Level	Pressure	Flow	Temperature	Liquid Analysis	Registration	Systems Components	Services	Solutions	

Technical information

Flow switch
Flowphant® T DTT31, DTT35

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

Application

Flow switch for monitoring and displaying 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 thread connections or coupling
Flowphant® T DTT35
– with process connections for hygienic applications

Application examples:
- Monitoring cooling water circulation systems of pumps, turbines, compressors and heat exchangers
- Monitoring pump functionality
- Leak monitoring in process lines
- Monitoring lubrication systems
- Filter monitoring in the beverage industry

Benefits at a glance

This compact flow switch impresses with the latest in technology being used:

- Practically no pressure loss
- Configuration software ReadWin® 2000 or FieldCare for quick configuration and reliable storage of device settings
- Optional: 4 to 20 mA analog output to read out the flow rate as percentage value
- Optional: second switch output or 4 to 20 mA analog output for temperature monitoring
- Function check and process information onsite thanks to digital display at device
- Top housing section which can be rotated 310° and rotatable display make it possible to read the measured values in all orientations
- DTT35: 3-A marked
- CIP-compliant up to 130 °C (266 °F)

Endress+Hauser

People for Process Automation

Function and system design

Measuring principle

T09-DTT31xxx-15-xx-xx-xx-000
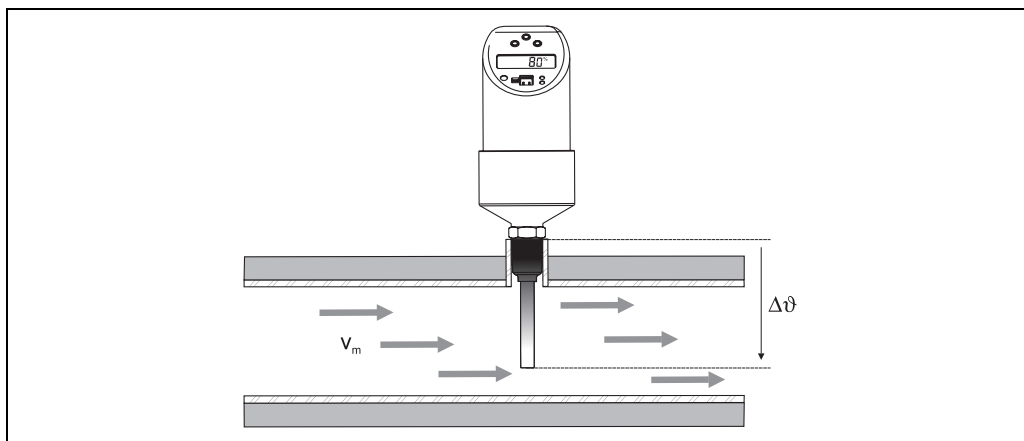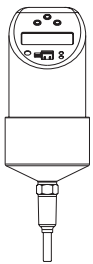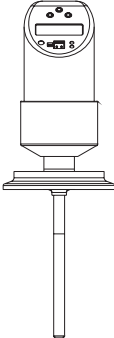
The device measures the mass flow of a liquid medium with the calorimetric measurement method. The calorimetric measuring principle is based on cooling a heated temperature sensor. Heat is removed from the sensor by forced convection due to medium flowing by. The extent of this heat transfer depends on the medium velocity and the difference in temperature between the sensor and medium (King's law). The higher the velocity or the mass flow of the medium, the greater the temperature sensor cooling.

Measuring system

Overview

Flowphant® product family	DTT31	DTT35
	a0005276	T09-TTR35xxx-14-xx-xx-xx-000
Measurement probe	RTD	RTD
Field of application	Monitoring of the mass flow of water, water-like substances and low-viscosity oils.	Monitoring of the mass flow of liquid media in hygienic processes.

Process connection	■ Compression fitting
	■ Thread:
	  – G½" and G¼"
	  – ANSI NPT ¼" and NPT ½"
		■ Hygiene:
		  – Conical metal-metal G½"
		  – Clamp 1" - 1½", 2"
		  – Varivent F, N
		  – DIN 11851
		  – APV-Inline

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

DC voltage version

PNP switch output of electronics.
Power supply e.g. with a power supply unit.
Preferably in conjunction with programmable logic controllers (PLC) or for controlling a relay.
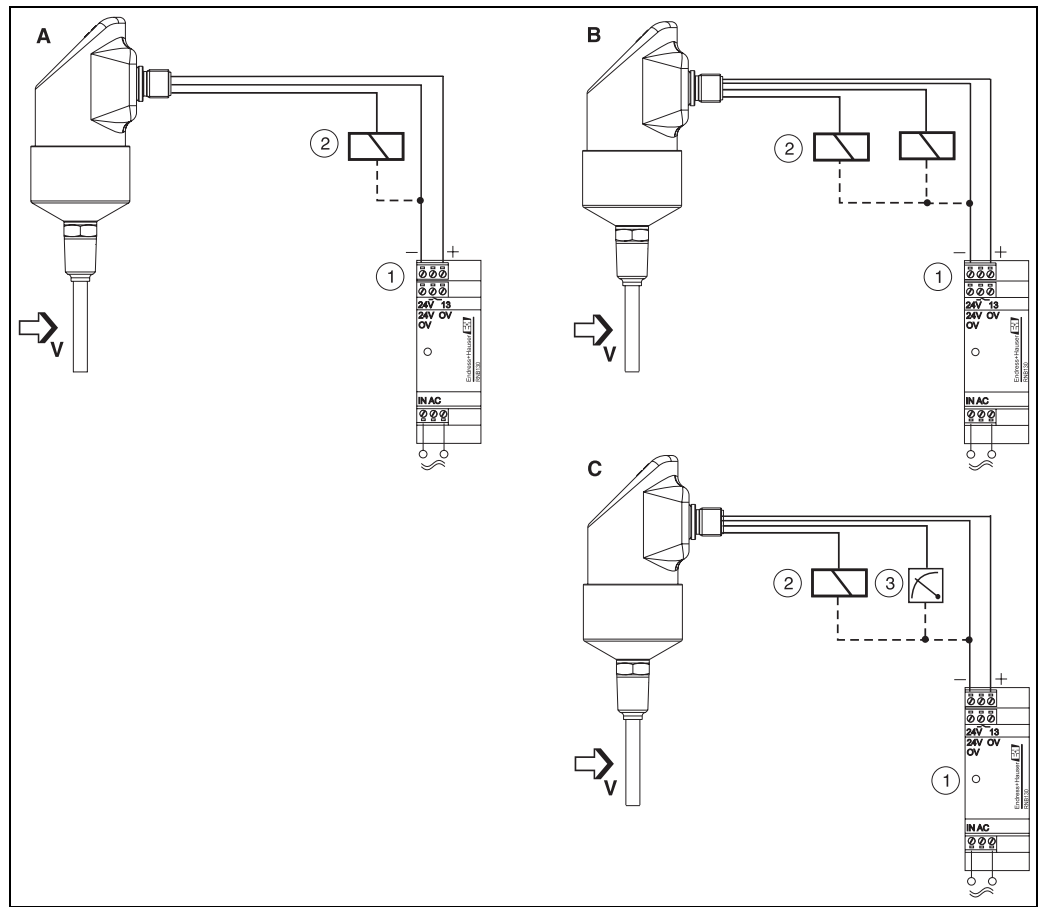
A: 1x PNP switch output
B: 2x PNP switch output
C: PNP switch output with additional analog output 4 to 20 mA
① *Transmitter power supply unit, e.g. RNB130*
② *Load (e.g. programmable logic controller, process control system, relay)*
③ *Display e.g. RIA452 or recorder e.g. Ecograph T or Minilog B (at 4 to 20 mA analog output)*

