

Safety Instructions

# Liquiphant FailSafe FTL80, FTL81, FTL85

Control Drawing XP + NI



Document: XA00655F-A

Safety instructions for electrical apparatus for explosion-hazardous areas classified according to the Canadian Electrical Code (CEC) and National Electrical Code (NEC)



# Liquiphant FailSafe FTL80, FTL81, FTL85

## Table of contents

Associated documentation .....	4
Extended order code .....	4
Class I, Div. 1; Class II and Class III, Div. 1 .....	7
Class I, Div. 2; Class II and Class III, Div. 2 .....	7
Flammable fluid seals .....	7
Zone concept (X-marking) .....	8
Explosion protection with heat insulation .....	8
Temperature tables .....	9
Connection data .....	12

**Associated documentation**

This document is an integral part of the following Operating Instructions:  
BA01037F/00

The Operating Instructions pertaining to the device apply.

**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*..
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.

**Device type: FTL80, FTL81, FTL85**

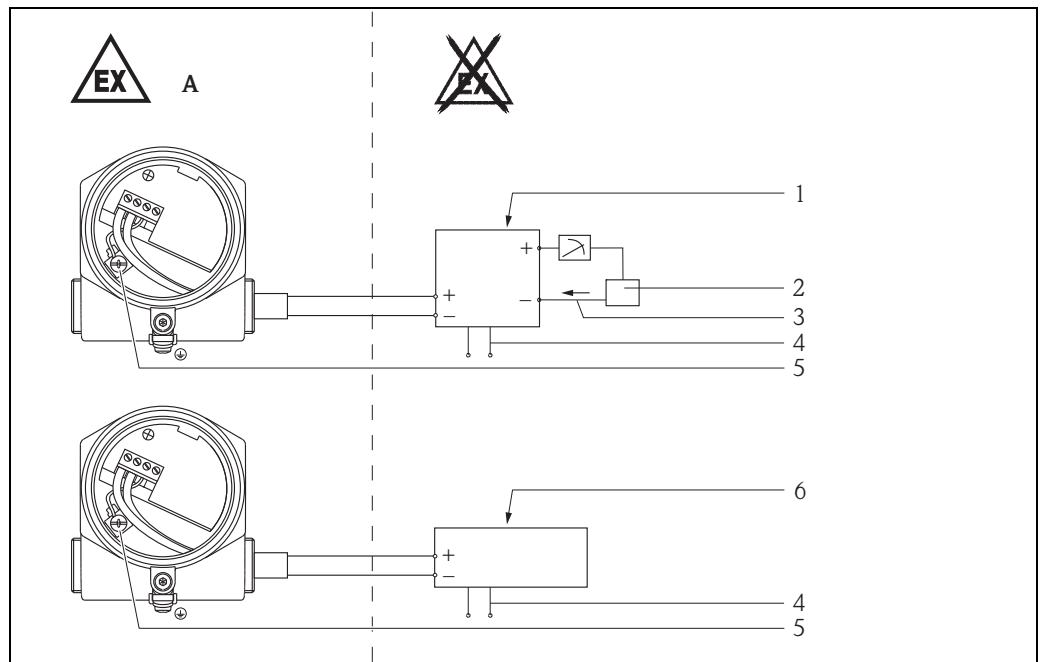
## Basic specifications

Position	Selected option	Description
1, 2 Approval	FTL8x: CD	CSA C/US XP Cl. I, Div. 1, Gr. A-G, Cl. II, III, Div. 1, Gr. E-G Cl. I, Zone 1, Ex d IIC T6 NI Cl. I, Div. 2, Gr. A-G, T6
3 Electronics; Output	FTL8x: S	FEL85; 2-wire, 4-20 mA
4 Display; Operating	FTL8x: A	LED; switch
5 Housing	FTL8x: D E I	F13 Alu, IP66/68 NEPA Type 4X/6P Encl. T13 Alu, separate conn. compartment, IP66/68 NEPA Type 4X/6P Encl. F27 316L, IP66/68 NEPA Type 4X/6P Encl.
6 Electrical Connection	FTL8x: D E	Thread NPT1/2 Thread NPT3/4
7 Application	FTL80: A C D Y	Process max. 150 °C/302 °F, 64 bar/928 psi Process max. 230 °C/446 °F, 100 bar/1450 psi; incl. gas-tight feed through Process max. 280 °C/536 °F, 100 bar/1450 psi; incl. gas-tight feed through Process max. 300 °C/572 °F, 100 bar/1450 psi
	FTL81: A B C D Y	Process max. 150 °C/302 °F, 64 bar/928 psi Process max. 150 °C/302 °F, 100 bar/1450 psi Process max. 230 °C/446 °F, 100 bar/1450 psi; incl. gas-tight feed through Process max. 280 °C/536 °F, 100 bar/1450 psi; incl. gas-tight feed through Process max. 300 °C/572 °F, 100 bar/1450 psi
	FTL85: N P T	ECTFE, Process max. 120 °C/248 °F, 40 bar/580 psi PFA, Process max. 150 °C/302 °F, 40 bar/580 psi Enamel, Process max. 150 °C/302 °F, 25 bar/362 psi
9 Surface Refinement	FTL85: N P Q R T	Coating ECTFE Coating PFA (Edlon) Coating PFA (RubyRed) Coating PFA (conductive) Coating Enamel

