

# Safety Instructions

## Liquiphant M, Liquiphant S

### FTL50(H), FTL51(H), FTL51C, FTL70, FTL71

EAC: Ga/Gb Ex de IIC/IIB T6...T3  
Ga/Gb Ex de IIC T6...T1



Document: XA01666F-B

Safety instructions for electrical apparatus for explosion-hazardous areas → 3

---

Liquiphant M, Liquiphant S

FTL50(H), FTL51(H), FTL51C, FTL70, FTL71

Table of contents

|                                                     |    |
|-----------------------------------------------------|----|
| Associated documentation . . . . .                  | 4  |
| Supplementary documentation . . . . .               | 4  |
| Manufacturer's certificates . . . . .               | 4  |
| Manufacturer address . . . . .                      | 4  |
| Extended order code . . . . .                       | 4  |
| Safety instructions: General . . . . .              | 8  |
| Safety instructions: Special conditions . . . . .   | 8  |
| Safety instructions: Installation . . . . .         | 9  |
| Safety instructions: Ex d joints . . . . .          | 10 |
| Safety instructions: Zone 0 . . . . .               | 10 |
| Explosion protection with heat insulation . . . . . | 10 |
| Temperature tables . . . . .                        | 11 |
| Connection data . . . . .                           | 13 |

Associated documentation

This document is an integral part of the following Operating Instructions:

- KA00143F/00, KA00163F/00 (FTL50, FTL51)
- KA00144F/00, KA00164F/00 (FTL50H, FTL51H)
- KA00162F/00, KA00165F/00 (FTL51C)
- KA00172F/00, KA00173F/00 (FTL70, FTL71)

Supplementary documentation

Explosion-protection brochure: CP00021Z/11

The Explosion-protection brochure is available:

- In the download area of the Endress+Hauser website:  
[www.endress.com](http://www.endress.com) -> Downloads -> Media Type: Documentation -> Documentation Type: Brochures and catalogs -> Text Search: CP00021Z
- On the CD for devices with CD-based documentation

Manufacturer's certificates

**Certificate of Conformity TP TC 012/2011**

Inspection authority:  
LLC NANIO CCVE (ООО «НАНИО ЦСВЭ»)

Certificate number:  
TC RU C-DE.AA87.B.00871

Affixing the certificate number certifies conformity with the following standards (depending on the device version):

- GOST 31610.0-2014 (IEC 60079-0:2011)
- GOST IEC 60079-1-2011
- GOST R IEC 60079-7-2012
- GOST 31610.26-2012 (IEC 60079-26:2006)

Manufacturer address

Endress+Hauser SE+Co. KG  
Hauptstraße 1  
79689 Maulburg, Germany  
Address of the manufacturing plant: See nameplate.

Extended order code

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

**Structure of the extended order code**

|                 |   |                        |   |                           |
|-----------------|---|------------------------|---|---------------------------|
| FTL5x(x), FTL7x | – | *****                  | + | A*B*C*D*E*F*G*..          |
| (Device type)   |   | (Basic specifications) |   | (Optional specifications) |

\* = Placeholder  
At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

*Basic specifications*

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available. The selected option of a feature can consist of several positions.

*Optional specifications*

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

**Extended order code: Liquiphant M**

The following specifications reproduce an extract from the product structure and are used to assign:

- This documentation to the device (using the extended order code on the nameplate).
- The device options cited in the document.

*Device type*

FTL50, FTL50H, FTL51, FTL51H, FTL51C

*Basic specifications*

| Position 1 (Approval) |                 |                                                           |
|-----------------------|-----------------|-----------------------------------------------------------|
| Selected option       |                 | Description                                               |
| FTL50(H)<br>FTL51(H)  | E, I            | ATEX II 1/2 G Ex de IIC T6<br>EAC Ga/Gb Ex de IIC T6...T3 |
| FTL51C                | E <sup>1)</sup> | ATEX II 1/2 G Ex de IIC T6<br>EAC Ga/Gb Ex de IIC T6...T3 |
|                       | 3 <sup>2)</sup> | ATEX II 1/2 G Ex de IIB T6<br>EAC Ga/Gb Ex de IIB T6...T3 |

