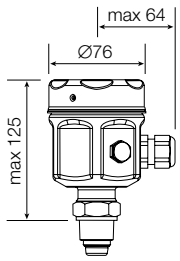
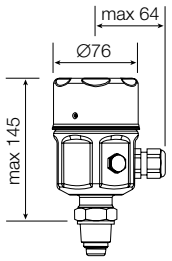
Note: In order to meeet EMC requirements, screened or shielded cable is recommended.

Operation

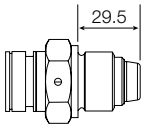
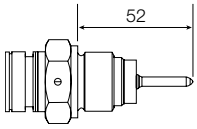
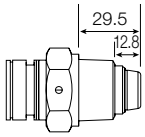
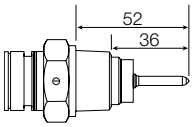
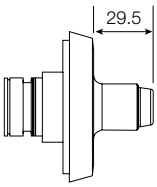
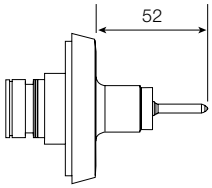
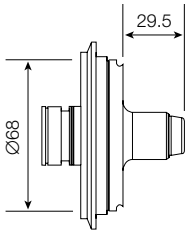
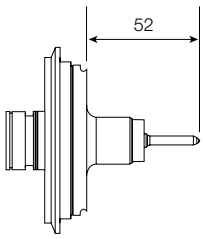
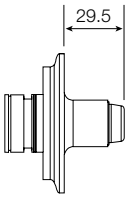
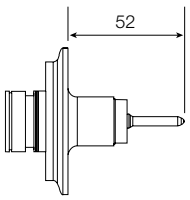
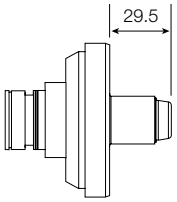
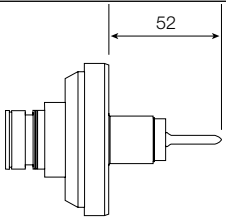
LED (Light Emitting Diode)
- Illuminates when measured flow above switchpoint.
- Off when measured flow below switchpoint.
- Flashes to indicate an error.

LCD (Liquid Crystal Display)
- Optional display used to indicate flow as a percentage of maximum. Also displays programming information and error codes (not essential for programming).

Housing and Sensor

Polyester Housing No display	**Steel Housing** No display	**Steel Housing with Extended Lid** With display
		

Process Connection

Process Connection	Dimensions with Flat-Face Sensor	Dimensions with Probe Sensor	Process Limits
BSP 3/4" (G)			max 25 bar A max 80°C
3/4" NPT			max 25 bar A max 80°C
Sanitary coupling DN40 DN50 to DIN 11851			max 25 bar A max 80°C
Varivent DN50			max 10 bar A max 80°C
Triclamp 1 1/2" 2" ISO 2852			max 16 bar A max 80°C
Aseptic coupling DN50 to DIN 11864			max 25 bar A max 80°C

