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Safety Instructions
Liquiphant FTL64

Ex db eb IIC T6...T1 Ga/Gb
Ex db eb IIC T6...T1 Gb

Endress+Hauser
People for Process Automation

Liquiphant FTL64

Table of contents

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

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 3836.3-2021
- GB 3836.20-2010

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*..
(Device type)		*(Basic specifications)*		*(Optional specifications)*

* = Placeholder
At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

Basic specifications

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available.
The selected option of a feature can consist of several positions.

Optional specifications

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

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	ND	NEPSI Ex db eb IIC T6...T1 Ga/Gb NEPSI Ex db eb IIC T6...T1 Gb

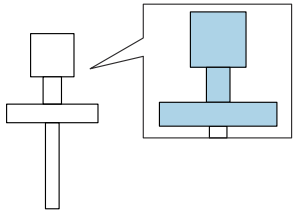
Position 3, 4 (Output)		
Selected option		**Description**
FTL64	A1	FEL61, 2-wire 19-253VAC + test button
	A2	FEL62, 3-wire PNP 10-55VDC + test button
	A3	FEL64DC, relay DPDT 9-20VDC
	A4	FEL64, relay DPDT 19-253VAC/19-55VDC contact 253V/6A + test button
	A7	FEL67, 2-wire PFM + test button
	A8	FEL68, 2-wire NAMUR + test button
	GA	FEL60D, density/concentration

Position 5 (Display, Operation)		
Selected option		**Description**
FTL64	A	W/o; switch
	B [1)]	LED module outside visible; switch

1) Only in connection with Position 3, 4 = A2-A4

Position 6 (Housing, Material)		
Selected option		**Description**
FTL64	M	Dual compartment L-shape; Alu, coated

Shown in the temperature tables exemplary as follows:



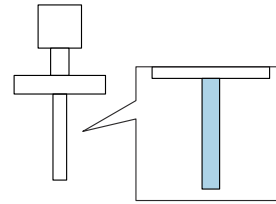
Position 7 (Electrical Connection)		
Selected option		**Description**
FTL64	B	Gland M20, brass nickel plated, IP66/68 NEMA Type 4X/6P
	C	Gland M20, 316L, IP66/68 NEMA Type 4X/6P
	F	Thread M20, IP66/68 NEMA Type 4X/6P
	G	Thread G1/2, IP66/68 NEMA Type 4X/6P
	I	Thread NPT3/4, IP66/68 NEMA Type 4X/6P
	Y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

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 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 = A1-A4, A7, Position 5 = A
2) Only in connection with Position 3, 4 = A8, Position 5 = A

ID Px, Rx (Accessory Enclosed)		
Selected option		**Description**
FTL64	PA	Weather protection cover, 316L
	R6 [1]	Test magnet

1) Only in connection with Position 3, 4 = A2-A4, 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".
- 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:
$-40\ °C \leq T_a \leq +70\ °C$

- 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: → 13, "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.
- Covers with glass window only permitted for the following ambient temperatures:
  $-50\ °C \leq T_a \leq +70\ °C$
- Avoid sparks caused by impact and friction.

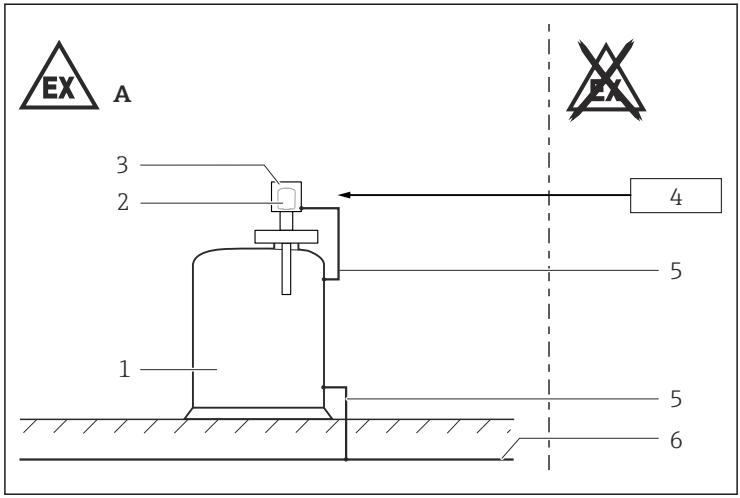
Optional specification, ID Px, Rx = PA
Connect the weather protection cover to the local potential equalization.