1) Only in connection with Position 5, 6 (Probe Length; Type) = xN, xS

2) Only in connection with Position 5, 6 (Probe Length; Type) = xL, xM, xK

| Position 5, 6 (Probe Length; Type) |            |                                               |
|------------------------------------|------------|-----------------------------------------------|
| Selected option                    |            | Description                                   |
| FTL50                              | Ax         | Compact                                       |
|                                    | Ix         | Compact; temp. separator                      |
|                                    | Qx         | Compact; press.tight feed through             |
| FTL50H                             | Ax         | Compact                                       |
|                                    | Ix         | Compact; temp. separator                      |
|                                    | Qx         | Compact; press.tight feed through             |
|                                    | xC         | Ra <1.5 µm                                    |
|                                    | xF         | Ra <0.76 µm                                   |
| FTL51                              | BB, CB, DB | ..... mm/in; 316L                             |
|                                    | BE, CE, DE | ..... mm/in; Alloy                            |
|                                    | JB, KB, LB | ..... mm/in; 316L + temp. separator           |
|                                    | JE, KE, LE | ..... mm/in; Alloy + temp. separator          |
|                                    | RB, SB, TB | ..... mm/in; 316L + press.tight feed through  |
|                                    | RE, SE, TE | ..... mm/in; Alloy + press.tight feed through |

| Position 5, 6 (Probe Length; Type) |            |                                       |
|------------------------------------|------------|---------------------------------------|
| Selected option                    |            | Description                           |
| FTL51H                             | Bx, Cx, Dx | ..... mm/in                           |
|                                    | Jx, Kx, Lx | ..... mm/in; temp. separator          |
|                                    | Rx, Sx, Tx | ..... mm/in; press.tight feed through |
|                                    | xC         | Ra <1.5 µm                            |
|                                    | xF         | Ra <0.76 µm                           |
| FTL51C                             | xK         | ECTFE                                 |
|                                    | xL         | PFA (Edlon)                           |
|                                    | xM         | PFA (RubyRed)                         |
|                                    | xN         | PFA (conductive)                      |
|                                    | xS         | Enamel                                |

| Position 7 (Electronics; Output) |   |                                                                     |
|----------------------------------|---|---------------------------------------------------------------------|
| Selected option                  |   | Description                                                         |
| FTL50(H)                         | A | FEL50A; PROFIBUS PA                                                 |
| FTL51(H)<br>FTL51C               | D | FEL50D; Density/Concentration, density electronics w/o WHG approval |
|                                  | 1 | FEL51; SIL 2-wire 19-253 VAC                                        |
|                                  | 2 | FEL52; SIL 3-wire PNP 10-55 VDC                                     |
|                                  | 4 | FEL54; SIL relay DPDT 19-253 VAC, 19-55 VDC                         |
|                                  | 5 | FEL55; SIL 8/16 mA, 11-36 VDC                                       |
|                                  | 6 | FEL56; SIL NAMUR (L-H signal)                                       |
|                                  | 7 | FEL57; SIL 2-wire PFM                                               |
|                                  | 8 | FEL58; SIL NAMUR+test button (H-L signal)                           |

| Position 8, 9 (Housing; Cable Entry) |    |                                               |
|--------------------------------------|----|-----------------------------------------------|
| Selected option                      |    | Description                                   |
| FTL50(H)<br>FTL51(H)<br>FTL51C       | x7 | T13; Alu, coated.; separate conn. compartment |
|                                      | Ex | NPT thread                                    |
|                                      | Fx | G 1/2 thread                                  |
|                                      | Gx | M20 gland                                     |

| Position 10 (Additional Option) |   |                              |
|---------------------------------|---|------------------------------|
| Selected option                 |   | Description                  |
| FTL50H<br>FTL51H<br>FTL51C      | Y | Special version: EAC marking |

| Position 11 (Additional Option 2) |   |                                                |
|-----------------------------------|---|------------------------------------------------|
| Selected option                   |   | Description                                    |
| FTL51C                            | A | Not selected                                   |
|                                   | B | Temp. separator                                |
|                                   | C | 2nd line of defence (press.tight feed through) |

*Optional specifications*

| ID Lx (Additional Approval) |    |             |
|-----------------------------|----|-------------|
| Selected option             |    | Description |
| FTL50                       | L8 | EAC marking |
| FTL51                       |    |             |

**Extended order code: Liquiphant S**

-  The following specifications reproduce an extract from the product structure and are used to assign:
- This documentation to the device (using the extended order code on the nameplate).
  - The device options cited in the document.

