UM-X

The evaluation unit in field housing for continuous level sensors
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1 Characteristics of the UM-X measurement evaluation unit

The UM-X measurement evaluation unit is a stand-alone level gauge display for continuous level sensors. It is directly driven from the power supply and serves at the same time as a power supply for the level sensor. The filling level can be presented in both analogue and digital form in the graphic display.

The UM-X measurement evaluation unit also has five potential-free changeover contacts available. The switching points of the five relays are adjusted via the display using 4 buttons and the state of the relays can be checked via the display.

The UM-X measurement evaluation unit

- can be used for any level sensors that have a 4-20 mA interface.
- can be supplied with ATEX approval (intrinsically safe electrical circuit).
- can be supplied as an approved overfill prevention device (see technical documentation overfill prevention, German, art. no. 207124)
- displays the filling level in digital and analogue form.
- has five potential-free changeover contacts as binary outputs.
- offers an easy menu-based operation via a graphic display.
- is installed in a splash-proof housing.

There are 4 versions of the UM-X measurement evaluation unit:

**UM-S**
Standard version: Measurement evaluation unit with 5 relay outputs and connection of a continuous level sensor and of an external acknowledge button.

**UM-O**
Measurement evaluation unit with 5 relay outputs and connection of a continuous level sensor and of an external acknowledge button.
Approved as an overfill prevention device.

**UM-Ex**
Measurement evaluation unit with 5 relay outputs and connection of a continuous level sensor and of an external acknowledge button.
Approved for the connection of an explosion-proof sensor (intrinsically safe sensor circuit).

**UM-O Ex**
Measurement evaluation unit with 5 relay outputs and connection of a continuous level sensor and of an external acknowledge button.
Approved for the connection of an explosion-proof sensor (intrinsically safe sensor circuit).
2 Safety instructions

The UM-X measurement evaluation unit operates as a stand-alone level gauge display for continuous level sensors. The system must be used exclusively for this purpose. The manufacturer accepts no liability for any form of damage resulting from improper use.

The UM-X measurement evaluation unit has been developed, manufactured and tested in accordance with the state-of-the art technology and the generally accepted safety standards. Nevertheless, hazards may still arise. For this reason, the following safety instructions must be observed:

- Do not change or modify the system or add any equipment without the prior consent of the manufacturer.
- All installation and maintenance work, with the exception of functional testing, must be carried out with the power disconnected.
- The measuring transducer must be installed outside of a potentially explosive area.
- The installation, operation and maintenance of the UM-X measurement evaluation unit must only be performed by expert personnel. Specialised knowledge must be acquired by regular training.
- Operators, installers and service technicians must observe all applicable safety regulations. This also applies to any local safety and accident prevention regulations which are not stated in this manual.

The safety instructions in this manual are marked as follows:

⚠️ If these safety instructions are not observed, it may result in the risk of accident or damages to the measurement evaluation unit.

كتبت | Useful information designed to ensure continued and correct operation of the system and to make your work easier.

2.1 Password

كتبت | You will need a password for certain menu options in order to be able to access or amend the points in question.

كتبت | The password will be advised on an attached sheet and may only be used by trained personnel!
3 Design and function

3.1 Type plate
The type plate contains amongst other things details on the version of your measurement evaluation unit:

- Device type UM-S, UM-O, UM-Ex or UM-O Ex
- Approvals

![Type plate diagram]

Figure 1: Design of the UM-X measurement evaluation unit, view from above

3.2 Functional pushbutton
You can navigate through the menu structure, using the four functional pushbuttons, which are shown on the display, and can amend parameters in the settings menus.
The function of the pushbuttons is shown in the button-function field of the display and it changes to some extent in the individual menus (see Section 6.1 „Layout of the display“).

3.3 Display window
The display shows the filling level information and is used to adjust the parameters for the measurement evaluation unit.
3.4 **Alarm light**

The measuring transducer is equipped with a red LED alarm for displaying system alarms and faults.

The red LED indicates the exceeding or falling below of the alarm thresholds set by the software and the occurrence of faults (see Section 7 „Alarms“).

3.5 **Buzzer**

The buzzer provides the acoustic alarm message. The sounding of the alarm is discontinued as soon as the acknowledge button has been activated, the cause of the alarm has been eliminated or the fault rectified. The loudness of the buzzer cannot be adjusted.
4 Installation

⚠️ The installation must be carried out only by expert personnel and in accordance with all applicable safety regulations. This also applies to any local safety and accident prevention regulations which are not stated in this manual.

4.1 Assembly and connections

The UM-X measurement evaluation unit is designed to be wall-mounted. It can only be mounted and connected-up in the opened condition:

1. Release the four cover screws.
2. Carefully remove the cover. It is still connected with the circuit board by means of two ribbon cables.
3. You should remove the plug in order to enable the cover to be completely removed.
4. You can now mount the measurement evaluation unit.

⚠️ The measurement evaluation unit must be installed outside of any area where there may be a risk of explosion.

5. After mounting, connect up the cables for the power supply and the filling level sensor to the measurement evaluation unit. As an option, you may connect up an external acknowledge button and external control devices (see Section 4.2 „Connection assignment“).

After mounting and the connecting up of all electrical leads again close up the measurement evaluation unit:

6. First of all carefully stow the wide ribbon cable back into its retaining bracket, which is equipped with a reverse polarity protection.
7. Now reconnect the membrane keypad with the narrow ribbon cable. The correct location of the plug should be carefully checked here, since this is not equipped with a reverse polarity protection.
8. Close up the measurement evaluation unit via the four cover screws.
4.2 Connection assignment

⚠️ Wiring work may only be performed when the power is disconnected. Special local rules and regulations of relevant associations and authorities must be observed (e.g. VDE in Germany).

