



## H250 M10 Supplementary instructions

Ex supplementary instructions  
Equipment category II 3 D



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## 1.1 General notes

These additional instructions apply to explosion-protected versions of the H250/M10 variable area flowmeter with the designation II 3 D. They complement the Installation and Operating Instructions for the non-explosion protected versions.

The information given in these Instructions contains only the data relevant to Category 3 explosion protection. The technical details given in the Installation and Operation Instructions for the non-explosion protected versions apply unchanged unless excluded or superseded by these Instructions.

## 1.2 EC conformity

The manufacturer declares with the EC Declaration of Conformity on his own responsibility conformity with the protection goals of Directive 94/9/EC for use in hazardous areas with dust.

The assessment was made according to Directive 94/9/EC, Annex VIII (module "Internal production control"), and is registered in-house under

**KMT-TDZ-A081**

This registration is also provided on the nameplate.

## 1.3 Safety instructions

Assembly, installation, start-up and maintenance may only be performed by personnel trained in explosion protection!



**CAUTION!**

*The operator respectively his agent is responsible to follow further standards, directives or laws if required due to operating conditions or place of installation. This applies particularly for the use of easy detachable process connections such as SMS or Clamp when measuring flammable mediums.*

## 2.1 Device description

Variable area flowmeters measure and display the volume flow of flammable and non-flammable gases and liquids. The display unit contains a 4...20 mA signal output with optional HART® communication, two programmable electronic switch outputs and a reset input.

## 2.2 Description code

The safety description code \* consists of the following elements:

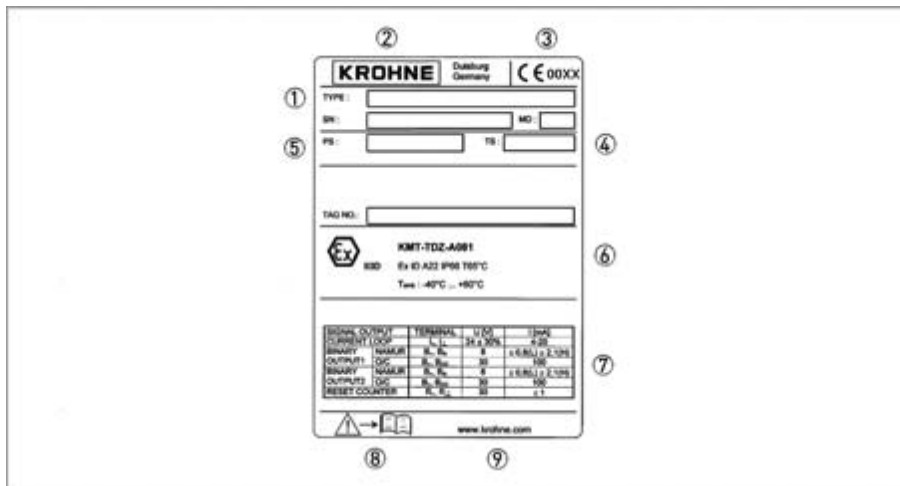


- ① Materials / versions
  - RR - Stainless Steel
  - C - PTFE or PTFE/ceramics
  - HC - Hastelloy
  - Ti - Titanium
  - F - aseptic version (food)
- ② Series of indicators
  - M10 - Converter M10

\* positions which are not needed are omitted (no blank positions)

## 2.3 Marking

The marking of the entire device is on the display, where the following identification plate can be found.



- ① Device type according to description code
- ② Manufacturer
- ③ Identification number of the notified body, Pressure Equipment Directive [PED]
- ④ Sizing data: temperature & pressure rating
- ⑤ PED data
- ⑥ Ex data
- ⑦ Electrical connection data
- ⑧ Note manual
- ⑨ KROHNE website

### Additional markings on the device:

- SN - serial number
- SO - sales order / item
- PA - KROHNE order
- Vxxx - product configurator code
- AC - article code

## 2.4 Flammable products

### Atmospheric conditions

An explosive atmosphere is a mixture of air and flammable gases, vapours, mists or dusts under atmospheric conditions. The following values define it:

$T_{\text{atm}} = -20\dots+60^{\circ}\text{C} / -4\dots+140^{\circ}\text{F}$  and  $P_{\text{atm}} = 0.8\dots1.1 \text{ bar}$ .

