

Safety Instructions

Liquiphant FailSafe

FTL80, FTL81, FTL85

II 1/2 G Ex db eb IIC T6 Ga/Gb



Liquiphant FailSafe FTL80, FTL81, FTL85

Table of contents

| | |
|---|----|
| Associated documentation | 4 |
| Supplementary documentation | 4 |
| Manufacturer's certificates | 4 |
| Manufacturer address | 4 |
| Other standards | 4 |
| Extended order code | 5 |
| Safety instructions: General | 8 |
| Safety instructions: Special conditions | 8 |
| Safety instructions: Installation | 9 |
| Safety instructions: Ex d joints | 10 |
| Safety instructions: Zone 0 | 11 |
| Explosion protection with heat insulation | 11 |
| Temperature tables | 12 |
| Connection data | 16 |

Associated documentation

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

BA01037F/00

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 -> Downloads -> Brochures and Catalogs -> Text Search: CP00021Z
- On the CD for devices with CD-based documentation

Manufacturer's certificates**UK Declaration of Conformity**

Declaration Number:

UK_00254

The UK Declaration of Conformity is available:

In the download area of the Endress+Hauser website:

www.endress.com -> Downloads -> Declaration ->

Type: UKCA Declaration -> Product Code: ...

UKCA type-examination certificate

Certificate number:

CML 21UKEX2637X

List of applied standards: See UK Declaration of Conformity.

Manufacturer address

Endress+Hauser SE+Co. KG

Hauptstraße 1

79689 Maulburg, Germany

Address of the manufacturing plant: See nameplate.

Other standards

Among other things, the following standards shall be observed in their current version for proper installation:

- IEC/EN 60079-14: "Explosive atmospheres - Part 14: Electrical installations design, selection and erection"
- EN 1127-1: "Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology"

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

| | | | | |
|----------------------|---|-------------------------------|---|----------------------------------|
| FTL8x | – | ***** | + | A*B*C*D*E*F*G*.. |
| <i>(Device type)</i> | | <i>(Basic specifications)</i> | | <i>(Optional specifications)</i> |

* = 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 FailSafe



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

FTL80, FTL81, FTL85

Basic specifications

| Position 1, 2 (Approval) | | |
|--------------------------|-------------|--------------------------------------|
| Selected option | Description | |
| FTL8x | UD | UK Ex II 1/2 G Ex db eb IIC T6 Ga/Gb |

| Position 3 (Electronics, Output) | | |
|----------------------------------|-------------|------------------------|
| Selected option | Description | |
| FTL8x | S | FEL85; 2-wire, 4-20 mA |

| Position 4 (Display, Operation) | | |
|---------------------------------|-------------|-------------|
| Selected option | Description | |
| FTL8x | A | LED; switch |

| Position 5 (Housing) | | |
|----------------------|-------------|--|
| Selected option | Description | |
| FTL8x | E | T13 Alu, separate conn. compartment, IP66/68 NEPA Type 4X/6P Encl. |

| Position 6 (Electrical Connection) | | |
|------------------------------------|-------------|---------------|
| Selected option | Description | |
| FTL8x | A | Gland M20 |
| | B | Thread M20 |
| | C | Thread G1/2 |
| | D | Thread NPT1/2 |
| | E | Thread NPT3/4 |

| Position 7 (Application) | | |
|--------------------------|-------------|--|
| Selected option | Description | |
| FTL80 | A | Process max. 150 °C/302 °F, 64 bar/928 psi |
| | C | Process max. 230 °C/446 °F, 100 bar/1450 psi; incl. gas-tight feed through |
| | D | Process max. 280 °C/536 °F, 100 bar/1450 psi; incl. gas-tight feed through |
| | Y | Process max. 300 °C/572 °F, 100 bar/1450 psi |

| Position 7 (Application) | | |
|---------------------------------|--------------------|---|
| Selected option | Description | |
| FTL81 | A | Process max. 150 °C/302 °F, 64 bar/928 psi |
| | B | Process max. 150 °C/302 °F, 100 bar/1450 psi |
| | C | Process max. 230 °C/446 °F, 100 bar/1450 psi; incl. gas-tight feed through |
| | D | Process max. 280 °C/536 °F, 100 bar/1450 psi; incl. gas-tight feed through |
| | Y | Process max. 300 °C/572 °F, 100 bar/1450 psi |
| FTL85 | N | ECTFE, Process max. 120 °C/248 °F, 40 bar/580 psi |
| | P | PFA, Process max. 150 °C/302 °F, 40 bar/580 psi |
| | T | Enamel, Process max. 150 °C/302 °F, 25 bar/362 psi |

| Position 9 (Surface Refinement) | | |
|--|--------------------|--------------------------|
| Selected option | Description | |
| FTL85 | N | Coating ECTFE |
| | P | Coating PFA (Edlon) |
| | Q | Coating PFA (RubyRed) |
| | R | Coating PFA (conductive) |
| | T | Coating Enamel |

