



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

Technical Information

## t-switch - ATT11

Thermal flow

Flow switch for liquids and gases



### Applications

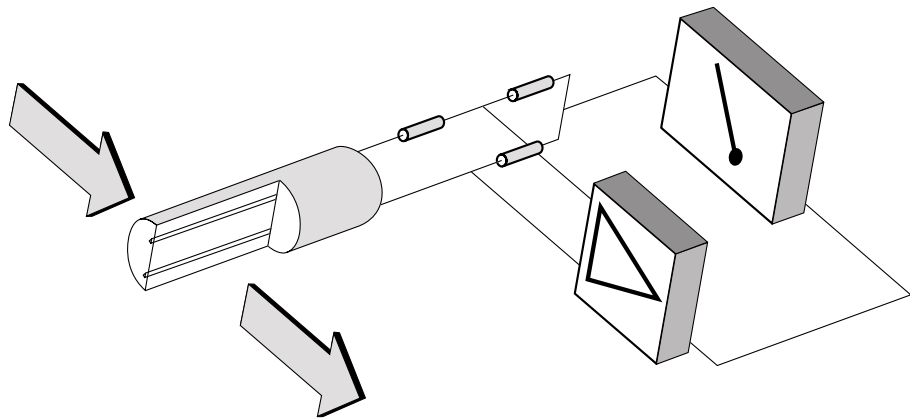
- Dry run pump protection
- Filter control
- Monitoring of lubricating oil flow

### Your benefits

- Nominal diameters from DN25
- Suitable for liquids and gases
- No moving parts – reduced maintenance
- Wide selection of process connections
- Wide dynamic range
- EHEDG approved. Meets 3A requirements
- cCSAus general approval

**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.



**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 2m/sec or 3m/sec  
 Response time: 5 sec rising  
 < 5 sec falling  
 (0-66% step change)

Conversion to Nm<sup>3</sup>/sec (velocity at normalised conditions)

$\frac{\text{Flow (Kg/hr)}}{\text{normal density of gas (Kg/m}^3\text{)}} \times \frac{353.68 \text{ (Constant)}}{d^2 \text{ pipe dia (mm)}}$
$= \frac{500}{1.293} \times \frac{353.68}{54^2}$
$\text{(density of air at } 0^\circ\text{C}+1.013\text{bar A) (Example 2" pipe)}$
$= 46.9\text{Nm}^3\text{/sec}$

**Note:**

Operates from 0.1m/sec

**Gas (probe)**

Figures referenced to air  
 Ranged 0-50Nm<sup>3</sup>/sec  
 Response time: 15 sec rising  
 10 sec falling  
 (0-66% step change)

Example: to convert 350 Nm<sup>3</sup>/hr in 50mm NB pipe to Nm<sup>3</sup>/sec

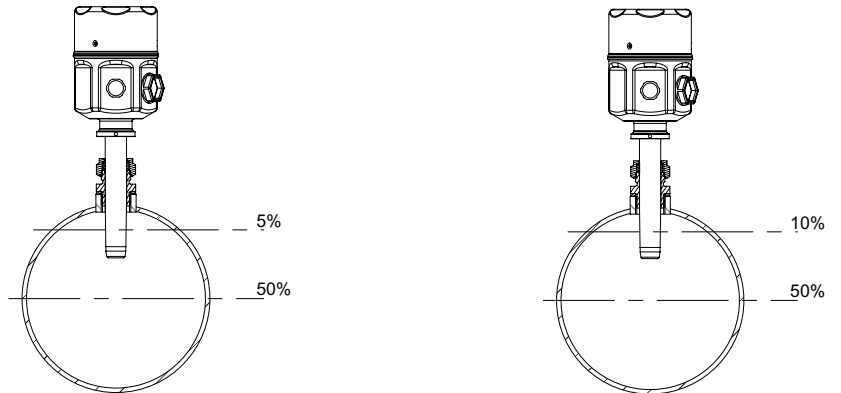
$\text{Flow (Nm}^3\text{/hr)} \times \frac{353.68 \text{ (Constant)}}{d^2 \text{ pipe dia (mm)}}$
$= 350 \times \frac{353.68}{54^2}$
$= 44.145\text{Nm}^3\text{/sec}$

Normal = 0°C+1.013bar A

## Mounting and installation

### Insertion depth (gas and liquid)

For optimum measuring performance, the active area should be inserted to a depth of between 5% and 50% of the internal pipe diameter. The sensor tip should be in contact with the medium at all times.



