chanhvinh.com

TI00125R/09/EN/04.20
71508880
2020-11-30

Technical Information
Flowphant T DTT31, DTT35

Flow switch for the safe and reliable monitoring of mass flow rates and temperature in industrial processes



Applications

Flow switch for monitoring and displaying the relative mass flow rates of liquid media in the range from 0.03 to 3 m/s (0.1 to 9.84 ft/s):

- Flowphant T DTT31 – with threaded connections or compression fitting
- Flowphant T DTT35 – with process connections for hygienic applications

Applications:

- Monitoring of cooling water circuits of pumps, turbines, compressors and heat exchangers
- Monitoring of pump functions
- Leak monitoring in process pipes
- Monitoring of lubrication circuits
- Filter monitoring in the beverages industry

Your benefits

The compact flow switch impresses with state-of-the-technology:

- Virtually zero pressure loss
- FieldCare for quick configuration and reliable storage of device settings
- Optional: Second switch output or 4 to 20 mAanalog output for temperature monitoring or to output the flow as a percentage value
- Onsite function check and process information with digital display on device
- 310° rotatable top housing section and rotatable display allow measured values to be read in all installation positions
- Marine approval
- 3-A mark and EHEDG certificate for DTT35

Endress+Hauser
People for Process Automation

chanhvinh.com

Table of contents

Function and system design 3
Measuring principle 3
Measuring system 3

Input 5
Measured variable 5
Measuring range 5

Output 5
Output signal 5
Signal on alarm 5
Load 5
Range of adjustment 5
Switching capacity 5
Inductive load 6

Power supply 6
Electrical connection 6
Supply voltage 7
Current consumption 7

Performance characteristics 7
Reference operating conditions 7
Maximum measured error 7
Switch point non-reproducibility 9
Temperature gradient 9
Sensor response time 9
Long-term drift 9
Long-term reliability 9
Switch output response time 9
Analog output 9

Installation 10
Orientation 10
Installation instructions 10
Inlet and outlet runs 11

Environment 12
Ambient temperature range 12
Storage temperature 12
Operating altitude 12
Degree of protection 12
Shock resistance 12
Vibration resistance 12
Electromagnetic compatibility (EMC) 12
Electrical safety 12

Process 12
Process temperature range 12
Process pressure range 13
Flow limit 13
Operational range 13

Mechanical construction 13
Design, dimensions 13
DTT31 design, dimensions of process connections 14
DTT35 design, dimensions of process connections 15
Weight 15
Materials 16

Operability 17
Operating concept 17
Local operation 17
Remote operation with PC 19

Certificates and approvals 20
CE mark 20
Other standards and guidelines 20
UL approval 20
Hygiene standard 20
Materials in contact with food/product (FCM) 20
Marine approval 20
Material certification 20

Ordering information 20

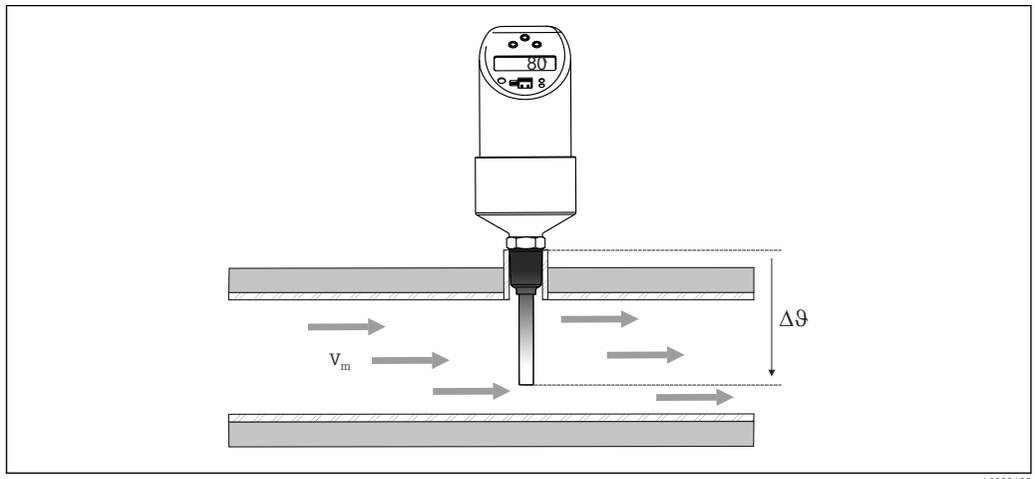
Accessories 22
Device-specific accessories 22
Communication-specific accessories 23

Supplementary documentation 24
Technical Information 24
Operating Instructions 24

chanhvinh.com

Function and system design

Measuring principle

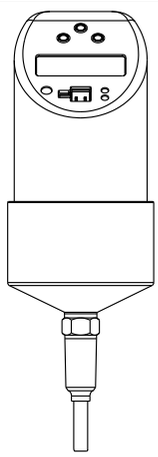
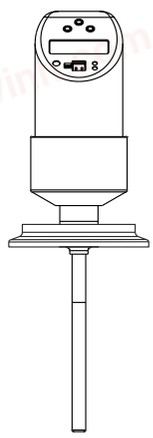


A0023188

The device measures the mass flow of a liquid medium using the calorimetric measurement method. The calorimetric measuring principle is based on the cooling of a heated temperature sensor. Heat is removed from the sensor by forced convection due to medium flowing by. The extent of this heat transfer depends on the flow velocity of the medium and the difference in temperature between the sensor and the medium (King's Law). The higher the flow velocity or the mass flow of the medium, the greater the temperature sensor cooling.

Measuring system

Overview

Flowphant product family	DTT31	DTT35
	 A0005276	 A0023194
Sensing element	RTD	RTD
Field of application	Monitoring of mass flow of water, water-like substances and low-viscosity oils (viscosity: 0.184 to 20 mPa·s; thermal conductivity: 29 to 688mW/m·K). Example: aqueous solution monoethylene glycol (20 vol%) at 20 °C: viscosity: 1.65 mPa·s; thermal conductivity: 512 mW/mK	Monitoring of mass flow of liquid media in hygienic processes (viscosity: 0.184 to 20 mPa·s; thermal conductivity: 29 to 688 mW/mK). Example: aqueous solution monoethylene glycol (20 °C vol%) at 20 °C: viscosity: 1.65 mPa·s; thermal conductivity: 512 mW/mK

chanhvinh.com

Flowphant product family	DTT31	DTT35

Process connection	▪ Compression fitting
	▪ Thread:
	  ▪ G½" and G¼"
	  ▪ ANSI NPT¼" and NPT½"
		Hygiene:
		▪ Conical metal-metal G½"
		▪ Clamp 1" - 1½", 2"
		▪ Varivent F, N
		▪ DIN 11851
		▪ APV Inline

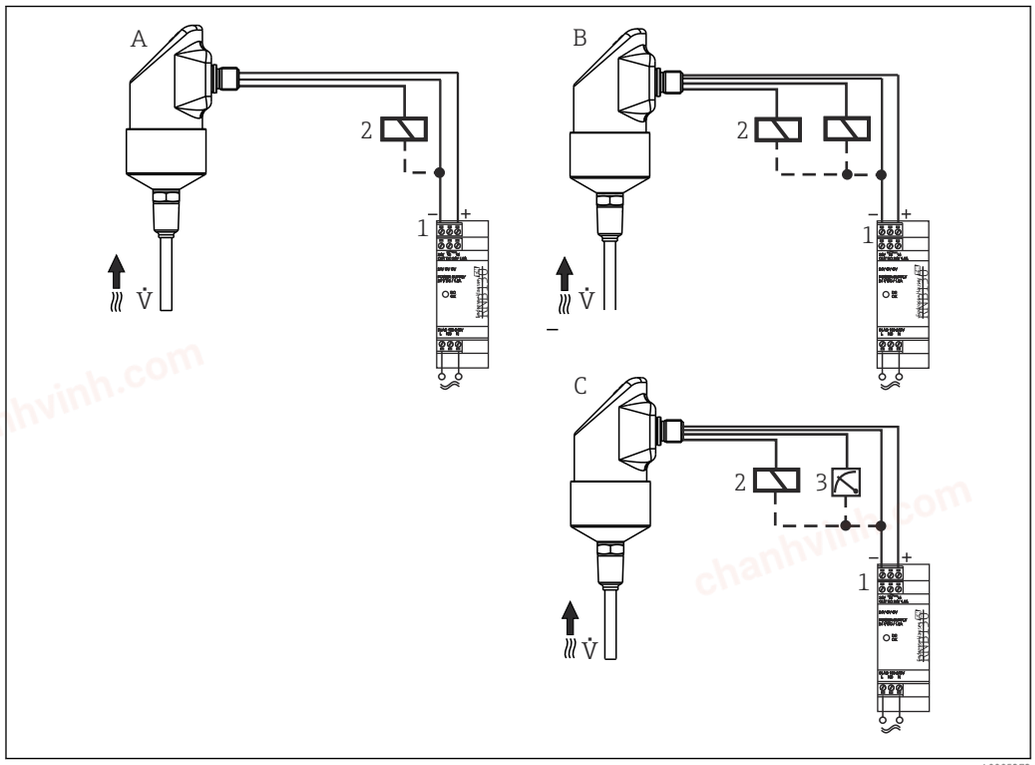
Measuring range	Mass flow as a relative value from 0 to 100%. Process measuring limit for liquids: 0.03 to 3 m/s (0.1 to 9.84 ft/s)	