① *Power supply "Easy Analog RNB130":*

Primary switched-mode power supply for sensors. Space saving DIN rail mounting as per IEC 60715.
Wide-range nominal voltage input: 100 to 240 V AC; Output: 24 V DC, max. 30 V in the event of a fault;
Nominal output current: 1.5 A. Connection to monophased a.c. networks or to two phase conductors of three-phase supply networks.

③ *Process display RIA452:*

If you would like to read off the instantaneous value of the temperature not only locally, but also e.g. directly from a control room or in the PC network, then one suitable device is the process display RIA452:
Digital process display unit in 96 x 96 mm (3.78 x 3.78") panel mounted housing for monitoring and displaying analog measured values with pump control and batch functions. Multicoloured 7-digit 14-segment LC display with large bargraph. Configuration and visualisation via RS232 interface and ReadWin® 2000 PC operating software.

③ *Multi Channel Recorder Ecograph T, Data logger Minilog B:*

If you would like to read off the instantaneous value of the temperature not only locally, but also record, analyze and display it e.g. directly from a control room or in the PC network, then the following devices are suitable:

- Multi Channel Recorder Ecograph T
  144 x 144 mm (5.67 x 5.67") panel mounted housing for electronic acquisition, display, recording, analysis, remote transmission and archiving of analog and digitalinput signals. Data recording system with CompactFlash card and multi-coloured LCD display (120 mm / 4.7" screen size). Configuration and visualisation via interface (USB, Ethernet, RS232/485) and ReadWin® 2000 PC operating software.
- Data logger Minilog B
  Battery powered measured value collector with 2 input channels for storing analog and digital values. Internal memory 128 kB for max. 84000 measured values. Configuration and visualisation via RS232 interface and ReadWin® 2000 PC operating software. Optionally with telealarm function.

Input

Measured variable	- Flow velocity of liquid media (calorimetric measuring principle) - Temperature (RTD), optional for two switch outputs or additional analog output
Measuring range	- Flow: 0.03 m/s to 3 m/s (0.1 to 9.84 ft/s), as relative value between 0 and 100%; maximum display resolution: 1% - Temperature: –20 °C 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, adjustable) or - 1x PNP switch output and 1x 4 bis 20 mA output, active (flow or temperature, adjustable) Note! The analog output reads out the measured flow rate as relative value in percentage of the adjusted measuring range.
Signal on alarm	Signal on alarm as per NAMUR NE43 - Underranging: Linear drop to 3.8 mA - Overranging: Linear rise to 20.5 mA - Sensor break; sensor short-circuit: $\leq$ 3.6 mA or $\geq$ 21.0 mA (at settings $\geq$ 21.0 mA, 21.7 mA output is guaranteed) - Switch outputs: at safety condition (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: freely adjustable: 0 = off (no damping) or 10 to 40 s in increments of 1 second - Unit: %, optional °C, °F (with two outputs and temperature monitoring)
Switching capacity	DC voltage version: - Switch status ON: $I_a \leq 250$ mA, switch status OFF: $I_a \leq 1$ mA - Switching cycles: > 10,000,000 - Voltage drop PNP: ≤ 2 V - Overload protection Automatic testing of switching current; output is switched off in case of overcurrent, the switching current is tested again every 0.5 s; max. capacitance load: 14 µF for max. supply voltage (without resistive load) Periodic disconnection from a protective circuit in event of overcurrent (f = 2 Hz) and indication of 'Warning'
Inductive load	To prevent electrical interference, only operate an inductive load (relays, contactors, solenoid valves) when directly connected to a protective circuit (free-wheeling diode or capacitor).

Power supply

Electrical connection

Plug connection

Note!
DTT35: Electrical cables must comply with 3-A standard, must be smooth, corrosion resistand and cleanable.

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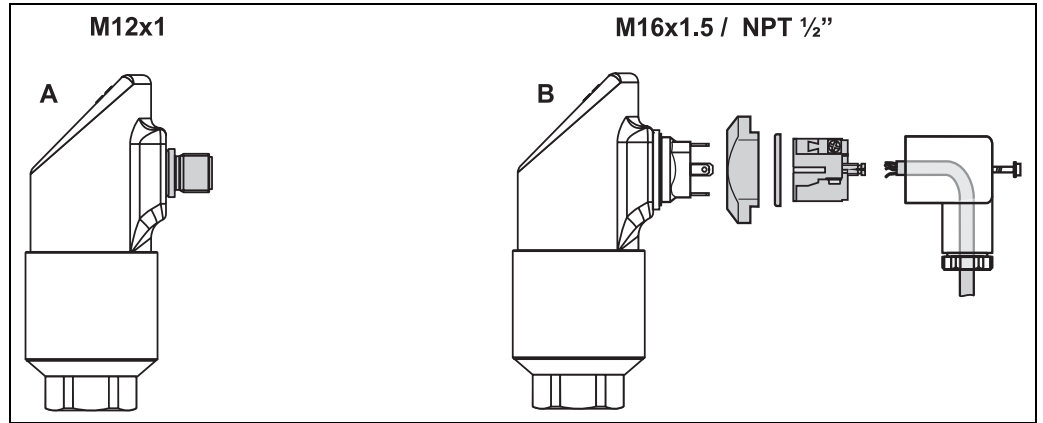
A: M12x1 connector
B: Valve connector M16x1.5 or NPT ½"