*Device type*

FTL70, FTL71

*Basic specifications*

| Position 1 (Approval) |   |                                                           |
|-----------------------|---|-----------------------------------------------------------|
| Selected option       |   | Description                                               |
| FTL7x                 | E | ATEX II 1/2 G Ex de IIC T6<br>EAC Ga/Gb Ex de IIC T6...T1 |

| Position 5, 6 (Probe Length; Type) |    |                    |
|------------------------------------|----|--------------------|
| Selected option                    |    | Description        |
| FTL70                              | AB | Compact; 316L      |
|                                    | AE | Compact; Alloy     |
| FTL71                              | xB | ..... mm/in; 316L  |
|                                    | xE | ..... mm/in; Alloy |

| Position 7 (Electronics; Output) |   |                                             |
|----------------------------------|---|---------------------------------------------|
| Selected option                  |   | Description                                 |
| FTL7x                            | A | FEL50A; PROFIBUS PA                         |
|                                  | 1 | FEL51; SIL 2-wire 19-253 VAC                |
|                                  | 2 | FEL52; SIL 3-wire PNP 10-55 VDC             |
|                                  | 4 | FEL54; SIL relay DPDT 19-253 VAC, 19-55 VDC |
|                                  | 5 | FEL55; SIL 8/16 mA, 11-36 VDC               |
|                                  | 6 | FEL56; SIL NAMUR (L-H signal)               |
|                                  | 7 | FEL57; SIL 2-wire PFM                       |
|                                  | 8 | FEL58; SIL NAMUR+test button (H-L signal)   |
|                                  | 9 | Special version: FEL50D                     |

| Position 8, 9 (Housing; Cable Entry) |    |                                               |
|--------------------------------------|----|-----------------------------------------------|
| Selected option                      |    | Description                                   |
| FTL7x                                | x7 | T13; Alu, coated.; separate conn. compartment |
|                                      | Ex | NPT thread                                    |
|                                      | Fx | G 1/2 thread                                  |
|                                      | Gx | M20 gland                                     |

| Position 11 (Application) |   |                                |
|---------------------------|---|--------------------------------|
| Selected option           |   | Description                    |
| FTL7x                     | L | 230 °C, gas-tight feed through |
|                           | N | 280 °C, gas-tight feed through |
|                           | Y | Special version: 300 °C        |

#### Optional specifications

| ID Lx (Additional Approval) |    |             |
|-----------------------------|----|-------------|
| Selected option             |    | Description |
| FTL7x                       | L8 | EAC marking |

#### Safety instructions: General

- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform
  - Be trained in explosion protection
  - Be familiar with national regulations
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Only use the device in media to which the wetted materials have sufficient durability.
- Avoid electrostatic charging:
  - Of plastic surfaces (e.g. housing, sensor element, special varnishing, attached additional plates, ..)
  - Of isolated capacities (e.g. isolated metallic plates)
- Refer to the temperature tables for the relationship between the permitted ambient temperature for the sensor and/or transmitter, depending on the range of application and the temperature class.
- Modifications to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.