DC voltage version (DC)

PNP switch output of electronics.

Power supply e.g. with a power supply unit.

Preferably in connection with programmable logic controllers (PLC) or for controlling a relay.



A0005373

A 1x PNP switch output
B 2x PNP switch output
C PNP switch output with additional analog output 4 to 20 mA (active)
1 Transmitter power supply unit, e.g. RNB130
2 Load (e.g. programmable logic controller, process control system, relay)
3 Indicator, e.g. RIA452, or recorder, e.g. Ecograph T, (at the 4 to 20 mA analog output)

1 "Easy Analog RNB130" transmitter power supply
Primary switched-mode power supply for sensors. Space-saving DIN rail mounting as per IEC 60715. Wide-range input: 100 to 240 V_{AC} nominal voltage; output: 24 V_{DC}, max. 30 V in the event of a fault;
Nominal current: 1.5 A. Connection to single-phase alternating current networks or to two phase conductors of three-phase supply networks.

2 Process Indicator RIA452
If you would like to read off the instantaneous temperature value not only locally, but also directly from a control room or in the PC network, for example, the process indicator RIA452 is one possible solution: digital process indicator in 96 to 96 mm (3.78 to 3.78 in) panel-mounted housing for

chanhvinh.com

monitoring and displaying analog measured values with pump control and batch functions. Multicolored 7-digit 14-segment LC display with bargraph representation. Configuration and measured value visualization via RS232 interface and PC configuration software.

3 Universal Graphic Data Manager Ecograph T
If you would not only like to read off the instantaneous temperature value, but also record, analyze and display it directly in a control room or in the PC network, for example, then the following options are available:
Ecograph T Universal Graphic Data Manager in the 144 mm (5.67 in) x 144 mm (5.67 in) panel-mounted housing for the electronic capture, display, recording, analysis, remote transmission and archiving of analog and digital input signals. Multichannel data recording system with multicolored TFT display (145 mm (5.7 in) screen size), galvanically isolated universal inputs (U, I, TC, RTD, pulse, frequency), digital inputs, transmitter power supply, limit relays, communication interfaces (USB, Ethernet, optionally RS232/485), 128 MB internal memory, external SD card and USB stick. The Field Data Manager (FDM) software supports data analysis at the PC, the device can be configured with FieldCare or the integrated Web server.

Input

Measured variable

- Flow velocity of liquid media (calorimetric measuring principle)
- Temperature (RTD), optionally for two switch outputs or additional analog output

Measuring range

Flow	0.03 to 3 m/s (0.1 to 9.84 ft/s), as relative value between 0 to 100%; maximum display resolution: 1%
Temperature	–20 to +85 °C (–4 to +185 °F); display resolution: 1 °C (1 °F)

Output

Output signal

DC voltage version (short-circuit proof version):
- 1x PNP switch output (flow) or
- 2x PNP switch outputs (flow or temperature, configurable) or
- 1x PNP switch output and 1x 4 to 20 mA output, active (flow or temperature, configurable)

The analog output reports the measured flow as a relative value expressed as a percentage of the set measuring range.

Signal on alarm

Analog output: signal on alarm according to NAMUR NE43

Underranging	Linear drop to 3.8 mA
Overranging	Linear rise to 20.5 mA
Sensor breakage; sensor short-circuit	≤3.6 mA or ≥ 21.0 mA (output 21.7 mA is guaranteed for setting ≥ 21.0 mA)
Switch outputs	In the safe state (switch open)

Load

Max. ($V_{power\ supply}$ - 6.5 V) / 0.022 A (current output)

Range of adjustment

Switch output	Switch point (SP) and switchback point (RSP) in increments of 1% with min. hysteresis of 5%
Damping	User-configurable 0 = off (no damping) or 10 to 40 s in increments of 1 s
Unit	%, optionally °C, °F (with two outputs and temperature monitoring)

Switching capacity

DC voltage version:

chanhvinh.com

Switch status ON	Ia ≤ 250 mA
Switch status OFF	Ia ≤ 1 mA
Switching cycles	> 10,000,000
Voltage drop PNP	≤2 V
Overload protection	Switching current checked automatically; switched off in event of overcurrent, switching current checked again every 0.5 s; max. capacitive load: 14 µF for max. supply voltage (without resistive load); periodic disconnection from a protective circuit in event of overcurrent (f = 2 Hz) and "Warning" displayed

Inductive load

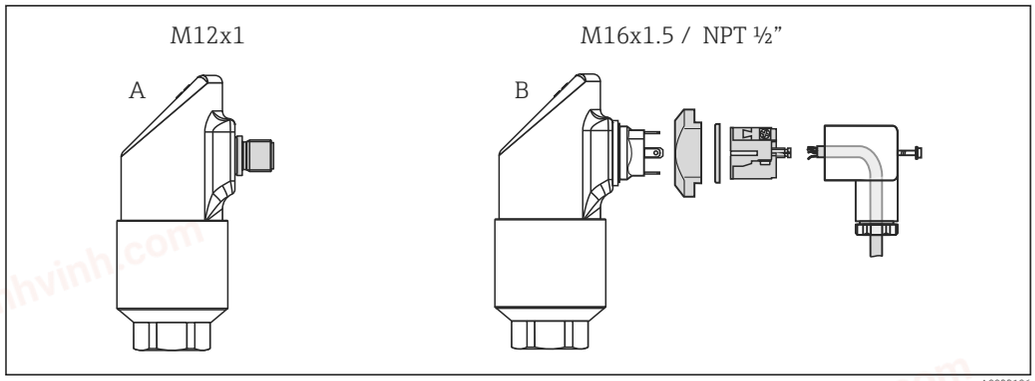
To prevent electrical interference, only operate an inductive load (relays, contactors, solenoid valves) with a direct protective circuit (free-wheeling diode or capacitor).

Power supply

Electrical connection

Plug connector

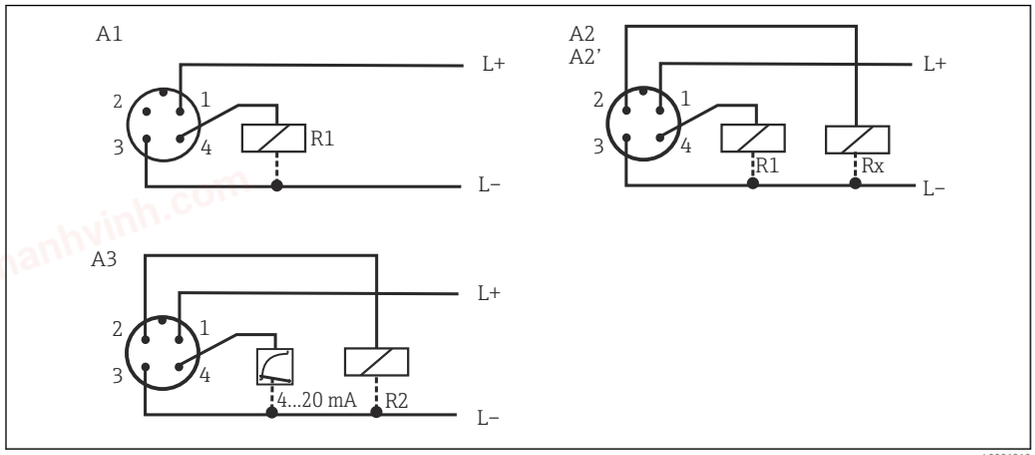
DTT35: According to the 3-A Sanitary Standard and EHEDG electrical connecting cables must be smooth, corrosion-resistant and easy to clean.