Device connection

- DC voltage version with M12x1 connector

a0006818
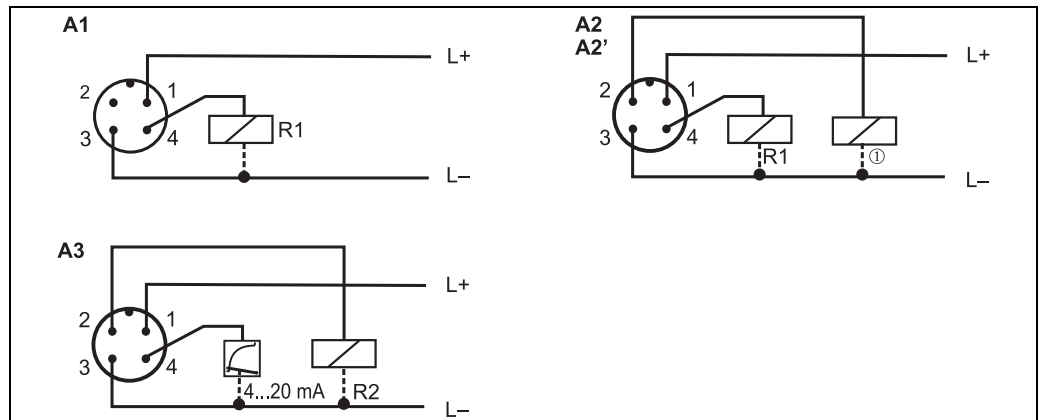
Item No.	Output setting	Order code (see Ordering information section)
A1	1x PNP switch output	DTT3x-A1A*******
A2	2x PNP switch output R1 and ① (R2)	DTT3x-A1B*******
A2'	2x PNP switch output R1 and ① (diagnosis/NC contact with "DESINA" setting)	DTT3x-A1B*******
A3	1x PNP switch output and 1x analog output (4 to 20 mA)	DTT3x-A1C*******

■ DC voltage version with valve connector M16x1.5 or NPT ½"
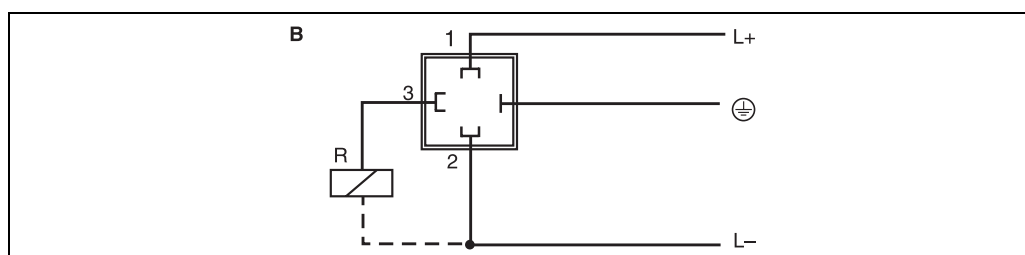
P01-PTx3xxxx-04-xx-xx-xx-003

Item No.	Output setting	Order code (see Ordering information section)
B	1x PNP switch output	DTT3x-A2A*******; DTT3x-A3A*******

|	
Supply voltage	DC voltage version 18...30 V DC (reverse polarity protection)
Current consumption	< 100 mA (without load) at 24 V DC, max. 150 mA (without load); with reverse polarity protection
Power supply failure	■ Behaviour in case of overvoltage (> 30 V) The device works continuously up to 34 V DC without any damage. No damage is caused to the device in case of a short-term overvoltage up to 1 kV (as per EN 61000-4-5). The specific properties are no longer guaranteed if the supply voltage is exceeded. ■ Behaviour in case of undervoltage If the supply voltage drops below the minimum value, the device switches off (status as if not supplied with power = switch open).

Performance characteristics

The percentage information in the "Performance characteristics" section refers 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 ± 5 °C (77 °F ± 9 °F), relative humidity 45 to 75 %, ambient air pressure 860 to 1060 kPa (124 to 153 PSI), water test medium. Supply voltage U = 24 V DC.
Maximum measured error	**Flow** The device records fluid velocity relatively in relation to a set monitoring range of the flow (0 to 100 % as display value). An absolute measurement of the fluid velocity or the mass flow is not possible. The sensitivity of the calorimetric flow sensor changes with the fluid velocity. It increases with decreasing fluid velocity (for example, with water, the greatest sensor sensitivity is recorded in the range from 0.03 to 0.5 m/s).
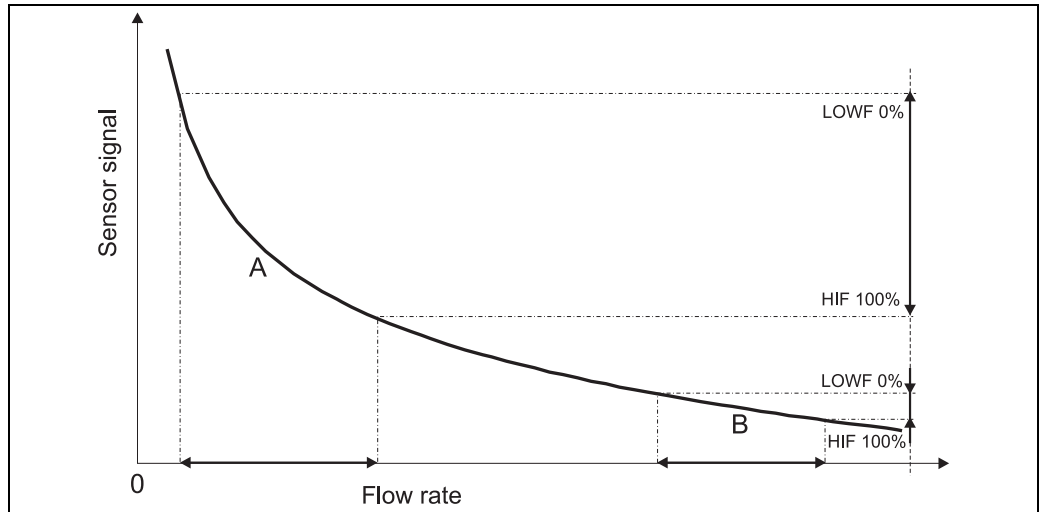
Standard characteristic

A, B: Set monitoring ranges of the flow (example)
LOWF 0%: Setting for the minimum fluid velocity occurring in the
monitoring range A or B (0% value)
HIF 100%: Setting for the maximum fluid velocity occurring in the
monitoring range A or B (100% value)

Temperature

- Accuracy: 2 K (3.6 °F)
- Repeatability: 1 K (1.8 °F)
- Influence of medium temperature: 0.05 %/K of full scale value

Switch point non-repeatability

Measuring range (water as medium)	% of maximum value	Influence of medium temperature[1]	Influence of ambient temperature
0.03 to 0.5 m/s (0.1 to 1.6 ft/s)	≤ 2 %	0.05 %/K	0.04 %/K
0.03 to 1 m/s (0.1 to 3.28 ft/s)	≤ 3 %	0.10 %/K	0.05 %/K
0.03 to 2 m/s (0.1 to 6.56 ft/s)	≤ 5 %	0.15 %/K	0.10 %/K
0.03 to 3 m/s (0.1 to 9.84 ft/s)	≤ 10 %	0.20 %/K	0.30 %/K
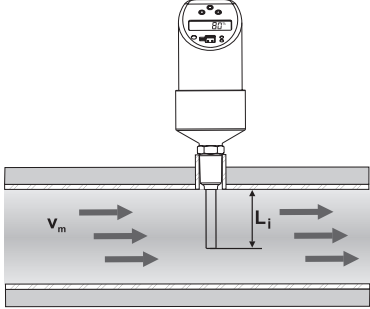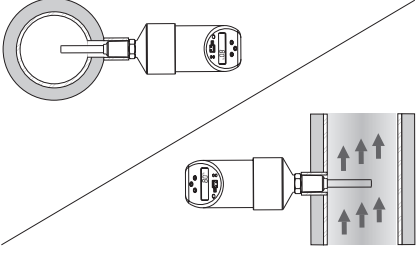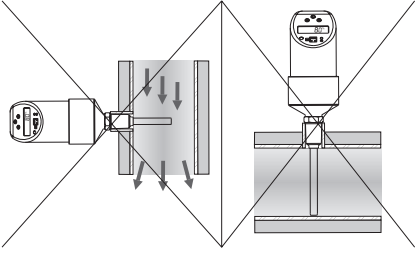
1) The values indicated only apply to the device itself without taking the temperature-dependent change of the thermo-physical properties of the medium into account. For this reason, we recommend you commission the device at the process temperature and set the switch points (see 'Learn function' → 🖹 12)