## Optional specifications

ID	Selected option	Description
Mx Sensor Design	FTL8x: MP MQ MR MS	Ambient temperature -50 °C/-58 °F Ambient temperature -60 °C/-76 °F Temperature separator Pressure tight feed through, incl. temperature separator
Nx Accessory Mounted	FTL8x: ND NE	Cover, housing F13 Alu, window Cover, housing T13 Alu, window

## Installation drawing XP



FTL8x\_11

 1

**A** Class I, Div. 1, Groups A, B, C, D;  
 Class II, Div. 1, Groups E, F, G;  
 Class III  
 Zone 1, Ex/AEx d IIC T6

- 1 Power supply, 4...20 mA transmitter  
 2 External load  
 3 4...20 mA  
 4 Supply  
 5 Ground stud  
 6 Endress+Hauser transmitter  
 Liquiphant FailSafe, Nivotester FTL825

**Class I, Div. 1;  
Class II and Class III, Div. 1**

**Explosion proof  
Class I, Div. 1, Groups A, B, C, D, Class II, Div. 1, Groups E, F, G, Class III;  
Zone 1 Ex/AEx d IIC T6**

**Hazardous locations installations**

- Control room equipment may not use or generate over 250 Vrms.
- Install as per CEC (Canadian Electrical Code) or NEC (National Electrical Code) (ANSI/NFPA70).
- Supply wires shall be installed in accordance with CEC or NEC.
- Install conduit seal at enclosure wall.
- Use supply wires suitable for 20 K above the ambient temperature.

Terminal compartment:

- Warning: Keep cover tight when circuit is live unless the area is known to be non-hazardous.

**Class I, Div. 2;  
Class II and Class III, Div. 2**

**Suitable for Class I, Div. 2, Groups A, B, C, D, Class II, Div. 2, Groups E, F, G, Class III; Ex nA IIC  
(only for NPT conduit entries)**

**Hazardous locations installations**

- Install as per CEC (Canadian Electrical Code) or NEC (National Electrical Code) (ANSI/NFPA70).
- Intrinsic safety barrier not required.
- Maximum ambient temperature: 80 °C.
- Maximum supply voltage: 30 V DC.
- Warning: Explosion hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Warning: Open circuit before removing cover.
- Warning: Substitution of components may impair suitability for Class I, Div. 2.

**Flammable fluid seals**

**Single/Dual Seal per ANSI/ISA 12.27.01**

Single seal device:

- Gas-tight conduit seal not required for FTL80, FTL81, FTL85: For version without gas-tight glass feed-through (Basic specification, Position 7 (Application) = A, B, N, P, T)

Dual seal device with annunciation:

- Gas-tight conduit seal not required for FTL80, FTL81: For version with gas-tight glass feed-through (Basic specification, Position 7 (Application) = C, D, Y).

**Zone concept (X-marking)****Electrostatic/impact sparks**

Gas group IIC

- If electrostatic charging of the probe can be avoided (e.g. through friction, cleaning, maintenance, strong medium flow), a probe coated with non-conductive material can be used.

Gas group IIB

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

Device type FTL85, Basic specification, Position 9 (Surface Refinement) = N, P, Q

- The probe with plastic coated surfaces can be electrostatically charged.
- Warning: Avoid electrostatic charging of the plastic surfaces, for plastic process connections or plastic coatings.
- Not suitable for dust application.