A M12x1 connector
B Valve connector M16x1.5 or NPT ½"

Device connection

DC voltage version with M12x1 connector

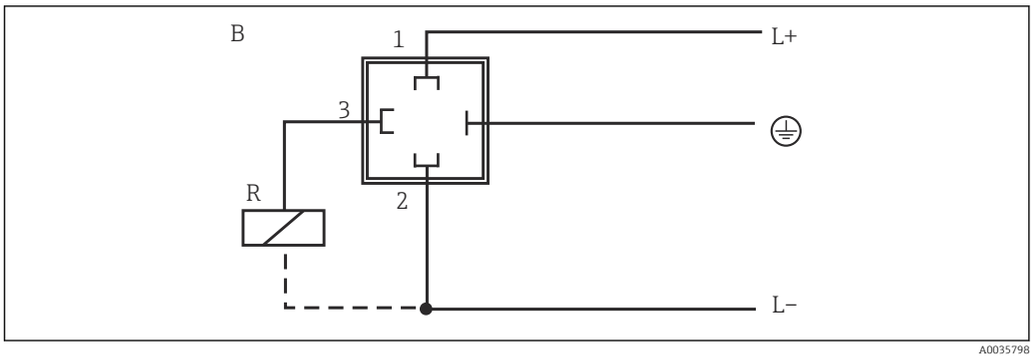


1 *Flowphant T with M12x1 connector*

chanhvinh.com

Item no.	Output setting
A1	1x PNP switch output
A2	A2 2x PNP switch output R1 and Rx (R2)
A2'	2x PNP switch output R1 and Rx (diagnostics/NC contact with "DESINA" setting)
A3	1x PNP switch output and 1x analog output (4 to 20 mA)

DC voltage version with M16x1.5 valve connector or NPT ½"



A0035798

Item no.	Output setting
B	1x PNP switch output

Supply voltage

DC voltage version: 18 to 30 V_{DC} (reverse polarity protection)

Behavior in the event of overvoltage (>30 V)
- The device works continuously up to 34 V_{DC} without any damage
- No damage in event of transient overvoltage up to 1 kV (according to EN 61000-4-5)
- If the supply voltage is exceeded, the specified characteristics are no longer guaranteed

Behavior in the event of undervoltage
If the supply voltage falls below the minimum value, the device switches off in a defined manner (status as if not supplied with power = switch open)

The device may be powered only by a power supply unit that operates using a limited energy circuit in accordance with UL/EN/IEC 61010-1, Section 9.4 and the requirements in Table 18.

Current consumption

< 100 mA (no-load) at 24 V_{DC}, max. 150 mA (no-load); with reverse polarity protection

Performance characteristics

The percentages in the "Performance characteristics" section refer to the full scale value or the set maximum value (100% value) of the monitoring range.

Reference operating conditions

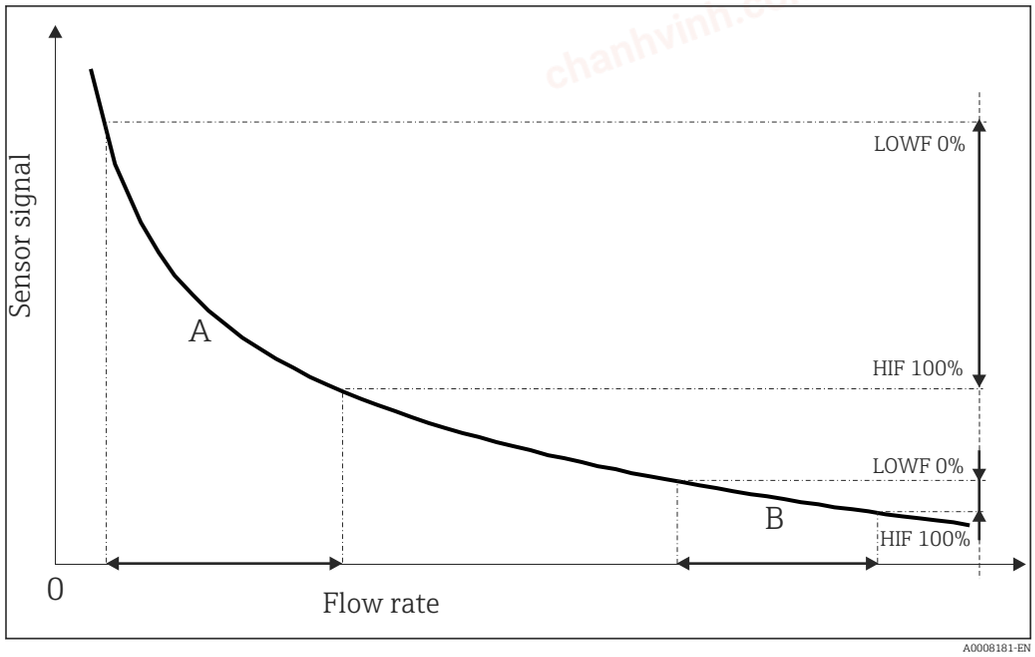
As per DIN IEC 60770 or DIN IEC 61003
T = 25 °C (77 °F) ± 5 °C (9 °F)
- Relative humidity 45 to 75%
- Ambient air pressure 860 to 1060 kPa (124 to 153 psi), water testing medium
- Supply voltage U = 24 V_{DC}

Maximum measured error

Flow

The device records flow velocities relatively in relation to a set flow monitoring range (0 to 100 % as the display value). Absolute measurement of the flow velocity or the mass flow is not possible. The sensitivity of the calorimetric flow sensor changes with the flow velocity of the medium. It increases with decreasing flow velocity (example: in the case of water, the greatest sensor sensitivity is in the range from 0.03 to 0.5 m/s).

chanhvinh.com



2 Standard characteristic

A, B Configured flow monitoring ranges (example)

LOWF 0%: Setting for the minimum flow velocity occurring in monitoring range A or B (0% value)

HIF 100%: Setting for the maximum flow velocity occurring in monitoring range A or B (100% value)

Temperature

- Accuracy2 K (3.6 °F)
- Reproducibility1 K (1.8 °F)
- Influence of ambient temperature 0.05%/K of full scale value

chanhvinh.com

Switch point non-reproducibility

The values indicated only apply to the device itself without factoring in the temperature-dependent change in the thermophysical properties of the medium. For this reason, it is advisable to commission the device and set the switch points at the process temperature → 17

Measuring range (water as medium)	% of maximum value	Influence of medium temperature	Influence of ambient temperature
0.03 to 0.5 m/s (0.1 to 1.6 ft/s)	≤ 2 % [1)]	0.05 %/K	0.04 %/K
0.03 to 1 m/s (0.1 to 3.28 ft/s)	≤3 % [2)]	0.10 %/K	0.05 %/K
0.03 to 2 m/s (0.1 to 6.56 ft/s)	≤5 % [2)]	0.15 %/K	0.10 %/K
0.03 to 3 m/s (0.1 to 9.84 ft/s)	≤10 % [2)]	0.20 %/K	0.30 %/K

1) For a Reynolds number > 10,000

Temperature gradient

If the medium experiences a temperature change of ≥ 0.5 K/min, temporary display drifts are possible which can exceed the specified non-reproducibility values of the switch point.