Temperature gradient

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

Sensor reaction time

6 to 12 s

Long-term drift

0.5% per year under reference operating conditions

Long-term reliability

Mean time between failure (MTBF) > 100 years
(calculated according to "British Telecom Handbook of Reliability Data No. 5")

Switch output response time

100 ms

Analog output

- Maximum measured error = switch point error and display error + 0.1%

- Rise time T_{90}: $\leq$ 200 ms
- Settling time T_{99}: $\leq$ 500 ms

Operating conditions: Installation instructions

Installation instructions	- The sensor tip should be completely surrounded by medium. - Position the sensor tip in the area of maximum fluid velocity (pipe center). - Minimum sensor immersion length: $L_i \geq$ 10 mm (0.4")	 A0007163 *Installation conditions*
	Orientation - For horizontal pipes: lateral installation. Note! Installation from above **only** if the pipe is completely filled with medium. - For vertical pipes: installation in the ascending pipeline. - DTT35: min. 3° inclination, because of self draining.	 A0006977 *Correct orientation*
	Caution! - Do not install in down pipes open towards the end. - The sensor tip should never touch the pipe wall.	 A0006978 *Incorrect installation!*

- Electrical rotation of display by 180°
- Housing can be rotated up to 310 ° mechanically

Orientation

No restrictions, but self draining.

Inlet and outlet run

The sensor requires a fully developed flow profile for correct monitoring. For this reason, steadying sections (5x DN) must be provided in the pipe after a pump, pipe bend, internal fittings and cross-sectional changes.

Operating conditions: Environment

Ambient temperature range	–40...+85 °C (-40 to +185 °F)
Storage temperature	–40...+85 °C (-40 to +185 °F)
Climate class	4K4H as per DIN EN 60721–3–4
Degree of protection	IP 65 (complete housing)
Shock resistance	50 g as per DIN IEC 68–2–27 (11 ms)
Vibration resistance	■ 20 g as per DIN IEC 68–2–6 (10-2000Hz) ■ 4 g as per German Lloyd GL Guidelines
Electromagnetic compatibility	■ Interference emission as per IEC 61326 Series, class B electrical equipment ■ Interference immunity as per IEC 61326 Series, appendix A (industrial use) and NAMUR Recommendation NE 21 EMC influence: ≤ 0.5 %

Operating conditions: Process

Process temperature limits	■ –20 to +85 °C (-4 to +185 °F) ■ CIP-compliant up to 130 °C (266 °F); Measurement automatically switches off at T ≥ 85 °C (185 °F) and restarts at T ≤ 85 °C (185 °F).
Process pressure limits	Maximum permitted process pressure p_{max} ≤ 10 MPa = 100 bar (1450 psi) Caution! The maximum process pressure for the conical metal–metal process connection (**MB** option) for the DTT35 is 1.6 MPa = 16 bar (232 psi)!
Process flow limit	Liquids: 0...3.0 m/s (0...9.84 ft/s)
Operating range	Liquids: 0.03...3.0 m/s (0.1...9.84 ft/s)

Mechanical construction

Design, dimensions DTT31, DTT35

Dimensions
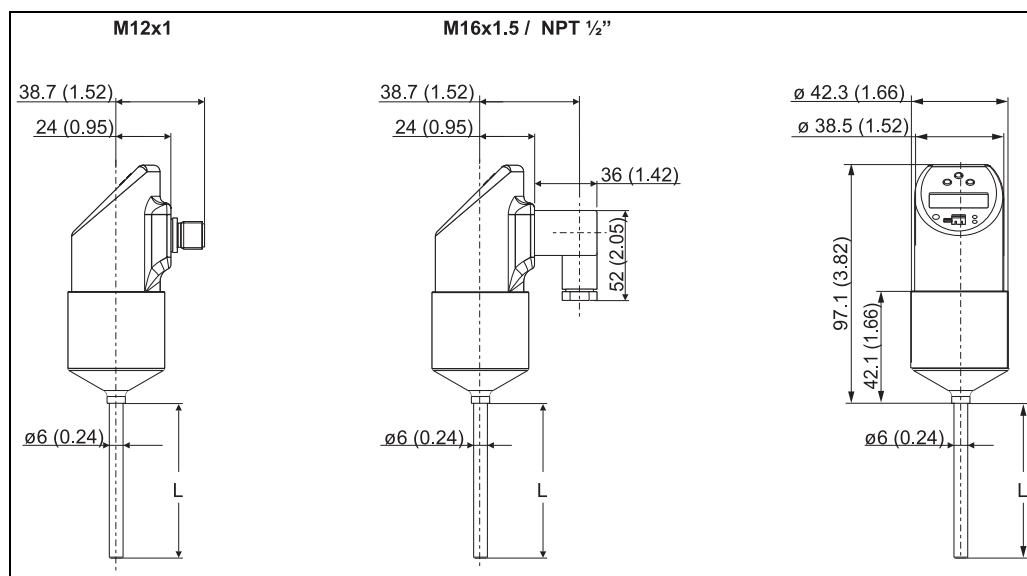
All dimensions in mm (inch)

L = insertion length (see ordering information, Pos. 080)

Connector M12x1 as per IEC 60947-5-2 (see ordering information, Pos. 020)

Valve connector M16x1.5 or NPT ½" as per DIN 43650A/ISO 4400 (see ordering information, Pos. 020)

DTT31 design, dimensions for process connections
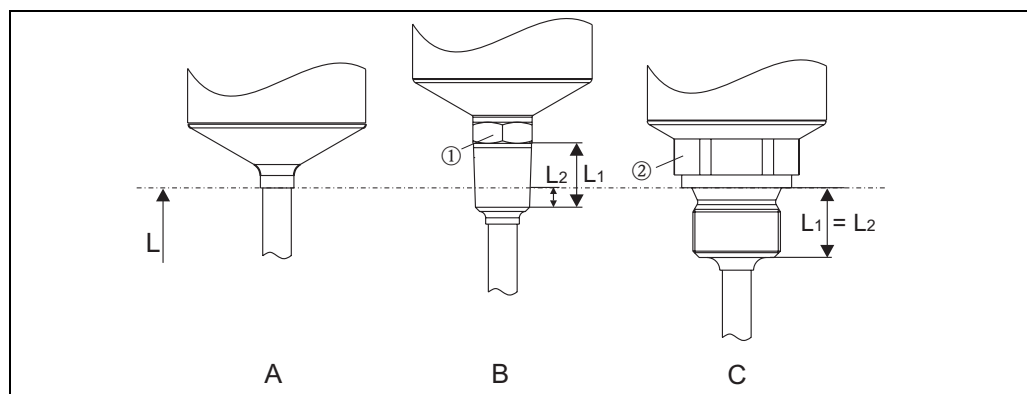
Process connections DTT31 (see ordering information DTT31, Pos. 080)

