

Safety Instructions

Liquiphant M, Liquiphant S FTL50(H), FTL51(H), FTL51C, FTL70/71

0/1 Ex db IIC T6...T3 Ga/Gb X

0/1 Ex db IIC T6...T1 Ga/Gb X



Liquiphant M, Liquiphant S FTL50(H), FTL51(H), FTL51C, FTL70/71

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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:

- 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 -> Downloads -> 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:

EAЭC RU C-DE.AA87.B.00962/22

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 60079-1-2013
- GOST 31610.26-2016/IEC 60079-26:2014

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*..
<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 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) FTL51(H)	K, L	ATEX II 1/2 G Ex db IIC T6...T3 Ga/Gb EAC 0/1 Ex db IIC T6...T3 Ga/Gb X
FTL51C	L ¹⁾	ATEX II 1/2 G Ex db IIC T6...T3 Ga/Gb EAC 0/1 Ex db IIC T6...T3 Ga/Gb X
	2 ²⁾	ATEX II 1/2 G Ex db IIB T6...T3 Ga/Gb EAC 0/1 Ex db IIB T6...T3 Ga/Gb X

1) Only in connection with Position 5, 6 = xN, xS

2) Only in connection with Position 5, 6 = 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) 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)	x1	F27; 316L
FTL51(H)	x5	F13; Alu
FTL51C		T13; Alu, coated.; separate conn. compartment
	Ex	NPT thread
	Fx	G1/2 thread
	Gx	M20 gland

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

Position 11 (Application)		
Selected option		Description
FTL50 FTL51	L8	EAC marking

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	L	ATEX II 1/2 G Ex db IIC T6...T1 Ga/Gb EAC 0/1 Ex db IIC T6...T1 Ga/Gb X

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	x1	F27; 316L
	x7	T13; Alu, coated.; separate conn. compartment
	x8	F13, Alu
	Ex	NPT thread
	Fx	G1/2 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

Position 11 (Application)		
Selected option		Description
FTL7x	L8	EAC marking

Safety instructions: **General**

- The device is intended to be used in explosive atmospheres as defined in the scope of IEC 60079-0 or equivalent national standards. If no potentially explosive atmospheres are present or if additional protective measures have been taken: The device may be operated according to the manufacturer's specifications.
- 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.
- The probe is made of stainless steel or high corrosion-resistant alloy of thickness ≥ 1 mm.
- Only open the device under the following condition: 17 minutes have elapsed since the power supply was switched off.

Safety instructions:
Special conditions

- Limitations of the maximum ambient temperature at the electronics enclosure may be required dependent on device configuration, process temperatures and temperature classification.
- Details of limitations: →  14, "Temperature tables".
- To avoid electrostatic charging: Do not rub surfaces with a dry cloth.
- In the event of additional or alternative special varnishing on the enclosure or other metal parts or for adhesive plates:
 - Observe the danger of electrostatic charging and discharge.
 - Do not install in the vicinity of processes (≤ 0.5 m) generating strong electrostatic charges.

Basic specification, Position 8, 9 = x5, x7, x8

Covers with glass window only permitted for the following ambient temperatures:

$$-50\text{ °C} \leq T_a \leq +70\text{ °C}$$

Basic specification, Position 8, 9 = x1

Covers with glass window not permitted.

Basic specification, Position 8, 9 = x5, x7, x8

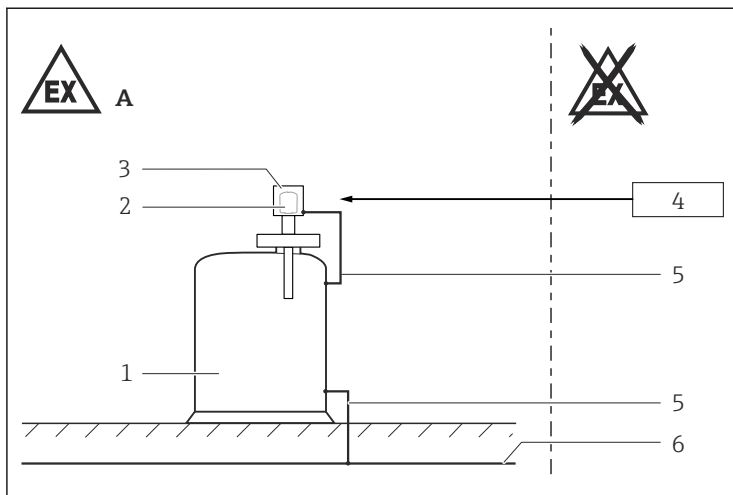
Avoid sparks caused by impact and friction.

