

# Safety Instructions

## LPGmass

### NEPSI Zone 1, Zone 21

**This document is an integral part of the following Operating Instructions:**  
BA00133D, LPGmass

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**COC certificates of conformity**

**COC certificates of conformity**

By affixing the certification number the product conforms with the following standards:

- GB/T 3836.1-4-2021
- GB/T 3836.9-2021
- GB/T 3836.31-2021

Certification number:

- GYJ22.1932X

**Inspection body**

NEPSI, National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation

**Description of measuring system**

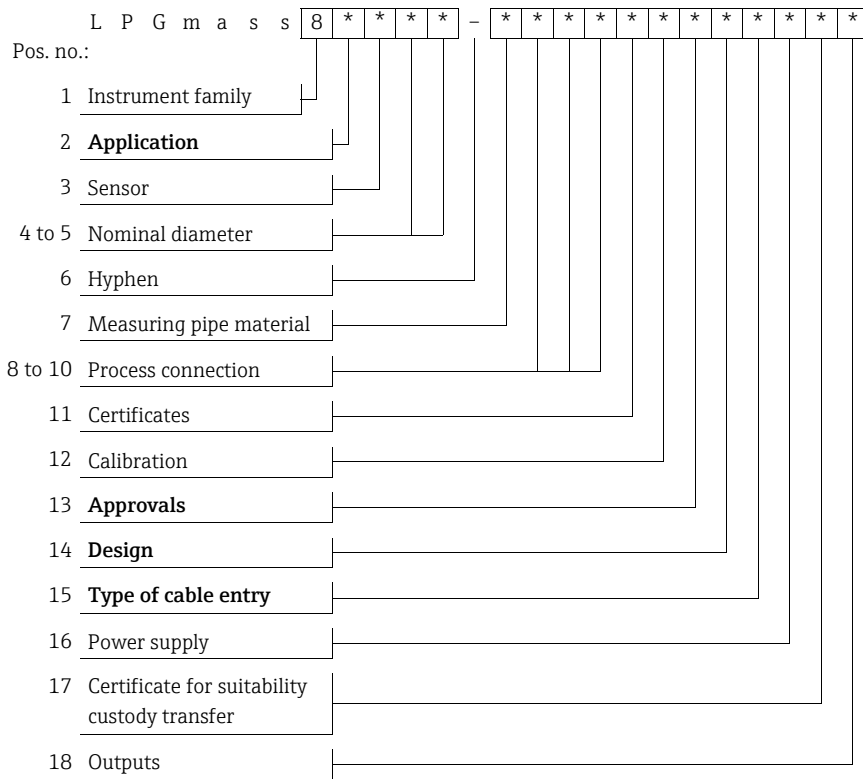
The measuring system consists of a transmitter and sensor which together form a mechanical unit.

**Order code**

The order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible.

Additional information on the nameplate is provided in the associated Operating Instructions.

Structure of the order code:



**Approvals (Pos. no. 13 in order code)**

| * | Type of explosion protection                                  |
|---|---|
| K | Ex db ia IIC T1...T6 Gb<br>Ex tb IIIC T85°C...T450°C Db       |
| L | Ex db eb ia mb IIC T1...T6 Gb<br>Ex tb IIIC T85°C...T450°C Db |