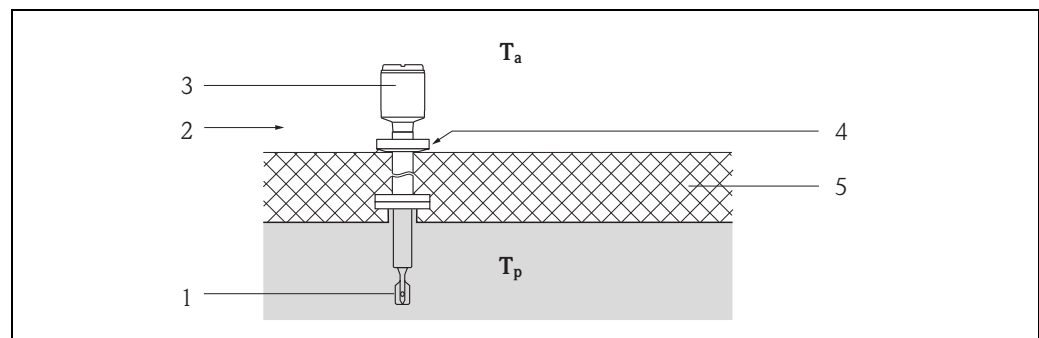
Basic specification, Position 5 (Housing) = D, E

- Avoid sparks caused by impact and friction.

**Explosion protection with heat insulation**

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

- While observing the "temperature derating", the device is suitable for process temperatures up to 300 °C (→ 11).
- When operating, ensure that you rule out contact between hot component surfaces and potentially explosive atmospheres beyond the limits of the corresponding temperature class (→ 10).  
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.



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**

Note!

Observe the permitted probe temperature range.

**Application in gas****Ambient temperature electronics****When used in Zone 0**

-20...+60 °C

**When used outside Zone 0**

-60...+70 °C

Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C

**Process temperature sensor****When used in Zone 0**

-20...+60 °C

Device type FTL80, FTL81, Basic specification, Position 7 (Application) = A, B, C, D, Y

**When used outside Zone 0**

-50...+150 °C (A, B)

-60...+230 °C (C)

-60...+280 °C (D)

-60...+300 °C (Y)

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

**When used outside Zone 0**


-50...+120 °C (N)

-50...+150 °C (P, T)


**Application in dust****Probe in Zone 20, electronics housing in Zone 21** $T = T_a + 10 \text{ K}$  $T_{500} = T_a + 30 \text{ K}$

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


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

Temperature class	Process temperature $T_p$ (process): sensor	Ambient temperature $T_a$ (ambient): electronics
T6	-50...+ 85 °C	-60...+70 °C Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C
T5	-50...+100 °C	-60...+70 °C Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C Additional temperature range for sensors with Optional specification Mx = MR, MS →  3
T4	-50...+135 °C	
T3	-50...+150 °C	

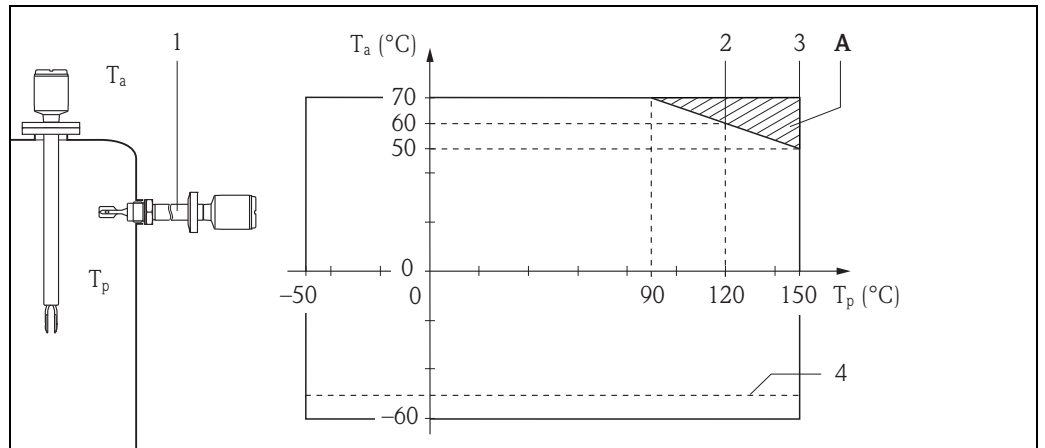
Device type FTL80, FTL81, Basic specification, Position 7 (Application) = C, D, Y

Temperature class	Process temperature $T_p$ (process): sensor	Ambient temperature $T_a$ (ambient): electronics
T6	-60...+ 85 °C	-60...+70 °C Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C
T5	-60...+100 °C	-60...+70 °C Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C For restrictions →  4
T4	-60...+135 °C	
T3	-60...+200 °C	
T2	-60...+230 °C (C) -60...+280 °C (D) -60...+300 °C (Y)	