Optional specifications

| ID Mx (Sensor Design) | | |
|------------------------------|--------------------|--|
| Selected option | Description | |
| FTL8x | MP | Ambient temperature -50 °C/-58 °F |
| | MR | Temperature separator |
| | MS | Pressure tight feed through, incl. temperature separator |

| ID Nx (Accessory Mounted) | | |
|----------------------------------|--------------------|--------------------------------|
| Selected option | Description | |
| FTL8x | NE | Cover, housing T13 Alu, window |

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. enclosure, 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 enclosure:
 $-50\text{ °C} \leq T_a \leq +70\text{ °C}$

- Observe the information in the temperature tables.
- In the case of process connections made of polymeric material or with polymeric coatings, avoid electrostatic charging of the plastic surfaces.
- In the event of additional or alternative special varnishing on the enclosure or other metal parts:
 - Observe the danger of electrostatic charging and discharge.
 - Do not rub surfaces with a dry cloth.

Basic specification, Position 5 = E

Avoid sparks caused by impact and friction.

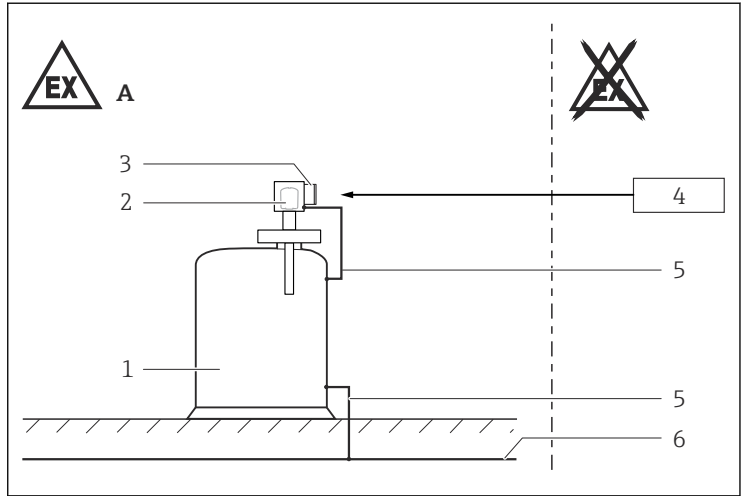
Device group IIC

A probe coated with non-conductive material can be used if avoiding electrostatic charging (e.g. through friction, cleaning, maintenance, strong medium flow).

Device group IIB

A probe coated with non-conductive material can be used.

Safety instructions: Installation



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1

- A Zone 1
 1 Tank; Zone 0, Zone 1
 2 Electronic insert, electronics compartment Ex d
 3 Connection compartment Ex e
 4 Power supply
 5 Potential equalization line
 6 Potential equalization

- 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.
- Support extension tube of the device if a dynamic load is expected.
- Connect the device:
 - Using suitable cable and wire entries of protection type "Increased safety (Ex eb)".
 - Using piping systems of protection type "Increased safety (Ex eb)".
- When operating the transmitter enclosure at an ambient temperature under $-20\text{ }^{\circ}\text{C}$, use appropriate cables and cable entries permitted for this application.

- Seal unused entry glands with approved sealing plugs that correspond to the type of protection. The plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.
- Continuous service temperature of the connecting cable:
-40 °C to $\geq +85$ °C; in accordance with the range of service temperature taking into account additional influences of the process conditions ($T_{a,min}$), ($T_{a,max} + 20$ K).
- 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.
- Before operation:
 - Screw in the cover all the way.
 - Tighten the securing clamp on the cover.

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 separation if mounted properly (see Operating Instructions).

Potential equalization

Integrate the device into the local potential equalization.

| Cross section connecting wire | Tightening torque of terminal screw | Stripped insulation |
|-------------------------------|-------------------------------------|---------------------|
| $\leq 2.5 \text{ mm}^2$ | 0.4 Nm | 6 to 8 mm |

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:

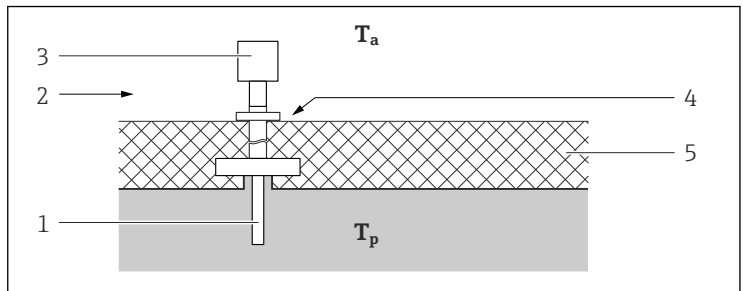
Zone 0

- 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.
- 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.
- Only use the device in media to which the wetted materials have sufficient durability (e.g. process connection seal).

