Mechanical Flow Controller

Supplementary Instructions for ATEX applications
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## 6 Notes


1.1 Scope

These instructions are applicable only to devices that have one of the two application options for use in hazardous areas (intrinsically-safe and explosion-proof devices). For all other data, use the Quick Start and Handbook for the DW 18 series flow switch. If you do not have these documents, please contact the nearest sales office or download them from the website www.krohne.com.

**WARNING!**
Installation, commissioning and maintenance may only be carried out by "Personnel trained in explosion protection".

**INFORMATION!**
The information in this ATEX supplement only contains the data applicable to explosion protection. The technical data in the installation and operating manual for the non-Ex version shall be valid in its current version, provided that they are not rendered invalid or are replaced by this ATEX supplement.

1.2 Device description

DW 181 - 184 flow switches are mechanical devices that use a hinged, spring-loaded metal disc to measure the flow rate of homogenous, clean liquids. Adjustable switches in the device operate an alarm when you have the correct flow rate or velocity.

Several variants (DW181, DW182 etc.) are available for a wide range of pipe diameters. Each variant has display and application options.

The flow switch is approved for use in potentially explosive atmospheres when equipped with the appropriate options.

1.3 Standards and approvals

**EX**
In compliance with European Directive 94/9/EC (ATEX 100a), the ATEX version of the device described in these Supplementary Instructions conforms to European Standards EN 60079-0:2009, EN 60079-1:2007, EN 60079-11:2007, prEN 60079-11:2011, EN 60079-31:2009, EN 13463-1:2009 and EN 13463-5:2004. The Ex ia, Ex d and Ex c versions are certified for use in hazardous areas by INERIS under INERIS 03ATEX0045 X.

**WARNING!**
Carefully read the ATEX approval certificate. Obey the boundary conditions.

The certificate is given on the CD-ROM supplied with the device. You can also download the certificate from our internet site.
1.4 Device categories

1.4.1 Ex c-approved devices

The Ex c-approved device does not have a switch option. It only has an indicator.

The Ex c-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Apparatus Group IIC. It is certified for applications requiring Category 1 G (gases, vapours or mists) or 1 D (dust) equipment when fitted with the appropriate options.

1.4.2 Ex ia-approved devices

Ex ia-approved devices have these switch options:

- K1 (1 × N/C [normally closed] switch or 1 × N/O [normally open] switch)
- K2 (2 × N/C switches or 2 × N/O switches)
- K2 (1 × N/C and 1 × N/O switches or 1 × N/O and 1 × N/C switches)
- K1 changeover (1 × 3-wire SPDT switch)
- K2 changeover (2 × 3-wire SPDT switches)

The Ex ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Apparatus Groups IIC and IIIC. It is certified for applications requiring Category 1 G (gases, vapours or mists), or 1 D (dust) equipment when fitted with the appropriate options.

INFORMATION!
The mechanical part of the assembly is Ex c-approved.

1.4.3 Ex d- / Ex tb-approved devices

Ex d- / Ex tb-approved devices have these switch options:

- K1 (1 × N/C switch)
- K1 (1 × N/O switch)
- KV1 (1 × N/O switch with relay)

The Ex d- and Ex tb-approved devices are suitable for use in potentially explosive atmospheres of all flammable substances in Apparatus Groups IIC and IIIC. It is certified for applications requiring Category 1/2 G (gases, vapours or mists) or 1/2 D (dust) equipment when fitted with the appropriate options.

INFORMATION!
The mechanical part of the assembly is Ex c-approved.
1.4.4 Definitions of device categories

**Category 1**
The device is installed in hazardous areas requiring Category 1 G or 1 D equipment.

**Category 1/2**
The switch housing is installed in hazardous areas requiring Category 2 G or 2 D equipment. The measuring tube is installed in hazardous areas requiring Category 1 G or 1 D equipment.

1.5 Equipment protection levels (EPL)

1.5.1 Ex ia-approved devices

The Ex ia-approved device is certified for applications for which an EPL of Ga or Da is necessary.

1.5.2 Ex d- / Ex tb-approved devices

The Ex d-approved device is suitable is certified for applications for which an EPL of Gb or Db is necessary.

1.5.3 Definitions of equipment protection levels

**EPL Ga or Da**
The device is installed in hazardous areas that must have equipment with a very high level of protection. The device is not a source of ignition in usual conditions of operation or when possible or unusual faults occur.

**EPL Gb or Db**
The device is installed in hazardous areas that must have equipment with a high level of protection. The device is not a source of ignition in usual conditions of operation or when possible faults occur. It is possible that this does not include frequent faults.

