

Safety Instructions

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

II 3 G Ex ec IIC Gc

II 3 G Ex ec nC IIC Gc

II 3 G Ex ic IIC Gc

II 3 D Ex tc IIIC Dc



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

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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)

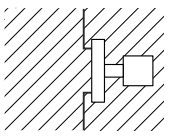
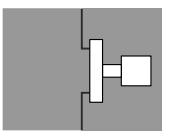
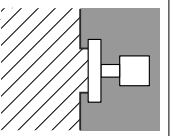
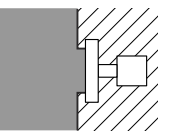
Supplementary documentation

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

**General notes:
Combined approval**

			
Ex ec IIC Ex ec nC IIC Ex ic IIC Zone 2	Ex tc IIIC Zone 22	Ex ec IIC Ex ic IIC Zone 2	Ex tc IIIC Zone 22
		Ex ec IIC Ex ec nC IIC Ex ic IIC Zone 2	

The device is designed for operation in explosive gas or explosive dust atmosphere as shown in the sketch above. In the event of potentially explosive gas-air and dust-air mixtures occurring simultaneously: Suitability requires further assessment.

-  A sequential change between gas and dust explosion protection is only possible if:
- A period with non-explosive atmosphere is realized during the transition or
 - Special examinations are done which are not covered by the certificate

Manufacturer's certificates

UK Declaration of Conformity

Declaration Number:
UK_00439

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:
 UK 00439 X

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

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)	B ¹⁾	ATEX II 3 G Ex ec nC IIC T6...T3 Gc ATEX II 3 D Ex tc IIIC Txxx°C Dc
	C ²⁾	ATEX II 3 G Ex ec IIC T6...T3 Gc ATEX II 3 G Ex ic IIC T6...T3 Gc ATEX II 3 D Ex tc IIIC Txxx°C Dc
FTL51C	B ¹⁾	ATEX II 3 G Ex ec nC IIC T6...T3 Gc
	C ²⁾	ATEX II 3 G Ex ec IIC T6...T3 Gc ATEX II 3 G Ex ic IIC T6...T3 Gc

1) Only in connection with Position 7 = 4

2) Ex ic IIC Gc only in combination with Position 7 = A, D, 5, 6, 7, 8

Position 5, 6 (Probe Length, Type)		
Selected option		Description
FTL50	AA	Compact
	IA	Compact; temp. separator
	QA	Compact; press.tight feed through
FTL50H	AC, AD	Compact
	IC, ID	Compact; temp. separator
	QC, QD	Compact; press.tight feed through
FTL51	BB, CB, DB	Length mm/in; 316L
	BE, CE, DE	Length mm/in; Alloy
	JB, KB, LB	Length mm/in; 316L + temp. separator
	JE, KE, LE	Length mm/in; Alloy + temp. separator
	RB, SB, TB	Length mm/in; 316L + press.tight feed through
	RE, SE, TE	Length mm/in; Alloy + press.tight feed through
FTL51H	BC, BD, CC, CD, DC, DD	Length mm/in
	JC, JD, KC, KD, LC, LD	Length mm/in; temp. separator
	RC, RD, SC, SD, TC, TD	Length mm/in; press.tight feed through
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)	D	FEL50D; Density, Concentration
FTL51C	1	FEL51; 2-wire 19-253 VAC
	2	FEL52; 3-wire PNP 10-55 VDC
	4	FEL54; relay DPDT 19-253 VAC, 19-55 VDC
	5	FEL55; 8/16 mA, 11-36 VDC
	6	FEL56; NAMUR
	7	FEL57; 2-wire PFM
	8	FEL58; NAMUR + test button

Position 8, 9 (Housing, Cable Entry)		
Selected option		Description
FTL50	x1	F27; 316L
FTL51		
FTL50(H)	C3 ¹⁾	Compact; IP66/68, 316L Hygiene; 5 m cable
FTL51(H)	N3 ¹⁾	Compact; IP66/68, 316L Hygiene; M12 plug
	x5	F13; Alu
	x6	F15; 316L Hygiene
	x7	T13; Alu
FTL51C	x1	F27; 316L
	x5	F13; Alu
	x6	F15; 316L Hygiene
	x7	T13; Alu

1) Only in connection with Position 7 = 2, 8

Position 11 (Additional Option 2)		
Selected option		Description
FTL51C	A	Not selected
	U	UK marking
	1	Temp. separator + UK marking
	2	2nd line of defence + UK marking (press.tight feed through)

Optional specifications

ID Lx (Additional Approval)		
Selected option		Description
FTL50(H)	LU	UK marking
FTL51(H)		

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	B ¹⁾	ATEX II 3 G Ex ec nC IIC T6...T2 Gc ATEX II 3 D Ex tc IIIC Txxx°C Dc
	C ²⁾	ATEX II 3 G Ex ec IIC T6...T2 Gc ATEX II 3 G Ex ic IIC T6...T2 Gc ATEX II 3 D Ex tc IIIC Txxx°C Dc

1) Only in connection with Position 7 = 4

2) Ex ic IIC Gc only in combination with Position 7 = A, 5, 6, 7, 8

Position 5, 6 (Probe Length, Type)		
Selected option		Description
FTL70	AB	Compact; 316L
	AE	Compact; Alloy
FTL71	BB, CB	Length mm/in; 316L
	BE, CE	Length mm/in; Alloy

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

Position 8, 9 (Housing, Cable Entry)		
Selected option		Description
FTL7x	x1	F27; 316L
	x5	F17; Alu
	x6	F15; 316L Hygiene
	x7	T13; Alu

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


Optional specifications

ID Lx (Additional Approval)		
Selected option		Description
FTL7x	LU	UK marking

Safety instructions:
General

- The device is intended to be used in explosive atmospheres as defined in the scope of EN 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.
- 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.
- Avoid electrostatic charging:
 - Of plastic surfaces (e.g. enclosure, sensor element, special varnishing, attached additional plates, ..)
 - Of isolated capacities (e.g. isolated metallic plates)
- 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

- 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: →  15, "Temperature tables".
- In the case of process connections made of polymeric material or with polymeric coatings, avoid electrostatic charging of the plastic surfaces.
- 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 7 = 1, 4 and Basic specification, Position 8, 9 = x1, x5, x6, x7

- In a condensing atmosphere: The device must not be serviced or installed.
- The device must be externally protected against transient overvoltage up to 140 % of the maximum voltage.