Explosion protection with heat insulation

Device type FTL80, FTL81, Basic specification, Position 7 = C, D, 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 enclosure.



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2

T_a Ambient temperature

T_p Process temperature

1 Sensor

2 Temperature class, e.g. T6

3 Enclosure

4 Reference point: max. $+85$ °C

5 E.g. thermal insulation

Temperature tables

Ambient temperature electronics

| When used outside Zone 0 |
|--------------------------|
| -50 to +70 °C |

Process temperature sensor

| When used in Zone 0 |
|---------------------|
| -20 to +60 °C |

Device type *FTL80, FTL81, Basic specification, Position 7 = A, B, C, D, Y*



| When used outside Zone 0 |
|--------------------------|
| -50 to +150 °C (A, B) |
| -60 to +230 °C (C) |
| -60 to +280 °C (D) |
| -60 to +300 °C (Y) |

Device type *FTL85, Basic specification, Position 7 = N, P, T*



| When used outside Zone 0 |
|--------------------------|
| -50 to +120 °C (N) |
| -50 to +150 °C (P, T) |

The dependency of the ambient and process temperatures upon the temperature class:



Device type *FTL80, FTL81, Basic specification, Position 7 = A, B*

| Temperature class | Process temperature T_p (process): sensor | Ambient temperature T_a (ambient): electronics |
|-------------------|---|---|
| T6 | -50 to +85 °C | -50 to +70 °C |
| T5 | -50 to +100 °C | -50 to +70 °C |
| T4 | -50 to +135 °C | Additional temperature range for sensors with Optional specifications Mx = MR, MS |
| T3 | -50 to +150 °C | →  3,  14 |

Device type FTL80, FTL81, Basic specification, Position 7 = C, D, Y

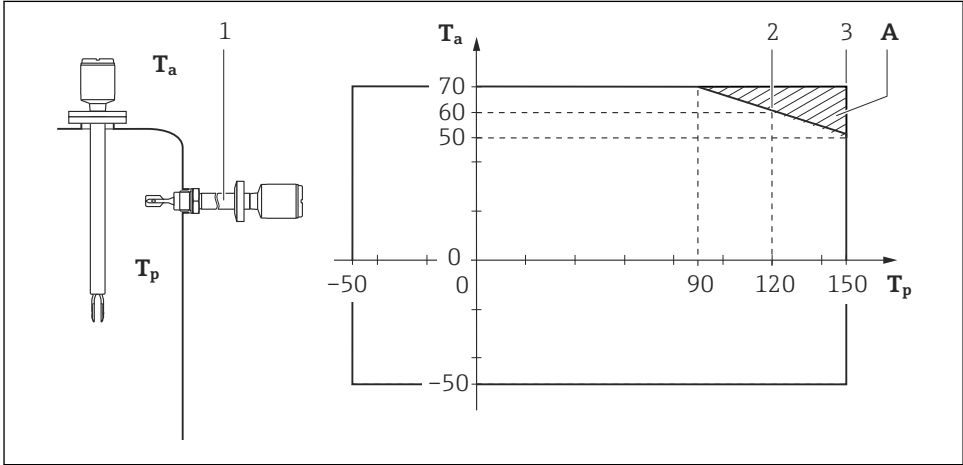
| Temperature class | Process temperature T _p (process): sensor | Ambient temperature T _a (ambient): electronics |
|-------------------|--|---|
| T6 | -60 to +85 °C | -50 to +70 °C |
| T5 | -60 to +100 °C | -50 to +70 °C For restrictions →  4,  15 |
| T4 | -60 to +135 °C | |
| T3 | -60 to +200 °C | |
| T2 | -60 to +230 °C (C) -60 to +280 °C (D) -60 to +300 °C (Y) | |

Device type FTL85, Basic specification, Position 7 = N, P, T

| Temperature class | Process temperature T _p (process): sensor | Ambient temperature T _a (ambient): electronics |
|-------------------|--|--|
| T6 | -50 to +85 °C | -50 to +70 °C |
| T5 | -50 to +100 °C | -50 to +70 °C Additional temperature range for sensors with Optional specifications Mx = MR, MS →  3,  14 |
| T4 | -50 to +120 °C (N) | |
| | -50 to +135 °C (P, T) | |
| T3 | -50 to +150 °C (P, T) | |