Sensor response time

6 to 12 s

Long-term drift

< 0.5% per year under reference operating conditions

Long-term reliability

Mean time between failure (MTBF) calculated according to SN29500 (at 40 °C)	
Low stress environment: < 0.1G	227 years
High stress environment: < 0.1G	48 years

Switch output response time

100 ms

Analog output

Maximum measured error	Switch point and display deviation + 0.1%
Rise time t_{90}	≤200 ms
Settling time t_{99}	≤500 ms

chanhvinh.com

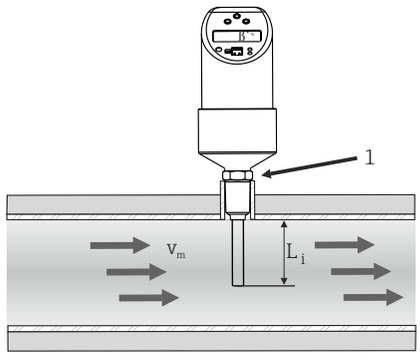
Installation

Orientation

No restrictions. However, self-draining in the process must be guaranteed. If there is an opening to detect leaks at the process connection, this opening must be at the lowest possible point.

Installation instructions

- The sensor tip should be completely surrounded by the medium.
- Position the sensor tip in the area of maximum flow velocity (pipe center).
- Minimum sensor immersion length:
  $L_i \geq 10$ mm (0.4 in).

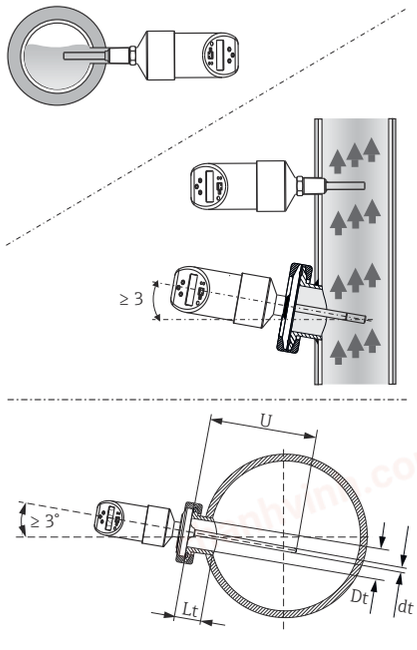


A0006976

3 Installation instructions (example)

Orientation

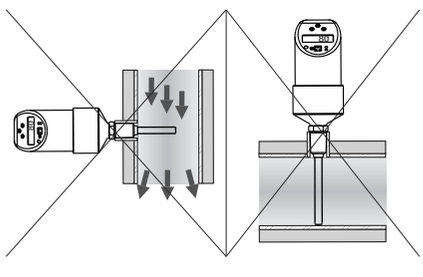
- For horizontal pipes: lateral installation. Installation from above only if the pipe is completely filled with medium
- For vertical pipes: installation in the ascending pipe
- For DDT35: install at an angle of at least 3° to guarantee self-draining



A0044425

4 Correct orientation

Do not install in down pipes open towards the end. The sensor tip should never touch the pipe wall.

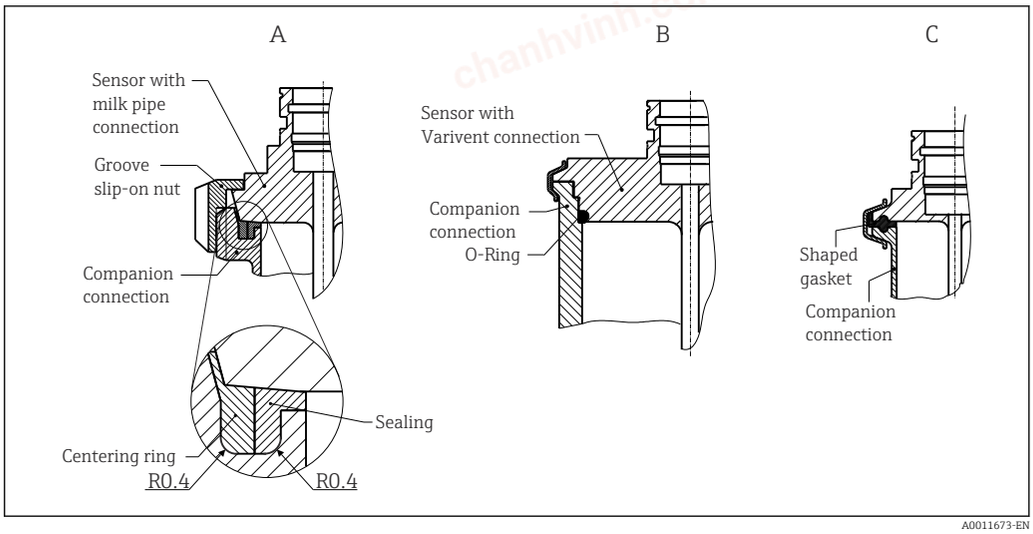


A0006978

5 Incorrect installation!

- The display can be rotated electronically by 180 °.
- The top housing section can be rotated mechanically by up to 310 °.

chanhvinh.com



6 *Detailed installation instructions for hygiene-compliant installation*

A Milk pipe connection according to DIN 11851 (PL, PG, PH connection), only in conjunction with EHEDG-certified and self-centering sealing ring
B Varivent® and APV-Inline (LB, LL, HL connection)
C Clamp as per ISO 2852 (DB, DL connection), EHEDG-certified only in conjunction with seal as per EHEDG position paper

The requirements of the EHEDG and the 3-A Sanitary Standard must be adhered to.

Installation instruction EHEDG/cleanability: Lt ≤ (Dt-dt)

Installation instruction 3-A/cleanability: Lt ≤ 2(Dt-dt)

In the case of weld-in connections, exercise the necessary degree of care when performing the welding work on the process side:

1. Use suitable welding material.
2. Flush-weld or weld with welding radius ≥ 3.2 mm (0.13 in).
3. Avoid crevices, folds or gaps.
4. Ensure the surface is honed and polished, Ra ≤ 0.76 µm (30 µin).

Pay attention to the following when installing the thermometer to ensure that the cleanability is not affected:

1. The installed sensor is suitable for CIP (cleaning in place). Cleaning is carried out in combination with tubing/piping or tank/vessel. In the case of internal tank fixtures using process connection nozzles, it is important to ensure that the cleaning assembly sprays this area directly so that it is cleaned properly.
2. The Varivent® connections enable flush-mounted installation.

NOTICE

The following action must be taken if a sealing ring (O-ring) or seal fails:

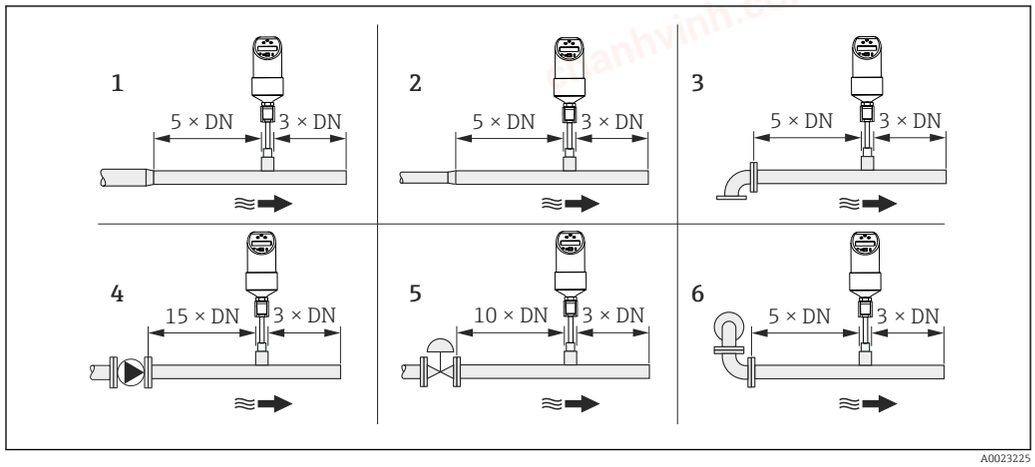
- The thermometer must be removed.
- The thread and the O-ring joint/sealing surface must be cleaned.
- The sealing ring or seal must be replaced.
- CIP must be performed after installation.

Inlet and outlet runs

The thermal measuring principle is sensitive to disturbed flow conditions.