## General warnings

- For installation, use and maintenance of the flow meter, the instruction manual and the following standards shall be observed:
    - GB50257-2014 "Code for construction and acceptance of electric device for explosive 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"
    - GB15577-2018: Safety regulations for dust explosion prevention and protection". (Only if installed in dust hazardous areas)
    - GB/T 3836.18-2017 "Explosive atmospheres – Part 18: Intrinsically safe electrical systems".
  - Any maintenance shall be done after power off or the area known to be non-hazardous.
  - The flow meter shall not be modified in order to ensure the explosion protection performance of the equipment. Any change may impair safety.
  - Installation, connection to the electricity supply, commissioning and maintenance of the devices must be carried out by qualified specialists trained to work on Ex-rated devices.
  - Compliance with all of the technical data of the device (see nameplate) is mandatory.
  - Open the device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply) or when the atmosphere is not potentially explosive [or in non-hazardous (classified) locations].
  - Service adapter: do not connect in potentially explosive atmospheres.
  - Opening the transmitter housing is only permitted for a brief time. During this time, ensure that no dust or water enters the housing.
  - To guarantee resistance to dust and water, the transmitter housing and the cable entries must be tightly sealed.
  - Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.
  - The suitability of the device in the event of simultaneous occurrence of gas-air and dust-air mixtures requires an additional assessment.
  - Stainless steel label attached to the measuring device (optional): There is a risk of electrostatic charge on the label. This is caused, for example, by friction or cleaning.
    - Ensure that the label is grounded. Ensure that the capacitance to ground is < 30 pF.
- Or
- Protect the label against electrostatic charge.
  - Attach the following warning to the measuring device so that it is clearly visible: WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS.

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## Installation instructions

- The device must be integrated into the potential equalization system.
- For terminals No. 22 to No. 27 of the transmitter, only devices with ratings  $U_m \leq 253$  V and  $I_m \leq 1$  A are allowed to be connected.
- The measuring device must only be used in the permitted temperature class.  
The values of the individual temperature classes can be found in the temperature tables: → 4.  
For Zone 21:  
The surface temperature of the measuring device must not exceed 2/3 of the ignition temperature of a dust cloud. The maximum surface temperature must maintain a safe distance of 75 °C to the smolder temperature of a dust layer of 5 mm.  
Example:  
Operation in temperature class T4 (135 °C) is, therefore, suitable for dust with an ignition temperature of 202.5 °C ( $1.5 \cdot 135$  °C or  $135$  °C = 2/3 of 202.5 °C) and a smolder temperature of 210 °C ( $135$  °C + 75 °C).
- The following applies when using the terminal compartment in type of protection "flameproof/Ex d": Only cable entries and cable glands, which are approved by NEPSI in accordance with GB/T 3836.1-2021 and GB/T 3836.2-2021 and which are suitable for an operating temperature of up to 80 °C, they shall be used.

- The following applies when using the terminal compartment in type of protection "increased safety/Ex e": Only cable entries, cable glands and blanking plugs, which are approved by NEPSI in accordance with GB/T 3836.1-2021 and GB/T 3836.3-2021 and which are suitable for an operating temperature of up to 80 °C and for an ingress protection of IP 67, they shall be used.
- Suitable cables and suitable, certified cable glands, cable entries and blanking plugs must be used for measuring devices operated at temperatures below -20 °C.
- The cable entries and openings not used must be sealed tight with suitable components.
- A threaded pin prevents undesired movement of the transmitter housing. When the pin is released, the transmitter housing can be rotated continuously until an internal retaining ring comes to the stop. The threaded pin has to be retightened once the housing has been rotated. If the transmitter and sensor have to be separated for repair purposes, the retaining ring can be destroyed if considerable force is exerted. In such instances, a new, genuine Endress+Hauser retaining ring must be installed when reassembling. The threaded pin has to be retightened.

## Temperature table

Max. medium temperature [°C] for T1-T6 in relation to the maximum ambient temperature  $T_a$

|                   | DN<br>[mm]    | $T_a$<br>[°C] | T6<br>(85 °C) | T5<br>(100 °C) | T4<br>(135 °C) | T3<br>(200 °C) | T2<br>(300 °C) | T1<br>(450 °C) |
|-------------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|
| LPGmass 8FE**-... | 8, 15         | +45           | 45            | 95             | 125            | 125            | 125            | 125            |
|                   | 8, 15         | +50           | -             | 95             | 125            | 125            | 125            | 125            |
|                   | 25, 40, 50    |               | 50            | 95             | 125            | 125            | 125            | 125            |
|                   | 8, 15, 25, 40 | +60           | -             | 95             | 125            | 125            | 125            | 125            |
|                   | 50            |               | 60            | 95             | 125            | 125            | 125            | 125            |

The minimum **medium temperature** for LPGmass is -40 °C .

