

Safety Instructions

Liquiphant FTL64

Ex ia IIC T6...T1 Ga/Gb

Ex ia IIIC T**°C Da/Db




Liquiphant FTL64

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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:
BA02037F/00

Supplementary documentation


Explosion-protection brochure: CP00021Z/11
The Explosion-protection brochure is available:

- In the download area of the Endress+Hauser website:
www.endress.com -> Downloads -> Brochures and Catalogs -> Text Search: CP00021Z
- On the CD for devices with CD-based documentation

**General notes:
Combined approval**

Ex ia IIC	Zone 1	Ex ia IIIC	Zone 21	Ex ia IIC	Zone 21	Ex ia IIIC	Zone 21
Zone 0 or Zone 1		Zone 20 or Zone 21		Zone 0 or Zone 1		Zone 20 or Zone 21	

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

NEPSI Declaration of Conformity

Certificate number:
GYJ21.1248X

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

- GB/T 3836.1-2021
- GB/T 3836.2-2021
- GB/T 3836.4-2021
- GB 3836.20-2010
- GB/T 3836.31-2021

**Manufacturer
address**

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

Address of the manufacturing plant: See nameplate.

**Extended
order code**

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

Structure of the extended order code

FTL64	-	*****	+	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



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

FTL64


Basic specifications

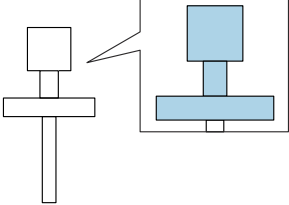
Position 1, 2 (Approval)		
Selected option		Description
FTL64	NK ¹⁾	NEPSI Ex ia IIC T6...T1 Ga/Gb NEPSI Ex ia IIIC T**°C Da/Db

- 1) In connection with Position 3, 4 = A8 and Optional specification, ID Nx, Ox = NG:
The temperature classes change to T4...T1

Position 3, 4 (Output)		
Selected option		Description
FTL64	A7	FEL67, 2-wire PFM + test button
	A8	FEL68, 2-wire NAMUR + test button
	GA	FEL60D, density/concentration

Position 6 (Housing, Material)		
Selected option		Description
FTL64	B	Single compartment; Alu, coated
	C	Single compartment; 316L, cast
	M	Dual compartment L-shape; Alu, coated

 Shown in the temperature tables exemplary as follows:




Position 7 (Electrical Connection)		
Selected option		Description
FTL64	B ¹⁾	Gland M20, brass nickel plated, IP66/68 NEMA Type 4X/6P
	C ²⁾	Gland M20, 316L, IP66/68 NEMA Type 4X/6P
	F	Thread M20, IP66/68 NEMA Type 4X/6P
	G	Thread G1/2, IP66/68 NEMA Type 4X/6P
	I	Thread NPT3/4, IP66/68 NEMA Type 4X/6P
	Y	Special version: Thread NPT1/2, IP66/68 NEMA Type 4X/6P

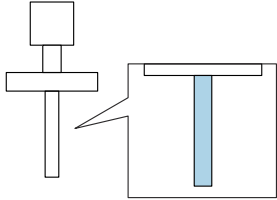
- 1) Only in connection with Position 6 = B, M
 2) Only in connection with Position 6 = B, C

Position 8 (Application)		
Selected option		Description
FTL64	D	Process max 280°C/536°F, max 100bar
	E	Process max 230°C/446°F, max 100bar
	R	Process max 230°C/446°F, max 40bar (PFA)
	9	Special version: Process max 300°C/572°F, max 100bar

Position 9 (Surface Refinement)		
Selected option		Description
FTL64	A	Standard Ra<3,2um/126uin
	R	Coating PFA (conductive)

Position 10 (Type of Probe)		
Selected option		Description
FTL64	1	Compact version
	2	Extension tube

 Shown in the temperature tables exemplary as follows:



Optional specifications

ID Jx, Kx (Test, Certificate, Declaration)		
Selected option		Description
FTL64	JL ¹⁾	Ambient temperature -50°C/-58°F
	JN ¹⁾	Ambient temperature -52°C/-62°F

