Supplementary Installation and Operating Instructions
Variable-Area Flowmeter
H250/M10
Dust explosion protected
version Category II3D

Variable area flowmeters
Vortex flowmeters
Flow controllers
Electromagnetic flowmeters
Ultrasonic flowmeters
Mass flowmeters
Level measuring instruments
Communications technology
Engineering systems & solutions
Switches, counters, displays and recorders
Heat metering
Pressure and temperature
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1 General safety information

These additional Instructions apply to the dust explosion protected versions of H250/M10 with the category II3D. They are supplementary to the Installation and Operating Instructions for the non-dust-explosion protected versions Ident. No.: 702280##00.

The information given in these Instructions contains only the data relevant to Category II3D explosion protection. The technical details given in the Installation and Operating Instructions for the nonhazardous-duty versions apply unchanged unless excluded or superseded by these Instructions.

The Variable-Area Flowmeter H250/M10 with Cat. II3D in compliance with European Directive 94/9/EG (ATEX 100a) and in conformity with European Standard EN 50281-1-1:1998 for use in dust-explosion locations zone 22 is approved by the manufacturer.

This statement of conformity, together with its boundary conditions, is required to be observed without fail (see Attachment A.1 “Statement of Conformity”).

Note!

- Mounting, installation, start-up and maintenance work may only be carried out by personnel trained in explosion protection!
- Repair, which is safety-relevant in the sense of explosion prevention, is only allowed by the manufacturer, its assigned one or under of supervision from experts.
- Dust explosion-protected instruments with Cat. II2D to EN 50281 -1 -2: 1998 Paragraph 5 may not be used in locations with conductive dust.
- For processes involving combustible and highly flammable products in Cat. II3D are not allowed.
2 Description code

The safety-relevant Description code is made up of the following elements: *)

\[
\begin{array}{c|c|c}
1 & 2 & 3 \\
\hline
\ H \ 2 \ 5 \ 0 \ & / & / \ M \ 1 \ 0 \\
\end{array}
\]

1 : Series measuring unit
   H54 : Unit H54
   H250 : Unit H250

2 : Material / versions
   RR : stainless steel
   C : stainless steel with PTFE liner (H250: PTFE / ceramic)
   HC : Hastelloy (H250 only)
   Ti : Titan (H250 only)
   F : aseptic version (Food) (H250 only)

3 : Indicator / transmitter M10

*) Positions which are not used in the type code are not required.

3 Main safety-relevant characteristics

The H.../.../M10 in Cat. II3D variable-area flowmeter consists of a combination of signal converter and measuring tube. The main characteristics of the explosion protected version are described below.

3.1 Process products
Flammable products are allowed provided they are not present in potentially explosive form.

3.2 Category / Zone allocation
The H.../.../M10 variable-area flowmeter in Cat. II3D is basically designed for use in Zone 22 acc. to EN 50281-1-1:1998.

3.3 Type of protection and marking
The H.../.../M10 variable-area flowmeter in Cat. II3D has a type of protection „Protection by housing“ to EN 50281-1-1:1998 and bears the following marking::

II3D IP65 T65°C

The marking consists of following specifications:

II General explosion protection
3 Device category 3
D Dust explosion protection
IP65 Contaminat and water protection
T65°C Max. surface temperature of the housing without dust contamination at ambient temperature of 60°C and process temperature of 60°C (other process temperatures see section 3.8)
3.4 Special lock
The sealing covers of the electronics compartment are secured by a special lock. The locking screw requires use of an Allen key (3 mm size).

3.5 Cable entries / sealing plugs
The H.../.../M10 variable-area flowmeter with Cat. II3D is provided alternatively with one or two cable entries. These parts provide for a contaminant and water protection (degree of protection) of IP65 acc. to EN 60529, NEMA 4x at a temperature range of \( T_{\text{amb}} = -40^\circ\text{C} \) to +60°C. The nominal size of the cable entries is 6...12mm.

3.6 Power supply
The H.../.../M10 variable-area flowmeter with Cat. II3D do not require any separate power source. The necessary supply is obtained via the current output 4 ... 20 mA.

3.7 I/O functions
When connecting the I/O interfaces of the H.../.../M10-EEEx variable-area flowmeters, the following values need to be taken into account.

<table>
<thead>
<tr>
<th>I/O function (1)</th>
<th>Nominal values of the non-certified receiver instrument</th>
<th>Added restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>See Standard Installation and Operating Instructions</td>
<td>See Standard Installation and Operating Instructions</td>
<td>Supply power for receiver instruments max. 253V</td>
</tr>
</tbody>
</table>

(1) Only for connection to circuits with “functional extra-low voltage with protective separation (PELV)”

Peak values \( U_{\text{AC}} \leq 25\text{V} \); \( U_{\text{DC}} \leq 60\text{V} \)

3.8 Ambient temperature / Process temperature
The permissible ambient temperature for the variable-area flowmeters H.../.../M10 with Cat. II3D is limited to a value of \( T_{\text{amb}} = -40^\circ\text{C} \) to +60 °C (-40°F ... +140°F). For restricted values see standard Installation and Operating Instruction.