The minimum **ambient temperature**  $T_a$  for LPGmass is -40 °C .

## Gas and dust explosion protection

### Determining the temperature class and surface temperature with the temperature table

In the case of gas: Determine the temperature class as a function of the ambient temperature  $T_a$  and the medium temperature  $T_m$ .

In the case of dust: Determine the maximum surface temperature as a function of the maximum ambient temperature  $T_a$  and the maximum medium temperature  $T_m$ .

### Example of the maximum surface temperature for explosion hazards arising from dust

Device: LPGmass, compact version, DN 25

Maximum ambient temperature:  $T_a = 60$  °C

Maximum medium temperature:  $T_m = 98$  °C

|                   | DN<br>[mm]    | $T_a$<br>[°C] | T6<br>(85 °C) | T5<br>(100 °C) | T4<br>(135 °C) | T3<br>(200 °C) | T2<br>(300 °C) | T1<br>(450 °C) |
|-------------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|
| LPGmass 8FE**-... | 8, 15         | +45           | 45            | 95             | 125            | 125            | 125            | 125            |
|                   | 8, 15         | +50           | -             | 95             | 125            | 125            | 125            | 125            |
|                   | 25, 40        |               | 50            | 95             | 125            | 125            | 125            | 125            |
|                   | 8, 15, 25, 40 | +60           | -             | 95             | 125            | 125            | 125            | 125            |
|                   | 50            |               | 60            | 95             | 125            | 125            | 125            | 125            |

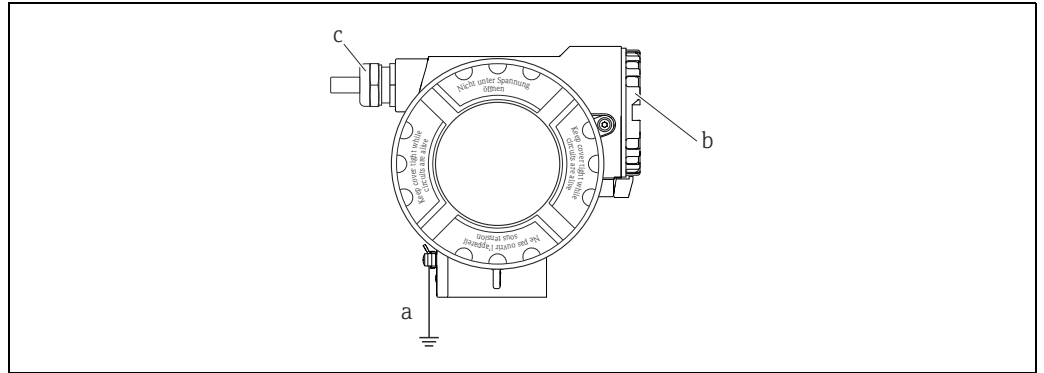
DN 25       $T_a = 60$  °C       $T_m = 98$  °C ( $\leq 125$  °C)

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Fig. 1: Procedure for calculating the max. surface temperature

1. Select the device (LPGmass), nominal diameter (DN 25) and ambient temperature  $T_a$  (60 °C) in the associated temperature table (compact version).
2. In the determined line, select the maximum medium temperature  $T_m$  (98 °C), which is smaller than or equal to the maximum medium temperature of a cell. The column with the temperature class for gas is determined (98 °C  $\leq$  125 °C  $\rightarrow$  T4).
3. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature:  $T_4 = 135$  °C = maximum surface temperature for dust.

## Design of measuring system



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Fig. 2: Design of the transmitter

- a Screw terminal for connecting to the potential equalization
- b Connection compartment cover
- c Cable entries (see chapter "Cable entries")

### Cable entries

- Cable entries for connection compartment (Ex d version): Power supply cable and cable of the communication circuit → choice of thread for cable entries M20, ½" NPT or G ½".  
Make sure that the Ex d cable glands/entries are secured to prevent working loose and that the seals are installed immediately adjacent to the housing.
- Cable entries for connection compartment (Ex e version): Power supply cable and cable of the communication circuit → cable glands M20 × 1.5 or choice of thread for cable entries M20, ½" NPT or G ½". The cables must be installed such that they are fixed in place. Adequate strain relief must be ensured.