1.6 Nameplates

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.
1.6.1 ATEX nameplates

Figure 1-1: Ex c nameplate

① ATEX certification agency code
② Year made
③ Gas group, equipment approval category [explosive atmosphere - gas or dust], types of device protection, temperature classes [T6...T3], maximum surface temperature and degree of ingress protection (if fitted with the appropriate cable glands)

Figure 1-2: Ex ia nameplate

① ATEX certification agency code
② Year made
③ Gas group, equipment approval category [explosive atmosphere - gas], types of device protection including apparatus groups, temperature classes [T6...T3] and equipment protection level
④ Gas group, equipment category [explosive atmosphere - dust], types of device protection including apparatus groups, maximum surface temperature, equipment protection level and degree of ingress protection (if fitted with the appropriate cable glands)
⑤ Mechanical parts only: Gas group, equipment approval category [explosive atmosphere - gas or dust], types of device protection, temperature classes [T6...T3], maximum surface temperature and degree of ingress protection (if fitted with the appropriate cable glands)
⑥ Maximum intrinsically-safe values for the electrical circuit
⑦ Electrical schematic [type of switch, number of switches and switch position]

INFORMATION!

Cable entry data for Ex i-approved devices is given on the standard device nameplate.
Cable entry options: PG13.5, M20×1.5 or ½ NPT
Figure 1-3: Ex d nameplate

1. Limit switch code
2. Year made
3. ATEX certification agency code
4. Gas group, equipment approval category (explosive atmosphere - gas), types of device protection including apparatus groups, temperature classes (T6...T3) and equipment protection level
5. Gas group, equipment category (explosive atmosphere - dust), types of device protection including apparatus groups, maximum surface temperature, equipment protection level and degree of ingress protection [if fitted with the appropriate cable glands]
6. **Mechanical parts only:** Gas group, equipment approval category (explosive atmosphere - gas or dust), types of device protection, temperature classes (T6...T3), maximum surface temperature and degree of ingress protection [if fitted with the appropriate cable glands]
7. Factory order number
8. Maximum switching capacity
9. Electrical schematic [type of switch, number of switches and switch position]
10. Cable entry type and size [Cable entry options: M20×1.5 or ¾ NPT]
1.6.2 Other labels

ESD warning sticker

Figure 1-4: ESD warning sticker (below the device nameplate)
① Text: Plastic Parts  
② Text: Warning! Potential electrostatic hazard - see instructions

For more data, refer to Special conditions for safe use on page 9.

Warning sticker for Ex d-approved devices

Figure 1-5: Warning sticker for Ex d-approved devices
① Text (in French and English): Warning - Do not open while energized

For more data, refer to Ex d / Ex tb equipment on page 13.
2.1 Special conditions for safe use

**WARNING!**
When you install the device, obey the conditions in the EC-Type Examination certificate. These conditions include:
- The special conditions for safe use.
- The Essential Health and Safety Requirements.

**DANGER!**
This installation must agree with EN 60079-14: Explosive atmospheres - Part 14: Electrical installations design, selection and erection and EN 61241-14: Electrical apparatus for use in the presence of combustible dust - Part 14: Selection and installation or other applicable international standards.

**DANGER!**
**Electrostatic discharge**
Risk of electrostatic discharge from plastic parts. Make sure that all personnel and equipment are correctly grounded.

Take the necessary antistatic precautions if you:
- handle,
- install or
- use

the device in potentially explosive atmospheres. Do not install in a location (near to ventilation systems, for example) where the electrostatic charge can increase.
2.2 Operating conditions: ambient and process temperature

The allowable ambient temperature and corresponding flange temperature range for the device depends on the equipment category, equipment protection level (EPL) and temperature classes marked on the nameplate.

The equipment category, equipment protection level and temperature class give the ambient temperature and related process temperature ranges for the device.

-40°C / -40°F is the minimum ambient temperature for all application options for use in hazardous areas.

Equipment category 1 G or EPL Ga: Ex ia devices
Equipment category 1 D or EPL Da: Ex ia devices

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum ambient temperature</th>
<th>Maximum process temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[°C]</td>
<td>[°F]</td>
</tr>
<tr>
<td>T6</td>
<td>+40</td>
<td>+104</td>
</tr>
<tr>
<td>T5</td>
<td>+40</td>
<td>+104</td>
</tr>
<tr>
<td>T4</td>
<td>+60</td>
<td>+140</td>
</tr>
<tr>
<td>T3</td>
<td>+80</td>
<td>+176</td>
</tr>
</tbody>
</table>

Equipment category 1/2 G or EPL Gb: Ex d devices
Equipment category 1/2 D or EPL Db: Ex tb devices

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum ambient temperature</th>
<th>Maximum process temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[°C]</td>
<td>[°F]</td>
</tr>
<tr>
<td>T6</td>
<td>+50</td>
<td>+122</td>
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<tr>
<td>T5</td>
<td>+50</td>
<td>+122</td>
</tr>
<tr>
<td>T4</td>
<td>+60</td>
<td>+140</td>
</tr>
<tr>
<td>T3</td>
<td>+80</td>
<td>+176</td>
</tr>
</tbody>
</table>