Item No.	Version DTT31	Insertion length L	Thread length L_1	Screw-in length L_2
A	Without process connection. For suitable welding bosses and compression fittings see 'Accessories'.		–	–
B	Threaded process connection: ■ ANSI NPT ¼" (① = AF14) ■ ANSI NPT ½" (① = AF27)	30 and 100 mm (1.18 and 3.94 in)	■ 14.3 mm (0.56") ■ 19 mm (0.75")	■ 5.8 mm (0.23") ■ 8.1 mm (0.32")
C	Cylindrical threaded process connection in inches as per ISO 228: ■ G¼" (② = AF14) ■ G½" (② = AF27)		■ 12 mm (0.47") ■ 14 mm (0.55")	–

DTT35 design, dimensions for process connections
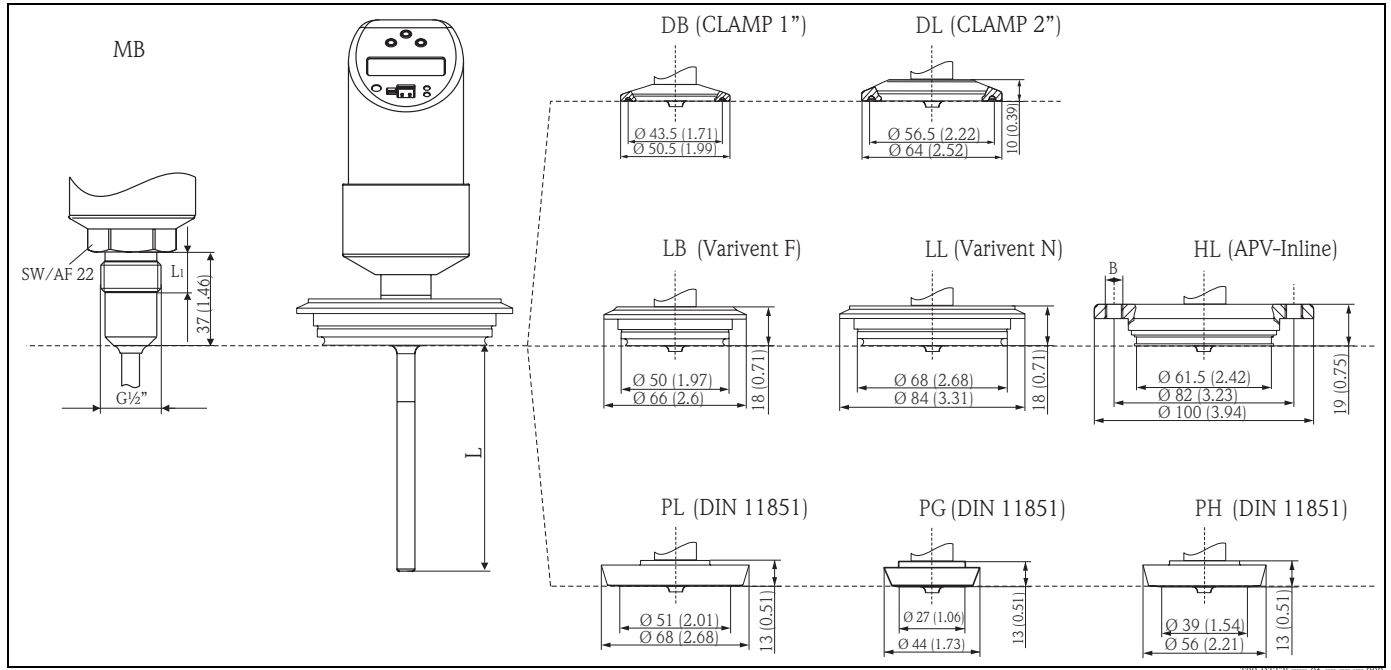
All dimensions in mm (inch)

L = insertion length (see ordering information DTT35, Pos. 070)

Item No.	Process connection versions DTT35 (see ordering information DTT35, Pos. 070)
MB	Conical metal–metal for hygienic processes, G½" thread. Suitable welding boss available as an accessory. Thread length L_1= 14 mm (0.55")
DB	Clamp 1"...1½" (ISO 2852) or DN 25...DN 40 (DIN 32676)
DL	Clamp 2" (ISO 2852) or DN 50 (DIN 32676)
LB	Varivent F DN25-32, PN 40
LL	Varivent N DN40-162, PN 40
HL	APV inline, DN 50, PN 40, 316L, (B = 6 x Ø8.6 bores + 2 x M8 thread)
PL	DIN 11851, DN50, PN40 (including coupling nut)
PG	DIN 11851, DN25, PN40 (including coupling nut)
PH	DIN 11851, DN40, PN40 (including coupling nut)

Weight	approx. 300 g (10.6 oz), depends on sensor length and process connection
Material	■ Process connection: AISI 316L Surfaces in contact with process in hygienic version with surface quality $R_a \leq 0.8$ μm Coupling nut: AISI 304 ■ Housing: AISI 316L, with surface quality $R_a \leq 0.8$ μm (31.5 μin) O ring between housing and sensor modul: EPDM ■ Electrical connection: M12 connector: exterior AISI 316L, interior polyamide (PA) Valve plug: outer polyamide (PA) M12 connector: exterior 316L Cable outer covering: 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®)

Human interface

Operating elements

Position of display and operating elements

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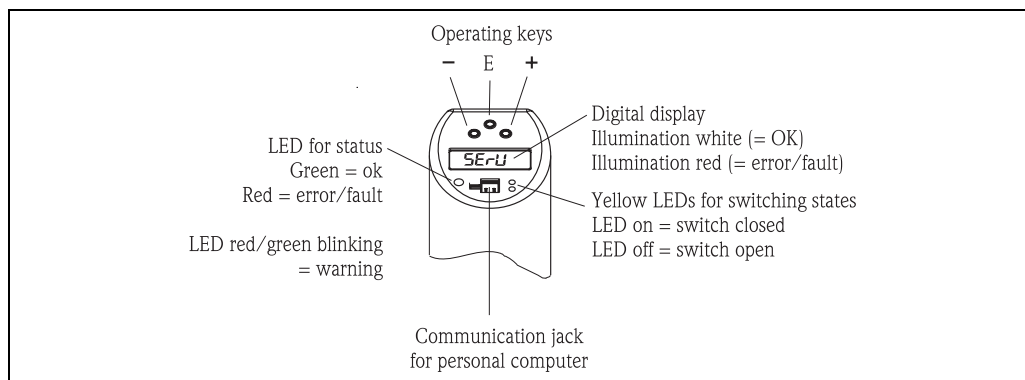
Onsite operation

Menu–guided operation using operating keys.