Device group IIC

Device type FTL51C

- Sensors coated with non-conductive material can be used if avoiding electrostatic charging (e.g. through friction, cleaning, maintenance, strong medium flow).
- Marked with warning sign: "Avoid electrostatic charging".

Safety instructions: Installation



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1

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

- Before operation:
 - Screw in the cover all the way.
 - Tighten the securing clamp on the cover.
- 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.
- 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. The plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.
- The built-in metallic sealing plug is examined and approved for explosion protection type Ex d with the device.
- 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.
- When connecting through a conduit entry approved for this purpose, mount the associated sealing unit directly at the enclosure.

Basic specification, Position 8, 9 = Fx

Flameproof equipment with G threaded entry holes is not intended for new installations but only for replacement of equipment in existing installations. Application of this equipment shall comply with the local installation requirements.

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.

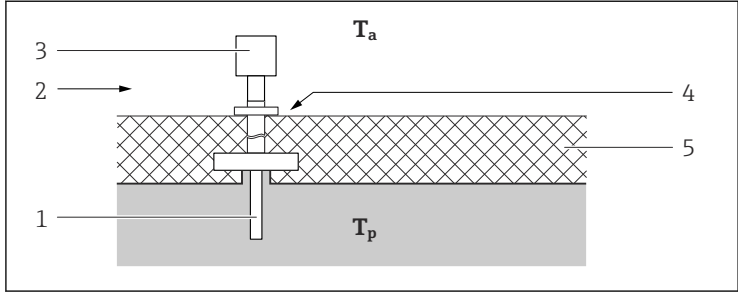
Safety instructions: Ex d joints

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

Explosion protection with heat insulation

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

- While observing the "temperature derating", the device is suitable for process temperatures up to $300\text{ }^{\circ}\text{C}$.
- 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 $85\text{ }^{\circ}\text{C}$ 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

Description notes



Unless otherwise indicated, the positions always refer to the basic specification.

1st line: Position 8, 9 = x1, x5, ...

Device type *FTL50, FTL50H, FTL51, FTL51H*

1st column: Position 5, 6 = Ax, Bx, ...

Device type *FTL51C, FTL70, FTL71*

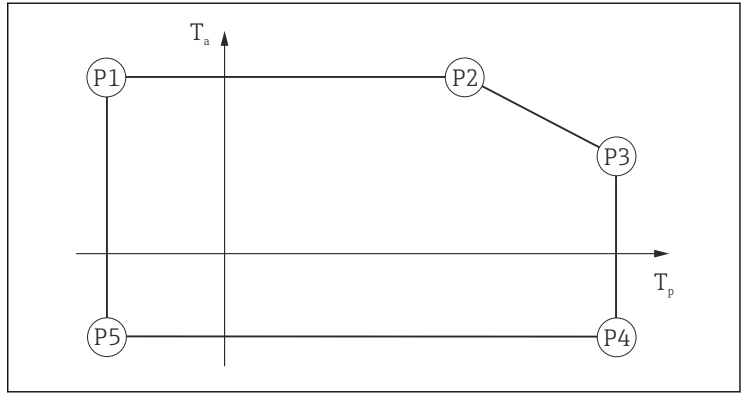
1st column: Position 11 = A, B, ...