All dimensions in mm

Technical Data

Process Conditions	• Nominal Process Diameters: DN25-1000 • Process Pressure Range: 25 Bar g (Process fitting dependent) • Process Temperature Range: -10 to +80°C
Materials	• Meter Body: 1.4404/1.4435/316L • Transducers: 1.4404/1.4435/316L • Polyester Housing: PBT-FR (polyester) with cover in PBT-FR or with transparent cover in PA 12, Seal of cover; EPDM • Steel Housing: 1.4301 (AISI 304), seal of cover silicone • Cable Gland: Polyamide
Process Connections	• Parallel thread BSP ¾" (includes brass ¾" compression fitting for insertion sensors only) • Tapered thread ¾" NPT (includes brass ¾" compression fitting for insertion sensors only) • Sanitary coupling DN40, 50 to DIN 11851 • Varivent DN50 to factory standard Tuchenhagen • Triclamp 1½", 2" to ISO 2852 • Aseptic coupling DN50 to DIN 11864
Performance Limits	• Accuracy: ± 5% of full scale • Repeatability: ± 1% of full scale • Time Response Flat Face: 5 sec rising, < 5 sec falling • Time Response Probe: 15 sec rising, 10 sec falling • Flow Ranges Liquid: 0-1.5m/sec ref. to water (provisional) • Flow Ranges Gas: 0-30m/sec ref. to air (provisional)
Human interface	• Electronic Insert: 8 DIL switches for commissioning • Red LED to indicate switching status, flashes under fault condition • Optional Display: 4 numeric characters with bar graph
Electrical	• Power Supply: 18-30V DC / AC (50/60 Hz) • Power Consumption: <3W • Relay Output: Selectable Normally Closed (NC) or Normally Open (NO) (NO as factory default)
Environment	• Storage Temperature Range: -20 to +80°C (without LCD) • Ambient Temperature Range: -10 to +65°C (without LCD) • Degree of Protection: Polyester and steel housings: IP66 to EN 60529 • Vibration Resistance: Up to 1g, 10....150Hz to IEC 60068-2-6 • Shock Resistance: to IEC 60068-2-31 • Electromagnetic Compatibility (EMC): IEC 801 part3: E = 10V/m (30MHz...1GHz)
Approvals	EHEDG, all wetted materials FDA listed. Meets the requirements of 3A.
Approvals Pending	CSA General Approval, FM General Approval.

Performance and Selection

Product Structure ATT11-

Approvals

A	For use in non-hazardous areas
B	FM General Approval (pending)
C	CSA General Approval (pending)
Y	Special – please specify

Sensor Form

11	Flat face sensor
12	Flat face sensor, insertion 125mm
13	Flat face sensor, insertion 235mm
21	Probe sensor
22	Probe sensor, insertion 125mm
23	Probe sensor, insertion 235mm
99	Special – please specify

Process Connection

(Material 1.4435/316L unless stated)

D1	G ¾" BSP, (Boss Included)
D2	G ¾" BSP, Brass (Boss Included) Brass compression fitting for insertion sensor only
F1	NPT ¾" (Boss Included)
F2	NPT ¾", Brass (Boss Included) Brass compression fitting for insertion sensor only
J1	DN40 Dairy coupling DIN 11851
K1	DN50 Dairy coupling DIN 11851
L1	Varivent >=DN50
M1	Tri Clamp 1½" ISO2852
N1	Tri Clamp 2" ISO2852
P1	DN50 Aseptic coupling DIN 11864-1
Y9	Special – please specify

Surface Finish, Wetted Parts

1	Standard Metal Finish
2	Ra<1.5 µm/120 grit
3	Ra<0.8 µm/150 grit (3A/EHEDG)
5	Ra<1.5 µm/120 grit, O_2 duty
6	Ra<0.8 µm/150 grit, O_2 duty (3A/EHEDG)
7	Standard Metal Finish, O_2 duty
9	Special – please specify

Electronics & Outputs

A	Relay Output, No Display, power supply – 18-30V DC/AC (50/60Hz)
B	Relay Output, 4 digit LCD, power supply – 18-30V DC/AC (50/60Hz) St. St. Housing only
Y	Special – please specify

Housing & Cable Entry

4D	Polyester Housing IP66 M20 Gland
4H	Polyester Housing NEMA4X NPT ½" entry
6D	SS304 Housing IP66 M20 Gland
6H	SS304 Housing NEMA4X NPT ½" entry
9Y	Special – please specify

Documentation

1	Standard Documentation
2	EN10204-2.3 Pressure test 1.5 x pressure rating for 3 minutes
9	Special – please specify

ATT11- ← Order Code

United Kingdom

Endress+Hauser Ltd.
Floats Road
Manchester M23 9NF
United Kingdom
Tel: 0161 286 5000
Fax: 0161 998 1841
www.uk.endress.com

All Other Countries

Endress+Hauser
GmbH+Co
Instruments International
Colmarer Str 6
D-79576 Weil am Rhein
Germany
Tel: +49 (7621) 97 5 02
Fax: +49 (7621) 97 53 45
www.ii.endress.com

Endress+Hauser
The Power of Know How