With regard to maximum surface temperatures, variable-area flowmeters are exposed to three heat sources:
- Ambient temperature \( T_{\text{amb}} \)
- Electric power loss \( P_v \)
- Process temperature \( T_m \)

Accordingly, at a given maximum ambient temperature and a given maximum power loss, we obtain maximum surface temperatures as a factor of the process temperature.

The H.../.../M10 variable-area flowmeter with Cat. II3D in the dust explosion protected version the categorization T65 correspond to a max. ambient and process temperature of 60°C (140°F). (Max. surface temperature without dust contamination).

For other ambient and process temperatures use the following formula:

\[
T_o = T_{\text{amb}} + 0,2 (T_m - T_{\text{amb}}) +5K \quad \text{(T in °C)}
\]

Apart from the based parameters, the measurement part of the device defines at least the max. surface temperature of the flowmeter.

The permissible max. surface temperature is also defined by the inflammation and glowing combustion temperature.

Please refer also to EN 50281-1-2, Paragraph 6 (Temperature limitation).
Dependent to the max. operating temperature of the cable, the process temperatures are:

<table>
<thead>
<tr>
<th>Ambient temperature in °C</th>
<th>Max. permissible process permanent temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wiring 70°C / 158°F</td>
</tr>
<tr>
<td>°C</td>
<td>°F</td>
</tr>
<tr>
<td>-40 ... +40</td>
<td>180</td>
</tr>
<tr>
<td>-40 ... +50</td>
<td>135</td>
</tr>
<tr>
<td>-40 ... +60</td>
<td>85</td>
</tr>
</tbody>
</table>

Max. permissible process temperature

*The cable glands and line entries must have the same degree of thermal stability as the connecting cable.*

### 4 Marking

The H.../..../M10 with Cat. II3D variable-area flowmeter are identified by an adhesive label or metal plate attached to the signal converter. The description code is explained in Section 2.

**Manufacturer**  
**Year of manuf.**

![Diagram of H250/..../M10 with Cat. II3D variable-area flowmeter](image)

**Note:** The values marked with xxx vary with the different versions of the H250/..../M10. Each particular label shows these values.
5 Mounting and installation

Mounting and installation is to be carried out acc. to EN 50281-1-2:1998 by specialist personnel trained in explosion protection.

The information given in the standard Installation and Operating Instructions, the Supplementary Installation and Operating Instructions and also in the EC Type Examination Certificate (see Attachment A.1) must be observed without fail.

Verify that the H.../..../M10 with Cat. II3D variable-area flowmeter is suitable for the application in question by comparing the details on the nameplate with those in Section 3.2 (Categories / Zone allocation), Section 2 (Description code) and Section 4 (Marking).

When installing, please pay special attention to the following points.

5.1 Electrical connection

5.1.1 Insulation rating

The insulation of variable-area flowmeters H.../..../M10 - EEx is rated in conformity with EN 61010-1:2001 and takes into account the following ratings:

- Overvoltage category for signalling and measurement circuits: II
- Insulation contamination level: 2

5.1.2 Terminal compartment

The electrical connection of the power supply and I/O functions is made in the integrated terminal compartment of the signal converter.

5.1.3 Connecting cables

The connecting cables shall be selected in keeping with the valid installation standards and the max. process temperature (see table section 3.8) . The outside diameter of the cable(s) must match the cable clamping area for the cable entries.

5.1.4 Connection of power and I/O function

- Before connecting or disconnecting the electrical interconnecting cables of the device, make sure that all cables leading to the signal converter are isolated from the ground (reference potential) of the hazardous area. This also applies to safety conductors (PE) and equipotential bonding conductors (PA).

- All cores and shields of the connecting cables not safety-connected to the equipotential bonding system for the hazardous area should be carefully insulated from each other and from ground (test voltage 500V_{rms} for conductors of non-intrinsically safe cables).
5.1.5 Electrical grounding

- The signal converter must be incorporated in the equipotential bonding system of the hazardous location. The cable is to be connected to the outer press-fitted U-clamp terminal of the converter housing.

- Connect the shields by the shortest possible route to the press-fitted U-clamp terminal (PE) in the terminal compartment. If shields are to be grounded at both ends (e.g. for EMC reasons), adequate equipotential bonding is required between the two shield ends to avoid unacceptable equalizing currents.