⚠️ Observe the maximum values of the operating parameters that are stated in the Technical Specifications.

Figure 2: UM-X measurement evaluation unit, pin assignment

Sensor connection
The sensor is connected to the terminals 1 (-) and 2 (+).
**Output circuits**
The relays K1 to K5 (terminals 3 to 17) serve as limit signal indicators. There are 5 potential-free changeover contacts.

💡 Special features of the UM-O and UM-O Ex versions of the device:
- Non-acknowledgeable overfill prevention relays:
  Relays K1 (terminals 3, 4 and 5)
- Acknowledgeable overfill prevention relays:
  Relays K2 (terminals 6, 7 and 8)

**Power supply**
The power supply is connected to the terminals PE, N and L of the circuit board. In the 24 VDC version + must be connected to L and - to N.

**External acknowledge button**
An external acknowledge button (potential-free NO) can be used. This is connected to the quit terminals (18 and 19).

⚠️ CAUTION MAINS VOLTAGE!
5 Commissioning

The measurement evaluation unit is supplied with a factory setting and should be adapted for the onsite conditions.

Detailed information on the setting of the measurement evaluation unit can be found in Section 6 „Operation“.

The values of the factory settings are given in Section 6.14 „Menu structure with factory setting“.

To start up the system proceed as follows:

1. Install the UM-X measurement evaluation unit in its designated position and insert the filling-level sensor into the container (see also Section 4).
2. Connect up at least the power supply and the sensor.
3. Ensure during the assembly that the ribbon leads from the display and from the membrane keypad are correctly connected before the measurement evaluation is closed.
4. Activate the power supply.
5. Adjust the 4 mA point on the filling level sensor (bottom) and the 20 mA point (top, container height).
6. Now go to the measurement evaluation menu. Select the "Height" point and enter the container height.
7. If the 4 mA point should not be at the height of the base of the container, then adjust the "Offset" in the menu to the correct height.
8. If the 20 mA point does not correspond to the container height,
   – fill your container to the maximum level possible (the 20 mA point must be above the container height),
   – then measure the filling height with a dipstick
   – and insert the value in the "Span-Change" menu point.

The 20 mA point may not be lower than the container height. In case of the versions UM-O and UM-O Ex (overfill prevention devices), the 20 mA point must correspond to the container height.

9. You can now adjust the relay switching points.

Altering the offset or the span-factor can cause a switching point to be below 4 mA or above 20 mA. In that case the relays switch not as required, which can cause malfunctions.

Check the current values in the "Relays -> K1...K5 -> S-P On and S-P Off“ menu points. Should the current values be outside of the desired range, then "< 4.00 mA“ or " > 20.00 mA“ will be displayed under the milliampere unit.
6 Operation

The word "Info" on display appears for 5 seconds after switching on the measurement evaluation unit. After this the display will change automatically to the filling level display in bar graph form.

A table overview via the menu structure and the factory-set default values can be found in Section 6.14 „Menu structure with factory setting“.

![Figure 3: Display after the evaluation unit is switched-on](image)

![Figure 4: Layout of the display](image)

6.1 Layout of the display

The display is divided into 3 areas (see Figure 4):

**Digital display**

The current filling level is digitally displayed in the top line.

**Multi-function field**

The information field has the following functions:

- Analogue display of the filling level or of the relay status.
- Navigation via the menu:
  Navigating through the menu structure using the buttons.
**Button function field**

The right column of the display serves as the button function field. The functions of the adjacent buttons are displayed here. The functions are matched with the respective menu options.

### 6.2 Bar graph presentation (analogue display)

The column shows the filling level. The scaling is specified in percentages and cannot be altered. The filling level is also displayed digitally (see Figure 4).

There are two possible ways of navigating in the bar graph presentation:
- Symbol [R] - shows the status of all relays
- Symbol [M] - returns to the main menu

### 6.3 Relay status display

The "Relay status" display provides an overview of the current status of all relays:
- ● A filled dot indicates the "relay activated" status.
- ○ An unfilled dot indicates the "relay deactivated" status.

You have at the same time an overview of the relay switching points to adjust in the "S-P On" and "S-P Off" menu points.

The symbol
- [B] - leads to the bar graph presentation ("Bargraph").
- [M] - returns to the main menu.

---

**Figure 5:** "Relay status" display
6.4 Main menu

The main menu is called up from the “Bar graph” or “Relay status” displays via the button that is next to the symbol [M].

You may select the following menu points:

- **Unit** – Setting the unit.
- **Height** – Setting the container height.
- **Offset** – Setting the distance from the base of the container up to the 4 mA point of the filling level sensor.
- **Span** – Menu for adjusting sensors, e.g. pressure sensors.
- **Relays** – Menu for configuring the relays.
- **Test** – Menu for manual control of the relays.
- **Display** – Menu for adjusting the display background illumination.
- **Reset** – Menu for resetting of all values to the factory settings.
- **Info** – Display of device information.

Should you be in a settings menu for more than 3 minutes without making any further inputs, the display automatically returns to the last display - bar graph presentation or relay status. Changes to parameters, which have not been confirmed will not be saved.

6.4.1 Navigation

There are four functions available for scrolling through the different menu points, for calling up selected menu points and for saving changed parameters.