⚠ Warning!

Cable glands and cable entries must be very leak-tight.

### Cable specification

You can find information about the cable specification in the associated Operating Instructions.

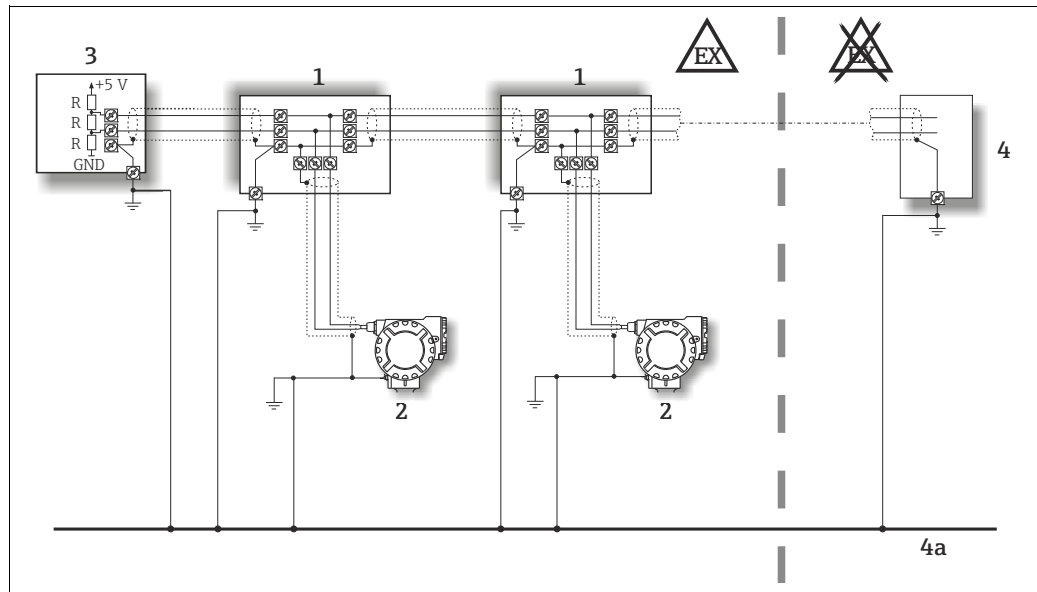
### Potential equalization

The transmitter is to be securely connected to the potential equalization system using the screw terminal on the outside of the transmitter housing. Alternatively, the transmitter of the compact version can be connected to the potential equalization system via the pipeline if a ground connection via the pipeline according to regulations can be assured.

📌 Note!

Further information about potential equalization, shielding and grounding can be found in the associated Operating Instructions.

Potential equalization with shield grounded at both sides for Modbus version



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Fig. 3: Example for connecting potential equalization lines

- 1 Distributor/T-Box
- 2 Bus devices for potentially explosive atmospheres
- 3 Bus terminator Modbus
- 4 Bus supply unit or automation system
- 4a Potential equalization line is fed out into the safe area

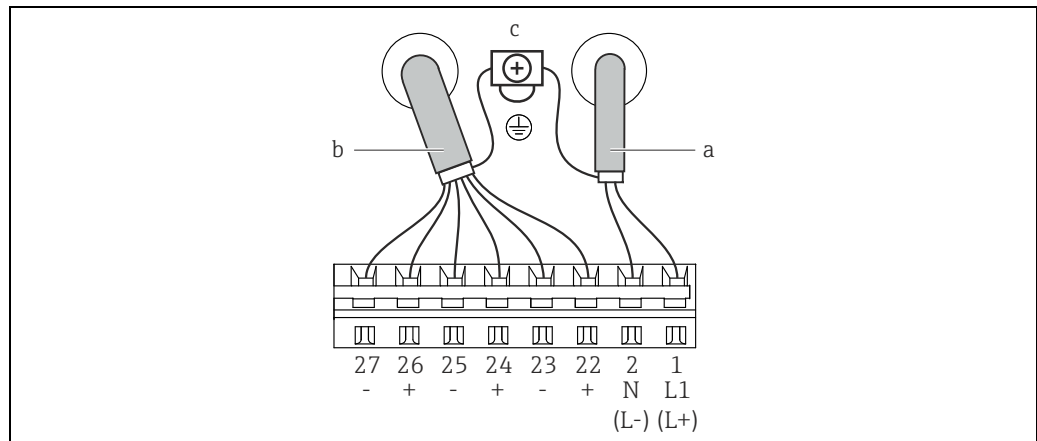
Note!