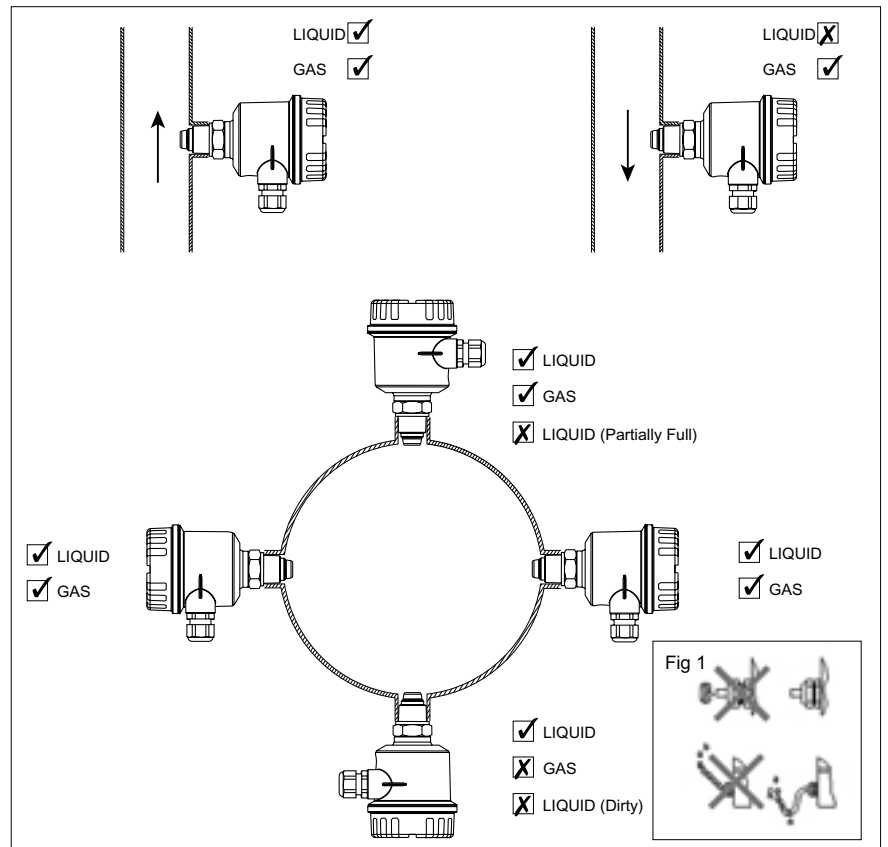
For pipe diameters <DN250

For pipe diameters >DN250

### IP protection guideline

- Housing gasket must be clean and undamaged prior to tightening the lid
- The cables used for connecting must have the correct outer diameter to suit the cable gland seal
- The cable gland must be firmly tightened
- The cable must loop down before entering the cable gland to ensure that no moisture can enter it (fig 1)
- Any cable glands not used are to be replaced with a blind plug
- The protective bush should not be removed from the cable gland

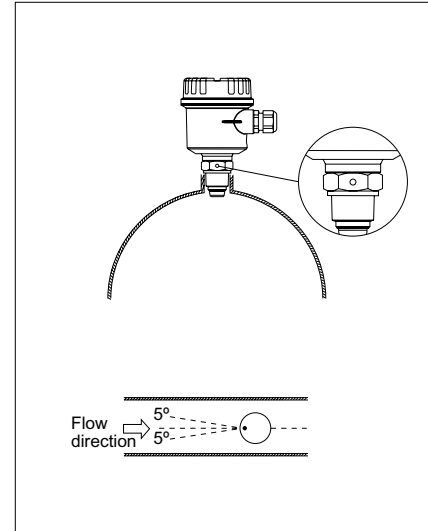
### Planning and installation guidelines



**Planning and installation guidelines**

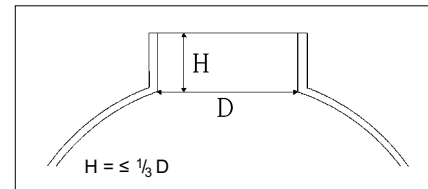
**Sensor**

- Each process connection has an orientation mark. This should be positioned in line facing the oncoming flow
- Sensor should be installed so that the sensing surface is in contact with the flowing medium at all times
- There is an allowed orientation tolerance of +/- 5° from centre
- For liquids, ensure full pipe
- Avoid mounting device where exposure to extreme ambient temperature change occurs, i.e. direct sunlight
- Avoid applications with large process temperature changes
- For gases, avoid areas where condensate collects