2nd column: Maximum load current

3rd column: Temperature classes T6 (85 °C) to T1 (450 °C)

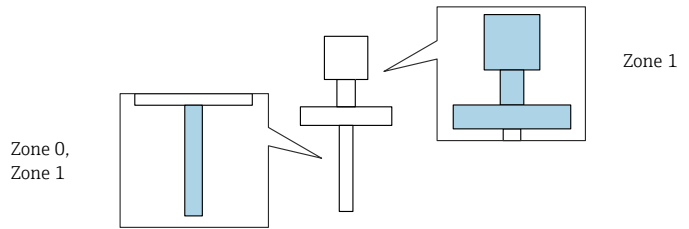
Column P1 to P5: Position (temperature value) on the axes of the derating

- T_a : Ambient temperature in °C
- T_p : Process temperature in °C



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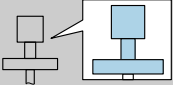
Zone 0, Zone 1



Device type *FTL50, FTL50H, FTL51, FTL51H*

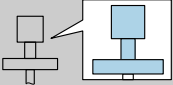
Position 7 = 1

		= x1, x5										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
FTL50, FTL50H: Ax	180 mA											
FTL51, FTL51H: Bx, Cx, Dx												
		T6	-50	58	70	58	75	55	75	-60	-50	-60
		T5	-50	70	70	70	90	55	90	-60	-50	-60
		T4	-50	70	70	70	125	40	125	-60	-50	-60
	T3	-50	70	70	70	150	30	150	-60	-50	-60	
FTL50, FTL50H: Ix, Qx	180 mA											
FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx												
		T6	-50	60	70	60	75	60	75	-60	-50	-60
		T5	-50	70	70	70	90	65	90	-60	-50	-60
		T4	-50	70	70	70	125	65	125	-60	-50	-60
		T3	-50	70	70	70	150	65	150	-60	-50	-60
		350 mA										
		T4	-50	70	70	70	125	55	125	-60	-50	-60
		T3	-50	70	70	70	150	55	150	-60	-50	-60

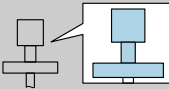
 = x7												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
FTL50, FTL50H: <i>Ax</i> FTL51, FTL51H: <i>Bx, Cx, Dx</i>	180 mA											
		T6	-50	60	70	60	75	59	75	-60	-50	-60
		T5	-50	70	70	70	90	70	90	-60	-50	-60
		T4	-50	70	70	70	125	70	125	-60	-50	-60
		T3	-50	70	70	70	150	69	150	-60	-50	-60
FTL50, FTL50H: <i>Ix, Qx</i> FTL51, FTL51H: <i>Jx, Kx, Lx, Rx, Sx, Tx</i>	180 mA											
		T6	-50	60	70	60	75	62	75	-60	-50	-60
		T5	-50	70	70	70	90	70	90	-60	-50	-60
		T4	-50	70	70	70	125	70	125	-60	-50	-60
		T3	-50	70	70	70	150	70	150	-60	-50	-60
	350 mA											
		T4	-50	70	70	70	125	55	125	-60	-50	-60
		T3	-50	70	70	70	150	54	150	-60	-50	-60

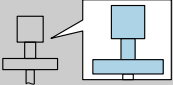
Position 7 = 2

		= x1, x5										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
FTL50, FTL50H: Ax FTL51, FTL51H: Bx, Cx, Dx	350 mA											
		T6	-50	50	65	50	70	45	70	-60	-50	-60
		T5	-50	70	70	70	90	60	90	-60	-50	-60
		T4	-50	70	70	70	125	55	125	-60	-50	-60
		T3	-50	70	70	70	150	45	150	-60	-50	-60
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	350 mA											
		T6	-50	54	65	54	75	70	75	-60	-50	-60
		T5	-50	70	70	70	90	65	90	-60	-50	-60
		T4	-50	70	70	70	125	70	125	-60	-50	-60
		T3	-50	70	70	70	150	70	150	-60	-50	-60