Outside of this range, no key data are available as to ignition behaviour for most mixtures.

### Operating conditions

Variable area flowmeters operate outside of atmospheric conditions, which means that explosion protection according to Directive 94/9/EC (ATEX) – regardless of the zone assignment – is fundamentally not applicable due to the lack of key safety data for the interior of the measuring section.



### CAUTION!

*Operation with flammable products is only permitted as long as no explosive fuel/air mixture builds up on the inside of the flowmeter under operating conditions. The operator is responsible for ensuring that the flowmeter is operated safely as regards the temperature and pressure of the products used. In case of operation with flammable products the measuring units must be included in the periodic pressure tests of the system. When using the device version H250/C... (PTFE-liner, nonconductive) the min. conductivity of the medium must be  $10^{-8} \text{ S/m}$ , in order to avoid the electrostatic charge.*

## 2.5 Equipment category

The flowmeters are designed in category II 3D according to EN61241-0:2006 and EN 61241-1:2004 for use in zone 22.

## 2.6 Protection types

The variable area flowmeter is designed with protection type "Protection by enclosure" according to EN 61241-1:2004. Dust protection is guaranteed by the use of a housing which provides appropriate protection against penetration by dust.

The marking is: **II 3 D Ex tD A22 IP66 T65°C**

The marking contains the following information:

The marking contains the following information:	
<b>II</b>	Group II explosion protection
<b>3</b>	Equipment category 3
<b>D</b>	Dust explosion protection
<b>tD</b>	Protection by enclosures
<b>A22</b>	Surface temperature according to method A, use in zone 22
<b>IP66</b>	Foreign bodies and water pollution control
<b>T65°C</b>	Maximum surface temperature of the converter housing without dust coating at ambient temperature $60^{\circ}\text{C} / 140^{\circ}\text{F}$ and product temperature $60^{\circ}\text{C} / 140^{\circ}\text{F}$

## 2.7 Ambient temperature / temperature classes

Because of the influence of the temperature of the product, no fixed temperature class is assigned to variable area flowmeters. In fact, the temperature class of a device is a function of the temperature of both the product and the environment. The classification is outlined in the following tables.

The tables take into account the following parameters:

- Ambient temperature  $T_{amb}$ .
- Product temperature  $T_m$
- Nominal DN
- Heat resistance of the connecting cable



### INFORMATION!

*The maximum permissible product temperatures listed in the tables are valid under the following conditions:*

- *The measuring device is installed and operated in accordance with the installation instructions in the installation and operating manual.*
- *It must be ensured that the flowmeter is not heated by the effects of additional heat radiation (sunshine, neighbouring system components) and thus operated above the permissible ambient temperature range.*
- *Insulation must be limited to the piping. Unobstructed ventilation of the indicator part must be ensured.*

For certain device version, lower values apply due to differing boundary conditions (e.g. lining materials).

Here the user should consult the technical data sheet.

### Maximum permitted product temperature °C

Maximum permitted product temperature $T_m$ (°C) as a function of the maximum continuous operating temperature of the cable $T_{max}$			
Ambient temp.	Cable $T_{max} = 70^\circ\text{C}$	$T_{max} = 80^\circ\text{C}$	Cable $T_{max} = 90^\circ\text{C}$
-40...+40	180	200	200
-40...+50	135	190	200
-40...+60	85	145	200

### Maximum permitted product temperature °F

Maximum permitted product temperature $T_m$ (°F) as a function of the maximum continuous operating temperature of the cable $T_{max}$			
Ambient temp.	Cable $T_{max} = 158^\circ\text{F}$	Cable $T_{max} = 176^\circ\text{F}$	Cable $T_{max} = 194^\circ\text{F}$
-40...+104	356	392	392
-40...+122	275	374	392
-40...+140	185	293	392

For use in areas with flammable dust it should be noted that the indicated maximum surface temperature of T65°C at an ambient temperature of 60°C / 140°F and a product temperature of 60°C / 140°F is valid without a dust coating. For higher product temperatures the maximum surface temperature is determined by the product.