![Main menu with navigation functions](image)

Figure 6: Main menu with navigation functions
Cursor UP [↑] and Cursor DOWN [↓]

The cursor is controlled using the UP [↑] or DOWN [↓] functions through the menu shown in the display. A menu point is selected in this way.

RETURN [←]

The RETURN symbol [←] has two functions:

- "Select" in the menu
  In the menu confirm your selection with RETURN [←] and call up the next selection or a settings menu.

- "To confirm, save and jump back" in the settings menu.
  If you have changed parameters in an adjustment menu, confirm and save your inputs using RETURN [←]. The menu will be automatically displayed at a higher level on the display after saving.

BACK [←]

The BACK symbol [←] has two functions:

- "Back without selecting" in the menu
  You can jump back in the menu using BACK [←] one level up.

- "Back without saving" in the settings menu
  If you have changed parameters in a settings menu, you can quit the menu point with BACK [←], without saving the new settings.

Password

In the case of menu points, in which the pass word has to be entered a key will be displayed instead of the enter button.

Switching on background illumination

When the background illumination is reduced to the set minimum, the lamp button in the button function field will be displayed.

When the lamp button is activated, the background illumination will be switched on once more and further operation of the device is enabled.
6.5  **Unit settings menu**

When the "Unit" settings menu is called up, the cursor moves automatically onto the unit being currently set. Using the UP [↑] and DOWN [↓] buttons, you can scroll through the units:

- % - percent
- mm - millimetre
- Inch - inch (unit input on the display using <”>)
- mA - milliamperes

Confirm your selection using RETURN [→].

The values in the data field and the values in the "Relay status" display are shown in the selected unit.

![Figure 7: "Unit" display](image)

6.6  **Height settings menu**

Enter the height of the container in the "height" settings menu. The height can be up to 25,000 mm and is established in 1 mm steps. The units of inches, percent and milliamperes are calculated and displayed for information.

Using the functions

- [+] PLUS and
- [-] MINUS

enter the value.

Confirm your selection with RETURN [→].

![Figure 8: "Height" display](image)

- In case of the versions UM-O and UM-O Ex (overfill prevention devices), a password is required to change the container height.

- The 20-mA point of the filling level sensor must be set to the container height. Should this not be possible, an adjustment can be made with the "Span" menu point.
6.7 Offset settings menu (Zero-point displacement)

The distance from the base of the container up to the 4 mA point of the filling level sensor is called the Offset.

The distance is established in 1 millimetre steps. The units of inches, percent and milliamperes are calculated and displayed for information.

Enter the distance using [+] PLUS and [-] MINUS

Confirm your selection with RETURN [←].

Figure 9: "Offset" display

![Offset display]

⚠️ Altering the offset or the span-factor can cause a switching point to be below 4 mA or above 20 mA. In that case the relays switch not as required, which can cause malfunctions.

👉 Check the current values in the "Relays -> K1...K5 -> S-P On and S-P Off" menu points. These may not be below 4 mA and not above 20 mA.

Example:
The container height is set at 3000 mm and the offset is set at 300 mm - which corresponds to 10%. Since the relay switching points are set in percentage, these points can also be below 10% and therefore less than 4 mA.

👉 In case of the versions UM-O and UM-O Ex (overfill prevention devices), a password is required to change the container height.
6.8 Span menu (adjustment)

If a sensor is used for the filling level measurement in which the 20 mA point does not coincide with the container height (for example pressure sensors) carry out a sensor adjustment in the “Span” menu. You obtain a sub-menu with the two points
• Change and
• Reset.

Using the UP [↑] and DOWN [↓] buttons, select a point.
Confirm your selection with RETURN [←].

Figure 10: "Span" display

In case of the versions UM-O and UM-O Ex (overfill prevention devices), a password is required to change the container height.

6.8.1 Change settings menu

The “Change” settings menu shows the set filling level in millimetres, inches and percent.

Enter the previously measured filling level using the [+ ] PLUS and [- ] MINUS buttons.

The filling level is established in 1 millimetre steps. The units of inches, percent and milliamperes are calculated and displayed for information.

The adjustment can only be made during operation. The container must be correctly filled and the correct container height must be entered, in order for the variations to be small. You can find detailed instructions in Section 5 “Commissioning”.

Figure 11: "Change" display

Altering the span-factor can cause a switching point to be below 4 mA or above 20 mA. In that case the relays switch not as required, which can cause malfunctions.

Check the current values in the “Relays -> K1...K5 -> S-P On and S-P Off” menu points. These may not be below 4 mA and not above 20 mA.
6.8.2 Reset settings menu

Reset the correction factor for the sensor adjustment back to the delivery status by using "Reset".

Select the symbol [Y] - for "Yes, reset" and [N] - for "No, don't reset".

Figure 12: “Reset” display

6.9 Relays menu

A Relays menu opens, in which using the UP [⇧] and DOWN [⇩] buttons you can select a relay (K1 to K5).

Confirm your selection with RETURN [↩].

Figure 13: Relays menu display board

In case of the versions UM-O and UM-O Ex (overfill prevention devices), a password is required to select the K1 and K2 relays. The K1 and K2 relays can only be selected and set together.
6.9.1 Relays sub menu

A sub-menu with the setting options opens for the selected relays:

- S-P On - Switching Point On
- S-P Off - Switching Point Off
- On Delay - switching-on delay
- Off Delay - switching-off delay
- Alarm - alarm configuration
- Acknowl. – Acknowledgement

With the UP [↑] and DOWN [↓] buttons select a menu point and confirm your selection with RETURN [→].