 = x7												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
FTL50, FTL50H: <i>Ax</i> FTL51, FTL51H: <i>Bx, Cx, Dx</i>	350 mA											
		T6	-50	50	65	50	75	50	75	-60	-50	-60
		T5	-50	70	70	70	90	65	90	-60	-50	-60
		T4	-50	70	70	70	125	66	125	-60	-50	-60
		T3	-50	70	70	70	150	54	150	-60	-50	-60
FTL50, FTL50H: <i>Ix, Qx</i> FTL51, FTL51H: <i>Jx, Kx, Lx, Rx, Sx, Tx</i>	350 mA											
		T6	-50	50	70	50	75	50	75	-60	-50	-60
		T5	-50	70	70	70	90	65	90	-60	-50	-60
		T4	-50	70	70	70	125	70	125	-60	-50	-60
		T3	-50	70	70	70	150	70	150	-60	-50	-60

Position 7 = 4

		 = x1, x5										
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
FTL50, FTL50H: Ax FTL51, FTL51H: Bx, Cx, Dx	2 A											
		T6	-50	52	52	52	75	40	75	-60	-50	-60
		T5	-50	67	67	67	90	55	90	-60	-50	-60
		T4	-50	70	70	70	125	47	125	-60	-50	-60
		T3	-50	70	70	70	150	38	150	-60	-50	-60
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	2 A											
		T6	-50	52	52	52	75	48	75	-60	-50	-60
		T5	-50	67	67	67	90	64	90	-60	-50	-60
		T4	-50	70	70	70	125	67	125	-60	-50	-60
		T3	-50	70	70	70	150	65	150	-60	-50	-60
	4 A											
		T6	-50	40	43	40	65	40	65	-60	-50	-60
		T5	-50	54	58	54	90	54	90	-60	-50	-60
		T4	-50	63	63	63	125	58	125	-60	-50	-60
		T3	-50	63	63	63	150	56	150	-60	-50	-60

 = x7												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
FTL50, FTL50H: <i>Ax</i> FTL51, FTL51H: <i>Bx, Cx, Dx</i>	2 A											
		T6	-50	55	55	55	75	50	75	-60	-50	-60
		T5	-50	70	70	70	90	65	90	-60	-50	-60
		T4	-50	70	70	70	125	65	125	-60	-50	-60
		T3	-50	70	70	70	150	65	150	-60	-50	-60
FTL50, FTL50H: <i>Ix, Qx</i> FTL51, FTL51H: <i>Jx, Kx, Lx, Rx, Sx, Tx</i>	2 A											
		T6	-50	55	55	55	75	54	75	-60	-50	-60
		T5	-50	70	70	70	90	68	90	-60	-50	-60
		T4	-50	70	70	70	125	70	125	-60	-50	-60
		T3	-50	70	70	70	150	70	150	-60	-50	-60
	4 A											
		T6	-50	45	45	45	75	44	75	-60	-50	-60
		T5	-50	60	60	60	90	59	90	-60	-50	-60
		T4	-50	67	67	67	125	63	125	-60	-50	-60
		T3	-50	67	67	67	150	62	150	-60	-50	-60

Position 7 = A, 5, 6, 7, 8

		= x1, x5, x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
FTL50, FTL50H: Ax, Ix, Qx												
FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx												
	T6	-50	70	75	70	80	65	80	-60	-50	-60	
	T5	-50	70	70	70	95	70	95	-60	-50	-60	
	T4	-50	70	70	70	130	70	130	-60	-50	-60	
	T3	-50	70	70	70	150	70	150	-60	-50	-60	

Position 7 = D

		= x1, x5, x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
FTL50, FTL50H: Ax, Ix, Qx												
FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx												
	T6	-50	70	75	70	80	65	80	-40	-50	-40	