**Sanitary sensor**

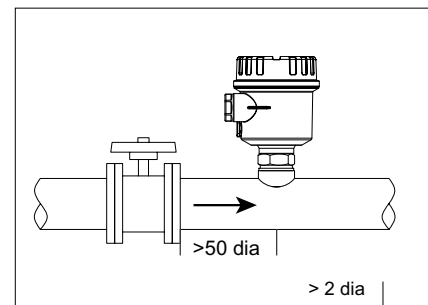
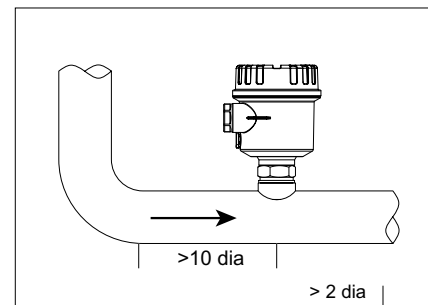
- It is the responsibility of the user to ensure that the volume enclosed by the mounting boss has sufficient dimensions to ensure adequate cleaning takes place



**Mounting and installation (Good Engineering Practice guidelines)**

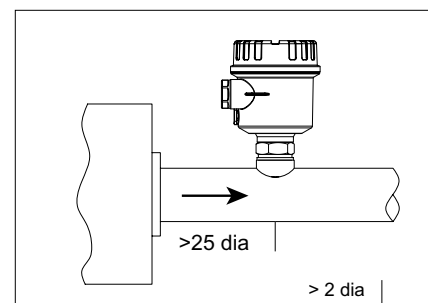
Avoid installing in areas of extreme flow turbulence. For example:

- Directly after bends or expansions/reductions
- Directly downstream of isolation and control valves
- Directly after pumps, fans and compressors



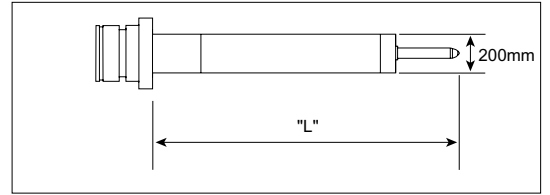
**Note:**

1. All downstream dimensions are provided only as a guideline and wherever possible greater dimensions should be considered
2. The devices will work if installed closer to or even on the bend, but overall performance will be impaired. If flow no flow is required then it is possible to mount the devices closer to bends



**Insertion sensor**

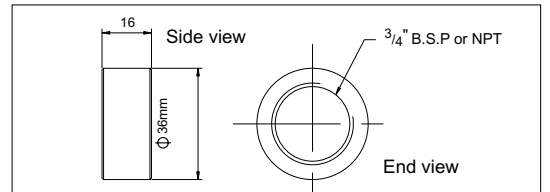
Process connection  
extended sensor



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

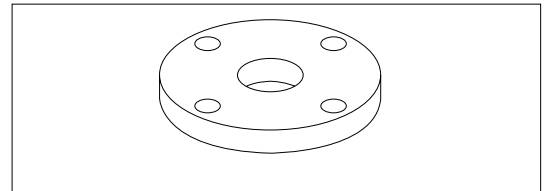
**Mounting boss**

For BSP and NPT threads

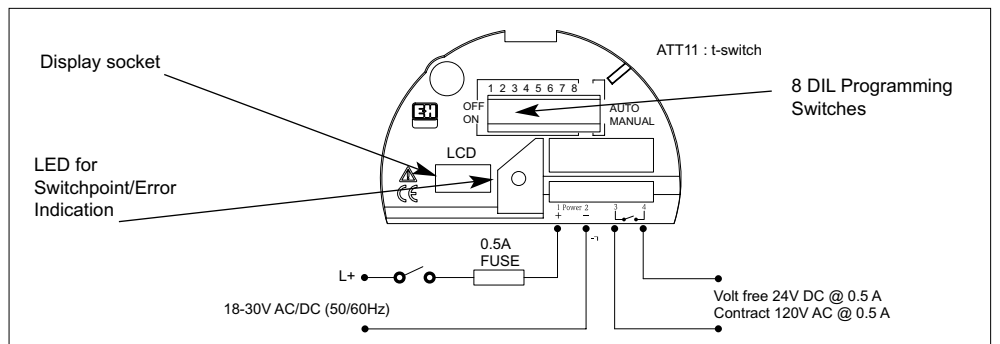


**Accessories**

**Threaded flanges**  
with G<sup>3/4</sup>" 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 1: In order to meet EMC requirements, screened or shielded cable is recommended.

Note 2: The sensor power supply should have a limited power circuit according to NEC Class 2 for North America and CEC Class 2 for Canada.