Basic specification, Position 8, 9 = x5, x6, x7
Avoid sparks caused by impact and friction.

Device type FTL50(H), FTL51(H)

Basic specification, Position 8, 9 = C3

The cable glands were tested with a low risk of mechanical danger (drop height 0.4 m with 1 kg mass) and must be mounted in a protected position if larger impact energy levels are expected.

Basic specification, Position 8, 9 = C3, N3

- The enclosures don't have any external potential equalization terminal. Therefore, the safe bonding of the devices must be ensured via the yellow-green bonding (C3) wire of the cable or via the metallic process connection (C3 or N3) of the device.
- Do not disconnect electrical connections when energized.

Device type FTL51C

Basic specification, Position 5, 6 = xK, xL, xM (isolating plastic coating)

The device is only permitted for gas.

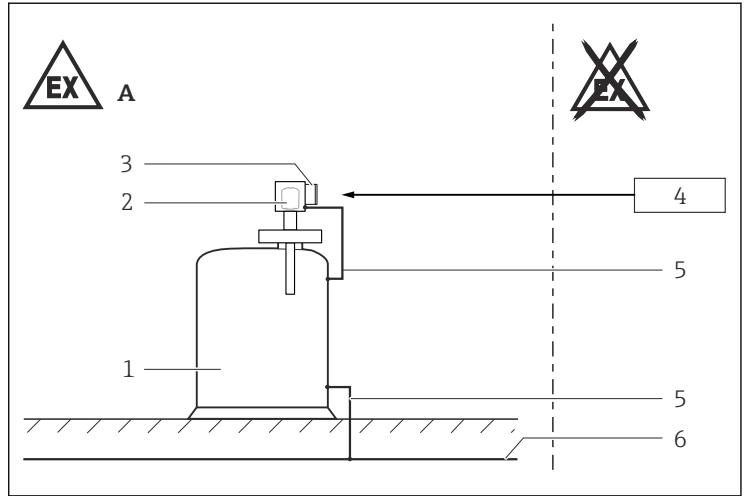
Device group IIC

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 2, Zone 22

1 Tank; Zone 2, Zone 22

2 Electronic insert; Electronics compartment

3 Connection compartment Ex ec (only Basic specification, Position 8, 9 = x7)

4 Power supply or power supply unit

5 Potential equalization line

6 Potential equalization

- Perform the following to achieve the degree of protection IP66/67 or 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.

- 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.
- Before operation:
 - Screw in the cover all the way.
 - Tighten the securing clamp on the cover.

Basic specification, Position 1 = B

Continuous service temperature of the connecting cable: $-50\text{ }^{\circ}\text{C}$ to $\geq +115\text{ }^{\circ}\text{C}$; in accordance with the range of service temperature taking into account additional influences of the process conditions ($T_{a,\text{min}}$), ($T_{a,\text{max}} + 45\text{ K}$).

Basic specification, Position 1 = C (only Ex ec, Ex ic)

Continuous service temperature of the connecting cable: $-50\text{ }^{\circ}\text{C}$ to $\geq +85\text{ }^{\circ}\text{C}$; in accordance with the range of service temperature taking into account additional influences of the process conditions ($T_{a,\text{min}}$), ($T_{a,\text{max}} + 15\text{ K}$).

Ex ec, Ex ec nC, Ex tc

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.

Accessory high pressure sliding sleeve

The high pressure sliding sleeve can be used for a continuous setting of the switch point (see Operating Instructions).

Non-sparking

Ex ec, Ex ec nC, Ex tc

In potentially explosive atmospheres: Do not disconnect electrical connections when energized.

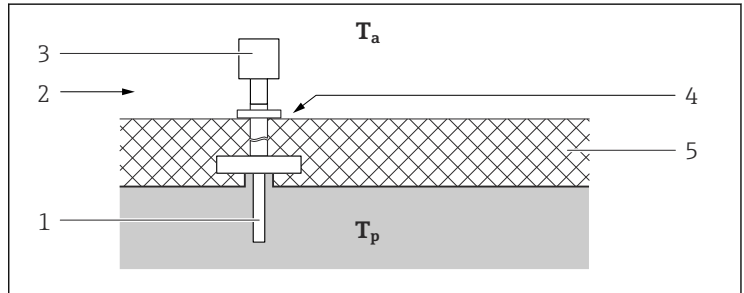
Potential equalization

Integrate the device into the local potential equalization.

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 °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

Description notes

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

Zone 2

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*

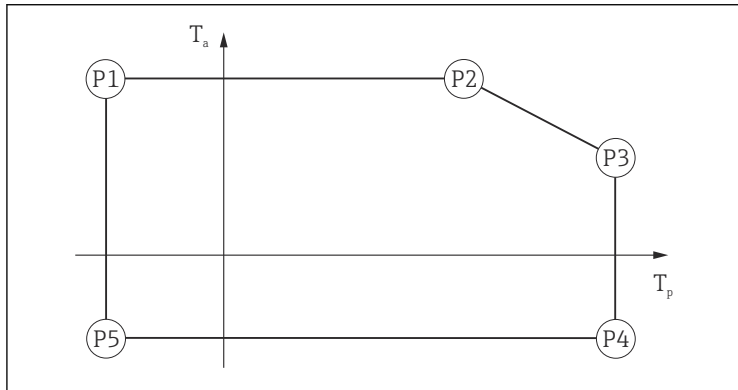
1st column: Position 11 = A, B, ...