- As a general rule, install the measuring device as far away as possible from any flow disturbances. For further information → ISO 14511.
- If possible, install the sensor upstream from fittings such as valves, T-pieces, elbows etc.
- To attain the specified level of accuracy of the measuring device, the inlet and outlet runs mentioned below must be maintained at the very minimum.
- If several flow disturbances are present, maintain the longest specified inlet run.

chanhvinh.com



1 *Reduction*
2 *Expansion*
3 *90° elbow or T-piece*
4 *Pump*
5 *Control valve*
6 *2x 90° elbow, 2- or 3-dimensional*

Environment

Ambient temperature range

−40 to +85 °C (−40 to +185 °F)

Storage temperature

−40 to +85 °C (−40 to +185 °F)

Operating altitude

Up to 4000 m (13 123.36 ft) above sea level

Degree of protection

IP65	M16 x 1.5 or NPT ½", valve connector
IP66	M12 x 1 connector

Shock resistance

50 g as per DIN IEC 68-2-27 (11 ms)

Vibration resistance

- 20 g as per DIN IEC 68-2-6 (10-2000 Hz)
- 4 g as per marine approval

Electromagnetic compatibility (EMC)

EMC to all relevant requirements of the IEC/EN 61326-series and NAMUR Recommendation EMC (NE21). For details, refer to the Declaration of Conformity.

Maximum fluctuations during EMC-tests: < 1 % of measuring span.

Interference immunity to IEC/EN 61326-series, requirements for industrial areas

Interference emission to IEC/EN 61326-series, electrical equipment Class B

Electrical safety

- Protection class III
- Overvoltage category II
- Pollution level 2

Process

Process temperature range

−20 to +85 °C (−4 to +185 °F)

chanhvinh.com

The sensor can be exposed to process temperatures up to 130 °C (266 °F) without being damaged. The monitoring system switches off automatically at T ≥ 85 °C (185 °F) and starts again at T ≤ 85 °C (185 °F).

Process pressure range

Maximum permissible process pressure P_{max} ≤ 10 MPa = 100 bar (1 450 psi)

The maximum process pressure for the conical metal-metal process connection (MB option) for the device is 1.6 MPa = 16 bar (232 psi).

Flow limit

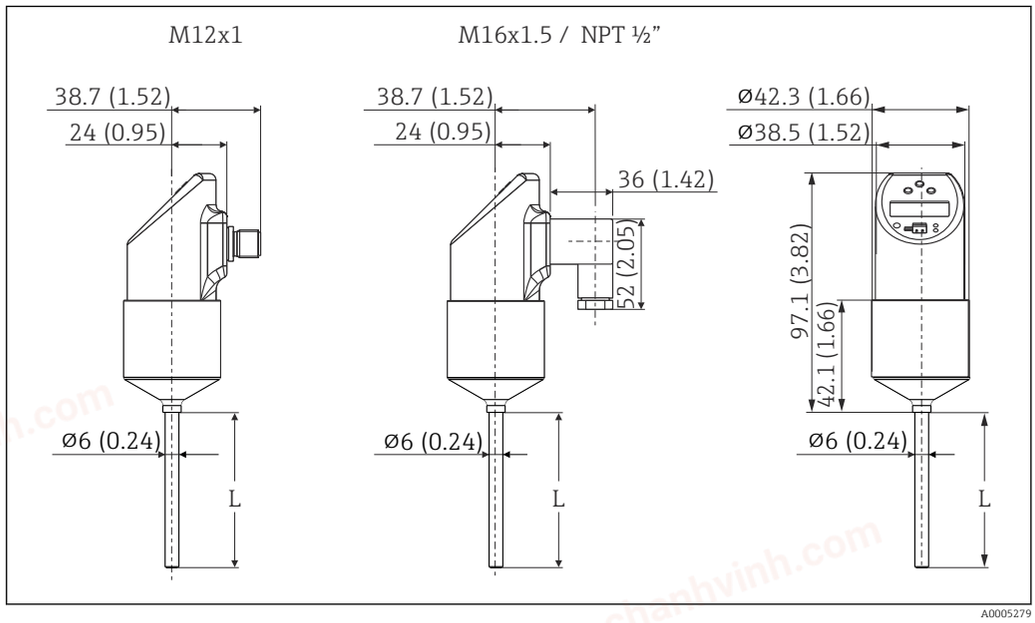
Liquids: 0 to 3.0 m/s (0 to 9.84 ft/s)

Operational range

Liquids: 0.03 to 3.0 m/s (0.1 to 9.84 ft/s)

Mechanical construction

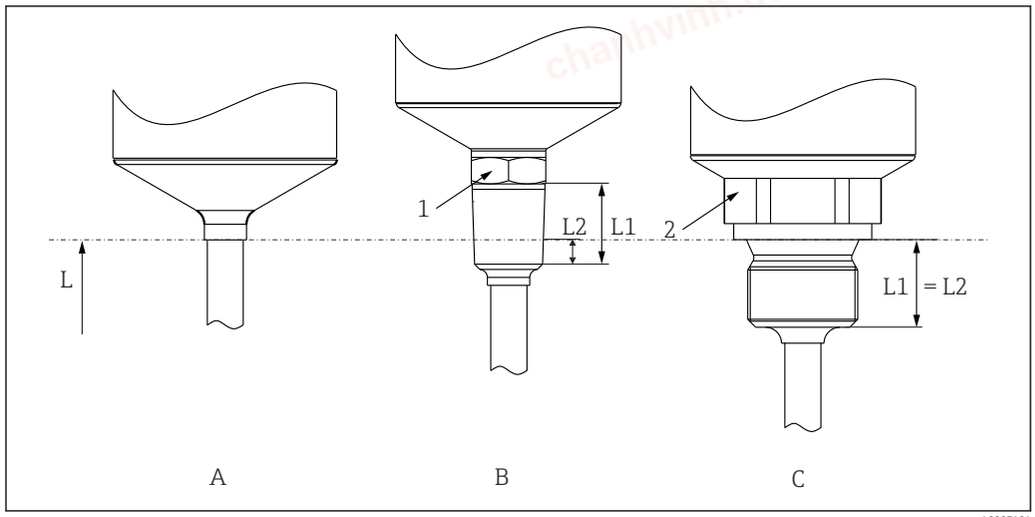
Design, dimensions



All dimensions in mm (in)
L = insertion length
M12x1 connector as per IEC 60947-5-2
Valve connector M16x1.5 or NPT ½" as per DIN 43650A/ISO 4400