Function group	Function (display)	Description
BASE (basic functions)	Display (DISP)	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 180° – Display of current medium temperature – Display of current medium temperature rotated 180° Factory setting: **current measured value**
	UNIT	Display medium temperature unit °C or °F Factory setting: **°C** Note! Only visible if the current medium temperature is selected in the DISP mode.
	Damping (TAU)	Measured value damping with regard to display value and output: 0 (no damping) or 9 to 40 s (in increments of 1 second) Factory setting: **0 s**
	DESINA (DESI) Only for 2 x PNP switch outputs	Behavior as per DESINA: The PIN of the M12 connector is assigned in accordance with the guidelines of DESINA. (DESINA = DistributEd and Standardized INstAllation technology for machine tools and manufacturing systems)
CAL (calibration)	Learn High Flow (HIF)	Setting for maximum flowrate occurring. 100% value
	Learn Low Flow (LOWF)	Setting for minimum flowrate occurring. 0% value

Function group	Function (display)	Description
OUT (Setting for the 1st output) OUT2 (Setting for the 2nd output, optional)	Switching mode (MODE)	Output switching mode for channel 2: flow or temperature Factory setting: **flow**
	UNIT	Temperature unit selection (°C/°F) Note! Function only visible if switching mode (MODE) is set to temperature in the 2nd output.
	Function 1 (FUNC) Function 2 (FNC2), optional	Switch output function: hysteresis function NC contact or NO contact (see diagram)
	Switch point (SP) Switch point 2 (SP2), 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. Factory setting: **55 °C**
	Switch point learn (SPL) Switch point learn 2 (SP2L), optional	Take current flowrate as SP.
	Switch–back point (RSP) Switch–back point 2 (RSP2), optional	▪ Enter value 0 to 95% in increments of 1%. Factory setting: **40%** Note! Value has to be at least 5% smaller 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. Factory setting: **50 °C** Note! Value has to be at least 5 °C (9 °F) smaller than switch point 2 (SP2).
	Switch point delay (TSP) Switch point 2 delay (TSP2), optional	Can be set anywhere between 0 and 99 s in increments of 1 second. Factory setting: **0 s**
Analog output 4-20 (Setting for the analog output, optional)	Output mode (MODE)	Process value for analog output: flow rate or temperature Factory setting: **FLOW**
	Error current (FCUR)	Current value in event of error: alternatively MIN = ≤ 3.6 mA, MAX = ≥ 21.7 mA, HOLD = last current value Factory setting: **MAX**

Function group	Function (display)	Description
SERV (service functions)	Preset (PRES)	Resetting of all settings to factory settings.
	Static revision counter (REVC)	Configuration counter, incremented each time the configuration is changed.
	Operating code (LOCK)	Enter the device locking code.
	Edit operating code (CODE)	Locking, only visible with valid operating code.
	Device status (STAT)	
	Last error (LSTA)	Display of last error to occur.
Simulation: switch output version	Simulation 1 (SIMU) Simulation 2 (SIM2), optional	Simulation switch output 1: on/off with display, optionally corresponding to switch output 2.
Simulation: analog output version (4 to 20 mA)	■ Simulation 1 (SIM) – switch output ■ Simulation 2 (SIMA) – analog output	■ Simulation switch output 1: on/off with display, ■ Simulation values for analog output in mA.

Switch-point function

- Hysteresis function
  The hysteresis function enables two-point control via a hysteresis. Depending on the flow, the hysteresis can be set via the switch point SP and the switch-back point RSP.

- NO contact or NC contact.
  This switch function is freely selectable.
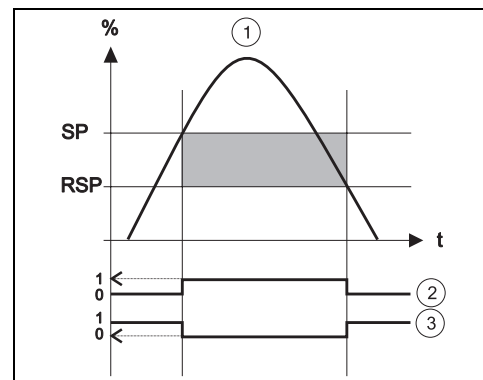
① Hysteresis function, ② NO contact, ③ NC contact

SP switch point; RSP switch-back point

Remote operation via PC

Operation, visualization and maintenance with PC and PC configuration software ReadWin® 2000 or FieldCare.
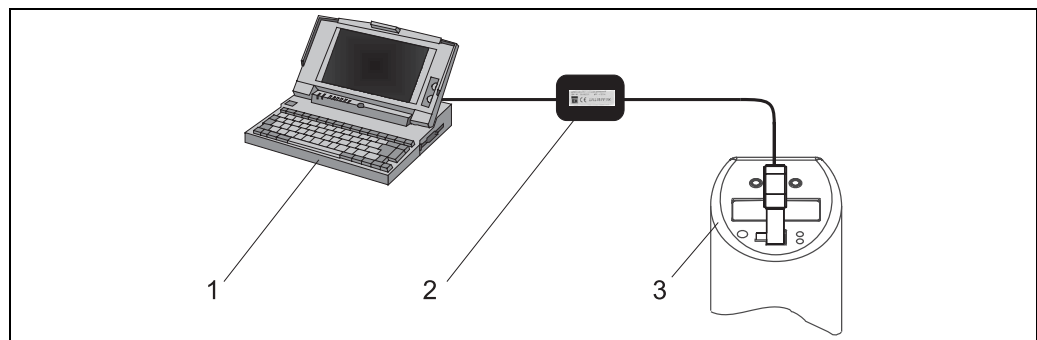
Operation, visualization and maintenance with PC and configuration software.

Item 1: PC with ReadWin® 2000 or FieldCare configuration software
Item 2: TXU10-AA or FXA291 configuration kit (see "accessories")
Item 3: Flow switch

In addition to the operating options listed in the previous "Onsite operation" section, the ReadWin® 2000 configuration software or FieldCare provides further information on the Flowphant® T:

Function group	Function (display)	Description
SERV (service functions)	Switching processes 1 Switching processes 2, optional	Number of changes in switching status for switch output 1; optionally 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 revision	Display of entire revision
	Hardware revision	Hardware version
	Software revision	Software version

Certificates and approvals

CE-Mark The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

GL Ship building approval (Germanischer Lloyd)

Other standards and guidelines
- IEC 60529: Degree of protection by housing (IP-Code)
- IEC 61010-1: Safety requirements for electrical measurement, control and laboratory instrumentation.
- IEC 61326-series: Electrical equipment for measurement, control and laboratory use – EMC requirements.
- NAMUR: User association of automation technology in process industries (www.namur.de)
- NEMA: Standardization association for the electrical industry in North America.