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 22

Device Type FTL50, FTL50H, FTL51, FTL51H

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

Device Type FTL51C, FTL70, FTL71

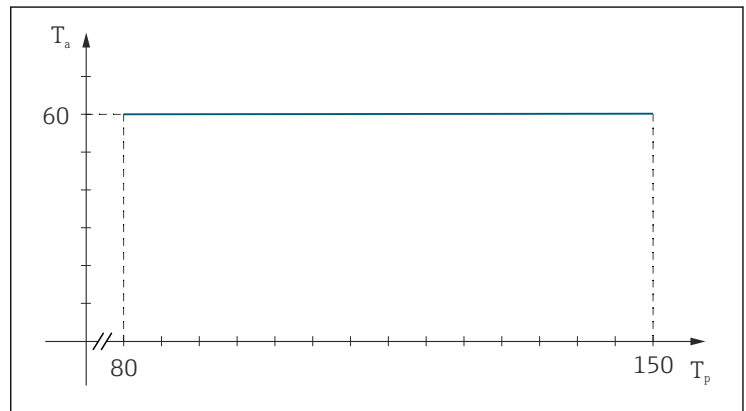
1st column: Position 11 = A, B, ...

2nd column: Maximum load current

3rd column: Process temperature range in °C

4th column: Ambient temperature range in °C

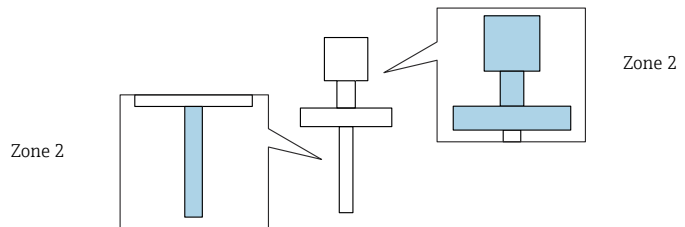
5th column: Maximum surface temperature in °C



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T_a Ambient temperature in °C

T_p Process temperature in °C

Zone 2

Exec IICDevice Type *FTL50, FTL50H, FTL51, FTL51H*

Position 7 = 1

		= x1, x5, x6, 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 FTL51, FTL51H: Bx, Cx, Dx	180 mA											
		T6	-50	52	53	52	80	40	80	-40	-50	-40
		T5	-50	67	68	67	95	55	95	-40	-50	-40
		T4	-50	70	78	70	130	47	130	-40	-50	-40
		T3...T1	-50	70	78	70	150	38	150	-40	-50	-40
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	180 mA											
		T6	-50	52	58	52	80	50	80	-40	-50	-40
		T5	-50	67	73	67	95	65	95	-40	-50	-40
		T4	-50	70	104	70	130	67	130	-40	-50	-40
		T3...T1	-50	70	104	70	150	65	150	-40	-50	-40
	350 mA											
		T6	-50	43	54	43	80	40	80	-40	-50	-40
		T5	-50	58	69	58	95	55	95	-40	-50	-40
		T4	-50	70	77	70	130	65	130	-40	-50	-40
		T3...T1	-50	70	77	70	150	63	150	-40	-50	-40

Position 7 = 2

		= x1, C3, N3, x5, x6, 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 FTL51, FTL51H: Bx, Cx, Dx	350 mA											
		T6	-50	70	70	70	80	70	80	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T5	-50	70	70	70	95	70	95	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T4	-50	70	70	70	130	55	130	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T3...T1	-50	70	70	70	150	45	150	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	350 mA											
		T6	-50	70	70	70	80	70	80	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T5	-50	70	70	70	95	70	95	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T4	-50	70	70	70	130	70	130	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T3...T1	-50	70	70	70	150	70	150	-40 -25 ¹⁾	-50	-40 -25 ¹⁾

1) Only in connection with Position 8, 9 = C3, N3

Position 7 = 5, 6, 7

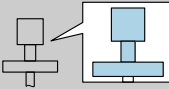
		= x1, x5, x6, x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
FTL50, FTL50H: Ax, Ix, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx												
		T6	-50	70	70	70	80	70	80	-40	-50	-40
		T5	-50	70	70	70	95	70	95	-40	-50	-40
		T4	-50	70	70	70	130	70	130	-40	-50	-40
		T3...T1	-50	70	70	70	150	70	150	-40	-50	-40

Position 7 = 8

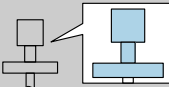
		= x1, C3, N3, x5, x6, x7										
		P1		P2		P3		P4		P5		
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	
FTL50, FTL50H: Ax, Ix, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx												
		T6	-50	70	70	70	80	70	80	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T5	-50	70	70	70	95	70	95	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T4	-50	70	70	70	130	70	130	-40 -25 ¹⁾	-50	-40 -25 ¹⁾
		T3...T1	-50	70	70	70	150	70	150	-40 -25 ¹⁾	-50	-40 -25 ¹⁾

1) Only in connection with Position 8, 9 = C3, N3

Position 7 = A

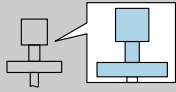
		 = x1, x5, x6, x7									
		P1		P2		P3		P4		P5	
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
FTL50, FTL50H: Ax, lx, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx											
	T6	-50	60	70	60	80	60	80	-40	-50	-40
	T5	-50	60	70	60	95	60	95	-40	-50	-40
	T4	-50	60	70	60	130	60	130	-40	-50	-40
	T3...T1	-50	60	70	60	150	60	150	-40	-50	-40

Position 7 = D

		 = x1, x5, x6, 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, lx, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx											
	T6...T1	-50	60	70	60	80	60	80	-40	-50	-40