Device type FTL51C

Position 7 = 1

		= x1, x5											
			P1		P2		P3		P4		P5		
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
A	180 mA												
		T6	-50	55	55	55	80	46	80	-60	-50	-60	
		T5	-50	70	70	70	95	61	95	-60	-50	-60	
		T4	-50	70	76	70	130 120 ¹⁾	50	130 120 ¹⁾	-60	-50	-60	
		T3	-50	70	76	70	150 120 ¹⁾	42	150 120 ¹⁾	-60	-50	-60	
B, C	180 mA												
		T6	-50	55	55	55	80	53	80	-60	-50	-60	
		T5	-50	70	70	70	95	68	95	-60	-50	-60	
		T4	-50	70	94	70	130 120 ¹⁾	67	130 120 ¹⁾	-60	-50	-60	
		T3	-50	70	94	70	150 120 ¹⁾	65	150 120 ¹⁾	-60	-50	-60	
	350 mA												
		T6	-50	37	49	37	80	34	80	-60	-50	-60	
		T5	-50	52	64	52	95	49	95	-60	-50	-60	
		T4	-50	69	69	69	130 120 ¹⁾	64	130 120 ¹⁾	-60	-50	-60	
		T3	-50	69	69	69	150 120 ¹⁾	62	150 120 ¹⁾	-60	-50	-60	

1) Only in connection with Position 5, 6 = xK

		= x7											
		P1		P2		P3		P4		P5			
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a		
A	180 mA	T6	-50	63	64	63	80	59	80	-60	-50	-60	
		T5	-50	70	95	70	95	70	95	-60	-50	-60	
		T4	-50	70	112	70	130 120 ¹⁾	66	130 120 ¹⁾	-60	-50	-60	
		T3	-50	70	112	70	150 120 ¹⁾	61	150 120 ¹⁾	-60	-50	-60	
	350 mA	T6	-50	38	39	38	80	29	80	-60	-50	-60	
		T5	-50	53	54	53	95	44	95	-60	-50	-60	
		T4	-50	70	72	70	130 120 ¹⁾	57	130 120 ¹⁾	-60	-50	-60	
		T3	-50	70	72	70	150 120 ¹⁾	53	150 120 ¹⁾	-60	-50	-60	
	B, C	180 mA	T6	-50	62	70	62	80	62	80	-60	-50	-60
			T5	-50	70	95	70	95	70	95	-60	-50	-60
			T4	-50	70	130	70	130 120 ¹⁾	70	130 120 ¹⁾	-60	-50	-60
			T3	-50	70	150	70	150 120 ¹⁾	70	150 120 ¹⁾	-60	-50	-60
350 mA		T6	-50	36	70	36	80	36	80	-60	-50	-60	
		T5	-50	51	95	51	95	51	95	-60	-50	-60	
		T4	-50	67	130	67	130 120 ¹⁾	67	130 120 ¹⁾	-60	-50	-60	
		T3	-50	66	150	66	150 120 ¹⁾	66	150 120 ¹⁾	-60	-50	-60	

1) Only in connection with Position 5, 6 = xK

Position 7 = 2

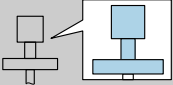
		= x1, x5, x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
A	350 mA											
		T6	-50	55	55	55	80	45	80	-60	-50	-60
		T5	-50	70	70	70	95	60	95	-60	-50	-60
		T4	-50	70	76	70	130 120 ¹⁾	50	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	76	70	150 120 ¹⁾	42	150 120 ¹⁾	-60	-50	-60
B, C	350 mA											
		T6	-50	55	55	55	80	52	80	-60	-50	-60
		T5	-50	70	70	70	95	67	95	-60	-50	-60
		T4	-50	70	94	70	130 120 ¹⁾	67	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	94	70	150 120 ¹⁾	65	150 120 ¹⁾	-60	-50	-60