- 1) Only in connection with Position 3, 4 = A7, A8

ID Nx, Ox (Accessory Mounted)		
Selected option		Description
FTL64	NF ¹⁾	Bluetooth VU121, Labeling: VA13-02
	NG ²⁾	Prepared for Heartbeat Verification + Monitoring + Bluetooth VU121, Labeling: VA13-01

- 1) Only in connection with Position 3, 4 = A7, Position 6 = B, M
 2) Only in connection with Position 3, 4 = A8, Position 6 = B, M

ID Px, Rx (Accessory Enclosed)		
Selected option		Description
FTL64	PA ¹⁾	Weather protection cover, 316L
	PB ²⁾	Weather protection cover, plastic
	R6 ³⁾	Test magnet


- 1) Only in connection with Position 6 = M
 2) Only in connection with Position 6 = B, C
 3) Only in connection with Position 3, 4 = A8

Safety instructions:
General

- Devices suitable for zone separation (marked Ga/Gb or Da/Db) are always suitable for installation in the less critical zone (Gb or Db). Due to space limitations the corresponding marking maybe not indicated on the nameplate.
- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
 - Be suitably qualified for their role and the tasks they perform
 - Be trained in explosion protection
 - Be familiar with national regulations
- For installation, use and maintenance of the device, users must also observe the requirements stated in the Operating Instructions and the standards:
 - GB 50257-2014: "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering".
 - GB/T 3836.13-2021: "Explosive atmospheres, Part 13: Equipment repair, overhaul, reclamation and modification".
 - GB/T 3836.15-2017: "Explosive atmospheres, Part 15: Electrical installations design, selection and erection".
 - GB/T 3836.16-2017: "Explosive atmospheres, Part 16: Electrical installations inspection and maintenance".
 - GB/T 3836.18-2017: "Explosive atmospheres, Part 18: Intrinsically safe electrical systems".
 - GB 15577-2018: "Safety regulations for dust explosive prevention and protection". (Only if installed in dust hazardous area.)
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Only use the device in media to which the wetted materials have sufficient durability.
- Avoid electrostatic charging:
 - Of plastic surfaces (e.g. enclosure, sensor element, special varnishing, attached additional plates, ..)
 - Of isolated capacities (e.g. isolated metallic plates)
- Refer to the temperature tables for the relationship between the permitted ambient temperature for the sensor and/or transmitter, depending on the range of application and the temperature class.
- Modifications to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.

Safety instructions:
Special conditions

Permitted ambient temperature range at the electronics enclosure:
 $-40\text{ °C} \leq T_a \leq +70\text{ °C}$

- 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 6 = B, M

Avoid sparks caused by impact and friction.

Optional specification, ID Px, Rx = PA

Connect the weather protection cover to the local potential equalization.

Optional specification, ID Px, Rx = PB

Avoid electrostatic charging of the weather protection cover (e.g. friction, cleaning, maintenance, strong medium flow).

Optional specification, ID Px, Rx = R6

Suitable for use in explosion hazardous areas.

Device group IIC and Device group III

Basic specification, Position 9 = R

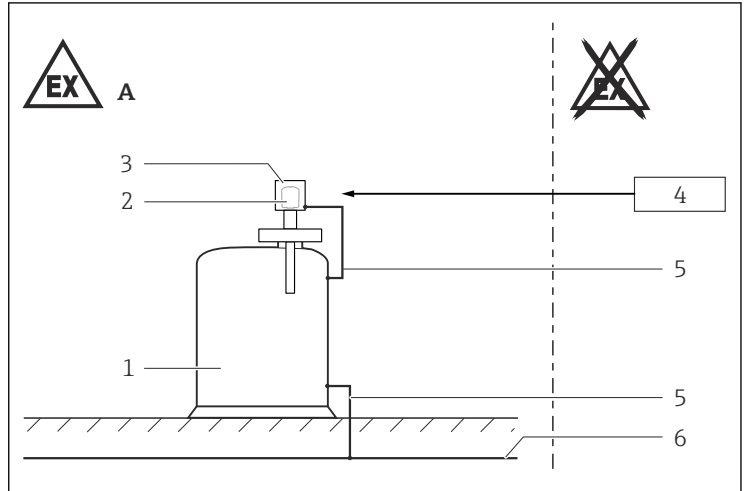
- Due to the surface resistance $1 \text{ G}\Omega$ ($|R|$ PFA-conductive), this coating is suitable without restrictions.
- Prevent damage to the conductive surface layer (e.g. by abrasion).