#### Safety instructions: Special conditions

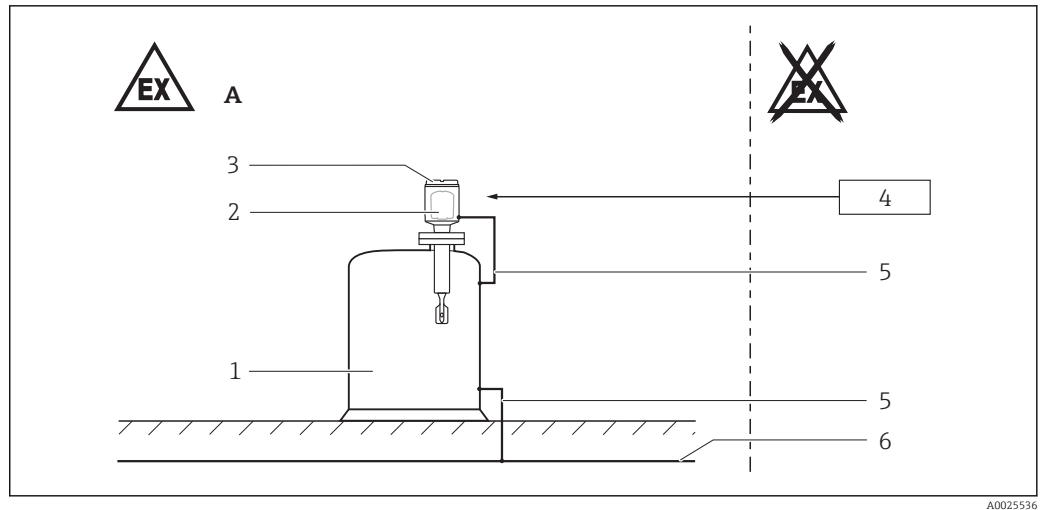
Permitted ambient temperature range at the electronics housing:  
→  11, "Temperature tables".

In the event of additional or alternative special varnishing on the housing or other metal parts:

- Observe the danger of electrostatic charging and discharge.
- Do not rub surfaces with a dry cloth.

*Basic specification, Position 8, 9 (Housing; Cable Entry) = x7*  
Avoid sparks caused by impact and friction.

## Safety instructions: Installation



1

- A Zone 1  
 1 Tank; Zone 0, Zone 1  
 2 Electronic insert  
 3 Housing  
 4 Supply unit  
 5 Potential equalization line  
 6 Local potential equalization

- In potentially explosive atmospheres:
  - Do not disconnect the electrical connection of the power supply circuit when energized.
  - Do not open the connection compartment cover and the electronics compartment cover when energized.
- Perform the following to achieve the degree of protection IP66/68:
  - Screw the cover tight.
  - Mount the cable entry correctly.
- Observe the maximum process conditions according to the manufacturer's Operating Instructions.
- At high medium temperatures, note flange pressure load capacity as a factor of temperature.
- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.
- Connect the device:
  - Using suitable cable and wire entries of protection type "Increased safety (Ex e)".
  - Using piping systems of protection type "Increased safety (Ex e)".
- Continuous service temperature of the connecting cable:  $\geq T_a + 5 \text{ K}$ .
- Support extension tube of the device if a dynamic load is expected.
- Only use certified cable entries suitable for the application. Observe national regulations and standards. Accordingly, the connection terminal does not include any ignition sources.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection.
- When operating the transmitter housing at an ambient temperature under  $-20 \text{ }^\circ\text{C}$ , use appropriate cables and cable entries permitted for this application.
- Before operation:
  - Screw in the cover all the way.
  - Tighten the securing clamp on the cover.

| Basic specification,<br>Position 7<br>(Electronics; Output) | Cross section<br>connecting wire | Tightening torque of<br>terminal screw | Stripped insulation |
|-------------------------------------------------------------|----------------------------------|----------------------------------------|---------------------|
| A, D, 1, 2, 5, 6, 7, 8, 9                                   | $\leq 2.5 \text{ mm}^2$          | 0.4 Nm                                 | 6 to 8 mm           |
| 4                                                           | 0.5 to $2.5 \text{ mm}^2$        | –                                      | 8 to 9 mm           |

### Accessory high pressure sliding sleeve

The high pressure sliding sleeve can be used for a continuous setting of the switch point and is suited for zone division if mounted properly (see Operating Instructions).

**Potential equalization**

Integrate the device into the local potential equalization.

**Safety instructions:  
Ex d joints**

- If required or if in doubt: ask manufacturer for specifications.
- Flameproof joints are not intended to be repaired.