Equipment category 1 G: Ex c devices
Equipment category 1 D: Ex c devices

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Maximum ambient temperature</th>
<th>Maximum process temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[°C]</td>
<td>[°F]</td>
</tr>
<tr>
<td>T6</td>
<td>+40</td>
<td>+104</td>
</tr>
<tr>
<td>T5</td>
<td>+40</td>
<td>+104</td>
</tr>
<tr>
<td>T4</td>
<td>+60</td>
<td>+140</td>
</tr>
<tr>
<td>T3</td>
<td>+80</td>
<td>+176</td>
</tr>
</tbody>
</table>
3.1 General notes

**WARNING!**
- Use the applicable cable glands for the cable entry openings in the housing.
- If ambient temperature > 70°C / > 158°F, use heat-resistant cables, cable glands and cable entry plugs certified for continuous operation above +80°C / +176°F.
- De-energize the circuit.

3.2 Ex c equipment

The Ex c-approved device does not have a switch option.

3.3 Ex ia equipment

3.3.1 How to connect the electrical cables

**INFORMATION!**
Cable entries are supplied on customer demand. If you supply the cable entries, this part must have a degree of ingress protection IP≥65 (EN 60529).

- Use the electrical connection procedure in the Handbook.
- Supply the Ex i equipment connected to the device. Use only certified intrinsically-safe equipment.
- Connect only to separate certified, intrinsically-safe circuits. Make sure that the electrical circuit characteristics are not more than the values that follow.

3.3.2 Maximum intrinsically-safe values for the electrical circuit

- \( U_i \) is not given
- \( I_i \leq 500 \) mA
- \( C_i = 0 \) nF
- \( L_i = 0 \) µH

Voltage is not given, but U and I must be intrinsically safe.
3.3.3 Electrical schematics

Figure 3-1: Electrical schematics for Ex ia-approved equipment (switch options)

1. K1: 1 × N/O [normally open] switch
2. K1: 1 × N/C [normally closed] switch
3. K2: 2 × N/O switches
4. K2: 2 × N/C switches
5. K2: 1 × N/O and 1 × N/C switches
6. K2: 1 × N/C and 1 × N/O switches
7. K1 changeover: 1 × 3-wire SPDT switch
8. K2 changeover: 2 × 3-wire SPDT switches
3.4 Ex d / Ex tb equipment

3.4.1 General notes

**DANGER!**
*Do not open the housing while the device is energized.*

3.4.2 How to connect the electrical cables

**INFORMATION!**
*Cable entries are supplied on customer demand. If you supply the cable entries, this part must have a degree of ingress protection IP≥65 (EN 60529).*

**WARNING!**
*Use only Ex d-approved cable entries and plugs for Ex d applications. Use only Ex t-approved cable entries and plugs for Ex t applications. Do not remove more than 6 mm / 0.2" of insulation from the wire.*

3.4.3 Maximum switching capacity values for the electrical circuit

- $U_{\text{max}} = 380 \text{ V}$
- $P_c = 20 \text{VA}$

3.4.4 Electrical schematics

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**Figure 3-2: Electrical schematics for Ex d-approved equipment (switch options)**

1. K1: 1 × N/O (normally open) switch
2. K1: 1 × N/C (normally closed) switch
3. KV1: 1 × N/O switch with amplifier relay
Do a start-up check:

- Are the wetted components (gasket, measuring tube and measuring disc) resistant to corrosion by the tank product?
- Does the information given on the nameplate agree with the application?
5.1 Periodic maintenance

**DANGER!**
Make sure that maintenance operations agree with EN 60079-17: Explosive atmospheres - Part 17: Electrical installations inspection and maintenance.

5.2 Returning the device to the manufacturer

5.2.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

**CAUTION!**
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.
- This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.

**CAUTION!**
If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

- to check and ensure, if necessary by rinsing or neutralizing, that all cavities are free from such dangerous substances,
- to enclose a certificate with the device confirming that is safe to handle and stating the product used.
5.2.2 Form (for copying) to accompany a returned device

<table>
<thead>
<tr>
<th>Company:</th>
<th>Address:</th>
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<table>
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<tr>
<th>Department:</th>
<th>Name:</th>
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<tr>
<th>Tel. no.:</th>
<th>Fax no.:</th>
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<tr>
<th>Manufacturer’s order no. or serial no.:</th>
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The device has been operated with the following medium:

<table>
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<tr>
<th>This medium is:</th>
<th>water-hazardous</th>
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<tbody>
<tr>
<td></td>
<td>toxic</td>
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<tr>
<td></td>
<td>caustic</td>
</tr>
<tr>
<td></td>
<td>flammable</td>
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</table>

We checked that all cavities in the device are free from such substances.
We have flushed out and neutralized all cavities in the device.

We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.

<table>
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<tr>
<th>Date:</th>
<th>Signature:</th>
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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

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