Figure 14: Relays sub-menu display
6.9.2 S-P On (switching-on point) settings menu

The "S-P On" (switching-on point) settings menu shows you the value at which the relay is activated.

The switching-on point is established in 0.1 percent steps. The range of values goes from 0.1 up to 99.9 percent. The units of inches, percent and milliamperes are calculated and displayed for information.

Enter the value

[+] PLUS and

[−] MINUS

functions
to establish the switching-on point.

Confirm your selection with RETURN [+].

Figure 15: "S-P On" display

⚠️ The current value may not be below 4 mA and not more than 20 mA to avoid a malfunction.

💡 The range of values with the UM-O and the UM-O Ex versions of the device for the K1/K2 relays is between 0.1 and 98.9 percent. The switching-on point (S-P On) is always below the switching-off point (S-P Off) and cannot exceed this.
6.9.3 S-P Off (switching-off point) settings menu

The "S-P Off" (switching-off point) settings menu shows you the value at which the relay is deactivated. The switching-off point is established in 0.1 percent steps. The range of values goes from 0.1 up to 99.9 percent. The units of inches, percent and milliamperes are calculated and displayed for information.

Enter the value with the [+ ] PLUS and [- ] MINUS functions to establish the switching-off point.

Confirm your selection with RETURN [↩ ].

Figure 16: "S-P Off" display

⚠️ The current value may not be below 4 mA and not more than 20 mA to avoid a malfunction.

⚠️ The range of values with the UM-O and the UM-O Ex versions of the device for the K1/K2 relays is between 0.2 and 99.0 percent. The switching-off point (S-P Off) is always above the switching-on point (S-P On) and cannot fall below this.

6.9.4 On Delay settings menu (switching-on delay)

You define the switching-on delay of a relay in the settings menu. The delay time can be between 0 and 255 seconds and is set in 1 second steps.

Enter the value with the [+ ] PLUS and [- ] MINUS functions.

Confirm your selection with RETURN [↩ ].

Figure 17: "On Delay" display
6.9.5 Off Delay settings menu (switching-off delay)

You define the switching-off delay of a relay in the settings menu. The delay time can be between 0 and 255 seconds and is set in 1 second steps. Enter the value with the [+ ] PLUS and [- ] MINUS functions. Confirm your selection with RETURN [ ].

![Figure 18: “Off Delay” display](image)

In case of the versions UM-O and UM-O Ex (overfill prevention devices), the switching-off delay for the K1/K2 relays is always 0 seconds and cannot be changed.

6.9.6 Alarm settings menu

You switch the relay alarm in the “Alarm” settings menu with the UP [] and DOWN [] functions to the values Off - for off On - for on. Confirm your selection with RETURN [ ].

In this respect see also Section 7 „Alarms“.

![Figure 19: “Alarm” display](image)

In case of the versions UM-O and UM-O Ex (overfill prevention devices), the alarm for the K1/K2 relays is always set and cannot be turned to “Off”.
6.9.7 Acknowledge settings menu

Whether this can be acknowledged is set for each relay. With the
UP [⇑] and
DOWN [_KeyDown]
functions select whether Off relay cannot be acknowledged
or
the On relay can be acknowledged.

Confirm your selection with RETURN [Return].

Figure 20: “Acknowl.” display

In case of the versions UM-O and UM-O Ex (overfill prevention devices), the
acknowledgement for K1/K2 cannot be changed.
6.10 Test menu

You obtain an overview of the five relays K1 to K5 in the “Test” menu point. It shows behind each relay with “On” or “Off” whether this is activated (On) or deactivated (Off).

To select relays:
You can select a relay using the UP [↑] and DOWN [↓] buttons.

To switch relays on and off:
Depending on the test status of a relay between the UP [↑] and DOWN [↓] the symbol [On] - appears for “relay activated” or [Off] - for “relay deactivated”.

Figure 21: “Test” display.

A manually-switched relay switches to the current operating status as soon as you select another relay or after quitting the “Test” menu-point.

In case of the versions UM-O and UM-O Ex (overfill prevention devices), a test cannot be performed for the K1 or K2 relays when K1 is switched-off (relay alarm).

In the event of a fault (see Section 7.2 „Error“) all relays are automatically switched-off. A test may only be repeated when the fault is rectified.
6.11 Display menu

The brightness, the switch-off delay and the switch-on delay can be set to match the display to the working environment.

With the UP [↑] and DOWN [↓] buttons select a menu point and confirm your selection with RETURN [→ ].

Figure 22: "Display" display

6.11.1 Brightness menu

- Maximum settings menu
  Brightness when the background illumination is switched-on.
  Default: 75.0 %
  Minimum: 30.0 %
  Maximum: 100.0 %
  Step size: 0.1 %

  The brightness changes when it is being adjusted

- Minimum settings menu
  Brightness when the background illumination is reduced.
  Default: 10.0 %
  Minimum: 0.0 %
  Maximum: 30.0 %
  Step size: 0.1 %

  The brightness changes when the adjustment is being made between Brightness Maximum and Brightness Minimum.
6.11.2 Off Delay settings menu
The back illumination of the display, for example when quitting the menu, is adjusted in the Off Delay settings menu (switching-off delay).

Default: 60 s
Minimum: 0 s
Maximum: 255 s
Step size: 1 s

6.11.3 On Delay settings menu
The (automatic) switching-on again of the background illumination is set in the On Delay settings menu (switching-on delay).