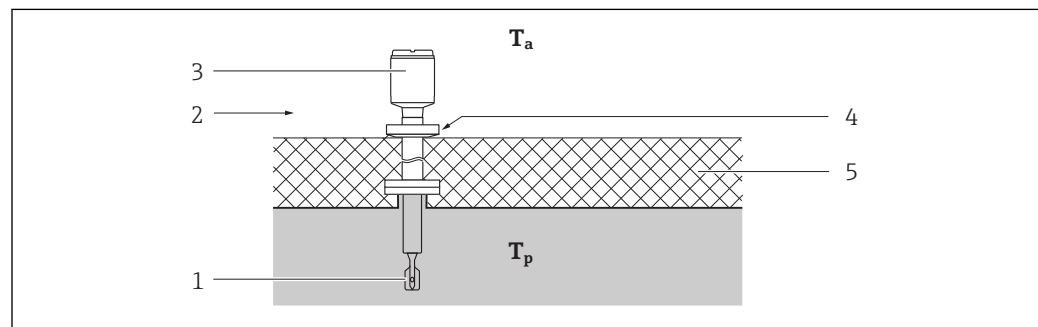
**Safety instructions: Zone 0**

- In the event of potentially explosive vapor/air mixtures, only operate the device under atmospheric conditions.
  - Temperature:  $-20$  to  $+60$  °C
  - Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
  - Air with normal oxygen content, usually 21 % (V/V)
- If no potentially explosive mixtures are present, or if additional protective measures have been taken, the device may also be operated under non-atmospheric conditions in accordance with the manufacturer's specifications.
- Only use the device in media to which the wetted materials have sufficient durability (e.g. process connection seal).
- When using under non-atmospheric pressures and non-atmospheric temperatures: The sensor part of the device approved for Zone 0 does not cause any ignition hazards.

**Explosion protection  
with heat insulation**

Device type FTL70, FTL71, Basic specification, Position 11 (Application) = L, N, Y

- While observing the "temperature derating", the device is suitable for process temperatures up to 300 °C.
- When operating, ensure that you rule out contact between hot component surfaces and potentially explosive atmospheres beyond the limits of the corresponding temperature class.  
Suitable measures: e.g. thermal insulation at container and/or pipes.
- The temperature of 85 °C specified at the reference point may not be exceeded.
- To protect the electronics, observe the specified ambient temperature at the electronics housing.



A0025541



- 2
- $T_a$  Ambient temperature  
 $T_p$  Process temperature  
 1 Sensor  
 2 Temperature class, e.g. T6  
 3 Housing  
 4 Reference point: max.  $+85$  °C  
 5 E.g. thermal insulation

**Temperature tables***Device type FTL50, FTL50H, FTL51, FTL51H and**Device type FTL51C, Basic specification, Position 5, 6 (Probe Length; Type) = xL, xM, xN, xS*

| Temperature class | Process temperature T <sub>p</sub> (process): sensor | Ambient temperature T <sub>a</sub> (ambient): electronics                                                                                                                                                                                                     |
|-------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T6                | -50 to +75 °C                                        | -50 to +70 °C <sup>1)</sup>                                                                                                                                                                                                                                   |
| T5                | -50 to +90 °C                                        | -50 to +70 °C<br>with temperature separator;<br>without temperature separator →  3,  12 |
| T4                | -50 to +125 °C                                       |                                                                                                                                                                                                                                                               |
| T3                | -50 to +150 °C                                       |                                                                                                                                                                                                                                                               |

1) Basic specification, Position 7 (Electronics; Output) = 4: T<sub>a,max</sub> = +55 °C*Device type FTL51C, Basic specification, Position 5, 6 (Probe Length; Type) = xK*