Type of protection Ex db

The high-temperature part of the device (fork/pipe/process connection/temperature spacer) is designed in type of protection Ex db and has an Ex ia connection to the electronics insert.

The installation on the terminals of the device must always be carried out in type of protection Ex i.

Safety instructions: Installation



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- A Zone 1, Zone 21
- 1 Tank; Zone 0, Zone 1, Zone 20, Zone 21
- 2 Electronic insert
- 3 Enclosure
- 4 Basic specification, Position 3, 4 = A7, A8:
Associated intrinsically safe power supply units
Basic specification, Position 3, 4 = GA:
Only associated intrinsically safe power supply unit FML621 from
Endress+Hauser
- 5 Potential equalization line
- 6 Local potential equalization

- Connect the device using suitable cable and wire entries of protection type "Intrinsic safety (Ex i)". An ingress protection of at least IP54 must be achieved.
- When the device is connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC and IIB, the type of protection changes to Ex ib IIC and Ex ib IIB.
- Continuous service temperature of the connecting cable: $\geq T_a + 20 \text{ K}$.
- Perform the following to achieve the degree of protection IP66/67:
 - Screw the cover tight.
 - Mount the cable entry correctly.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.

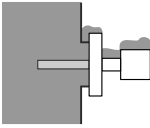
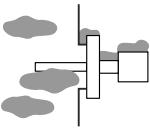
- Observe the maximum process conditions according to the manufacturer's Operating Instructions.
- At high medium temperatures, note flange pressure load capacity as a factor of temperature.
- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.
- Support extension tube of the device if a dynamic load is expected.
- The device can be equipped with the Bluetooth® module: refer to the Operating Instructions and specifications in the "Bluetooth® module" chapter.

Device group III, Application in dust

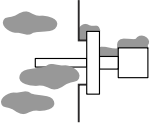
- To ensure the ingress protection IP66/67: Only use the unit-mounted cable entries, sealing plugs and O-rings.
- Supplied cable glands and metallic sealing plugs comply with the requirements of type of protection marked on the nameplate.

Permitted ambient conditions

Ex ia IIIC Txxx°C Da/Db

Process Zone 20		Enclosure Zone 21
Continuous dust submersion		Dust accumulation or temporary explosive dust atmosphere
Continuous explosive dust atmosphere and deposits		Dust accumulation or temporary explosive dust atmosphere

Ex ia IIIC Txxx°C Db

Process Zone 21		Enclosure Zone 21
Continuous dust deposits or temporary explosive dust atmosphere		Dust accumulation or temporary explosive dust atmosphere

Accessory high pressure sliding sleeve

The high pressure sliding sleeve can be used for a continuous setting of the switch point and is suited for zone separation if mounted properly (see Operating Instructions).

Intrinsic safety

- The device is only suitable for connection to certified, intrinsically safe equipment with explosion protection Ex ia / Ex ib.
- The intrinsically safe input power circuit of the device is isolated from ground. The dielectric strength is at least 500 V_{rms}.

Potential equalization

Integrate the device into the local potential equalization.

Optional specification, ID Px, Rx = PA

Connect the weather protection cover to the local potential equalization.

Bluetooth® module

Basic specification, Position 3, 4 = A7

If the device is equipped with the Bluetooth® module, no battery is required or allowed.

Basic specification, Position 3, 4 = A8

- If the device is equipped with the Bluetooth® module, a battery is required.
- Removal or replacement of the battery is only permitted in non-hazardous areas.
- Observe the information in the Safety Instructions (XA) included with the Bluetooth® module.