Default: 0 s*
Minimum: 0 s
Maximum: 255 s
Step size: 1 s

* Display does not switch-on again automatically.
6.12 Reset menu

You reset all specifications back to the factory-adjusted settings with "Reset". Select the function

[Y] - for "Yes, reset" and

[N] - for "No, don't reset".

ℹ️ A password is required to call-up this menu point!

Figure 23: "Reset" display

6.13 Info display

Information can be obtained under this menu point on

• the version of the device,
• contact details of the manufacturer FAFNIR and the
• software version of the evaluation unit.

You return to the main menu by pressing one of the four buttons.

Figure 24: "Info" display
## 6.14 Menu structure with factory setting

<table>
<thead>
<tr>
<th>Start Display</th>
<th>Main menu</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Possible values</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar graph presentation</td>
<td>Relays</td>
<td>K1</td>
<td>S-P On</td>
<td>0,1 ... 99.9 %</td>
<td>94.0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S-P Off</td>
<td>0,1 ... 99.9 %</td>
<td>95.0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alarm</td>
<td>ON/OFF</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K2</td>
<td>S-P On</td>
<td>0,1 ... 99.9 %</td>
<td>94.0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S-P Off</td>
<td>0,1 ... 99.9 %</td>
<td>95.0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alarm</td>
<td>ON/OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In the case of the UM-O and UM-O Ex versions, K1/K2 are set together and a password is required.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-P On</td>
<td>0,1 ... 98.9 %</td>
<td>94.0 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; S-P Off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-P Off</td>
<td>0,2 ... 99.0 % &amp;</td>
<td>95.0 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; S-P On</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>On Delay</td>
<td>0 ... 255 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off Delay</td>
<td>0 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alarm</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>K3</td>
<td>S-P On</td>
<td>0,1 ... 99.9 %</td>
<td>74.9 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S-P Off</td>
<td>0,1 ... 99.9 %</td>
<td>75.1 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alarm</td>
<td>ON/OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K4</td>
<td>S-P On</td>
<td>0,1 ... 99.9 %</td>
<td>49.9 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S-P Off</td>
<td>0,1 ... 99.9 %</td>
<td>50.1 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alarm</td>
<td>ON/OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K5</td>
<td>S-P On</td>
<td>0,1 ... 99.9 %</td>
<td>24.9 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S-P Off</td>
<td>0,1 ... 99.9 %</td>
<td>25.1 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Off Delay</td>
<td>0 ... 255 s</td>
<td>0 s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alarm</td>
<td>ON/OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Start Display</td>
<td>Main menu</td>
<td>Level 2</td>
<td>Level 3</td>
<td>Possible values</td>
<td>Factory setting</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Unit</td>
<td>%</td>
<td>mm</td>
<td>inch</td>
<td>mA</td>
<td>mm</td>
</tr>
<tr>
<td>Height</td>
<td>1 … 25.000 mm</td>
<td>0 … 984,3 &quot;</td>
<td>100 %</td>
<td>3,000 mm</td>
<td>A password is required for UM-O and UM-O Ex versions.</td>
</tr>
<tr>
<td>Offset</td>
<td>0 … {Height} mm</td>
<td>0 … {Height} &quot;</td>
<td>0 … 100,00 %</td>
<td>0 mm 0 &quot; 0.00 %</td>
<td>A password is required for UM-O and UM-O Ex versions.</td>
</tr>
<tr>
<td>Span</td>
<td>Charge</td>
<td>0 … {Height} mm</td>
<td>0 … {Height} &quot;</td>
<td>0 … 100,00 %</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Test</td>
<td>for each relay</td>
<td>On/Off</td>
<td>On/Off</td>
<td>30.0 % … 100.0 %</td>
<td>75.0 %</td>
</tr>
<tr>
<td>Display</td>
<td>Brightness Maximum</td>
<td>Minimum</td>
<td>Off Delay</td>
<td>0.0 % … 30.0 %</td>
<td>60 s 0 s</td>
</tr>
<tr>
<td></td>
<td>On Delay</td>
<td>0 s … 255 s</td>
<td>0 s … 255 s</td>
<td>60 s 0 s</td>
<td>60 s 0 s</td>
</tr>
<tr>
<td>Reset</td>
<td>Yes/No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Info</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7 Alarms

7.1 Relay alarm
A relay alarm is an over or under threshold limit value which you set. If a relay is deactivated and at the same time the alarm has been set for this relay, then an alarm is triggered.

In the event of an alarm, the LED flashes at equal intervals (1 sec. on, 1 sec. off) and the buzzer sounds. The symbol [Q] appears on the display beside the lowest operating button. You acknowledge the alarm here.

When you acknowledge the alarm the buzzer is switched off and the LED is continuously illuminated. The [Q]-symbol is the displayed inverted. The LED will no longer be illuminated and the (inverted) [Q] symbol displayed only when the cause of the alarm has been rectified.

7.2 Error

In the event of a fault, the LED flashes at intervals (0.1 sec. on; 0.9 sec. off), a buzzer sounds and the error code is superimposed on the display.

All relays are automatically deactivated in the event of an error and the [Q] symbol can be seen beside the lowest operating button. You acknowledge the alarm here.

The buzzer stops after the acknowledgement, but the LED continues to flash until the fault is rectified. The device is only accepted as being error-free when the fault is rectified and no further fault has occurred after 10 seconds. In the meantime, the "ERROR 0" fault code is displayed.