chanhvinh.com

DTT31 design, dimensions of process connections



A0007101

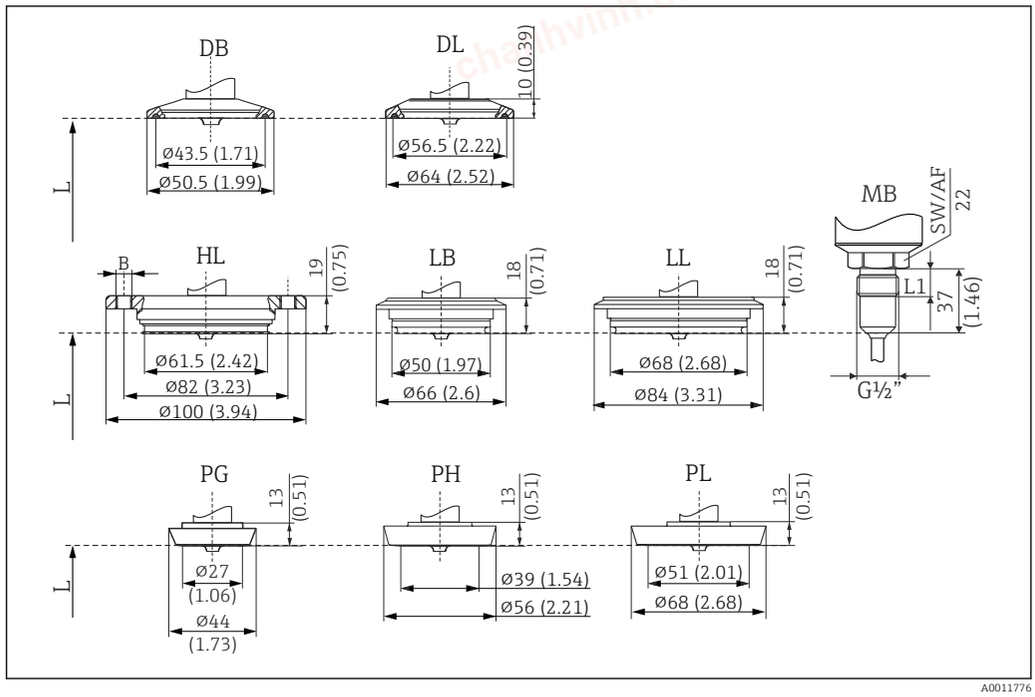
7 *Process connection versions*

L Insertion length

Item no.	Version	Thread length L_1	Screw-in length L_2
A	Without process connection. Suitable welding bosses and compression fittings. → 22	-	-
B	Threaded process connection: ANSI NPT ¼" (1 = AF14) ANSI NPT ½" (1 = AF27)	▪ 14.3 mm (0.56 in) ▪ 19 mm (0.75 in)	▪ 5.8 mm (0.23 in) ▪ 8.1 mm (0.32 in)
C	Threaded process connection, inches, cylindrical as per ISO 228: G¼" (2 = AF14) G½" (2 = AF27)	▪ 12 mm (0.47 in) ▪ 14 mm (0.55 in)	-

chanhvinh.com

DTT35 design, dimensions of process connections



8 Process connection versions

All dimensions in mm (in).
L = insertion length L

Item no.	Process connection versions DTT35	Hygiene standard
DB	Clamp 1" to 1½" (ISO 2852) or DN 25 to 40 (DIN 32676)	3-A marked and EHEDG certified (only in conjunction with self-centering seal according to EHEDG position paper)
DL	Clamp 2" (ISO 2852) or DN 50 (DIN 32676)	
HL	APV Inline, DN50, PN40, 316L, B = bores 6 x Ø8.6 mm (0.34 in) + 2 x M8 thread	With 3-A symbol and EHEDG certification
LB	Varivent F DN25-32, PN 40, 316L	
LL	Varivent N DN40-162, PN 40, 316L	
MB	Metal sealing system for hygienic processes, G½" thread, thread length L1 = 14 mm (0.55 in). Suitable welding boss available as an accessory. 316L	-
PG	DIN 11851, DN25, PN40 (including coupling nut), 316L	3-A marked and EHEDG certified (only in conjunction with self-centering seal according to EHEDG position paper)
PH	DIN 11851, DN40, PN40 (including coupling nut), 316L	
PL	DIN 11851, DN50, PN40 (including coupling nut), 316L	

The VARINLINE® housing connection flange is suitable for welding into the conical or torispherical head in tanks or vessels with a small diameter (≤ 1.6 m (5.25 ft)) and up to a wall thickness of 8 mm (0.31 in). The Varivent type F cannot be used for installations in pipes in combination with the VARINLINE housing connection flange.

Weight

approx. 300 g (10.58 oz), depends on process connection and sensor length

chanhvinh.com

Materials

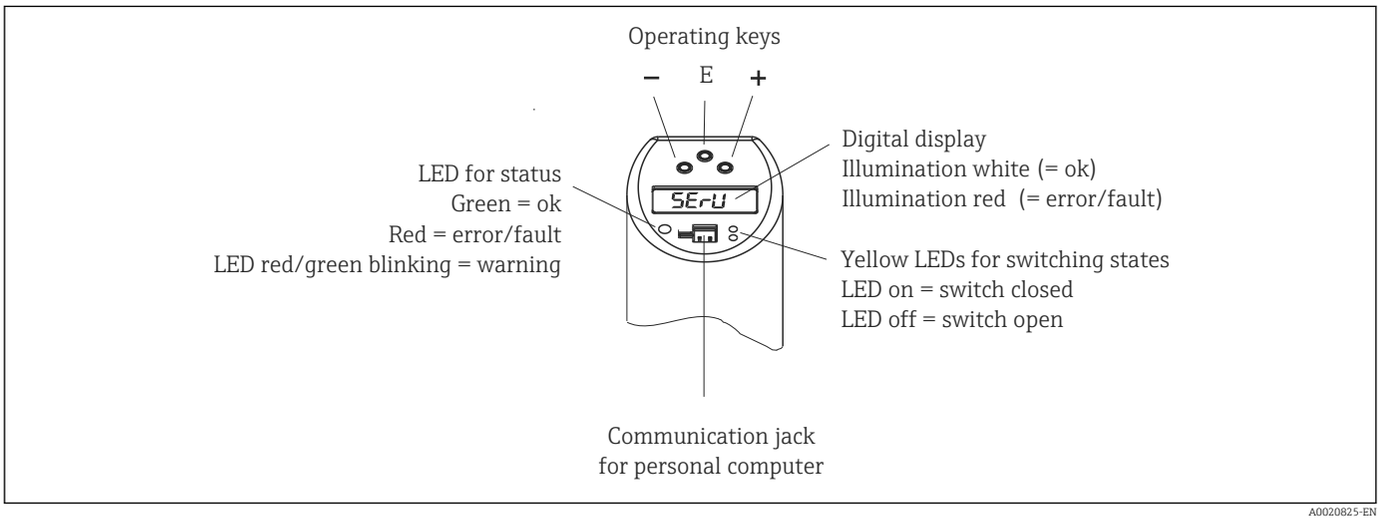
- Process connection AISI 316L
  Surfaces in contact with the process in hygienic version with surface quality Ra ≤ 0.76 µm (30 µin)
- Coupling nut AISI 304
- AISI 316L housing, with surface quality R_a ≤ 0.76 µm (30 µin)
  O-ring between housing and sensor module: EPDM
- Electrical connection
  - M12 connector, exterior AISI 316L, interior polyamide (PA)
  - Valve connector, polyamide (PA)
  - M12 connector, exterior 316L
  - Cable sheath polyurethane (PUR)
  - O-ring between electrical connection and housing: FKM
- Display, polycarbonate PC-FR (Lexan®)
  Seal between display and housing: SEBS THERMOPLAST K®
  Keys, polycarbonate PC-FR (Lexan®)

chanhvinh.com

Operability

Operating concept

Position of the display and operating elements



To prevent damage to the keys, do not operate them with a pointed object!

Local operation

Menu-guided operation using operating keys.

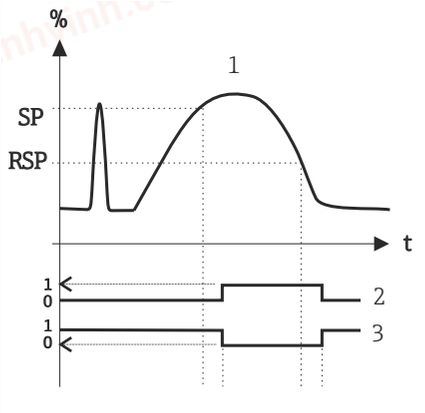
Function group	Function (display)		Description
BASE (basic functions)	**DISP**	Display	Display assignment: ▪ OFF ▪ Display of current measured value or of configured switch point (switch 1) ▪ Display of current measured value or of configured switch point (switch 1) rotated by 180° ▪ Display of current medium temperature ▪ Display of current medium temperature rotated by 180° ▪ Factory setting: **current measured value**
	UNIT	Technical unit	Medium temperature displayed in the unit °C or °F Factory setting: **°C** Only visible if the current medium temperature TMP is selected in the DISP mode.
	TAU	Damping	Measured value damping with regard to display value and output: 0 (no damping) or 9 to 40 s (in increments of 1 s) Factory setting: **0 s**
	DESI	DESINA Only for 2 x PNP switch outputs	Behavior as per DESINA: The PIN assignment of the M12 connector is in accordance with the DESINA Guidelines (DESINA = distributed and standardized installation technology for machine tools and manufacturing systems) Factory setting: **NO**
CAL Calibration	**HIF**	Learn High Flow	Setting for the maximum flow rate that occurs. 100% value
	LOWF	Learn Low Flow	Setting for the maximum flow rate that occurs. 0% value
Switch outputs OUT (setting for the 1st output) OUT2 (setting for the 2nd output) **OUT** Output 2	**MODE**	Switching mode	Process value for analog output: flow or temperature Factory setting: **flow**
	UNIT	Technical unit	Temperature unit selection (°C or °F) Function is only visible if the switching mode MODE is set to temperature TEMP in the 2nd output. Factory setting: **°C**