Hygiene standard The DTT35 flow switch meets the requirements of Sanitary Standard no. 74-03. Endress+Hauser confirms this by applying the 3–A symbol.

Note!
Depends on the selected process connection (see ordering information DTT35, Pos. 070)

UL listed for Canada and USA The device was examined by Underwriters Laboratories Inc. (UL) in accordance with the standards UL 61010B-1 and CSA C22.2 No. 1010.1-92 and listed under the number E225237 UL.

Ordering information

Flowphant® T DTT31
Product structure

Flowphant® T DTT31 Flow switch, intelligent, programmable. Sensor: calorimetric measurement method										

Pos. 010	**Approval:**									
	A	Non-hazardous areas								

Pos. 020		**Electrical connection:**								
	1	Plug M12x1								
	2	Plug M16x1.5, ISO4400								
	3	Plug NPT ½", ISO4400								

Pos. 030			**Power supply; Output:**							
		A	18...30 V DC; 1 x switch PNP							
		B	18...30 V DC; 2 x switch PNP							
		C	18...30 V DC; switch PNP + 4...20 mA							

Pos. 040				**Display:**						
			1	Digital						

Pos. 050					**Application; Measuring range:**					
				1	Liquid, -20...+85 °C (-4...+185 °F), 0...3 m/s (0...9.84 ft/s)					

Pos. 060						**Adjustment:**				
					1	on site				

Pos. 070							**Process connection:**			
						AA	w/o; Compr. fitting, 316L, L ≥ 100 mm (3.94 in) insertion length; Compr. fitting, to order separately			
						AB	Thread ISO228 G¼", 316L			
						AE	Thread ISO 228 G½", 316L			
						DA	Thread ANSI NPT ¼", 316L			
						DE	Thread ANSI NPT ½", 316L			

Pos. 080								**Insertion length L; Diameter D:**		
							2A	L = 30 mm (1.18 in); D = 6 mm (0.24 in)		
							2C	L = 100 mm (3.94 in); D = 6 mm (0.24 in)		

Pos. 090									**Additional option; Material certificate:**	
								A	Basic version; not needed	
								B	Basic version; material EN10204-3.1	
								C	Basic version; material + roughness EN10204-3.1	

Pos. 100										**Version:**
									A	Standard, Documentation German
									B	Standard, Documentation English
									C	Standard, Documentation French
									D	Standard, Documentation Japanese

Pos. 995										**Marking:**
									1	Tagging (TAG), on nameplate
									4	Tagging (TAG), metal
									5	Tagging (TAG), paper

DTT31-	**A**		**1**	**1**	**1**					⇒ **Order code**

Flowphant® T DTT35 product structure

Flowphant® T DTT35
Flow switch, intelligent, programmable. Sensor: calorimetric measurement method. Hygienic applications. 3-A 74-03 compliant (depends on the selected process connection).

Pos. 010	Approval:										
	A	Non-hazardous area									

Pos. 020		Electrical connection:									
	1	Plug M12x1									
	2	Plug M16x1.5, ISO4400									
	3	Plug NPT ½", ISO4400									

Pos. 030			Power supply; Output:								
		A	18...30 V DC; 1 x switch PNP								
		B	18...30 V DC; 2 x switch PNP								
		C	18...30 V DC; switch PNP + 4...20 mA								

Pos. 040				Display:							
			1	Digital							

Pos. 050					Application; Measuring range:						
				1	Liquid, -20...+85 °C (-4...+185 °F), 0...3 m/s (0...9.84 ft/s)						

Pos. 060						Adjustment:					
					1	on site					

Pos. 070							Process connection:				
						DB	Clamp ISO2852 DN25-38, 1-1½", 316L, 3A, DIN32676 DN25-40				
						DL	Clamp ISO2852 DN40-51, 2", 316L, 3A, DIN32676 DN50				
						HL	APV-Inline DN50 PN40, 316L, 3A				
						LB	Varivent F DN25-32, PN40, 316L, 3A				
						LL	Varivent N DN40-162, PN40, 316L, 3A				
						MB	Conical metal-metal G ½", 316L				
						PG	DIN11851, DN25 PN40, 316L, 3A				
						PH	DIN11851, DN40 PN40, 316L, 3A				
						PL	DIN11851, DN50 PN40, 316L, 3A				

Pos. 080								Insertion length L; Diameter D:			
							2A	L = 30 mm (1.18"); D = 6 mm (0.24")			
							2B	L = 50 mm (1.97"); D = 6 mm (0.24")			
							2C	L = 100 mm (3.94"); D = 6 mm (0.24")			

Pos. 090									Additional option; Material certificate:		
								A	Basic version; not needed		
								B	Basic version; material EN10204-3.1		
								C	Basic version; material + roughness EN10204-3.1		

Pos. 100										Version:	
									A	Standard, Documentation German	
									B	Standard, Documentation English	
									C	Standard, Documentation French	
									D	Standard, Documentation Japanese	

Pos. 995											Marking:
										1	Tagging (TAG), on nameplate
										4	Tagging (TAG), metal
										5	Tagging (TAG), paper

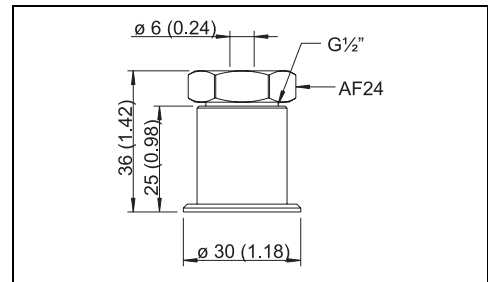| DTT35-	A			1	1	1					⇒ **Order code**

This ordering information can give an overview about the available order options. The Endress+Hauser sales organization can provide detailed ordering information and information on the order code.

Accessories

All dimensions in mm (inches).
EN10204–3.1 = Material certificate (melt analysis)

