

Safety Instructions

Liquiphant FailSafe

FTL80, FTL81, FTL85

Ex ia IIC T6...T2 Ga

Ex ia IIC T6...T2 Ga/Gb



Liquiphant FailSafe FTL80, FTL81, FTL85

Table of contents

About this document	4
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	9
Safety instructions: Installation	10
Safety instructions: Zone 0	11
Explosion protection with heat insulation	12
Temperature tables	12
Connection data	17

About this document

This document has been translated into several languages. Legally determined is solely the English source text.

Associated documentation

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

BA01037F

Supplementary documentation

Explosion protection brochure: CP00021Z

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**NEPSI Declaration of Conformity**

Certificate number:

GYJ23.1033X

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

- GB/T 3836.1-2021
- GB/T 3836.4-2021

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

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	NA	NEPSI Ex ia IIC T6...T2 Ga
	NB	NEPSI Ex ia IIC T6...T2 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	A	F16 Polyester, IP66/67 NEMA Type 4X Encl.
	C	F17 Alu, IP66/67 NEMA Type 4X Encl.
	D	F13 Alu, IP66/68 NEMA Type 4X/6P Encl.
	E	T13 Alu, separate conn. compartment, IP66/68 NEMA Type 4X/6P Encl.
	H	F15 316L hygiene, IP66/67 NEMA Type 4X Encl.
	I	F27 316L, IP66/68 NEMA 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
	I	Plug M12

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
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	NA	Cover, enclosure F16 PA, transparent
	NC	Cover, enclosure F17 Alu, window
	ND	Cover, enclosure F13 Alu, window
	NE	Cover, enclosure T13 Alu, window
	NH	Cover, enclosure F15 316L, 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
- For installation, use and maintenance of the device, users must also observe the requirements stated in the Operating Instructions and the standards:
 - GB 50257-2014: "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
 - GB/T 3836.13-2021: "Explosive atmospheres, Part 13: Equipment repair, overhaul, reclamation and modification".
 - GB/T 3836.15-2017: "Explosive atmospheres, Part 15: Electrical installations design, selection and erection".
 - GB/T 3836.16-2017: "Explosive atmospheres, Part 16: Electrical installations inspection and maintenance".
 - GB/T 3836.18-2017: "Explosive atmospheres, Part 18: Intrinsically safe electrical systems".
- 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 = A

- In Zone 0, enclosure not permitted.
- Avoid electrostatic charging of the enclosure (e.g. friction, cleaning, maintenance, strong medium flow).

Basic specification, Position 5 = C, D, E

In Zone 0, avoid sparks caused by impact and friction.

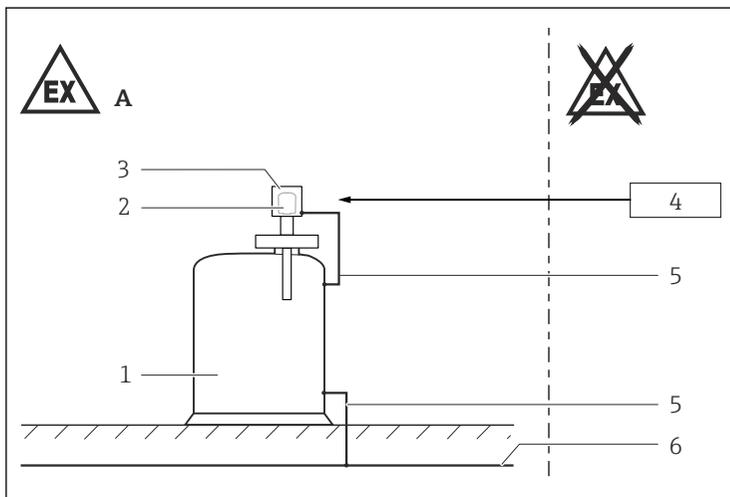
Device group IIC

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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- A Zone 0, Zone 1
 1 Tank; Zone 0, Zone 1
 2 Electronic insert
 3 Enclosure
 4 Certified associated apparatus
 5 Potential equalization line
 6 Potential equalization

- Perform the following to achieve the degree of protection IP66/67:
 - Screw the cover tight.
 - Mount the cable entry correctly.
- Connect the device using suitable cable and wire entries of protection type "Intrinsic safety (Ex i)".
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection.
- 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.
- 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).

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).

Intrinsic safety

- The device is only suitable for connection to certified, intrinsically safe equipment with explosion protection Ex ia.
- The intrinsically safe input power circuit of the device is isolated from ground. The dielectric strength is at least $500 V_{\text{rms}}$.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.

Potential equalization

Integrate the device into the local potential equalization.

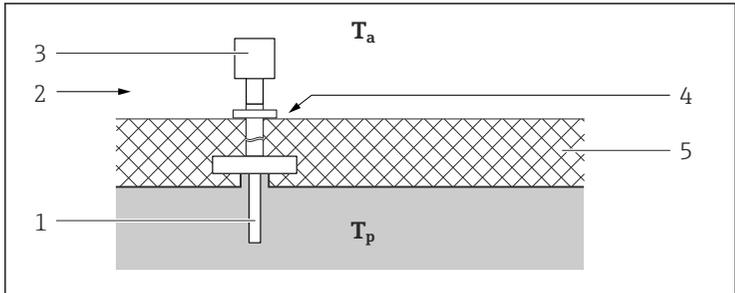
Safety instructions: Zone 0

- 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.
- Associated devices with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.
- Only use the device in media to which the silicone rubber potting compound of the electronic insert and the enclosure made of PBT, aluminum or 316L have sufficient durability.
- 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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- 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 in Zone 0
-20 to +60 °C

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 +60 °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 →  3,  15
T3	-50 to +150 °C	