1) Only in connection with Position 5, 6 = xK

Position 7 = 4

		= x1, x5										
A	2 A		P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
		T6	-50	52	52	52	80	40	80	-60	-50	-60
		T5	-50	67	67	67	95	55	95	-60	-50	-60
		T4	-50	70	77	70	130 120 ¹⁾	70	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	77	70	150 120 ¹⁾	70	150 120 ¹⁾	-60	-50	-60
B, C	2 A											
		T6	-50	52	52	52	80	49	80	-60	-50	-60
		T5	-50	67	67	67	95	63	95	-60	-50	-60
		T4	-50	70	100	70	130 120 ¹⁾	67	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	100	70	150 120 ¹⁾	66	150 120 ¹⁾	-60	-50	-60
	4 A											
		T6	-50	41	50	41	80	38	80	-60	-50	-60
		T5	-50	56	65	56	95	53	95	-60	-50	-60
		T4	-50	69	76	69	130 120 ¹⁾	64	130 120 ¹⁾	-60	-50	-60
		T3	-50	69	76	69	150 120 ¹⁾	63	150 120 ¹⁾	-60	-50	-60

1) Only in connection with Position 5, 6 = xK

 = x7												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
A	2 A											
		T6	-50	55	56	55	80	50	80	-60	-50	-60
		T5	-50	70	71	70	95	65	95	-60	-50	-60
		T4	-50	70	94	70	130 120 ¹⁾	61	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	94	70	150 120 ¹⁾	57	150 120 ¹⁾	-60	-50	-60
B, C	2 A											
		T6	-50	55	59	55	80	53	80	-60	-50	-60
		T5	-50	70	74	70	95	68	95	-60	-50	-60
		T4	-50	70	130	70	130 120 ¹⁾	70	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	148	70	150 120 ¹⁾	69	150 120 ¹⁾	-60	-50	-60
	4 A											
		T6	-50	45	62	45	80	44	80	-60	-50	-60
		T5	-50	60	77	60	95	59	95	-60	-50	-60
		T4	-50	70	113	70	130 120 ¹⁾	69	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	115	70	150 120 ¹⁾	67	150 120 ¹⁾	-60	-50	-60

1) Only in connection with Position 5, 6 = xK

Position 7 = A, 5, 6, 7, 8

			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
A, B, C												
		T6	-50	70	75	70	80	65	80	-60	-50	-60
		T5	-50	70	95	70	95	70	95	-60	-50	-60
		T4	-50	70	100	70	130 120 ¹⁾	70	130 120 ¹⁾	-60	-50	-60
		T3	-50	70	110	70	150 120 ¹⁾	70	150 120 ¹⁾	-60	-50	-60

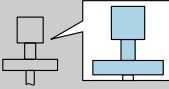
1) Only in connection with Position 5, 6 = xK

Position 7 = D

			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
A, B, C												
		T6	-50	70	75	70	80	65	80	-40	-50	-40

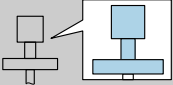
Device type FTL70, FTL71

Position 7 = 1

												
= x1, x8												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
L	180 mA											
		T6	-60	60	69	60	80	60	80	-60	-60	-60
		T5	-60	70	95	70	95	70	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	193	70	195	69	195	-60	-60	-60
	T2	-60	70	193	70	230	65	230	-60	-60	-60	
	350 mA											
		T6	-60	35	53	35	80	35	80	-60	-60	-60
		T5	-60	50	68	50	95	50	95	-60	-60	-60
		T4	-60	69	69	69	130	65	130	-60	-60	-60
		T3	-60	69	69	69	195	62	195	-60	-60	-60
	T2	-60	69	69	69	230	61	230	-60	-60	-60	

		= x1, x8										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
N, Y	180 mA											
		T6	-60	61	72	60	80	60	80	-60	-60	-60
		T5	-60	70	95	70	95	70	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	195	70	195	70	195	-60	-60	-60
		T2	-60	70	230	70	280 290 ¹⁾	67	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	230	70	280 300 ¹⁾	67	280 300 ¹⁾	-60	-60	-60
	350 mA											
		T6	-60	37	58	37	80	36	80	-60	-60	-60
		T5	-60	52	73	52	95	51	95	-60	-60	-60
		T4	-60	69	69	69	130	66	130	-60	-60	-60
		T3	-60	69	69	69	195	63	195	-60	-60	-60
		T2	-60	69	69	69	280 290 ¹⁾	59	280 290 ¹⁾	-60	-60	-60
		T1	-60	69	69	69	280 300 ¹⁾	59	280 300 ¹⁾	-60	-60	-60