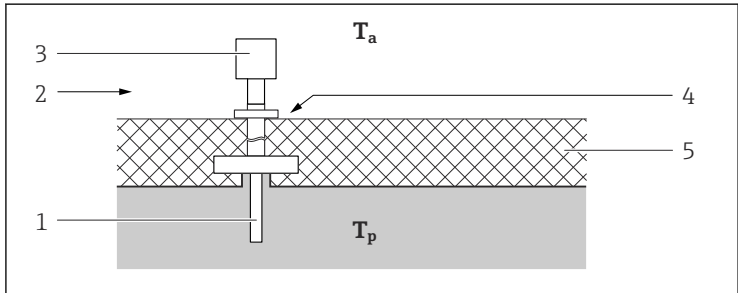
Safety instructions: Zone 0

- In the event of potentially explosive vapor/air mixtures, only operate the device under atmospheric conditions.
 - Temperature: -20 to +60 °C
 - Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
 - Air with normal oxygen content, usually 21 % (V/V)
- If no potentially explosive mixtures are present, or if additional protective measures have been taken, the device may also be operated under non-atmospheric conditions in accordance with the manufacturer's specifications.
- When using under non-atmospheric pressures and non-atmospheric temperatures: The sensor part of the device approved for Zone 0 does not cause any ignition hazards.

Explosion protection with heat insulation

Basic specification, Position 8 = D, E, R, 9

- While observing the "temperature derating", the device is suitable for process temperatures up to 300 °C.
- When operating, ensure that you rule out contact between hot component surfaces and potentially explosive atmospheres beyond the limits of the corresponding temperature class. Suitable measures: e.g. thermal insulation at container and/or pipes.
- The temperature of 85 °C specified at the reference point may not be exceeded.
- To protect the electronics, observe the specified ambient temperature at the electronics enclosure.



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- T_a Ambient temperature
 T_p Process temperature
 1 Sensor
 2 Temperature class, e.g. T6
 3 Enclosure
 4 Reference point: max. +85 °C
 5 E.g. thermal insulation

Temperature tables

i Optional specification, ID Jx, Kx = JL
 Lower limit of the ambient temperature for explosion protection changes to -50 °C.

Optional specification, ID Jx, Kx = JN
 Lower limit of the ambient temperature for explosion protection changes to -52 °C.

General notes

Ex ia IIC

i Optional specification, ID Px, Rx = PB
 When using the weather protection cover: Reduce the values T_a of P1, P2, P3 by 16 K.

Ex ia III C*Optional specification, ID Px, Rx = PB*When using the weather protection cover: Reduce the values T_a by 16 K.**Description notes**

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

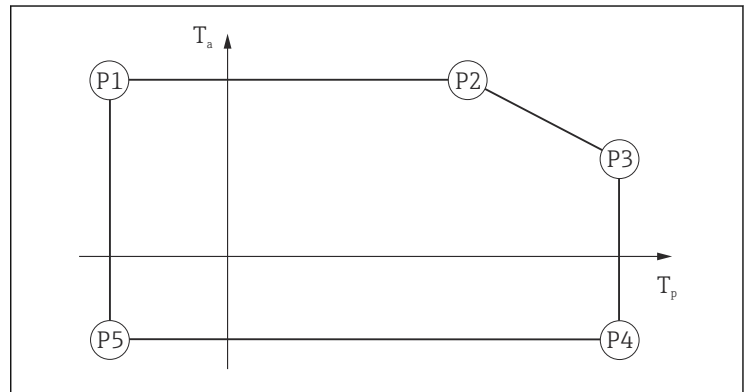
Zone 0, Zone 1

1st column: Position 8 = A, B, ...

2nd 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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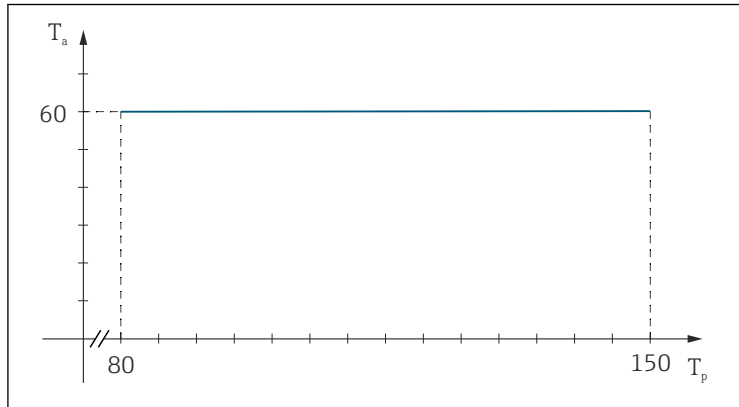
Zone 20, Zone 21 or Zone 21

1st column: Position 8 = A, B, ...