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

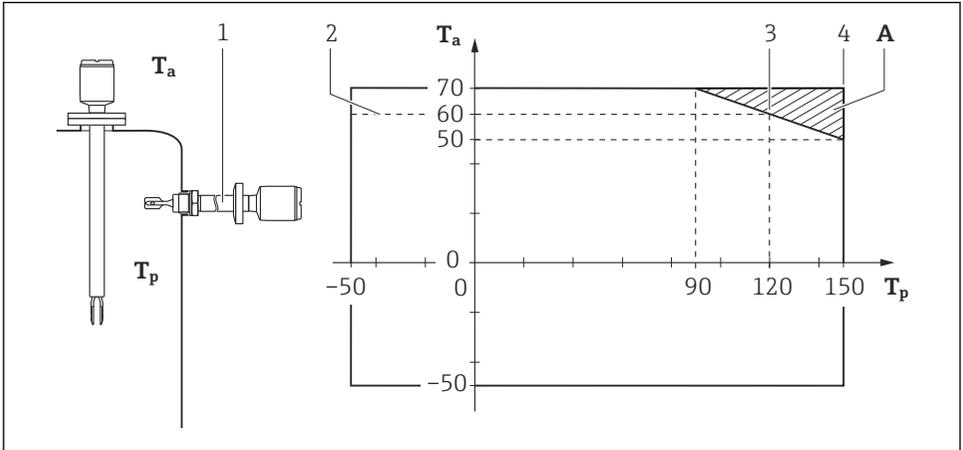
Temperature class	Process temperature T_p (process): sensor	Ambient temperature T_a (ambient): electronics
T6	-60 to +85 °C	-50 to +60 °C
T5	-60 to +100 °C	-50 to +70 °C For restrictions →  4,  16
T4	-60 to +135 °C	
T3	-60 to +200 °C	
T2	-60 to +230 °C (C) -60 to +280 °C (D) -60 to +300 °C (Y)	

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 +60 °C
T5	-50 to +100 °C	-50 to +70 °C Additional temperature range for sensors with Optional specifications Mx = MR, MS →  3,  15
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

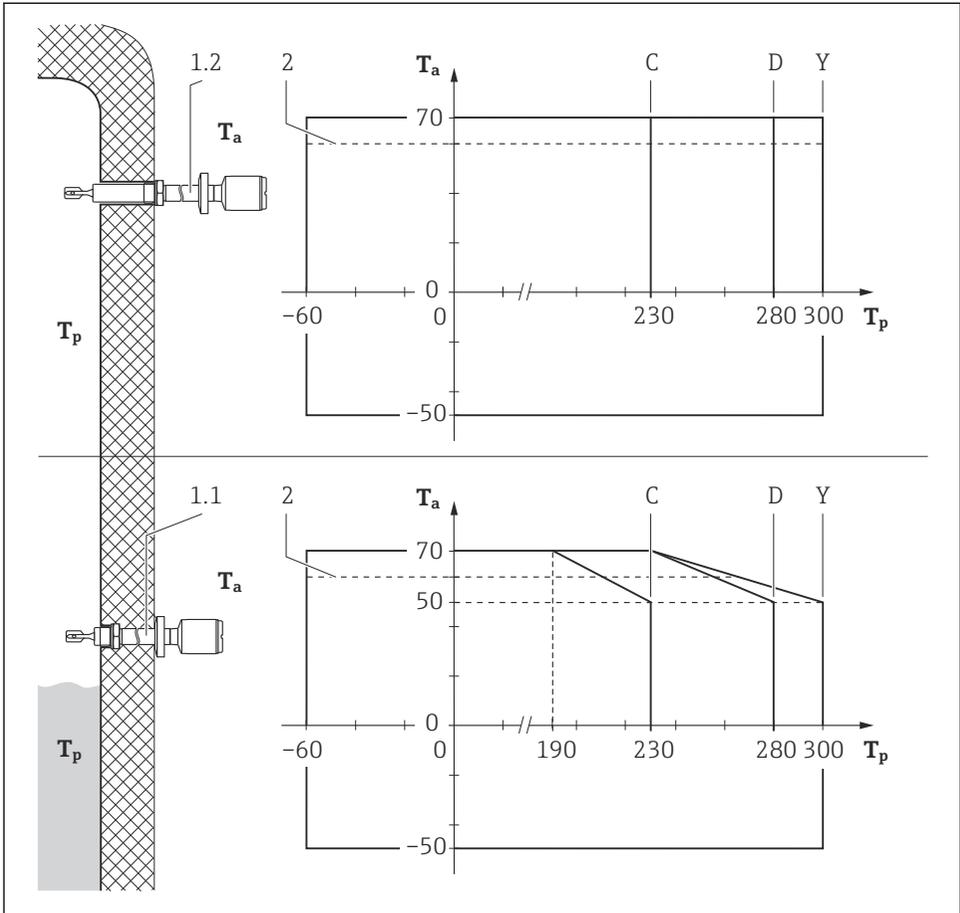
1 Temperature separator or pressure tight feed through

2 T_a for T6: -50 to +60 °C

3 ECTFE

4 PFA, Enamel

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



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- T_a Ambient temperature
- T_p Process temperature
- 1 Temperature separator:
 - 1.1 insulated
 - 1.2 free-standing
- 2 T_a for T6: -50 to +60 °C

Connection data**Ex ia**

Power supply circuit with protection type: intrinsic safety Ex ia IIC, Ex ia IIB.



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:

$$U_i = 30 \text{ V}$$

$$I_i = 170 \text{ mA}$$

$$P_i = 1 \text{ W}$$

effective inner inductance $L_i = 0$

effective inner capacitance $C_i = 16 \text{ nF}$



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