Device Type FTL51C

Position 7 = 1



= x1, x5, x6, 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	52	53	52	80	40	80	-40	-50	-40
		T5	-50	67	68	67	95	55	95	-40	-50	-40
		T4	-50	70	78	70	130 120 ¹⁾	47	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	78	70	150 120 ¹⁾	38	150 120 ¹⁾	-40	-50	-40
B, C	180 mA											
		T6	-50	52	58	52	80	50	80	-40	-50	-40
		T5	-50	67	73	67	95	65	95	-40	-50	-40
		T4	-50	70	104	70	130 120 ¹⁾	67	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	104	70	150 120 ¹⁾	65	150 120 ¹⁾	-40	-50	-40
	350 mA											
		T6	-50	43	54	43	80	40	80	-40	-50	-40
		T5	-50	58	69	58	95	55	95	-40	-50	-40
		T4	-50	70	77	70	130 120 ¹⁾	65	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	77	70	150 120 ¹⁾	63	150 120 ¹⁾	-40	-50	-40

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

Position 7 = 2

		= x1, x5, x6, 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	70	70	70	80	70	80	-40	-50	-40
		T5	-50	70	70	70	95	70	95	-40	-50	-40
		T4	-50	70	70	70	130 120 ¹⁾	55	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	70	70	150 120 ¹⁾	45	150 120 ¹⁾	-40	-50	-40
B, C	350 mA											
		T6	-50	70	70	70	80	70	80	-40	-50	-40
		T5	-50	70	70	70	95	70	95	-40	-50	-40
		T4	-50	70	70	70	130 120 ¹⁾	70	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	70	70	150 120 ¹⁾	70	150 120 ¹⁾	-40	-50	-40

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

Position 7 = 5, 6, 7

			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	70	70	80	70	80	-40	-50	-40
		T5	-50	70	70	70	95	70	95	-40	-50	-40
		T4	-50	70	70	70	130 120 ¹⁾	70	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	70	70	150 120 ¹⁾	70	150 120 ¹⁾	-40	-50	-40

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

Position 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	70	70	80	70	80	-40	-50	-40
		T5	-50	70	70	70	95	70	95	-40	-50	-40
		T4	-50	70	70	70	130 120 ¹⁾	70	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	70	70	150 120 ¹⁾	70	150 120 ¹⁾	-40	-50	-40

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

Position 7 = A

		= x1, x5, x6, 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, B, C												
		T6	-50	60	70	60	80	60	80	-40	-50	-40
		T5	-50	60	70	60	95	60	95	-40	-50	-40
		T4	-50	60	70	60	130 120 ¹⁾	60	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	60	70	60	150 120 ¹⁾	60	150 120 ¹⁾	-40	-50	-40

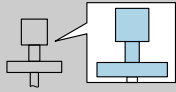
1) Only in connection with Position 5, 6 = xK

Position 7 = D

		= x1, x5, x6, 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, B, C												
		T6...T1	-50	60	70	60	80	60	80	-40	-50	-40

Device Type FTL70, FTL71

Position 7 = 1



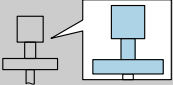
= x1, x5, x6

L			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
	180 mA											
		T6	-60	52	60	52	80	50	80	-40	-60	-40
		T5	-60	67	75	67	95	65	95	-40	-60	-40
		T4	-60	70	118	70	130	69	130	-40	-60	-40
		T3	-60	70	118	70	195	64	195	-40	-60	-40
		T2...T1	-60	70	118	70	230	61	230	-40	-60	-40
	350 mA											
		T6	-60	43	58	43	80	41	80	-40	-60	-40
		T5	-60	58	73	58	95	56	95	-40	-60	-40
		T4	-60	70	80	70	130	67	130	-40	-60	-40
		T3	-60	70	80	70	195	63	195	-40	-60	-40
		T2...T1	-60	70	80	70	230	59	230	-40	-60	-40

		= x1, x5, x6										
		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	52	64	52	80	51	80	-40	-60	-40
		T5	-60	67	79	67	95	66	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	139	70	195	67	195	-40	-60	-40
		T2	-60	70	139	70	280 290 ¹⁾	63	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	139	70	280 300 ¹⁾	63	280 300 ¹⁾	-40	-60	-40
	350 mA	T6	-60	43	66	43	80	42	80	-40	-60	-40
		T5	-60	58	80	58	95	57	95	-40	-60	-40
		T4	-60	70	85	70	130	68	130	-40	-60	-40
		T3	-60	70	85	70	195	65	195	-40	-60	-40
		T2	-60	70	85	70	280 290 ¹⁾	61	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	85	70	280 300 ¹⁾	60	280 300 ¹⁾	-40	-60	-40

1) Only in connection with Position 11 = Y

		= x7										
L			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
	180 mA											
		T6	-60	55	61	55	80	54	80	-40	-60	-40
		T5	-60	70	76	70	95	69	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	176	70	195	69	195	-40	-60	-40
		T2...T1	-60	70	176	70	230	67	230	-40	-60	-40
	350 mA											
		T6	-60	45	66	45	80	44	80	-40	-60	-40
		T5	-60	60	81	60	95	59	95	-40	-60	-40
		T4	-60	70	124	70	130	69	130	-40	-60	-40
		T3	-60	70	124	70	195	66	195	-40	-60	-40
		T2...T1	-60	70	124	70	230	65	230	-40	-60	-40

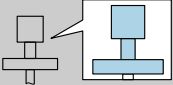
 = x7												
N, Y			P1		P2		P3		P4		P5	
			T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
	180 mA											
		T6	-60	55	62	55	80	54	80	-40	-60	-40
		T5	-60	70	77	70	95	69	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	195	70	195	70	195	-40	-60	-40
		T2	-60	70	208	70	280 290 ¹⁾	67	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	208	70	280 300 ¹⁾	66	280 300 ¹⁾	-40	-60	-40
	350 mA											
		T6	-60	45	73	45	80	44	80	-40	-60	-40
		T5	-60	60	88	60	95	59	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	142	70	195	68	195	-40	-60	-40
		T2	-60	70	142	70	280 290 ¹⁾	65	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	142	70	280 300 ¹⁾	64	280 300 ¹⁾	-40	-60	-40