The length of the spur must be observed.

Electrical connection

Connection compartment

Transmitter housing (terminal assignment, connection data → 7 ff.)



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Fig. 4: Electrical connection

- a Power supply cable (terminal assignment and connection data see below)
- d Signal cable / RS485 line (terminal assignment and connection data → 7)
- e Ground terminal for protective ground, signal cable shield, RS485 line


**Terminal assignment and connection data, power supply**

**Terminal assignment and connection data**

| All transmitters           | 1 L (+)   | 2 N (-) | ⊕  |
|----------------------------|---|---------|--|
| Designation                | Supply voltage  |         | Protective earth                                       |
| Functional values          | AC: U = 20 to 28 V<br>DC: U = 10 to 30 V<br><br>Power consumption:<br>AC: < 4 VA<br>DC: < 3.2 W |         | Caution!<br>Observe the grounding plans of the system! |
| Intrinsically safe circuit | no  |         |  |
| U <sub>m</sub>             | 253 V AC  |         |  |

**Terminal assignment and connection data for signal circuits**

 Note!

The following tables contain values/specifications, which are dependent on the type code (type of measuring device). Please compare the following type code to the one shown on the nameplate of your measuring device. For a graphic representation of the electrical connections: →  6.

**Terminal assignment**

| Order characteristic "Outputs"   | Terminal no. (outputs)              |        |                                     |        |                                     |        |
|--|-------------------------------------|--------|-------------------------------------|--------|-------------------------------------|--------|
|  | 22 (+)                              | 23 (-) | 24 (+)                              | 25 (-) | 26 (+)                              | 27 (-) |
| <i>Non-convertible communication boards (fixed assignment)</i>   |                                     |        |                                     |        |                                     |        |
| N  | Pulse / Frequency / Status output 2 |        | Pulse / Frequency / Status output 1 |        | Modbus RS485 <sup>1)</sup><br>B   A |        |
| <sup>1)</sup> PROFIBUS DP, Modbus RS485:<br>- Terminal 26 (+) → B (Rx/D/TxD-P)<br>- Terminal 27 (-) → A (Rx/D/TxD-N) |                                     |        |                                     |        |                                     |        |

**Safety-related and functional values of signal circuits**

| Signal circuits        | Functional values   | Safety-related values   |
|------------------------|---|---|
| Pulse/frequency output | galvanically isolated<br>passive<br>30 V DC / 250 mA<br>Open Collector<br><br>Full scale frequency 100 to 5000 Hz | intrinsically safe = no<br>U <sub>m</sub> = 253 V<br>I <sub>m</sub> = 1 A |
| Status output          | galvanically isolated<br>passive<br>30 V DC / 250 mA<br>Open Collector  |   |
| Modbus RS485           | galvanically isolated,<br>RS485 as per Standard EIA/TIA-485   |   |

**Service adapter**

The service adapter is only used for connecting service interfaces approved by Endress+Hauser (e.g. FXA291).

 Warning!

Service adapter: do not connect in potentially explosive atmospheres.

**Technical Data**

**Dimensions**

The dimensions of the instruments for the hazardous area correspond to those in the Technical Information documentation.

**Weight**

The weight of the Ex d version is equivalent to the weight in the Technical Information documentation.

 Note!

Technical Information for LPGmass → TI00080D











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