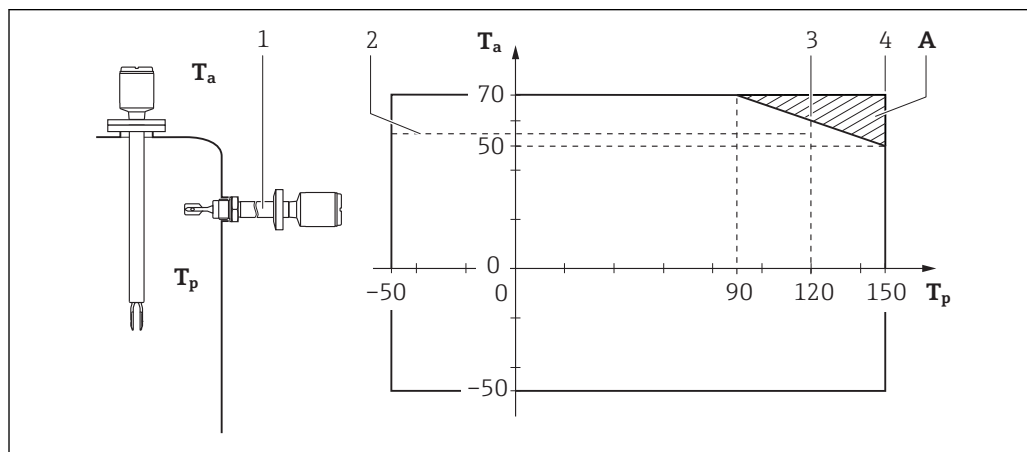
| Temperature class | Process temperature T <sub>p</sub> (process): sensor | Ambient temperature T <sub>a</sub> (ambient): electronics                                                                                                                                                                                                     |
|-------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T6                | -50 to +75 °C                                        | -50 to +70 °C <sup>1)</sup>                                                                                                                                                                                                                                   |
| T5                | -50 to +90 °C                                        | -50 to +70 °C<br>with temperature separator;<br>without temperature separator →  3,  12 |
| T4                | -50 to +120 °C                                       |                                                                                                                                                                                                                                                               |

1) Basic specification, Position 7 (Electronics; Output) = 4: T<sub>a,max</sub> = +55 °C*Device type FTL70, FTL71*

| Temperature class | Process temperature T <sub>p</sub> (process): sensor           | Ambient temperature T <sub>a</sub> (ambient): electronics                                                                                                                                                         |
|-------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T6                | -60 to +75 °C                                                  | -50 to +70 °C <sup>1)</sup>                                                                                                                                                                                       |
| T5                | -60 to +90 °C                                                  | -50 to +70 °C                                                                                                                                                                                                     |
| T4                | -60 to +125 °C                                                 |                                                                                                                                                                                                                   |
| T3                | -60 to +190 °C                                                 | -50 to +70 °C<br>Restrictions →  4,  13 |
| T2                | -60 to +230 °C (L)<br>-60 to +280 °C (N)<br>-60 to +285 °C (Y) |                                                                                                                                                                                                                   |
| T1                | -60 to +300 °C (Y)                                             |                                                                                                                                                                                                                   |

1) Basic specification, Position 7 (Electronics; Output) = 4: T<sub>a,max</sub> = +55 °C

Device type FTL50, FTL50H, FTL51, FTL51H, FTL51C



A0034493

3

 $T_a$  Ambient temperature in °C $T_p$  Process temperature in °C

A Additional temperature range for devices with temperature separator or pressure-tight feed through