1) Only in connection with Position 11 = Y

Position 7 = 2

		= x1, x5, x6										
			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	52	65	52	80	51	80	-40	-60	-40
		T5	-60	67	80	67	95	66	95	-40	-60	-40
		T4	-60	67	82	67	130	64	130	-40	-60	-40
		T3	-60	67	82	67	195	60	195	-40	-60	-40
		T2...T1	-60	67	82	67	230	58	230	-40	-60	-40
N, Y	350 mA											
		T6	-60	52	71	52	80	51	80	-40	-60	-40
		T5	-60	67	86	67	95	66	95	-40	-60	-40
		T4	-60	67	87	67	130	65	130	-40	-60	-40
		T3	-60	67	87	67	195	62	195	-40	-60	-40
		T2	-60	67	87	67	280 290 ¹⁾	58	280 290 ¹⁾	-40	-60	-40
		T1	-60	67	87	67	280 300 ¹⁾	58	280 300 ¹⁾	-40	-60	-40

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
L	350 mA											
		T6	-60	55	55	55	80	53	80	-40	-60	-40
		T5	-60	70	70	70	95	68	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	133	70	195	67	195	-40	-60	-40
		T2...T1	-60	70	133	70	230	65	230	-40	-60	-40
N, Y	350 mA											
		T6	-60	55	56	55	80	54	80	-40	-60	-40
		T5	-60	70	71	70	95	69	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	154	70	195	68	195	-40	-60	-40
		T2	-60	70	154	70	280 290 ¹⁾	65	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	154	70	280 300 ¹⁾	65	280 300 ¹⁾	-40	-60	-40

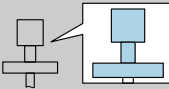
1) Only in connection with Position 11 = Y

Position 7 = 5, 6, 7, 8

		= x1, x5, x6, 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>												
		T6	-60	70	80	70	80	70	80	-40	-60	-40
		T5	-60	70	95	70	95	70	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	195	70	195	70	195	-40	-60	-40
		T2...T1	-60	70	200	70	230	67	230	-40	-60	-40
<i>N, Y</i>												
		T6	-60	70	80	70	80	70	80	-40	-60	-40
		T5	-60	70	95	70	95	70	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	195	70	195	70	195	-40	-60	-40
		T2	-60	70	230	70	280 290 ¹⁾	69	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	279	70	280 300 ¹⁾	68	280 300 ¹⁾	-40	-60	-40

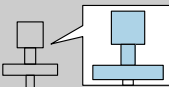
1) Only in connection with Position 11 = Y

Position 7 = A

		 = x1, x5, x6, 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
L												
		T6	-60	60	80	60	80	60	80	-40	-60	-40
		T5	-60	60	95	60	95	60	95	-40	-60	-40
		T4	-60	60	130	60	130	60	130	-40	-60	-40
		T3	-60	60	195	60	195	60	195	-40	-60	-40
		T2...T1	-60	60	200	60	230	60	230	-40	-60	-40
N, Y												
		T6	-60	60	80	60	80	60	80	-40	-60	-40
		T5	-60	60	95	60	95	60	95	-40	-60	-40
		T4	-60	60	130	60	130	60	130	-40	-60	-40
		T3	-60	60	195	60	195	60	195	-40	-60	-40
		T2	-60	60	230	60	280 290 ¹⁾	60	280 290 ¹⁾	-40	-60	-40
		T1	-60	60	279	60	280 300 ¹⁾	60	280 300 ¹⁾	-40	-60	-40

1) Only in connection with Position 11 = Y

Position 7 = 9

		 = x1, x5, x6, 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
L, N, Y												
		T6...T1	-60	60	80	60	80	60	80	-40	-60	-40

Exec nC IICDevice Type *FTL50, FTL50H, FTL51, FTL51H*

Position 7 = 4

		= x1, x5, x6, 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 FTL51, FTL51H: Bx, Cx, Dx	2 A											
		T6	-50	52	53	52	80	40	80	-40	-50	-40
		T5	-50	67	68	67	95	55	95	-40	-50	-40
		T4	-50	70	78	70	130	47	130	-40	-50	-40
		T3...T1	-50	70	78	70	150	38	150	-40	-50	-40
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	2 A											
		T6	-50	52	58	52	80	50	80	-40	-50	-40
		T5	-50	67	73	67	95	65	95	-40	-50	-40
		T4	-50	70	104	70	130	67	130	-40	-50	-40
		T3...T1	-50	70	104	70	150	65	150	-40	-50	-40
	4 A											
		T6	-50	43	54	43	80	40	80	-40	-50	-40
		T5	-50	58	69	58	95	55	95	-40	-50	-40
		T4	-50	70	77	70	130	65	130	-40	-50	-40
		T3...T1	-50	70	77	70	150	63	150	-40	-50	-40

Device Type FTL51C

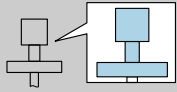
Position 7 = 4

		= x1, x5, x6, 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	52	53	52	80	40	80	-40	-50	-40
		T5	-50	67	68	67	95	55	95	-40	-50	-40
		T4	-50	70	78	70	130 120 ¹⁾	47	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	78	70	150 120 ¹⁾	38	150 120 ¹⁾	-40	-50	-40
B, C	2 A											
		T6	-50	52	58	52	80	50	80	-40	-50	-40
		T5	-50	67	73	67	95	65	95	-40	-50	-40
		T4	-50	70	104	70	130 120 ¹⁾	67	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	104	70	150 120 ¹⁾	65	150 120 ¹⁾	-40	-50	-40
	4 A											
		T6	-50	43	54	43	80	40	80	-40	-50	-40
		T5	-50	58	69	58	95	55	95	-40	-50	-40
		T4	-50	70	77	70	130 120 ¹⁾	65	130 120 ¹⁾	-40	-50	-40
		T3...T1	-50	70	77	70	150 120 ¹⁾	63	150 120 ¹⁾	-40	-50	-40