2nd column: Process temperature range in °C

3rd column: Ambient temperature range in °C

4th column: Maximum surface temperature in °C

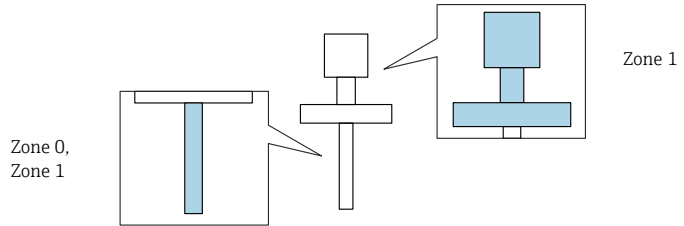


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T_a Ambient temperature in °C

T_p Process temperature in °C

Zone 0, Zone 1



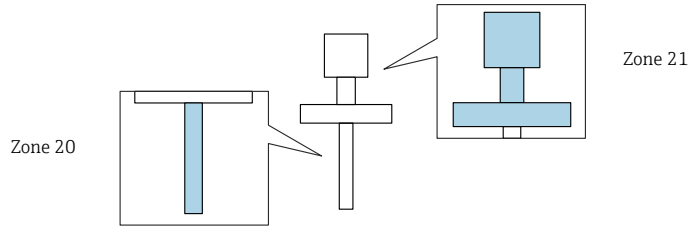
E, R		P1		P2		P3		P4		P5	
		T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a	T _p	T _a
	T6	-60	67 65 ¹⁾	80	67 65 ¹⁾	80	70	80	-40 -50 ²⁾ -52 ³⁾	-60	-40 -50 ²⁾ -52 ³⁾
	T5	-60	70 65 ¹⁾	95	70 65 ¹⁾	95	70	95		-60	
	T4 ⁴⁾	-60	70 65 ¹⁾	130	70 65 ¹⁾	130	70	130		-60	
	T3 ⁴⁾	-60	70 65 ¹⁾	195	70 65 ¹⁾	195	70	195		-60	
	T2...T1 ⁴⁾	-60	70 65 ¹⁾	200	70 65 ¹⁾	230	67	230		-60	

- 1) Only in connection with Position 3, 4 = A8 and Optional specification, ID Nx, Ox = NG
- 2) Only in connection with Optional specification, ID Jx, Kx = JL
- 3) Only in connection with Optional specification, ID Jx, Kx = JN
- 4) In connection with Position 3, 4 = A8 and Optional specification, ID Nx, Ox = NG: The temperature classes change to T4...T1

D, 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
	T6	-60	67 65 ¹⁾	80	67 65 ¹⁾	80	70	80	-40 -50 ²⁾ -52 ³⁾	-60	-40 -50 ²⁾ -52 ³⁾
	T5	-60	70 65 ¹⁾	95	70 65 ¹⁾	95	70	95		-60	
	T4 ⁴⁾	-60	70 65 ¹⁾	130	70 65 ¹⁾	130	70	130		-60	
	T3 ⁴⁾	-60	70 65 ¹⁾	195	70 65 ¹⁾	195	70	195		-60	
	T2 ⁴⁾	-60	70 65 ¹⁾	230	70 65 ¹⁾	280 290 ⁵⁾	70	280 290 ⁵⁾		-60	
	T1 ⁴⁾	-60	70 65 ¹⁾	279	70 65 ¹⁾	280 300 ⁵⁾	68	280 300 ⁵⁾		-60	

- 1) Only in connection with Position 3, 4 = A8 and Optional specification, ID Nx, Ox = NG
- 2) Only in connection with Optional specification, ID Jx, Kx = JL
- 3) Only in connection with Optional specification, ID Jx, Kx = JN
- 4) In connection with Position 3, 4 = A8 and Optional specification, ID Nx, Ox = NG: The temperature classes change to T4...T1
- 5) Only in connection with Position 8 = 9