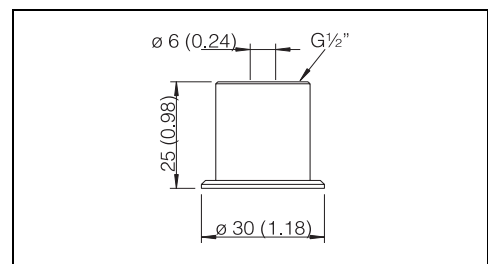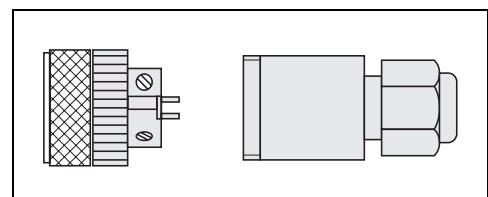|		
Welding boss with sealing taper for DTT31	Collar welding boss moveable with sealing taper and pressure screw; material of parts in contact with the process: 316L, PEEK, max. process pressure 10 bar (145 PSI) Order number: 51004751	ø 6 (0.24) G½" AF24 36 (1.42) 25 (0.98) ø 30 (1.18) T09-TSM470AX-06-09-00-en-000
Collar welding boss for DTT31	Material of parts in contact with process: 316L Order no. 51004752	ø 6 (0.24) G½" 25 (0.98) ø 30 (1.18) T09-TSM470BX-06-09-00-en-000
Coupling for DTT31	moveable coupling, G½" process connection, coupling and parts in contact with process: 316L Order no. 51004753	ø 6 (0.24) AF14 AF27 15 (0.59) 45 +1 (1.77 +0.04) G½" T09-TSM470AX-06-09-00-en-001
Welding boss with sealing taper (metal-metal) for DTT35	Welding boss for G½" thread Seal, metal–metal, Material of parts in contact with process: 316L/ 1.4435 Max. process pressure 16 bar (232 PSI) Order no. 60021387	Ø 30 (1.18) G½" 16 (0.63) 34 (1.34) 15 (0.6) a0006621
Coupling	Coupling M12x1 for simple user installable assembly of the connecting cable; straight connection to M12x1 housing connector Order number: 52006263	P01-PMP13xxx-00-xx-00-xx-003
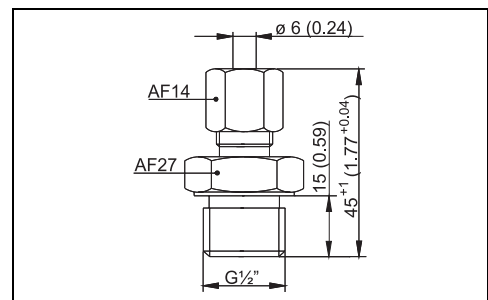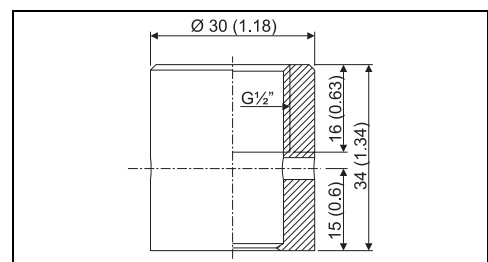
|		
Coupling	Coupling M12x1 for simple user installable assembly of the connecting cable; elbowed; connection to M12x1 housing connector IP 67, PG7 Order number: 51006327	

T09-TTR3xxxx-06-09-xx-en-000
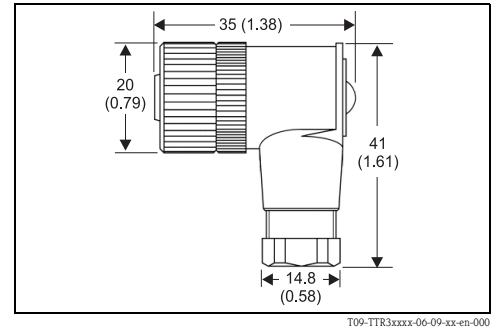
|		
Connecting cable (pre-assembled)	PVC cable, 4 x 0.34 mm^2 (22 AWG) with M12x1 coupling, elbowed, screw plug, length 5 m (16.4 ft), IP 67 Order number: 51005148 Core colours: – 1 = BN brown – 2 = WH white – 3 = BU blue – 4 = BK black	1 (BN) + 2 (WH) R2 3 (BU) - 4 (BK) R1

T09-TTR31xXX-00-00-xx-xx-002
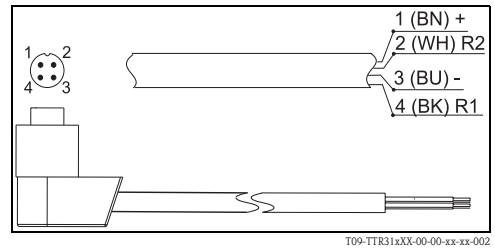
Connecting cable with LED	PVC cable, 4 x 0.34 mm^2 (22 AWG) with M12x1 coupling, with LED, elbowed, 316L screw plug, length 5 m (16.4 ft), specially for hygiene applications, IP 69K Order number: 52018763 Display: –gn: device operational –ye1: switch status 1 –ye2: switch status 2 Note! Not for use at devices with "4 to 20 mA analog output" option!	ye 1 ye 2 gn

T09-TTR31xxx-00-00-xx-xx-001
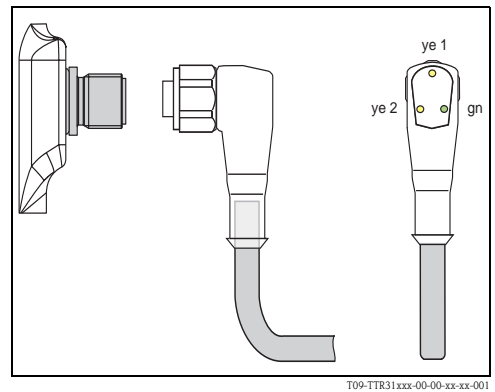
Configuration kit	■ Configuration kit for PC-programmable transmitters – ReadWin® 2000 setup program and interface cable for PCs with USB port. Adapter for transmitters with 4-pole post connector. Order code: **TXU10-AA** ■ Configuration kit "Commubox FXA291" with interface cable for PCs with USB port. Intrinsically safe CDI interface (Endress+Hauser Common Data Interface) for transmitters with 4-pole post connector. Suitable device configuration tool is e.g. FieldCare. Order code: **FXA291**

a0008067
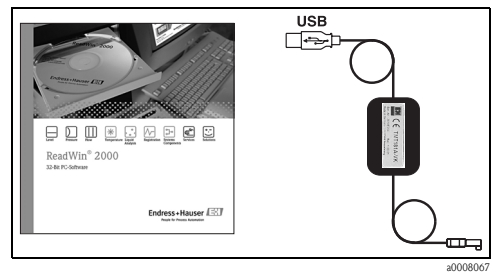
Configuration software	■ ReadWin® 2000 and FieldCare 'Device Setup' can be downloaded free of charge directly from the internet at the following addresses: **www.endress.com/readwin** **www.products.endress.com/fieldcare** For the order of the FieldCare 'Device Setup' software please ask your Endress+Hauser sales organisation.

Power supply	■ Power supply Easy Analog RNB130 by Endress+Hauser with nominal output current I_N = 1.5 A. Details see Technical information **TI120R/09/en**.
	■ Process display RIA452 by Endress+Hauser with transmitter power supply, max. output current I = 250 mA. Details see Technical information **TI113R/09/en**.

Documentation

Technical information	■ Easy Analog RNB130: TI120R/09/en
	■ Process display RIA452: TI113R/09/en
	■ Easy Analog RNB130: TI120R/09/en
	■ Datalogger Minilog B: TI089R/09/en
Operating manual	■ Flow switch Flowphant® T DTT31, DTT35: BA235R/09/en
	■ Configuration software ReadWin® 2000: BA137R/09/en

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