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

Device Type FTL70, FTL71

Position 7 = 4

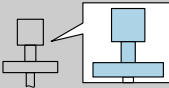


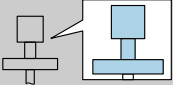
= x1, x5, x6

L	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	-60	52	60	52	80	50	80	-40	-60	-40
		T5	-60	67	75	67	95	65	95	-40	-60	-40
		T4	-60	70	118	70	130	69	130	-40	-60	-40
		T3	-60	70	118	70	195	64	195	-40	-60	-40
		T2...T1	-60	70	118	70	230	61	230	-40	-60	-40
	4 A											
		T6	-60	43	58	43	80	41	80	-40	-60	-40
		T5	-60	58	73	58	95	56	95	-40	-60	-40
		T4	-60	70	80	70	130	67	130	-40	-60	-40
		T3	-60	70	80	70	195	63	195	-40	-60	-40
		T2...T1	-60	70	80	70	230	59	230	-40	-60	-40

		= x1, x5, x6										
		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>N, Y</i>	2 A											
		T6	-60	52	64	52	80	51	80	-40	-60	-40
		T5	-60	67	79	67	95	66	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	139	70	195	67	195	-40	-60	-40
		T2	-60	70	139	70	280 290 ¹⁾	63	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	139	70	280 300 ¹⁾	63	280 300 ¹⁾	-40	-60	-40
	4 A											
		T6	-60	43	66	43	80	42	80	-40	-60	-40
		T5	-60	58	80	58	95	57	95	-40	-60	-40
		T4	-60	70	85	70	130	68	130	-40	-60	-40
		T3	-60	70	85	70	195	65	195	-40	-60	-40
		T2	-60	70	85	70	280 290 ¹⁾	61	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	85	70	280 300 ¹⁾	60	280 300 ¹⁾	-40	-60	-40

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	-40	-60	-40
		T5	-60	70	76	70	95	69	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	176	70	195	69	195	-40	-60	-40
		T2...T1	-60	70	176	70	230	67	230	-40	-60	-40
	4 A											
		T6	-60	45	66	45	80	44	80	-40	-60	-40
		T5	-60	60	81	60	95	59	95	-40	-60	-40
		T4	-60	70	124	70	130	69	130	-40	-60	-40
		T3	-60	70	124	70	195	66	195	-40	-60	-40
		T2...T1	-60	70	124	70	230	65	230	-40	-60	-40

 = x7												
N, Y	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	-60	55	62	55	80	54	80	-40	-60	-40
		T5	-60	70	77	70	95	69	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	195	70	195	70	195	-40	-60	-40
		T2	-60	70	208	70	280 290 ¹⁾	67	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	208	70	280 300 ¹⁾	66	280 300 ¹⁾	-40	-60	-40
	4 A											
		T6	-60	45	73	45	80	44	80	-40	-60	-40
		T5	-60	60	88	60	95	59	95	-40	-60	-40
		T4	-60	70	130	70	130	70	130	-40	-60	-40
		T3	-60	70	142	70	195	68	195	-40	-60	-40
		T2	-60	70	142	70	280 290 ¹⁾	65	280 290 ¹⁾	-40	-60	-40
		T1	-60	70	142	70	280 300 ¹⁾	64	280 300 ¹⁾	-40	-60	-40

1) Only in connection with Position 11 = Y

Ex ic IICDevice Type *FTL50, FTL50H, FTL51, FTL51H*

Position 7 = A, D, 5, 7

		= x1, x5, x6, 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 FTL51, FTL51H: Bx, Cx, Dx	T6	-50	55	55	55	75	45	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T5...T1	-50	55	55	55	90	40	90	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	T6	-50	55	65	55	75	50	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T5	-50	55	65	55	90	50	90	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T4	-50	55	65	55	125	50	125	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T3...T1	-50	55	65	55	150	45	150	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	

1) Only in connection with Position 8, 9 = x6

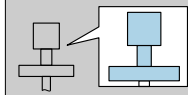
Position 7 = 6, 8

		= x1, C3, N3, x5, x6, 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 FTL51, FTL51H: Bx, Cx, Dx	T6	-50	55	67	55	75	55	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T5	-50	65	70	65	90	55	90	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T4...T1	-50	65	70	65	130	40	130	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	T6	-50	55	70	55	75	55	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T5	-50	65	95	65	95	65	95	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T4	-50	65	95	65	125	60	125	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	
	T3...T1	-50	65	95	65	150	60	150	-50 -40 ¹⁾	-50	-50 -40 ¹⁾	

1) Only in connection with Position 8, 9 = x6

Device Type FTL51C

Position 7 = A, D, 5, 7



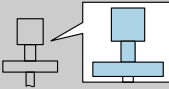
= x1, x5, x6, x7

			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												
		T6	-50	55	55	55	75	45	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T5...T1	-50	55	55	55	90	40	90	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
B, C												
		T6	-50	55	65	55	75	50	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T5	-50	55	65	55	90	50	90	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T4	-50	55	65	55	125 120 ²⁾	50	125 120 ²⁾	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T3...T1	-50	55	65	55	150 120 ²⁾	45	150 120 ²⁾	-50 -40 ¹⁾	-50	-50 -40 ¹⁾

1) Only in connection with Position 8, 9 = x6

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

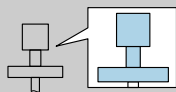
Position 7 = 6, 8

 = x1, x5, x6, 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												
		T6	-50	55	67	55	75	55	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T5	-50	65	70	65	90	55	90	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T4...T1	-50	65	70	65	130 120 ²⁾	40	130 120 ²⁾	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
B, C												
		T6	-50	55	70	55	75	55	75	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T5	-50	65	95	65	95	65	95	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T4	-50	65	95	65	125 120 ²⁾	60	125 120 ²⁾	-50 -40 ¹⁾	-50	-50 -40 ¹⁾
		T3...T1	-50	65	95	65	150 120 ²⁾	60	150 120 ²⁾	-50 -40 ¹⁾	-50	-50 -40 ¹⁾