## 2.8 Electrical data

Circuit	Rated voltage	Nominal current
Optional switching outputs	NAMUR 8V DC	1mA - 3mA
	Open-collector-PNP 24V DC $\pm$ 25%	1mA - 100mA
Current output 4-20 mA	24V DC $\pm$ 25%	4mA - 20mA with HART communication
Reset input	9V DC - 30V DC	< 2mA

The insulation of the flowmeter is measured according to EN 61010-1:2001. The following ratings are taken into account:

- Overvoltage category II
- Pollution degree 2 (inside device on printed circuit boards)



## 3.1 Installation

Installation and setup must be carried out according to the applicable installation standards (e.g. EN 60079-14) by qualified personnel trained in explosion protection. The information given in the Installation and Operation Instructions and the Supplementary Installation and Operation Instructions must always be observed.

### Variable area flowmeters must be installed in such a way that

- There is no danger from mechanical impact effects.
- There are no external forces affecting the indicator part.
- The device is accessible for any visual inspections that are necessary, and can be viewed from all sides.
- The nameplate is clearly visible.
- It can be operated from a location with secure footing.



### **CAUTION!**

*The manufacturer is not liable for any damage resulting from improper use or use other than the intended purpose. This applies in particular to hazards due to insufficient corrosion resistance and suitability of the materials in contact with product.*

## 3.2 Special Conditions

### Cable entries / Blanking plugs

The variable area flowmeter is optionally equipped with one conduit entry and one blind plug or two conduit entries. These elements ensure protection against foreign bodies and water (protection category) IP66 according to EN 60529 in the temperature range of  $T_{amb} = -40^{\circ}\text{C} \dots +100^{\circ}\text{C} / -40 \dots +212^{\circ}\text{F}$ . The conduit entries are sealed with a plug. The plugs should be replaced with suitable connecting cables. The nominal diameter range of the conduit entries is marked on the plugs.

### A choice of the following nominal diameters is available:

- Plugs with marking 13,5: Nominal diameter 6...12 mm / 0.24...0.47 inch
- Plugs with marking 16: Nominal diameter 10...14 mm / 0.39...0.55 inch

### Electronics compartment lock

Close the variable area flowmeter during operation. The cover for the electronics compartment is secured by means of a lock. Use an SW3 Allen key to turn the screw.

## 4.1 General notes

The signal circuits are electrically connected in the built-in terminal compartment of the signal converter.

Unused conduit entries should be closed using approved blind plugs and seals. Ensure that the seals are tight.

The connecting cables should be selected according to the applicable installation standards (e.g. EN 60079-14) and the maximum operating temperature. The outside diameter of the connecting cables must be matched to the sealing area of the conduit entry/entries. The connecting cables must be fixed and laid in such a way as to be sufficiently protected against damage.

Before connecting or disconnecting the electric connecting cable of the device, ensure that all of the cables leading to the signal converter are de-energised relative to each other and to the reference potential of the hazardous area. This also applies to earthing conductors (FE) and equipotential bonding conductors (PA).

All cores that are not used must be securely connected to the earth potential of the hazardous area or carefully insulated against each other and against ground (test voltage  $\geq 500 V_{\text{eff}}$ ).

## 4.2 Power supply

The variable area flowmeter does not require any separate power supply. The required supply for the built-in electronics is provided via the 4...20mA current output.

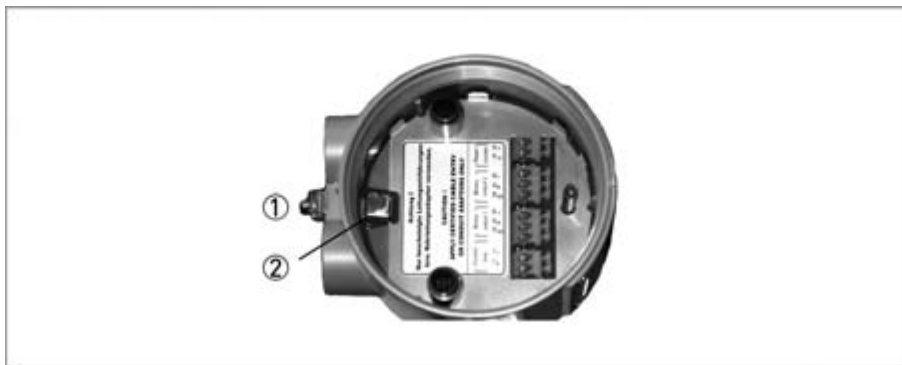
## 4.3 Inputs / outputs

The signal circuits of the variable area flowmeter may only be connected to downstream devices or circuits that satisfy the requirements of protective extra-low voltage (PELV). The terminal assignment of the equipment is described in the standard installation and operating instructions.