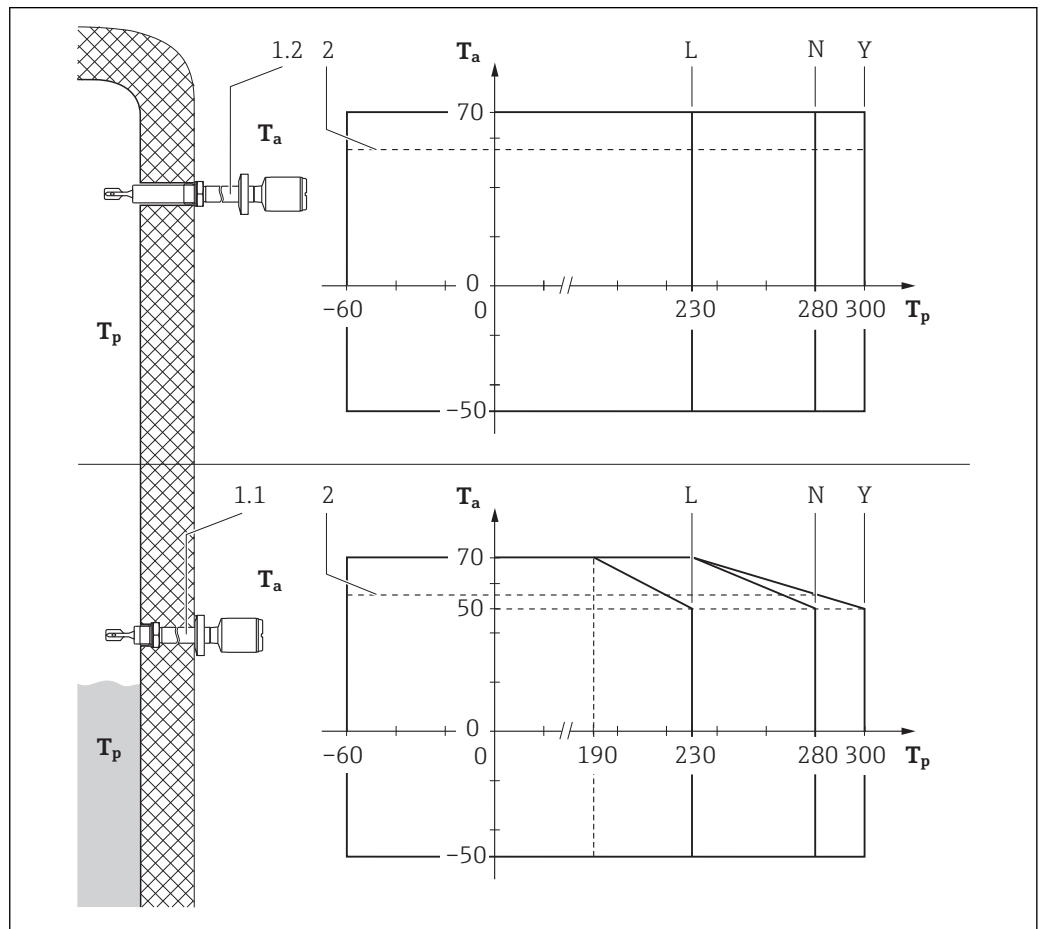
1 Temperature separator or pressure tight feed through

2 Basic specification, Position 7 (Electronics; Output) = 4:  $T_a = +55$  °C

3 ECTFE

4 PFA, Enamel, 316L, Alloy

Device type FTL70, FTL71



A0034551

4

 $T_a$  Ambient temperature in  $^\circ\text{C}$  $T_p$  Process temperature in  $^\circ\text{C}$ 

1 Temperature separator:

1.1 insulated

1.2 free-standing

2 Basic specification, Position 7 (Electronics; Output) = 4:  $T_a = +55^\circ\text{C}$ 

## Connection data

| Basic specification,<br>Position 7<br>(Electronics; Output) | Supply circuit                                                                       | Output                                             |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------|
| A                                                           | For connection to a Fieldbus                                                         | PROFIBUS PA or FOUNDATION Fieldbus                 |
| Device type<br>FTL5x(H), FTL51C = D<br>FTL7x = 9            | Only associated intrinsically safe power supply unit FML621 from Endress+Hauser      |                                                    |
| 1                                                           | U = 19 to 253 V <sub>AC</sub> , 50/60 Hz;<br>max. 0.96 VA                            | max. 350 mA                                        |
| 2                                                           | U = 10 to 55 V <sub>DC</sub> ; max. 0.83 W                                           | PNP transistor; max. 350 mA                        |
| 4                                                           | U = 19 to 253 V <sub>AC</sub> , 50/60 Hz or<br>19 to 55 V <sub>DC</sub> ; max. 1.3 W | 2 potential free change-over contacts;<br>4 A Ex e |
| 5                                                           | U = 11 to 36 V <sub>DC</sub> ; max. 0.6 W                                            | max. 22 mA                                         |
| 6                                                           | U = 4 to 12.5 V <sub>DC</sub> ; max. 0.23 W                                          | NAMUR; max. 3.5 mA                                 |
| 7                                                           | U = max. 16.7 V <sub>DC</sub> ; max. 0.15 W                                          | PFM; max. 12 mA                                    |
| 8                                                           | U = 4 to 12.5 V <sub>DC</sub> ; max. 0.23 W                                          | NAMUR; max. 3.5 mA                                 |