The display then returns to the bar graph or relay status display - depending on which one you last had shown on the display.

Figure 25: "Error 2" display

7.2.1 Meaning of the error codes
The following faults can occur:

ERROR 1: Current fault on the filling level sensor (3.6 mA or 21.5 mA).
ERROR 2: Interruption in the sensor electric circuit, e.g. cable breakage.
ERROR 3: Short circuit in the sensor electric circuit.
ERROR 4: Internal device fault.
ERROR 0: Status between rectification of the fault and 10 seconds of the absence of any fault.
## Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-20 °C ... +50 °C</td>
</tr>
<tr>
<td>Index of protection</td>
<td>IP64</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>180 mm × 130 mm × 52 mm</td>
</tr>
<tr>
<td>Power supply</td>
<td>230 VAC ±10 %, 50 – 60 Hz, 7.5 VA, or 115 VAC ±10 %, 50 – 60 Hz, 7.5 VA, or 24 VAC ±10 %, 50 – 60 Hz, 7.5 VA, or 24 VAC ±20 %, 4.7 W</td>
</tr>
<tr>
<td>Sensor circuit</td>
<td>4 to 20 mA</td>
</tr>
<tr>
<td>Voltage</td>
<td>$U \leq 27$ V</td>
</tr>
<tr>
<td>Current</td>
<td>$I \leq 30$ mA</td>
</tr>
<tr>
<td>Output</td>
<td>Five relays each with potential-free changeover contact</td>
</tr>
<tr>
<td>AC voltage</td>
<td>$U \leq 250$ V; $I \leq 5$ A; $P \leq 100$ VA; $\cos \varphi \geq 0.7$</td>
</tr>
<tr>
<td>DC voltage</td>
<td>$U \leq 250$ V; $I \leq 0.25$ A; $P \leq 50$ W</td>
</tr>
<tr>
<td>External acknowledge button</td>
<td>Potential-free NO present in the power supply</td>
</tr>
</tbody>
</table>
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EU-Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de Conformité

FAFNIR GmbH  
Bahnenfelder Straße 19  
22765 Hamburg / Germany

erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt  
declares as manufacturer under sole responsibility that the product  
déclare sous sa seule responsabilité en qualité de fabricant que le produit  

Messauswertung  
Evaluation Unit  
Unité d’analyse  

UM-…

den Vorschriften der europäischen Richtlinien  
complies with the regulations of the European directives  
est conforme aux réglementations des directives européennes suivantes

| 2011/65/EU | Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten | RoHS |
| 2011/65/EU | Restriction of the use of certain hazardous substances in electrical and electronic equipment | RoHS |
| 2011/65/EU | Limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques | RoHS |
| 2014/30/EU | Elektromagnetische Verträglichkeit | EMV |
| 2014/30/EU | Electromagnetic compatibility | EMC |
| 2014/30/EU | Compatibilité électromagnétique | CEM |
| 2014/34/EU | Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen | ATEX |
| 2014/34/EU | Equipment and protective systems intended for use in potentially explosive atmospheres | ATEX |
| 2014/34/EU | Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles | ATEX |
| 2014/35/EU | Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt | NSRL |
| 2014/35/EU | Making available on the market of electrical equipment designed for use within certain voltage limits | LVD |
| 2014/35/EU | Mise à disposition sur le marché du matériel électrique destiné à être employé dans certaines limites de tension | DBT |

durch die Anwendung folgender harmonisierter Normen entspricht  
by applying the harmonised standards  
par l’application des normes

RoHS / RoHS / RoHS  
EMV / EMC / CEM  
ATEX / ATEX / ATEX  

NSRL / LVD / DBT  

Das Produkt ist bestimmt als Elektro- und Elektronikgerät der RoHS-  
The product is determined as electrical and electronic equipment of RoHS  
Le produit est déterminé comme des équipements électriques et électroniques de RoHS

Kategorie / Category / Catégorie  

Überwachungs- und Kontrollinstrumenten in der Industrie /  
Industrial Monitoring and Control Instruments /  
Instruments de contrôle et de surveillance industriels

Das Produkt entspricht den EMV-Anforderungen  
The product complies with the EMC requirements  
Le produit est conforme aux exigences CEM

Störaussendung / Emission / Émission  
Störfestigkeit / Immunity / D’immunité  

Klasse B / Class B / Classe B  
Industrielle elektromagnetische Umgebung /  
Industrial electromagnetic environment /  
Environnement électromagnétique industriel

Die notizierte Stelle TÜV NORD CERT GmbH, 0044 hat eine EG-Baumusterprüfung durchgeführt und folgende Bescheinigung ausgestellt  
The notified body TÜV NORD CERT GmbH, 0044 performed a EC-type examination and issued the certificate  
L’organisme notifié TÜV NORD CERT GmbH, 0044 a effectué examen CE de type et a établi l’attestation

UM-… Ex

Ort, Datum / Place, Date / Lieu, Date  

Geschäftsführer / Managing Director / Gérant: René Albrecht

F A F N I R  G m b H  •  B a h n e n f e l d e r  S t r a ß e  1 9  •  2 2 7 6 5  H a m b u r g  •  T e l e f o n : + 4 9 / ( 0 ) 4 0 / 3 9 8 2 0 7 - 0  •  T e l e f a x : + 4 9 / ( 0 ) 4 0 / 3 9 0 6 3 3 9
Translation

(1) **EC-Type Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 94/9/EC**

(3) **Certificate Number**

TÜV 07 ATEX 345770

(4) for the equipment: Measurement analysis system type UM-... Ex

(5) of the manufacturer: FAFNIR GmbH

(6) Address:

Bahnenfelder Str. 19
22765 Hamburg
Germany

Order number: 8000345770

Date of issue: 2007-02-26

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report No. 07203345770.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50 014:1997 +A1+A2
EN 50 020:2002

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

![Ex][1] (1) G [EEx ia] IIIC/IIIB

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

[Signature]

Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

---

This certificate may only be reproduced without any change, schedule included. Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH
(13) S C H E D U L E

(14) EC-Type Examination Certificate No. TÜV 07 ATEX 345770

(15) Description of equipment
The measurement analysis system UM-... Ex is used for the supply, display and limit value indication of level sensors equipped with a 4 to 20 mA interface.