Optional specification, ID Px, Rx = R6
Suitable for use in explosion hazardous areas.

Device group IIC

Basic specification, Position 9 = R
Due to the surface resistance 1 GΩ (|R| PFA-conductive), this coating is suitable without restrictions.

Safety instructions: Installation



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

- 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.
- 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.
- Connect the device:
  - Using suitable cable and wire entries of protection type "Increased safety (Ex eb)".
  - Using piping systems of protection type "Increased safety (Ex eb)".

- Continuous service temperature of the connecting cable / cable gland / cable entry: ≥ T_a +20 K.
- 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.
- When operating the transmitter enclosure at an ambient temperature under −20 °C, use appropriate cables and cable entries permitted for this application.
- The device can be equipped with the Bluetooth® module: refer to the Operating Instructions and specifications in the "Bluetooth® module" chapter.
- Before operation:
  - Screw in the cover all the way.
  - Tighten the securing clamp on the cover.

Cross section connecting wire	Tightening torque of terminal screw	Stripped insulation
0.2 to 2.5 mm^2	≤ 0.4 Nm	6 to 8 mm

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.

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: Ex d joints

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

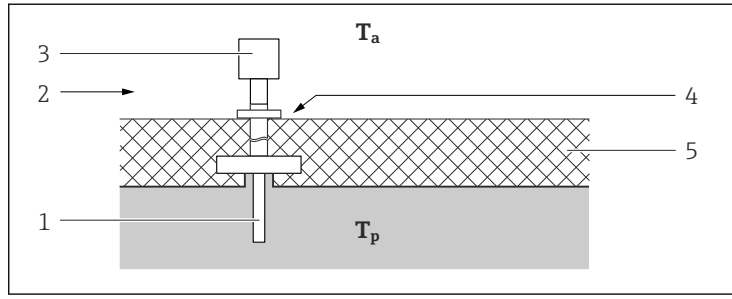
Safety instructions: Zone 0

- 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.
- Only use the device in media to which the wetted materials have sufficient durability (e.g. process connection seal).
- 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.



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

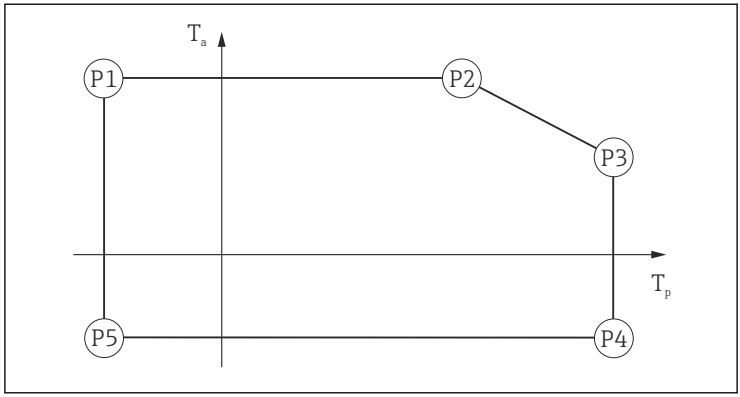
Unless otherwise indicated, the positions always refer to the basic specification.