- 1) Only in connection with Position 8, 9 = x6
 2) Only in connection with Position 5, 6 = xK

Device Type FTL70, FTL71

Position 7 = A, 5, 7



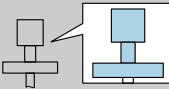
= x1, x5, x6, x7

			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
L												
		T6	-60	50	80	50	80	50	80	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T5	-60	55	70	55	95	50	95	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T4	-60	55	70	55	130	50	130	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T3	-60	55	70	55	195	45	195	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T2...T1	-60	55	70	55	230	45	230	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
N, Y												
		T6	-60	55	80	55	80	50	80	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T5	-60	55	75	55	95	50	95	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T4	-60	55	75	55	130	50	130	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T3	-60	55	75	55	195	50	195	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T2	-60	55	75	55	280 290 ²⁾	45	280 290 ²⁾	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T1	-60	55	75	55	280 300 ²⁾	45	280 300 ²⁾	-50 -40 ¹⁾	-60	-50 -40 ¹⁾

1) Only in connection with Position 8, 9 = x5, x6

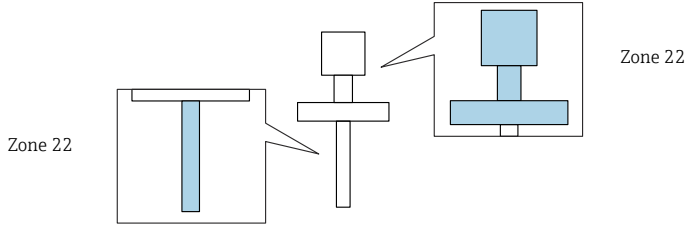
2) Only in connection with Position 11 = Y

Position 7 = 6, 8

 = x1, x5, x6, 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
L												
		T6	-60	55	80	55	80	55	80	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T5	-60	65	80	65	95	65	95	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T4	-60	65	95	65	130	65	130	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T3	-60	65	115	65	195	60	195	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T2...T1	-60	65	115	65	230	55	230	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
N, Y												
		T6	-60	55	80	55	80	55	80	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T5	-60	65	95	65	95	65	95	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T4	-60	65	130	65	130	65	130	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T3	-60	65	140	65	195	60	195	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T2	-60	65	140	65	280 290 ²⁾	55	280 290 ²⁾	-50 -40 ¹⁾	-60	-50 -40 ¹⁾
		T1	-60	65	140	65	280 300 ²⁾	55	280 300 ²⁾	-50 -40 ¹⁾	-60	-50 -40 ¹⁾

- 1) Only in connection with Position 8, 9 = x5, x6
 2) Only in connection with Position 11 = Y

Zone 22



Ec tc IIIC

Device Type *FTL50, FTL50H, FTL51, FTL51H*

Position 7 = 1

FTL50, FTL50H: Ax FTL51, FTL51H: Bx, Cx, Dx	180 mA			
		$-50 \leq T_p \leq +80$	$-40 \leq T_a \leq +70$	T80
		$-50 \leq T_p \leq +90$	$-40 \leq T_a \leq +66$	T80 to 90
		$-50 \leq T_p \leq +120$	$-40 \leq T_a \leq +53$	T80 to 120
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +40$	T80 to 150
FTL50, FTL50H: lx, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	180 mA			
		$-50 \leq T_p \leq +125$	$-40 \leq T_a \leq +70$	T80 to 125
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +67$	T80 to 150
	350 mA			
		$-50 \leq T_p \leq +116$	$-40 \leq T_a \leq +70$	T80 to 116
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +67$	T80 to 150

Position 7 = 2

FTL50, FTL50H: Ax FTL51, FTL51H: Bx, Cx, Dx	350 mA			
		$-50 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$ $-25 \leq T_a \leq +70$ ¹⁾	T80 to 95
		$-50 \leq T_p \leq +130$	$-40 \leq T_a \leq +55$ $-25 \leq T_a \leq +55$ ¹⁾	T80 to 130
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +45$ $-25 \leq T_a \leq +45$ ¹⁾	T80 to 150
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	350 mA			
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +70$ $-25 \leq T_a \leq +70$ ¹⁾	T80 to 150

1) Only in connection with Position 8, 9 = C3, N3

Position 7 = 4

FTL50, FTL50H: Ax FTL51, FTL51H: Bx, Cx, Dx	2 A, 4 A			
		$-50 \leq T_p \leq +80$	$-40 \leq T_a \leq +70$	T80
		$-50 \leq T_p \leq +90$	$-40 \leq T_a \leq +66$	T80 to 90
		$-50 \leq T_p \leq +120$	$-40 \leq T_a \leq +53$	T80 to 120
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +40$	T80 to 150
	6 A			
		$-50 \leq T_p \leq +90$	$-40 \leq T_a \leq +64$	T80 to 90
		$-50 \leq T_p \leq +120$	$-40 \leq T_a \leq +51$	T80 to 120
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +38$	T80 to 150
FTL50, FTL50H: Ix, Qx FTL51, FTL51H: Jx, Kx, Lx, Rx, Sx, Tx	2 A			
		$-50 \leq T_p \leq +125$	$-40 \leq T_a \leq +70$	T80 to 125
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +67$	T80 to 150
	4 A			
		$-50 \leq T_p \leq +116$	$-40 \leq T_a \leq +70$	T80 to 116
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +67$	T80 to 150
	6 A			
		$-50 \leq T_p \leq +97$	$-40 \leq T_a \leq +70$	T80 to 97
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +65$	T80 to 150

Position 7 = 5, 6, 7

FTL50, FTL50H: Ax, Ix, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx				
		$-50 \leq T_p \leq +80$	$-40 \leq T_a \leq +70$	T80
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +50$	T80 to 150