**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 liquid sensor	Dimensions with gas 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  
For extended insertion sensor  
supplied with compression  
fitting: 20 bar A at 20°C

## Technical data

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### Process conditions

- Nominal process diameters from DN25 (see Note)
  - Process pressure range: 25 Bar A (process fitting dependent)
  - Process temperature range: -10 to +80°C. (For temperatures in excess of 80°C, please contact your local E+H representative)
- 

### 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
  - Hastelloy C (available on request)
  - Aluminium housing (available on request)
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### Process connections

- Parallel thread BSP 3/4" (includes brass 3/4" compression fitting for insertion sensors only)
  - Tapered thread 3/4" NPT (includes brass 3/4" compression fitting for insertion sensors only)
  - Sanitary coupling DN40, 50 to DIN 11851
  - Varivent DN50 to factory standard Tuchenhagen
  - Triclamp 1 1/2", 2" to ISO 2852
  - Aseptic coupling DN50 to DIN 11864
  - Optional: stainless steel compression fitting for insertion sensors
- 

### Performance limits

- Accuracy: ± 5% of factory full scale
  - Repeatability: ± 1% of factory full scale
  - Response time, flat-face: 5 sec rising, < 5 sec falling
  - Response time, probe: 15 sec rising, 10 sec falling
  - Flow ranges, liquid: 2m/sec or 3m/sec ref. to water (see page 2)
  - Flow ranges, gas: 50Nm/sec ref. to air
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### 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
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### Electrical

- Power supply: 18-30V AC/DC (~) 50/60Hz
  - Power consumption: <3W
  - Relay output: normally open (NO), single pole contact
  - The sensor power supply should have a limited power circuit, according to NEC Class 2 for North America and CEC Class 2 for Canada
- 

### Environment

- Storage temperature range: -20 to +80°C (without LCD)
  - Ambient temperature range: -10 to +60°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)
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### Approvals

- EHEDG, all wetted materials FDA listed. Meets the requirements of 3A
  - cCSAus general approval
    - Installation (overvoltage) category 2
    - Pollution degree 2
- 

### Note:

Care should be taken when installing in 25mm (1") pipework. It is advised to seek guidance from your local E+H representative.

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# Performance and selection

## Product structure ATT11-

### Approvals

- A For use in non-hazardous areas
- C cCSAus general approval
- Y Special – please specify

### Sensor form

- 11 Flat-face sensor, 2m/sec (liquid)
- 12 Flat-face sensor, insertion 125mm, 2m/sec (liquid)
- 13 Flat-face sensor, insertion 235mm, 2m/sec (liquid)
- 21 Probe sensor, 50Nm/sec (gas)
- 22 Probe sensor, insertion 125mm, 50Nm/sec (gas)
- 23 Probe sensor, insertion 235mm, 50Nm/sec (gas)
- 31 Flat-face sensor, 3m/sec (liquid)
- 32 Flat-face sensor, insertion 125mm, 3m/sec (liquid)
- 33 Flat-face sensor, insertion 235mm, 3m/sec (liquid)
- 99 Special – please specify

### Process connection

(Material 1.4435/316L unless stated)

- D1 G <sup>3</sup>/<sub>4</sub>" BSP, (boss included)  
(boss suitable for DN40 to DN1000)
- D2 G <sup>3</sup>/<sub>4</sub>" BSP, brass boss included (brass  
compression fitting, insertion sensor only)
- D3 G <sup>3</sup>/<sub>4</sub>" BSP
- D4 G <sup>3</sup>/<sub>4</sub>" BSP stainless steel boss included  
(stainless steel compression fitting, insertion sensor only)
- F1 NPT <sup>3</sup>/<sub>4</sub>" (boss included)  
(boss suitable for DN40 to DN1000)
- F2 NPT <sup>3</sup>/<sub>4</sub>", brass boss included (brass  
compression fitting, insertion sensor only)
- F3 NPT <sup>3</sup>/<sub>4</sub>"
- F4 NPT <sup>3</sup>/<sub>4</sub>", stainless steel boss included  
(stainless steel compression fitting, insertion sensor only)
- J1 DN40 dairy coupling DIN 11851
- K1 DN50 dairy coupling DIN 11851
- L1 Varivent >=DN50
- M1 Tri Clamp 1<sup>1</sup>/<sub>2</sub>" 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<sub>2</sub> duty
- 6 Ra<0.8 µm/150 grit, O<sub>2</sub> duty (3A/EHEDG)
- 7 Standard metal finish, O<sub>2</sub> 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)  
Stainless steel housing only
- Y Special – please specify

### Housing & cable entry

- 4D Polyester housing IP66 M20 gland
- 4H Polyester housing NEMA4X NPT  
1<sup>1</sup>/<sub>2</sub>" entry
- 6D SS304 housing IP66 M20 gland
- 6H SS304 housing NEMA4X NPT 1<sup>1</sup>/<sub>2</sub>" entry
- 9Y Special – please specify

### Documentation

- 1 Standard documentation
- 2 EN10204-2.3 pressure test  
1.5 x pressure rating for 3 minutes
- 3 3.1b extended documentation pack
- 9 Special – please specify

ATT11-

 Order Code

United Kingdom

All other countries

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