1) Only in connection with Position 11 = Y

 = x7												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
<i>L</i>	180 mA											
		T6	-60	63	68	63	80	62	80	-60	-60	-60
		T5	-60	70	95	70	95	70	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	195	70	195	70	195	-60	-60	-60
		T2	-60	70	230	70	230	70	230	-60	-60	-60
	350 mA											
		T6	-60	37	57	37	80	36	80	-60	-60	-60
		T5	-60	52	72	52	95	51	95	-60	-60	-60
		T4	-60	69	69	69	130	66	130	-60	-60	-60
		T3	-60	69	69	69	195	63	195	-60	-60	-60
		T2	-60	69	69	69	230	61	230	-60	-60	-60

		= x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
N, Y	180 mA											
		T6	-60	63	70	63	80	60	80	-60	-60	-60
		T5	-60	70	95	70	95	70	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	195	70	195	70	195	-60	-60	-60
		T2	-60	70	280	70	280 290 ¹⁾	70	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	280	70	280 300 ¹⁾	67	280 300 ¹⁾	-60	-60	-60
	350 mA											
		T6	-60	37	58	37	80	36	80	-60	-60	-60
		T5	-60	52	73	52	95	51	95	-60	-60	-60
		T4	-60	69	69	69	130	66	130	-60	-60	-60
		T3	-60	69	69	69	195	63	195	-60	-60	-60
		T2	-60	69	69	69	280 290 ¹⁾	62	280 290 ¹⁾	-60	-60	-60
		T1	-60	69	69	69	280 300 ¹⁾	59	280 300 ¹⁾	-60	-60	-60

1) Only in connection with Position 11 = Y

Position 7 = 2

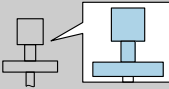
		= x1, x8										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
L	350 mA											
		T6	-60	55	55	55	80	53	80	-60	-60	-60
		T5	-60	70	70	70	95	68	95	-60	-60	-60
		T4	-60	70	102	70	130	68	130	-60	-60	-60
		T3	-60	70	102	70	195	64	195	-60	-60	-60
		T2	-60	70	102	70	230	62	230	-60	-60	-60
N, Y	350 mA											
		T6	-60	55	56	55	80	53	80	-60	-60	-60
		T5	-60	70	71	70	95	68	95	-60	-60	-60
		T4	-60	70	112	70	130	69	130	-60	-60	-60
		T3	-60	70	112	70	195	66	195	-60	-60	-60
		T2	-60	70	112	70	280 290 ¹⁾	62	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	112	70	280 300 ¹⁾	62	280 300 ¹⁾	-60	-60	-60

1) Only in connection with Position 11 = Y

		= x7										
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
<i>L</i>	350 mA											
		T6	-60	54	71	54	80	53	80	-60	-60	-60
		T5	-60	69	86	69	95	68	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	133	70	195	67	195	-60	-60	-60
		T2	-60	70	133	70	230	65	230	-60	-60	-60
<i>N, Y</i>	350 mA											
		T6	-60	54	77	54	80	53	80	-60	-60	-60
		T5	-60	69	70	69	95	68	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	154	70	195	68	195	-60	-60	-60
		T2	-60	70	154	70	280 290 ¹⁾	65	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	154	70	280 300 ¹⁾	65	280 300 ¹⁾	-60	-60	-60

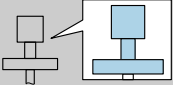
1) Only in connection with Position 11 = Y

Position 7 = 4

 = x1, x8												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
<i>L</i>	2 A											
		T6	-60	51	53	51	80	50	80	-60	-60	-60
		T5	-60	66	68	66	95	65	95	-60	-60	-60
		T4	-60	70	110	70	130	68	130	-60	-60	-60
		T3	-60	70	110	70	195	65	195	-60	-60	-60
		T2	-60	70	110	70	230	63	230	-60	-60	-60
	4 A											
		T6	-60	41	51	41	80	39	80	-60	-60	-60
		T5	-60	56	66	56	95	54	95	-60	-60	-60
		T4	-60	69	78	69	130	66	130	-60	-60	-60
		T3	-60	69	78	69	195	62	195	-60	-60	-60
		T2	-60	69	78	69	230	60	230	-60	-60	-60