Position 7 = 8

FTL50, FTL50H: Ax, Ix, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx				
		$-50 \leq T_p \leq +80$	$-40 \leq T_a \leq +70$ $-25 \leq T_a \leq +70$ ¹⁾	T80
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +50$ $-25 \leq T_a \leq +50$ ¹⁾	T80 to 150

1) Only in connection with Position 8, 9 = C3, N3

Position 7 = A

FTL50, FTL50H: Ax, Ix, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx				
		$-50 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-50 \leq T_p \leq +150$	$-40 \leq T_a \leq +50$	T80 to 150

Position 7 = D

FTL50, FTL50H: Ax, Ix, Qx FTL51, FTL51H: Bx, Cx, Dx, Jx, Kx, Lx, Rx, Sx, Tx				
		$-50 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80

*Device Type FTL70, FTL71**Position 7 = 1*

L	180 mA			
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +70$	T80 to 230
N, Y	180 mA			
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +290$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 290 ¹⁾
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 300 ¹⁾

1) Only in connection with Position 11 = Y

Position 7 = 2

L	350 mA			
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +70$	T80 to 230
N, Y	350 mA			
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +290$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 290 ¹⁾
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 300 ¹⁾

1) Only in connection with Position 11 = Y

Position 7 = 4

L	2 A, 4 A, 6 A			
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +70$	T80 to 230
N, Y	2 A, 4 A, 6 A			
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +290$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 290 ¹⁾
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 300 ¹⁾

1) Only in connection with Position 11 = Y

Position 7 = 5, 6, 7, 8

L				
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +70$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +70$	T80 to 230
N, Y				
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +70$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +70$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +70$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +70$	T80 to 195
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +290$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 290 ¹⁾
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +70$	T80 to 280 T80 to 300 ¹⁾

1) Only in connection with Position 11 = Y

Position 7 = A

L				
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +60$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +60$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +60$	T80 to 195
		$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +60$	T80 to 230
N, Y				
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80
		$-60 \leq T_p \leq +95$	$-40 \leq T_a \leq +60$	T80 to 95
		$-60 \leq T_p \leq +130$	$-40 \leq T_a \leq +60$	T80 to 130
		$-60 \leq T_p \leq +195$	$-40 \leq T_a \leq +60$	T80 to 195
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +290$ ¹⁾	$-40 \leq T_a \leq +60$	T80 to 280 T80 to 290 ¹⁾
		$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +60$	T80 to 280 T80 to 300 ¹⁾

1) Only in connection with Position 11 = Y

Position 7 = 9

L, N, Y				
		$-60 \leq T_p \leq +80$	$-40 \leq T_a \leq +60$	T80

Connection data

Basic specification, Position 1 = B

Basic specification, Position 7	Supply
4	<p>U = 19 to 253 V_{AC}, 50/60 Hz; P_{max} ≤ 1.3 W or U = 19 to 55 V_{DC}</p> <p>Relay: $I_{\max} \sim 6.0 \text{ A} \rightarrow U_{\max} = 253 \text{ V}_{AC}$; P_{max} = 1 500 VA, cos φ = 1 P_{max} = 750 VA, cos φ > 0.7 $I_{\max} \sim 6.0 \text{ A} \rightarrow U_{\max} = 30 \text{ V}_{DC}$ $I_{\max} \sim 0.2 \text{ A} \rightarrow U_{\max} \leq 125 \text{ V}_{DC}$</p>

Basic specification, Position 1 = C (only Ex ec, Ex tc)

Basic specification, Position 7	Supply
A	U = 9 to 32 V _{DC} ; connection only to PROFIBUS PA I _{max} ≤ 13.5 mA
D (FTL5x(H), FTL51C) 9 (FTL7x)	U = 21 to 26 V; connection only to FML621 I _{max} ≤ 16 mA
1	U = 19 to 253 V _{AC} , 50/60 Hz; P _{max} ≤ 0.83 W I _{max} ≤ 350 mA
2	U = 10 to 55 V _{DC} ; P _{max} ≤ 0.83 W I _{max} ≤ 350 mA
5	U = 11 to 36 V _{DC} ; P _{max} ≤ 0.6 W I _{max} ≤ 22 mA
6, 8	U = 4 to 12.5 V _{DC} ; P _{max} ≤ 23 mW I _{max} ≤ 3.5 mA
7	U = 9.5 to 12.5 V _{DC} ; P _{max} ≤ 150 mW I _{max} ≤ 13 mA

Basic specification, Position 1 = C (only Ex ic)

<i>Basic specification, Position 7</i>	Supply	
A	$U_i = 17.5 \text{ V}$ $P_i = 5.5 \text{ W}$ $I_i = 500 \text{ mA}$ $C_i = 2.7 \text{ nF}$ $L_i = 10 \text{ }\mu\text{H}$	Fieldbus: PROFIBUS PA
D (<i>FTL5x(H), FTL51C</i>)	$U_i = 27.6 \text{ V}$ $P_i = 640 \text{ mW}$ $I_i = 93 \text{ mA}$ $C_i = 2 \text{ nF}$ $L_i = 0.133 \text{ mH}$	Only associated intrinsically safe power supply unit FML621 from Endress+Hauser
5	$U_i = 36 \text{ V}$ $P_i = 1 \text{ W}$ $I_i = 100 \text{ mA}$ $C_i/L_i = 0$	Power supply unit with max. electrical specifications below the characteristic values of the electronic inserts
6, 8	$U_i = 16 \text{ V}$ $P_i = 170 \text{ mW}$ $I_i = 52 \text{ mA}$ $C_i = 30 \text{ nF}$ $L_i = 0$	Power supply unit with max. electrical specifications below the characteristic values of the electronic inserts
7	$U_i = 16.7 \text{ V}$ $P_i = 1 \text{ W}$ $I_i = 150 \text{ mA}$ $C_i/L_i = 0$	Power supply unit with max. electrical specifications below the characteristic values of the electronic inserts



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