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

Temperature class	Process temperature $T_p$ (process): sensor	Ambient temperature $T_a$ (ambient): electronics
T6	-50...+ 85 °C	-60...+70 °C Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C
T5	-50...+100 °C	-60...+70 °C Optional specification Nx (Accessory Mounted) = ND, NE: -50...+70 °C Additional temperature range for sensors with Optional specification Mx = MR, MS →  3
T4	-50...+120 °C (N)	
T4	-50...+135 °C (P, T)	
T3	-50...+150 °C (P, T)	

Device type FTL80, FTL81, Basic specification, Position 7 (Application) = A, B  
 Device type FTL85, Basic specification, Position 7 (Application) = N, P, T

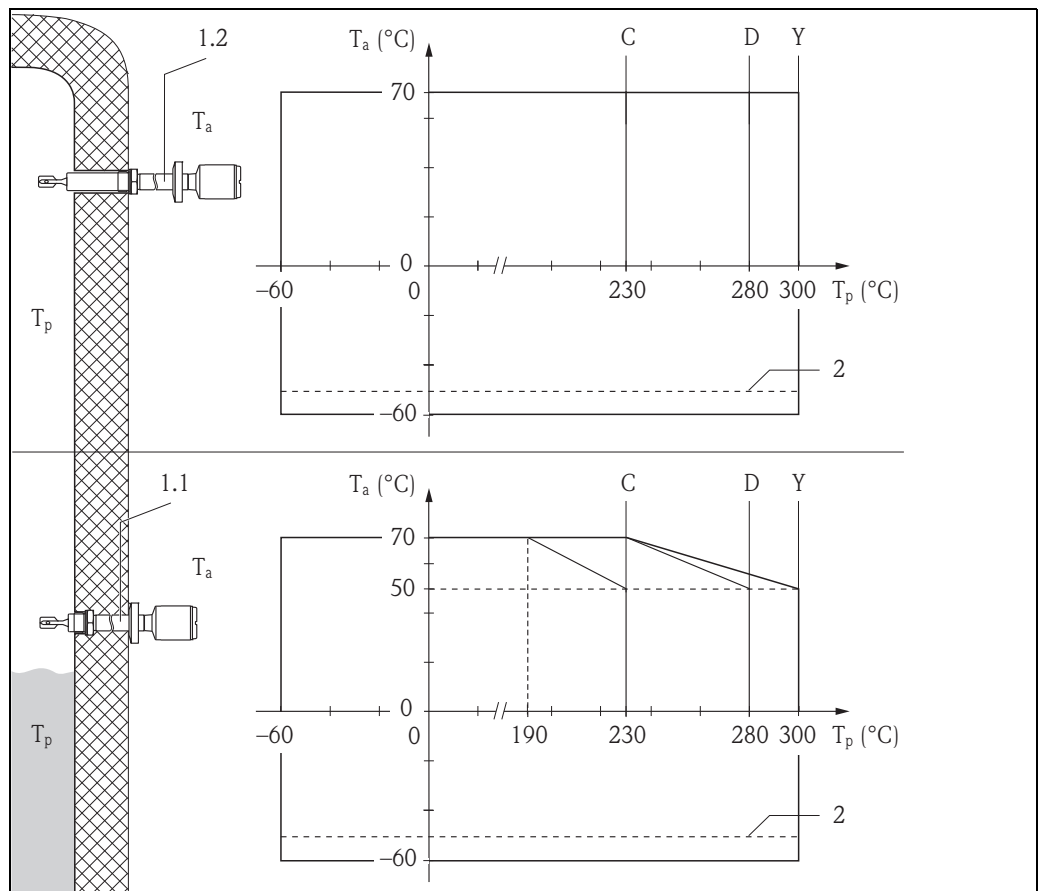


FTL8x\_05

3

- 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
- 4  $T_a$  for Optional specification Nx (Accessory Mounted) = ND, NE:  $-50...+70\text{ }^\circ\text{C}$

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



FTL8x\_07

4

- 1 Temperature separator:
  - 1.1 insulated
  - 1.2 free-standing
- 2  $T_a$  for Optional specification Nx (Accessory Mounted) = ND, NE:  $-50...+70\text{ }^\circ\text{C}$

**Connection data**

Basic specification, Position 1, 2 (Approval) = CD

**Explosion proof / Nonincendive**

Power supply:

- Barrier/associated equipment not required
- Endress+Hauser transmitter: Liquiphant FailSafe, Nivotester FailSafe



Note!

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

**Terminal 1 (-)** Max. level safety

**Terminal 2 (+)**

**Terminal 3 (-)** Min. level safety

Power supply:

$U_{in} = 30 \text{ V DC}$

$U_m = 250 \text{ V AC}$

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

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







[www.endress.com/worldwide](http://www.endress.com/worldwide)

---

**Endress + Hauser**   
People for Process Automation