Device type FTL80, FTL81, Basic specification, Position 7 = A, B

Device type FTL85, Basic specification, Position 7 = N, P, T



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T_a Ambient temperature

T_p Process temperature

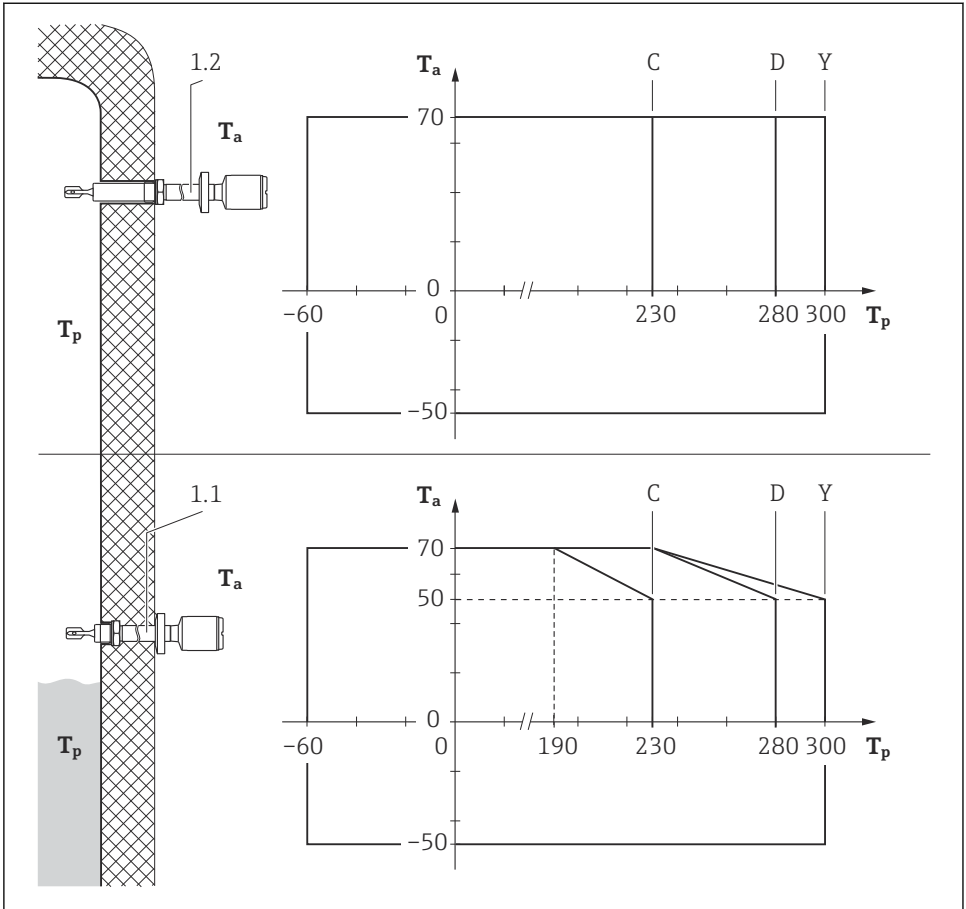
A Additional temperature range for sensors with Optional specifications Mx = MR, MS

1 Temperature separator or pressure tight feed through

2 ECTFE

3 PFA, Enamel

Device type FTL80, FTL81, Basic specification, Position 7 = C, D, Y



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4

- T_a Ambient temperature
 T_p Process temperature
 1 Temperature separator:
 1.1 insulated
 1.2 free-standing

Connection data**Ex db eb**

Only connect the device to terminals 1 and 2 or terminals 2 and 3, respectively.

Terminal 1 (-) (MAX safety)

Terminal 2 (+)

Terminal 3 (-) (MIN safety)

Power supply

$$U_e = 30 V_{DC}$$

$$U_m = 250 V_{AC}$$

$$I_{Nom} = 4 \text{ to } 20 \text{ mA}$$

$$P_{max} \leq 660 \text{ mW}$$

Cable entry

Cable gland: *Basic specification, Position 6 = B*

| Thread | Clamping range | Material | Sealing insert | O-ring |
|---------|--|-------------------|----------------|------------------------------------|
| M20x1,5 | $\varnothing 8 \text{ to } 10.5 \text{ mm}^{1)}$ ($\varnothing 6.5 \text{ to } 13 \text{ mm}^{2)}$ | Ms, nickel-plated | LSR (Silicone) | EPDM ($\varnothing 17 \times 2$) |

1) Standard

2) Separate clamping inserts available



- The tightening torque refers to cable glands installed by the manufacturer:
 - Recommended torque to connect the cable gland into the enclosure: 3.75 Nm
 - Recommended torque to tighten the cable into the cable gland: 3.5 Nm
 - Maximum torque to tighten the cable into the cable gland: 10 Nm
 - This value may be different depending on the type of cable. However, the maximum value must not be exceeded.
- Only suitable for fixed installation. The operator must pay attention to a suitable strain relief of the cable.
- The cable glands are suitable for a low risk of mechanical danger (4 Joule) and must be mounted in a protected position if larger impact energy levels are expected.
- To maintain the ingress protection of the enclosure: Install the enclosure cover, cable glands and blind plugs correctly.



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