Zone 20, Zone 21



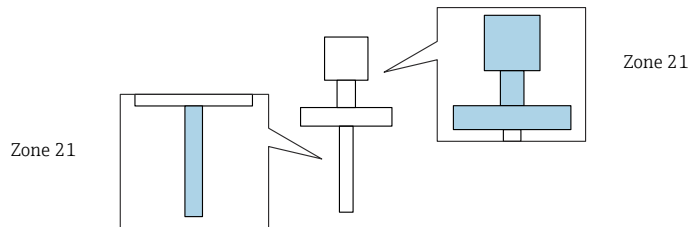
<i>E, R</i>			
	$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +60$ $-50 \leq T_a \leq +60$ ¹⁾ $-52 \leq T_a \leq +60$ ²⁾	Zone 20: $T_{200} -45$ to $+245$ ³⁾
			Zone 21: $T_L -55$ to $+235$ ⁴⁾

- 1) Only in connection with Optional specification, ID Jx, Kx = JL
- 2) Only in connection with Optional specification, ID Jx, Kx = JN
- 3) With 200 mm dust deposit
- 4) With dust accumulation T_L

<i>D, 9</i>			
	$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +60$ $-50 \leq T_a \leq +60$ ²⁾ $-52 \leq T_a \leq +60$ ³⁾	Zone 20: $T_{200} -45$ to $+295$ ⁴⁾
			Zone 21: $T_L -55$ to $+305$ ⁵⁾

- 1) Only in connection with Position 8 = 9
- 2) Only in connection with Optional specification, ID Jx, Kx = JL
- 3) Only in connection with Optional specification, ID Jx, Kx = JN
- 4) With 200 mm dust deposit
- 5) With dust accumulation T_L

Zone 21



<i>E, R</i>			
	$-60 \leq T_p \leq +230$	$-40 \leq T_a \leq +60$ $-50 \leq T_a \leq +60$ ¹⁾ $-52 \leq T_a \leq +60$ ²⁾	$T_L -55$ to $+235$ ³⁾

- 1) Only in connection with Optional specification, ID Jx, Kx = JL
- 2) Only in connection with Optional specification, ID Jx, Kx = JN
- 3) With dust accumulation T_L

<i>D, 9</i>			
	$-60 \leq T_p \leq +280$ $-60 \leq T_p \leq +300$ ¹⁾	$-40 \leq T_a \leq +60$ $-50 \leq T_a \leq +60$ ²⁾ $-52 \leq T_a \leq +60$ ³⁾	$T_L -45$ to $+285$ ⁴⁾ $T_L -45$ to $+305$ ^{1) 4)}

- 1) Only in connection with Position 8 = 9
- 2) Only in connection with Optional specification, ID Jx, Kx = JL
- 3) Only in connection with Optional specification, ID Jx, Kx = JN
- 4) With dust accumulation T_L

Connection data

Optional specification, ID Nx, Ox = NF, NG

When using the Bluetooth® module: No changes to the connection values.

Associated intrinsically safe power supply unit with max. electrical specifications below the characteristic values of the electronic inserts

<i>Basic specification, Position 3, 4</i>	Power supply circuit
A7	$U_i = 14.6 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 633 \text{ mW}$ $L_i = 0$ $C_i = 3 \text{ nF}$
A8	$U_i = 16 \text{ V}$ $I_i = 52 \text{ mA}$ $P_i = 170 \text{ mW}$ $L_i = 0$ $C_i = 30 \text{ nF}$

Only associated intrinsically safe power supply unit FML621 from Endress+Hauser

<i>Basic specification, Position 3, 4</i>	Power supply circuit
GA	$U_i = 27.6 \text{ V}$ $I_i = 93 \text{ mA}$ $P_i = 640 \text{ mW}$ $L_i = 3 \text{ }\mu\text{H}$ $C_i = 3 \text{ nF}$

Cable entry parameters**Ex ia IIC**

Not relevant.

Ex ia IIIC

Cable gland: *Basic specification, Position 7 = B*

mandatory for Position 6 = B, M

Thread	Clamping range	Material	Sealing insert	O-ring
M20x1,5	ø 8 to 10.5 mm ¹⁾ (ø 6.5 to 13 mm) ²⁾	Ms, nickel-plated	Silicone	EPDM (ø 17x2)

- 1) Standard
2) Separate clamping inserts available

Cable gland: *Basic specification, Position 7 = C*

preferably for Position 6 = C and possible for Position 6 = B, M

Thread	Clamping range	Material	Sealing insert	O-ring
M20x1,5	ø 7 to 12 mm	1.4404	NBR	EPDM (ø 17x2)



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



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