The permissible ambient temperature range is 0 °C to +50 °C.

Electrical data

Auxiliary power circuit (terminals 20, 21 and 22)
- U = 230 V AC, ± 10 %, 50...60 Hz, approx. 7.5 VA or
- U = 24 V AC, ± 10 %, 50...60 Hz, approx. 7.5 VA or
- U = 24 V DC, ± 20 %, approx. 4.7 W
- U_m = 253 V

Sensor circuit (terminals 1 and 2)
- in type of protection “intrinsic safety” EEx ia IIIC
  or EEx ia IIB
- Maximum values:
  - U_o = 28.4 V
  - I_o = 99.5 mA
  - R = 285 Ω
  - P_o = 705 mW
- Characteristic: linear

C_i negligibly small
L_i negligibly small

The permissible maximum values for the outer inductance (L_o) and capacitance (C_o) must be looked up in the following table:

<table>
<thead>
<tr>
<th>EEx ia IIC</th>
<th>EEx ia IIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_o</td>
<td>0.68 mH</td>
</tr>
<tr>
<td></td>
<td>0.2 mH</td>
</tr>
<tr>
<td>C_o</td>
<td>59 nF</td>
</tr>
<tr>
<td></td>
<td>290 nF</td>
</tr>
</tbody>
</table>

Output circuit (terminals 3 to 17)
- U ≤ 250 V, I ≤ 5 A, P ≤ 500 VA, cos φ ≥ 0.7 or
- U ≤ 250 V, I ≤ 0.25 A, P ≤ 50 W

The sensor circuit is safely galvanically separated from the auxiliary power circuit and output circuit up to an apex value of the voltage of 375 V.

(16) Test documents are listed in the test report No. 07203345770.

(17) Special conditions for safe use
none

(18) Essential Health and Safety Requirements
no additional ones
Translation
1. SUPPLEMENT

to Certificate No. TÜV 07 ATEX 345770

Equipment: Measurement analysis system type UM-... Ex

Manufacturer: FAFNIR GmbH

Address: Bahrenfelder Straße 19
22765 Hamburg
Germany

Order number: 8000401623

Date of issue: 2012-01-12

Amendments:

In the future, the Measurement analysis system type UM-... Ex may also be manufactured according to the test documents listed in the test report. The modifications refer to the layout of the item.

The permissible ambient temperature range will be -20 °C to +50 °C in the future.

Furthermore the "Electrical data" was changed.

Electrical Data

Auxiliary power circuit (terminal 20, 21 und 22)  
U = 24/115/230 V a.c., ± 10 %, 50...60 Hz, about 7.5 VA
U = 24 V d.c., ± 20 %, about 4.7 W
U_m = 33 V at 24 V d.c. resp. 24 V a.c.
U_m = 130 V at 115 V a.c.
U_m = 253 V at 230 V a.c.

Sensor circuit (terminal 1 und 2)  
in type of protection "Intrinsic Safety" Ex ia IIC resp. Ex ia IIB

Maximum values:  
\( U_o = 28.4 \text{ V} \)  
\( I_o = 99.5 \text{ mA} \)  
\( R = 285 \Omega \)  
\( P_o = 705 \text{ mW} \)

Characteristic line: linear

\( C_i \) negligibly small
\( L_i \) negligibly small

The maximum permissible value pairs of the external inductances \( (L_o) \) and capacitances \( (C_o) \) have to be taken from the following table:
1. Supplement to Certificate No. TÜV 07 ATEX 345770

<table>
<thead>
<tr>
<th>Ex ia IIC</th>
<th>Ex ia IIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L_0$</td>
<td>0.68 mH</td>
</tr>
<tr>
<td>$C_0$</td>
<td>59 nF</td>
</tr>
</tbody>
</table>

Aforementioned maximum values are valid at coincidental appearance of concentrated capacitance and inductance.

Output circuit (terminal 3 bis 17)

- $U \leq 250$ V, $I \leq 5$ A, $P \leq 100$ VA, $\cos \varphi \geq 0.7$ resp.
- $U \leq 250$ V, $I \leq 0.25$ A, $P \leq 50$ W

The sensor circuit is safely galvanically separated from auxiliary power circuit and output circuit up to a peak crest value of the voltage of 375 V.

Furthermore the equipment was evaluated according to the standards EN 60079-0:2009, EN 60079-11:2007 and EN 60079-26:2007.

All other data apply unchanged for this supplement.

The device will then be labeled as follows:

\[\text{Ex II (1) G [Ex ia Ga] IIC}\]

The equipment incl. of this supplement meets the requirements of these standards:

|-----------------|-----------------|-----------------|

(16) Test documents are listed in the test report No. 11 203 091922.