## 4.4 Earthing and equipotential bonding

The signal converter shall be connected to the equipotential bonding system of the hazardous area via the external grounding connection on the signal converter housing. The measuring unit and the signal converter are electrically connected via an equipotential bonding conductor.

Any existing cable shields should be connected to earth according to applicable installation regulations (EN 60079-14). A terminal connection in the terminal compartment permits a short way earthing of the cable shields.



- ① External grounding connection
- ② Internal grounding connection

## 5.1 Start-up

**Start-up is only permitted when the variable area flowmeter:**

- is correctly installed in the system and connected.
- has been checked for the proper state with regard to its installation and connection requirements.

The user of the system must have it checked before start-up in compliance with the national regulations for checks before startup.

If the device needs to be configured due to the existence of an explosive dust atmosphere, this can be done using the supplied programming magnets. There is no need to open the housing as it can be done through the glass window of the electronics compartment or digitally via the signal output (HART interface).

## 5.2 Operation

Variable area flowmeters must be operated in such a way that they remain within the maximum and minimum permissible temperatures and pressures and the electrical limit values.

Variable area flowmeters may only be operated if the equipment parts necessary for safety are effective in the long run, and are not rendered inoperable during operation.

During operation it is only permitted to open the indicator if no explosive atmosphere is present.

## 5.3 Electrostatic charge

**In order to avoid ignition hazards due to electrostatic charge, variable area flowmeters may not be used in areas where the following appear:**

- processes that generate large charges,
- machines with friction and cutting processes,
- spraying of electrons (e.g. in the vicinity of electrostatic painting systems),
- dust carried by compressed air.

## 6.1 Maintenance

Maintenance work of a safety-relevant nature within the meaning of explosion protection may only be carried out by the manufacturer, his authorised representative or under the supervision of authorised inspectors.

For systems in hazardous areas, regular tests are required in order to maintain the proper condition.

**The following checks are recommended:**

- Checking the housing, the cable entries and the feed lines for corrosion and/or damage.
- Checking the measuring unit and the piping connections for leakage.
- Checking the measuring unit and the indicator for dust deposits.

Following any maintenance work on the converter, re-grease the cover thread including the cover seals with a non resinous, acid-free, all purpose grease.

## 6.2 Dismantling

### Exchanging the built-in equipment

Due to the modular design of the variable area flowmeter, it is possible to replace a complete signal converter and display with an identical spare part in accordance with safety guidelines.



**CAUTION!**

*There may be a loss of measuring accuracy!*

### Exchanging the entire device

Removal and installation are the responsibility of the operator.

Before disconnecting the electric connecting cable of the device, make sure that all cables leading to the indication unit are isolated from the ground of the hazardous area. This also applies to functional earthing conductors (FE) and equipotential bonding conductors (PA).

Faulty prisms (spacers) between the measuring tube and the display housing should be replaced.



**CAUTION!**

- *Pressurized pipes have to be depressurized before removing the measuring unit.*
- *In the case of environmentally critical or hazardous products, appropriate safety precautions must be taken with regard to residual liquids in the measuring unit.*
- *New gaskets have to be used when re-installing the device in the piping.*





### KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Measuring systems for the oil and gas industry
- Measuring systems for sea-going tankers

Head Office KROHNE Messtechnik GmbH  
Ludwig-Krohne-Str. 5  
D-47058 Duisburg (Germany)  
Tel.:+49 (0)203 301 0  
Fax:+49 (0)203 301 10389  
info@krohne.de

The current list of all KROHNE contacts and addresses can be found at:  
[www.krohne.com](http://www.krohne.com)

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