chanhvinh.com

Function group	Function (display)		Description
	FUNC **FNC2**	Function 1 Function 2, optional	Switch output function: Hysteresis function NC contact or NO contact (see the following diagram)
	SP **SP2**	Switch point Switch point 2, optional	Enter value 5 to 100% in increments of 1%, only if High and Low Flow (HIF and LOWF) have been configured beforehand. Factory setting: **50 %** **or optionally for SP2:** Enter value −15 to +85 °C (−5 to +185 °F) in increments of 1 °C (1 °F) if the switching mode MODE is set to temperature TEMP. Factory setting: **55 °C**
	SPL **SP2L**	Switch point learn Switch point learn 2, optional	Take current flow rate as SP.
	RSP **RSP2**	Switchback point Switchback point 2, optional	Enter value 0 to 95% in increments of 1%. Factory setting: **40%** Value must be at least 5% less than switch point 2 (SP2). **or optionally for RSP2:** Enter value −20 to +80 °C (−4 to +176 °F) in increments of 1 °C (1 °F) if the switching mode MODE is set to temperature TEMP. Factory setting: **50 °C** Value must be at least 5 °C (9 °F) less than switch point SP2.
	TSP **TSP2**	Switch point delay Switch point 2 delay, optional	Can be configured as required from 0 to 99 s in increments of 1 s Factory setting: **0 s**
	TRSP **TRSP2**	Switchback point delay Switchback point 2 delay, optional	Can be configured as required from 0 to 99 s in increments of 1 s Factory setting: **0 s**
Analog output 4-20 (setting for the analog output, optional)	**MODE**	Output mode	Process value for analog output: flow or temperature Factory setting: **flow**
	FCUR	Failure current	Specify the failure current: Choice of MIN = ≤3.6 mA MAX = ≥21.7 mA HOLD = last current value Factory setting: **MAX**
SERV (service functions)	**PRES**	Reset	Reset all entries to the delivery settings.
	REV'C	Static revision counter	Configuration counter, incremented each time the configuration is changed.
	LOCK	Locking code	Enter the device locking code.
	Code	Edit locking code	Locking, only visible if the locking code is valid.
	STAT	Device status	
	LSTA	Last error	Displays the last error to occur.
Simulation: Version 2 x switch output	**SIMU** **SIM2**	Simulation 1 Simulation 2, optional	Simulation switch output 1: on/off with display, optionally corresponding to switch output 2.
Simulation: Version 1 x analog output and 1 x switch output	**SIM** **SIMA**	Simulation 1 - switch output Simulation 2 - analog output	Simulation switch output 1: on/off with display Simulation values for analog output in mA.

chanhvinh.com

Functions of the switch point
- Hysteresis function: The hysteresis function enables two-point control via a hysteresis. Depending on the mass flow, the hysteresis can be set via the switch point SP and switchback point RSP
- NO contact or NC contact: This switch function can be selected as required.
- Delay times for switch point SP and switchback point RSP can be configured in increments of 1 s. This makes it possible to filter out undesired temperature peaks of short duration or of high frequency

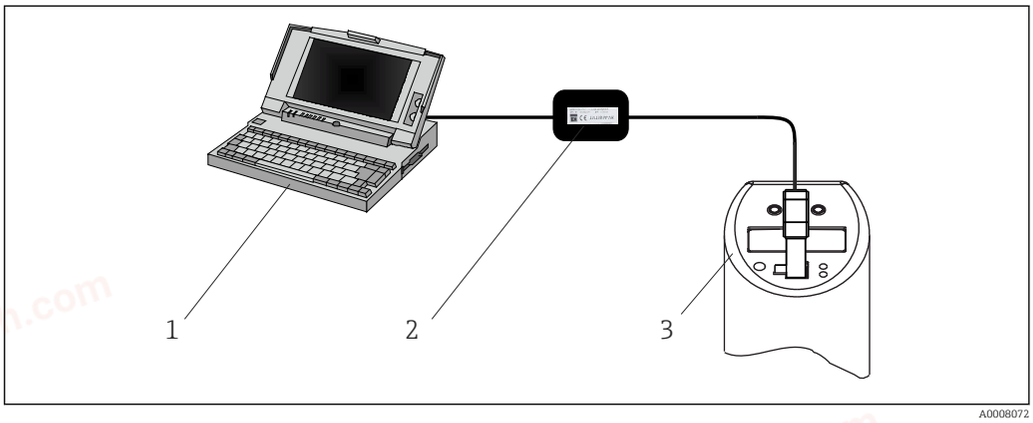


9 *SP switch point; RSP switchback point*

1 Hysteresis function
2 NO contact
3 NC contact

Remote operation with PC

Operation, visualization and maintenance with PC and FieldCare PC configuration software.



10 *Operation, visualization and maintenance with PC and configuration software*

1 PC with FieldCare configuration software
2 Configuration kit TXU10-AA or FXA291 with USB port
3 Flow switch

In addition to the operating options listed in the previous "Local operation" section, further information about the Flowphant T is available via the FieldCare configuration software:

Function group	Function (display)	Description
SERV (service function)	Switching operations 1 Switching operations 2, optional	Number of changes in the switching state for switch output 1; optionally for switch output 2
INFO (device information)	TAG 1 TAG 2, optional	Tagging, 18-digit
	Order code	Order code
	Serial number	Device serial number
	Sensor serial number	Sensor serial number
	Electronics serial number	Electronics serial number
	Device version	Displays overall version
	Hardware revision	Hardware version
	Software revision	Software version

chanhvinh.com

Certificates and approvals

CE mark

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.

Other standards and guidelines

- IEC 60529:
  Degrees of protection provided by enclosures (IP code)
- IEC/EN 61010-1:
  Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures
- IEC/EN 61326 series:
  Electromagnetic compatibility (EMC requirements)
- NAMUR:
  International user association of automation technology in process industries (www.namur.de)
- NEMA:
  United States National Electrical Manufacturers Association.

UL approval

More information under UL Product iq™, search for keyword "E225237")

Hygiene standard

- EHEDG certification, type EL CLASS I. EHEDG certified/tested process connections → 14
- 3-A Authorization No. 1144, 3-A Sanitary Standard 74-07. Listed process connections → 15

Materials in contact with food/product (FCM)

The materials of the thermometer in contact with food/product (FCM) comply with the following European regulations:

- (EC) No. 1935/2004, Article 3, Paragraph 1, Articles 5 and 17 on materials and articles intended to come into contact with food.
- (EC) No. 2023/2006 on good manufacturing practice (GMP) for materials and articles intended to come into contact with food.
- (EC) No. 10/2011 on plastic materials and articles intended to come into contact with food.
- All surfaces in contact with the medium are free from materials derived from bovine animals or other livestock (ADI/TSE)

Marine approval

Information on the Type Approval Certificates currently available (DNVGL, BV, etc.) can be obtained from the sales organization.

Material certification

The material certificate 3.1 (according to standard EN 10204) can be requested separately. The "short form" certificate includes a simplified declaration with no enclosures of documents related to the materials used in the construction of the single sensor and guarantees the traceability of the materials through the identification number of the thermometer. The data related to the origin of the materials can subsequently be requested by the client if necessary.

Ordering information

Detailed ordering information is available for your nearest sales organization www.addresses.endress.com or in the Product Configurator under www.endress.com :

1. Click Corporate
2. Select the country
3. Click Products
4. Select the product using the filters and search field
5. Open the product page

chanhvinh.com

The Configuration button to the right of the product image opens the Product Configurator.

Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

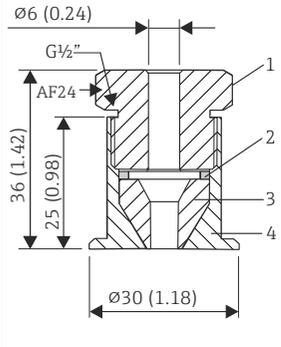
chanhvinh.com

Accessories

Device-specific accessories

Welding boss with sealing taper

- Collar welding boss movable with sealing taper, washer and pressure screw G½"
- Material of parts in contact with the process: 316L, PEEK,
- Max. process pressure 10 bar (145 psi)
- Order number with pressure screw 51004751
- Order number without pressure screw 51004752

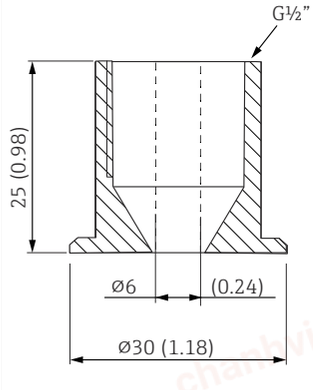


11 *Dimensions in mm (in)*

1 *Pressure screw, 303/304*
2 *Washer, 303/304*
3 *Sealing taper, PEEK*
4 *Collar welding boss, 316L*

Collar welding boss

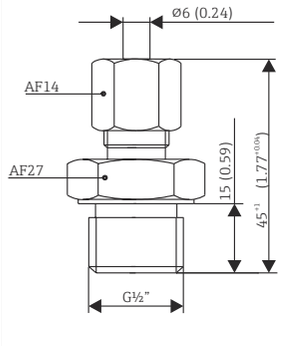
- Collar welding boss movable with sealing taper and washer
- Material of parts in contact with the process: 316L, PEEK
- Max. process pressure 10 bar (145 psi)
- Order number without pressure screw: 51004752



12 *Dimensions in mm (in)*

Compression fitting

- Movable clamping ring, various process connections
- Material of compression fitting and parts in contact with the process: 316L
- Order number: TA50-..... (depending on the process connection)



13 *Dimensions in mm (in)*

chanhvinh.com

Version	F in mm (in)		L ~ in mm (in)	C in mm (in)	B in mm (in)	Clamping ring material	Max. process temperature	Max. process pressure
TA50	G½"	SW/AF 27	47 (1.85)	-	15 (0.6)	SS316 [1]	800 °C (1472 °F)	40 bar at 20 °C (580 psi at 68 °F)
						PTFE [2]	200 °C (392 °F)	5 bar at 20 °C (72.5 psi at 68 °F)
	G¾"	SW/AF 32	63 (2.48)	-	20 (0.8)	SS316 [1]	800 °C (1472 °F)	40 bar at 20 °C (580 psi at 68 °F)
						PTFE [2]	200 °C (392 °F)	5 bar at 20 °C (72.5 psi at 68 °F)
	G1"	SW/AF 41	65 (2.56)	-	25 (0.98)	SS316 [1]	800 °C (1472 °F)	40 bar at 20 °C (580 psi at 68 °F)
						PTFE [2]	200 °C (392 °F)	5 bar at 20 °C (72.5 psi at 68 °F)
	NPT½"	SW/AF 22	50 (1.97)	-	20 (0.8)	SS316 [1]	800 °C (1472 °F)	40 bar at 20 °C (580 psi at 68 °F)
	R½"	SW/AF 22	52 (2.05)	-	20 (0.8)	PTFE [2]	200 °C (392 °F)	5 bar at 20 °C (72.5 psi at 68 °F)
	R¾"	SW/AF 27	52 (2.05)	-	20 (0.8)	PTFE [2]	200 °C (392 °F)	5 bar at 20 °C (72.5 psi at 68 °F)

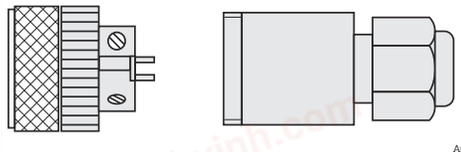
1) SS316 clamping ring: can only be used once. Once released the compression fitting cannot be repositioned on the thermowell. Fully adjustable immersion length on initial installation

2) PTFE/Elastosil® clamping ring: reusable; once loosened, the compression fitting can be moved up or down on the thermowell. Fully adjustable immersion length

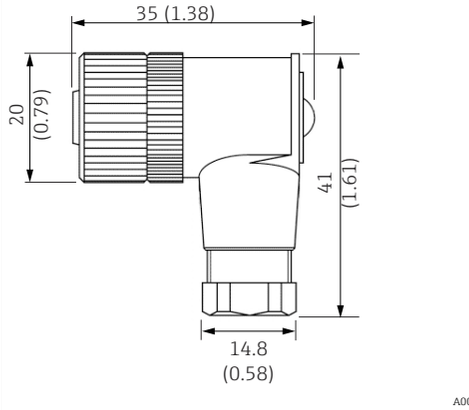
Communication-specific accessories

Coupling; connecting cable

- Coupling M12x1; straight
- Connection to M12x1 housing connector
- Materials: body PA, coupling nut CuZn, nickel-plated
- Degree of protection (connected): IP 67
- Order number: 52006263



- M12x1 coupling; elbowed, for termination of connecting cable by user
- Connection to M12x1 housing connector
- Materials: body PBT/PA,
- Coupling nut GD-Zn, nickel-plated
- Degree of protection (connected): IP 67
- Order number: 51006327

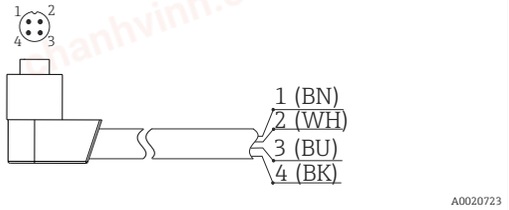


14 *Dimensions in mm (in)*

chanhvinh.com

- PVC cable (terminated), 4 x 0.34 mm² with M12x1 coupling, elbowed, screw plug, length 5 m (16.4 ft)
- Degree of protection: IP67
- Order number: 51005148

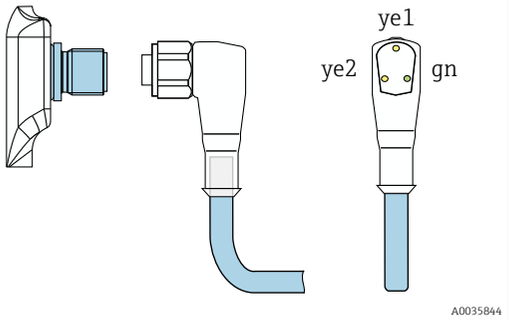
Core colors:
- 1 = BN brown
- 2 = WH white
- 3 = BU blue
- 4 = BK black



- PVC cable, 4x 0.34 mm²with M12x1 coupling, with LED, elbowed,
- 316L screw plug, length5 m (16.4 ft), specially for hygiene applications,
- Degree of protection (connected): IP69K
- Order number: 52018763

Display:
- gn: device is operational
- ye1: switch status 1
- ye2: switch status 2

Not suitable for 4 to 20 mA analog output!



Configuration kit

- Configuration kit for PC-programmable transmitters;
  Configuration software and interface cable for PC with USB port and 4-pin post connector
  Order code: TXU10-AA
- "Commubox FXA291" configuration kit with interface cable for PC with USB port. Intrinsically safe CDI interface (Endress+Hauser Common Data Interface) for transmitters with 4-pin post connector. Suitable configuration software is FieldCare for example.
  Order code: **FXA291**

Configuration software

The FieldCare 'Device Setup' configuration programs can be downloaded free of charge from the Internet at:

www.produkte.endress.com/fieldcare

FieldCare 'Device Setup' can also be ordered from an Endress+Hauser sales office.

Supplementary documentation

Technical Information

- Easy Analog RNB130: TI120R/09/en
- Process display unit RIA452: TI113R/09/en
- Universal data manager Ecograph T: TI01079R/09/en
- Data logger Minilog B: TI089R/09/en

Operating Instructions

Flow switch Flowphant T DTT31, DTT35: BA00235R/09/en

chanhvinh.com

chanhvinh.com

chanhvinh.com

chanhvinh.com

71508880

www.addresses.endress.com

Endress+Hauser

People for Process Automation