5.1.6 Terminal assignment

The terminal assignment is listed in the following table:

<table>
<thead>
<tr>
<th>Function</th>
<th>Terminal designation (see sketch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current output HART (current loop)</td>
<td>I+ I-</td>
</tr>
<tr>
<td>Status output (1) (binary output 1)</td>
<td>NAMUR B+ B_N</td>
</tr>
<tr>
<td>Status output (2) (binary output 2)</td>
<td>O/C-PNP B+ B_OC</td>
</tr>
<tr>
<td>Status input (reset counter)</td>
<td>R+ R-</td>
</tr>
</tbody>
</table>

Note the electrical data of the circuits given in Section 3.7. Even when operated in the nonhazardous location, the requirements pertaining to the signal output circuits need to be met.
6 Initial startup

Check the following points before initial startup:

- Suitability of the materials used for the measuring tube and gaskets for adequate resistance to corrosion through the process product.
- Compare the data on the nameplate on the signal converter with the existing operating data.
- Check that the measuring tube has been correctly installed in the pipeline.
- Check that the equipotential bonding system is properly connected.
- Check correct connection of the power cables.
- Check that the cover(s) of the electronics compartment is firmly in place, that the special lock is tightened down.

7 Operation

- It is not permitted to open the cover of the electronics compartment during operation and in the presence of an explosive dust atmosphere.
- Should parameterization of the device become necessary in the presence of an explosive dust atmosphere, this can be done by applying the supplied programming bar magnet to the glass window of the electronics compartment, without opening the housing, or digitally by way of the signal output (HART interface).

8 Preventive maintenance

8.1 Maintenance

The signal converter does not require any maintenance under normal operating conditions and when used for the intended purpose. Within the scope of checks required to be carried out in hazardous locations to maintain systems in proper working order, the following visual inspections should be carried out at regular intervals:

- Inspection of the housing, cable entries and incoming cables for signs of corrosion and damage.
- Check of pipe connections for leakages.
- After any maintenance work has been carried out, be sure to regrease the thread of the flameproof cover of the signal converter, including cover gaskets, with a resin-free and acid-free all-purpose grease.

8.2 Dismantling

8.2.1 General

Before connecting or disconnecting the device interconnecting cables, make sure that all cables leading into the signal converter are isolated from the ground (reference potential) of the hazardous location. This also applies to safety conductors (PE), functional ground (FE) and the equipotential bonding conductor (PA).
8.2.2 Replacement of signal converter / display
Disconnect the device from supply before opening the Flameproof Enclosure. Be sure to follow the procedure described in Section 8.2.1.

Note: Only same-type displays and complete converter housings may be replaced. Individual device inserts may not be replaced! Compare nameplates when replacing the signal converter. Only same-type signal converters to be replaced.

The display can be replaced after opening the Flameproof Enclosure of the electronics compartment. To replace a complete display, take note of the information given in Section 5.1.4.

The measuring tube of the variable-area flowmeter can in both cases remain in the pipeline, also when product is flowing.

Note: Always renew defective fastening clips (prisms) between measuring tube and display housing.

8.2.3 Replacement of complete device
Please refer to Sections 8.2.1 and 8.2.2. In addition, make sure that all process connections and the pipeline are non-pressurized and free of product. In the case of environmentally critical substances, carefully decontaminate the wetted parts of the flange system after dismantling.
DECLARATION OF CONFORMITY

KROHNE Messtechnik GmbH & Co. KG, Ludwig-Krohne-Str. 5, D-47058 Duisburg Germany

We declare herewith under sole responsibility that the product(s):
Wir erklären hiermit unter alleiniger Verantwortung, dass das Produkt / die Produkte:
Nous déclarons sous notre seule responsabilité que le(s) produit(s):

H250 / RR / M10

Variable Area Flowmeters complies with the directive on devices and protective systems designated for use in areas subject to explosion hazards:
Schwebekörper-Durchflussmessgeräte der Richtlinie über Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen entspricht:
Débitmètre à Section Variable est en accord avec la directive sur les instruments et systèmes protectifs conçus pour l'utilisation dans des endroit à risques d'explosion:

Directive 94/9/EG

The stipulated safety and public health safety requirements are fulfilled in accordance with:
Die grundlegenden Sicherheits- und Gesundheitsschutz werden erfüllt durch Übereinstimmung mit:
Les obligations à l'encontre de la sécurité et de la santé publique sont remplis en accord avec:

EN 50281-1-1 : 1998

The equipment type plates contain the following:
Die Kennzeichnung des Gerätes enthält folgende Angaben:
L’inscription de type de l’équipement contient des informations suivantes:

Ex II 3 D IP65 T65°C

Duisburg, den 05.04.2004

Michael Dudlick
Central Management

DOC-ID1-002