(17) Special conditions for safe use

none
1. Supplement to Certificate No. TÜV 07 ATEX 345770

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

[Signature]

Schwedt

Hanover office, Am TÜV 1, 30519 Hannover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590
Instructions

Measurement evaluation unit type UM-... Ex

I Range of application
The measurement evaluation unit type UM-... Ex can serve as part of an overfilling prevention system.

II Standards
See EC-type examination certificate including supplements.

III Instructions for safe use

III.a ... use
The measurement evaluation unit serves as associated equipment and is not approved for use inside potentially explosive atmospheres. The intrinsically safe sensor circuit of the measurement evaluation unit can be lead in zone 0 and is suitable for all gas groups (IIA, IIB and IIC).
The approval is valid only for the versions of the device
UM-Ex
UM-O Ex

III.b ... assembling and dismantling
The measurement evaluation unit is suitable for wall mounting. The evaluation unit must be installed outside potentially explosive atmospheres.

III.c ... installation
Wiring work may only be performed with the power disconnected. The special EN regulations including EN 60079-14 and local installation regulations must be observed.
The wiring from the sensor (for example TORRIX Ex ...) to the measurement evaluation unit (preferably blue coloured cable) may not exceed the permissible inductance and capacitance according to section V.

Terminal designation:
- Power supply circuit: L, N and PE (22, 21 and 20)
- Acknowledge circuit: Ack. (19 and 18)
- Outputs: Relay 5 (17, 16 and 15)  
  Relay 4 (14, 13 and 12)  
  Relay 3 (11, 10 and 9)  
  Relay 2 (8, 7 and 6)  
  Relay 1 (5, 4 and 3)
- Sensor circuit: - + Probe 4..20 mA (2 and 1)

III.d ... putting into service
Before putting into service, all devices must be checked to ensure they are properly connected and installed. The power supply, also of connected equipment, must be checked.

III.e ... maintenance (servicing and emergency repair)
In general, the measurement evaluation unit is maintenance-free. In case of a defect it must be send back to FAFNIR or one of its representations.
IV Equipment marking
1 Manufacturer: FAFNIR GmbH, Hamburg
2 Type designation: UM-...
3 Certificate number: TÜV 07 ATEX 345770
4 Ex marking: II (1) G [Ex ia Ga] IIC
5 CE marking: CEE044
6 Technical data:
   \[ T_a \leq +50 ^\circ C \]
   \[ U_o \leq 28.4 \text{ V} \]
   \[ I_o \leq 99.5 \text{ mA} \]
   \[ P_o \leq 705 \text{ mW} \]

   \[ \begin{array}{ccc}
   \text{IIIC} & 680 \mu \text{H} & 500 \mu \text{H} & 5 \text{ mH} & 2 \text{ mH} \\
   \text{IIB} & 59 \text{ nF} & 67 \text{ nF} & 240 \text{ nF} & 290 \text{ nF} \\
   \end{array} \]

V Technical data
The power supply for the evaluation unit, depending on model:

\[ U = 24 \text{ V DC } \pm 20 \% , \sim 4.7 \text{ W} , \text{ or} \]
\[ U = 24 \text{ V AC } \pm 10 \% , 50 ... 60 \text{ Hz} , \sim 7.5 \text{ VA} , \text{ or} \]
\[ U = 115 \text{ V AC } \pm 10 \% , 50 ... 60 \text{ Hz} , \sim 7.5 \text{ VA} , \text{ or} \]
\[ U = 230 \text{ V AC } \pm 10 \% , 50 ... 60 \text{ Hz} , \sim 7.5 \text{ VA} . \]

The maximum safety voltage is
\[ U_m = \begin{array}{l}
33 \text{ V at 24 V AC/DC} , \text{ resp.} \\
130 \text{ V at 115 V AC} , \text{ resp.} \\
253 \text{ V at 230 V AC} . \\
\end{array} \]

The electric circuit of the sensor is designed with "Intrinsic safety" (ia) ignition protection class with a linear output characteristic. Output values per electric circuit are

| Output voltage | \( U_o \) | 28.4 \text{ V} |
| Output current | \( I_o \) | 99.5 \text{ mA} |
| Output power | \( P_o \) | 705 \text{ mW} |
| Internal capacitance | \( C_i \) | negligibly small |
| Internal inductance | \( L_i \) | negligibly small |

Permissible external

\[ \begin{array}{ccc}
\text{IIIC} & 680 \mu \text{H} & 500 \mu \text{H} & 5 \text{ mH} & 2 \text{ mH} \\
\text{IIB} & 59 \text{ nF} & 67 \text{ nF} & 240 \text{ nF} & 290 \text{ nF} \\
\end{array} \]

The intrinsically safe sensor circuits are galvanically isolated from the supply circuit safely up to a peak crest voltage of 375 \text{ V}.

As outputs five relays are available each with potential-free relay contacts. The terminal values are:

\[ \begin{array}{l}
\text{Alternating current AC} \quad U \leq 250 \text{ V} ; I \leq 5 \text{ A} ; P \leq 100 \text{ VA} ; \cos \varphi \geq 0.7 \\
\text{Direct current DC} \quad U \leq 250 \text{ V} ; I \leq 250 \text{ mA} ; P \leq 50 \text{ W} \\
\end{array} \]

When an acknowledge button is used it must be potential-free, as the connectors are wired-up to the power supply!

The evaluation unit can be used in the following ambient temperature range:
\[ T_a = -20 ^\circ C ... +50 ^\circ C \]