		= x1, x8										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
N, Y	2 A											
		T6	-60	52	53	52	80	50	80	-60	-60	-60
		T5	-60	67	68	67	95	65	95	-60	-60	-60
		T4	-60	70	122	70	130	69	130	-60	-60	-60
		T3	-60	70	122	70	195	66	195	-60	-60	-60
		T2	-60	70	122	70	280 290 ¹⁾	63	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	122	70	280 300 ¹⁾	62	280 300 ¹⁾	-60	-60	-60
	4 A											
		T6	-60	42	54	41	80	40	80	-60	-60	-60
		T5	-60	57	69	56	95	55	95	-60	-60	-60
		T4	-60	69	81	69	130	66	130	-60	-60	-60
		T3	-60	69	81	69	195	64	195	-60	-60	-60
		T2	-60	69	81	69	280 290 ¹⁾	60	280 290 ¹⁾	-60	-60	-60
		T1	-60	69	81	69	280 300 ¹⁾	59	280 300 ¹⁾	-60	-60	-60

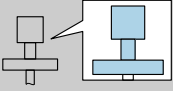
1) Only in connection with Position 11 = Y

 = x7												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
<i>L</i>	2 A											
		T6	-60	55	61	55	80	54	80	-60	-60	-60
		T5	-60	70	76	70	95	69	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	176	70	195	69	195	-60	-60	-60
		T2	-60	70	176	70	230	67	230	-60	-60	-60
	4 A											
		T6	-60	45	66	45	80	44	80	-60	-60	-60
		T5	-60	60	81	60	95	59	95	-60	-60	-60
		T4	-60	70	124	70	130	69	130	-60	-60	-60
		T3	-60	70	124	70	195	66	195	-60	-60	-60
		T2	-60	70	124	70	230	65	230	-60	-60	-60

		= x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
N, Y	2 A											
		T6	-60	55	62	55	80	54	80	-60	-60	-60
		T5	-60	70	77	70	95	69	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	195	70	195	70	195	-60	-60	-60
		T2	-60	70	208	70	280 290 ¹⁾	67	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	208	70	280 300 ¹⁾	66	280 300 ¹⁾	-60	-60	-60
	4 A											
		T6	-60	45	73	45	80	44	80	-60	-60	-60
		T5	-60	60	88	60	95	59	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	142	70	195	68	195	-60	-60	-60
		T2	-60	70	142	70	280 290 ¹⁾	65	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	142	70	280 300 ¹⁾	64	280 300 ¹⁾	-60	-60	-60

1) Only in connection with Position 11 = Y

Position 7 = A, 5, 6, 7, 8

 = x1, x7, x8												
			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
<i>L</i>												
		T6	-60	70	80	70	80	70	80	-60	-60	-60
		T5	-60	70	95	70	95	70	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	195	70	195	70	195	-60	-60	-60
		T2	-60	70	200	70	230	70	230	-60	-60	-60
<i>N, Y</i>												
		T6	-60	70	80	70	80	70	80	-60	-60	-60
		T5	-60	70	95	70	95	70	95	-60	-60	-60
		T4	-60	70	130	70	130	70	130	-60	-60	-60
		T3	-60	70	195	70	195	70	195	-60	-60	-60
		T2	-60	70	230	70	280 290 ¹⁾	70	280 290 ¹⁾	-60	-60	-60
		T1	-60	70	280	70	280 300 ¹⁾	70	280 300 ¹⁾	-60	-60	-60

1) Only in connection with Position 11 = Y

Position 7 = 9

		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
L, N, Y												
		T6	-60	70	70	70	80	70	80	-40	-60	-40

Connection data

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



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