1st column: Position 8 = 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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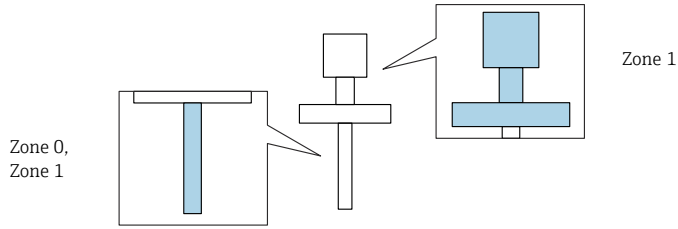
Zone 0, Zone 1



Position 3, 4 = A1

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
	180 mA											
		T6	–60	63	68	63	80	62	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	230	70	230	70	230	–40	–60	–40
	350 mA											
		T6	–60	37	57	37	80	36	80	–40	–60	–40
		T5	–60	52	72	52	95	51	95	–40	–60	–40
		T4	–60	69	69	69	130	66	130	–40	–60	–40
		T3	–60	69	69	69	195	63	195	–40	–60	–40
		T2...T1	–60	69	69	69	230	61	230	–40	–60	–40

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
	180 mA											
		T6	–60	63	70	63	80	60	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	280	70	280 290 [1)]	70	280 290 [1)]	–40	–60	–40
		T1	–60	70	280	70	280 300 [1)]	67	280 300 [1)]	–40	–60	–40
	350 mA											
		T6	–60	37	58	37	80	36	80	–40	–60	–40
		T5	–60	52	73	52	95	51	95	–40	–60	–40
		T4	–60	69	69	69	130	66	130	–40	–60	–40
		T3	–60	69	69	69	195	63	195	–40	–60	–40
		T2	–60	69	69	69	280 290 [1)]	62	280 290 [1)]	–40	–60	–40
		T2…T1	–60	69	69	69	280 300 [1)]	59	280 290 [1)]	–40	–60	–40

1) Only in connection with Position 8 = 9

Position 3, 4 = A2

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
	350 mA											
		T6	–60	54	71	54	80	53	80	–40	–60	–40
		T5	–60	69	86	69	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

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
	350 mA											
		T6	–60	54	77	54	80	53	80	–40	–60	–40
		T5	–60	69	70	69	95	68	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	280 290 [1)]	–40	–60	–40

1) Only in connection with Position 8 = 9

Position 3, 4 = A3, A4

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**
	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

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**
	2 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
		T2...T1	−60	70	142	70	280 300 [1)]	64	280 290 [1)]	−40	−60	−40

1) Only in connection with Position 8 = 9

Position 3, 4 = A7, A8

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	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

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	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	280 290 [1]	–40	–60	–40

1) Only in connection with Position 8 = 9

Position 3, 4 = GA

D, E, R, 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...T1	–60	70	70	70	80	70	80	–40	–60	–40

Connection data

Optional specification, ID Nx, Ox = NF, NG
When using the Bluetooth® module: No changes to the connection values.

Basic specification, Position 3, 4	**Power supply circuit**	**Output**
A1	U = 19 to 253 V_{AC}, 50/60 Hz; P_{max} < 2 VA	I_{max} = 180 mA
A2	U = 10 to 55 V_{DC}; P_{max} < 0.5 W, P_{max} < 1.2 W [1]	I_{max} = 350 mA
A3	U = 9 to 20 V_{DC}; P_{max} < 1 W, P_{max} < 1.7 W [1]	2 potential free change-over contacts; 2 A Ex e
A4	U = 19 to 253 V_{AC}, 50/60 Hz or 19 to 55 V_{DC}; P_{max} < 25 VA or < 1.3 W, P_{max} < 31 VA or < 2 W [1]	
A7	U = 9.5 to 12.5 V_{DC}; PFM; I_{max} = 12 mA Connection only to power supply unit FTL325P or FTL375P from Endress+Hauser.	
A8	U = 4 to 8.2 V_{DC}	NAMUR; I_{max} = 3.8 mA
GA	U = 21 to 26 V_{DC}; I_{max} = 16 mA Connection only to power supply unit FML621 from Endress+Hauser.	

1) Only in connection with Position 5 = B

Cable entry parameters

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

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*

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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