Safety instructions for steam boiler approval

**Levelflex M FMP45, Levelflex M FMP45 + process transmitter RMA422**

Guided level-radar as limiting device for high level water and low level water

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### Application

Guided level-radar as limiting device for high level water and low level water for liquids in tanks to meet the particular requirements as per EN 12952-11 and EN 12953-9.

The measuring device fulfils the requirements concerning:
- Electrical safety as per IEC/EN 61010-1
- Functional safety as per IEC 61508/IEC 61511
- Explosion protection (depending on the version)
- Electromagnetic compatibility as per EN 61326 and NAMUR recommendation NE 21

### Your benefits

- Used as limiting device as per EN 12952-11/EN 12953-9 for FMP45 and FMP45 + RMA422 (certified by TÜV Nord)
- Permanent self-monitoring
- Continuous measurement
- Measurement is virtually independent of product properties
- Measurement is possible even at strongly agitated surfaces and foam
- Easy commissioning

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Endress+Hauser
People for Process Automation
# Table of contents

**Introduction** .............................................. 3

**Structure of the measuring system** .......................... 3
- System components .................................................. 3
- System description/function ......................................... 4
- Permitted device types ................................................. 5
- Supplementary device documentation .............................. 6

**Installation and commissioning** ............................. 7
- Installation instructions/engineering ............................... 7
- Behavior during normal operation and in case of error ........... 7
- Gas phase compensation ............................................... 8
- Installation conditions .................................................. 9
- Instrumentation options ............................................... 9
- Commissioning .......................................................... 13
- Configuration ........................................................... 14
- Operation ................................................................. 16
- Error of measurement .................................................... 17

**Maintenance** .................................................... 18
- Maintenance .............................................................. 18

**Checking device operativeness** ................................ 18
- Testing ....................................................................... 18

**Repairs** ............................................................... 18
- Repairs ..................................................................... 18

**Certificates** .......................................................... 19
- Levelflex M FMP45 ........................................................ 19
- Levelflex M FMP45 + process transmitter RMA422 ............... 20
Introduction

Note!
The device may only be installed and commissioned by suitable and trained staff. Maintenance work and adjustments may only be performed by authorized staff who have received special training.

The nameplate indicates the technical characteristics of the device. A device without a device-specific nameplate must not be commissioned or operated!

Structure of the measuring system

System components

The measuring system’s devices are displayed in the following diagram (example).

An analog safety signal (4 to 20 mA) proportional to the level is generated in the transmitter. This is sent to a process transmitter (optional, e.g. RMA422) and a downstream logic unit (e.g. PLC, limit signal transmitter, etc.) where it is monitored to determine whether it overshoots or undershoots a specified limit value. For fault monitoring, the logic unit must recognize both HI-alarms ($\geq 21.0$ mA) and LO-alarms ($\leq 3.6$ mA (2-wire), $\leq 2.4$ mA (4-wire)).
The Levelflex M is a "downward-looking" measuring system that functions according to the ToF method (ToF = Time of Flight). The distance from the reference point (process connection of the measuring device) to the product surface is measured. High-frequency pulses are injected to a probe and led along the probe. The pulses are reflected by the product surface, received by the electronic evaluation unit and converted into level information. This method is also known as TDR (time domain reflectometry).

The level measuring device records the minimum or maximum level in a tank for the generation of steam using the time-of-flight measurement method in accordance with the scope of EN 12952-11 and EN 12953-9.

Used as a limiting device for high level water and low level water, the Levelflex FMP45 or the Levelflex FMP45 + process transmitter RMA422 is classified as part of a safety system. It can be used in a 2-wire and 4-wire version (both versions with overlying HART communication).

The protection function for the entire boiler is covered by an additional safety system and actuator.
Permitted device types

The details in these instructions relate to the device versions listed below and are valid as of the specified software and hardware version. Unless otherwise specified, all subsequent versions can also be used for limiting devices.

Levelflex M FMP45

<table>
<thead>
<tr>
<th>Feature</th>
<th>Designation</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>Approval</td>
<td>All</td>
</tr>
<tr>
<td>020</td>
<td>Process Temperature</td>
<td>All</td>
</tr>
<tr>
<td>030</td>
<td>Probe</td>
<td>K, L, M, N, S, T, U, V</td>
</tr>
<tr>
<td>040</td>
<td>Process Connection</td>
<td>All</td>
</tr>
<tr>
<td>050</td>
<td>Power Supply; Output</td>
<td>B, G, H</td>
</tr>
<tr>
<td>060</td>
<td>Operation</td>
<td>All</td>
</tr>
<tr>
<td>070</td>
<td>Type of Probe</td>
<td>All</td>
</tr>
<tr>
<td>080</td>
<td>Housing</td>
<td>All</td>
</tr>
<tr>
<td>090</td>
<td>Cable Entry</td>
<td>All</td>
</tr>
<tr>
<td>100</td>
<td>Additional Option</td>
<td>D, U, V, Y (TSP8N0008)</td>
</tr>
</tbody>
</table>

Valid software version: as of 01.04.02
Valid hardware version (electronics): as of delivery date August 2008

Process transmitter RMA422

<table>
<thead>
<tr>
<th>Feature</th>
<th>Designation</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>Approval</td>
<td>K, L</td>
</tr>
<tr>
<td>020</td>
<td>Power supply</td>
<td>All</td>
</tr>
<tr>
<td>030</td>
<td>Measuring Signal</td>
<td>2</td>
</tr>
<tr>
<td>040</td>
<td>Display; Operating</td>
<td>All</td>
</tr>
<tr>
<td>050</td>
<td>Output</td>
<td>3</td>
</tr>
<tr>
<td>060</td>
<td>Relay</td>
<td>2</td>
</tr>
<tr>
<td>070</td>
<td>Additional Option</td>
<td>All</td>
</tr>
</tbody>
</table>

Valid software version: 02.01
### Supplementary device documentation

<table>
<thead>
<tr>
<th>Documentation</th>
<th>Contents</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Information</td>
<td>– Technical data</td>
<td>– The documentation is available on the Internet.</td>
</tr>
<tr>
<td>(FMP45)</td>
<td>– Instructions on accessories</td>
<td>→ <a href="http://www.endress.com">www.endress.com</a>.</td>
</tr>
<tr>
<td>(RMA422)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Instructions (HART)</td>
<td>– Identification</td>
<td>– The documentation is supplied with the device.</td>
</tr>
<tr>
<td>(FMP45)</td>
<td>– Installation</td>
<td>– The documentation is also available on the Internet.</td>
</tr>
<tr>
<td>(RMA422)</td>
<td>– Wiring</td>
<td>→ <a href="http://www.endress.com">www.endress.com</a>.</td>
</tr>
<tr>
<td>– Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Commissioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Accessories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Troubleshooting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Technical data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Appendix: menu diagram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Instructions (Device Functions)</td>
<td>– Instructions on use</td>
<td>– The documentation is available on the Internet.</td>
</tr>
<tr>
<td>(FMP45)</td>
<td>– Levelflex M function menu</td>
<td>→ <a href="http://www.endress.com">www.endress.com</a>.</td>
</tr>
<tr>
<td>– Function groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Envelope curve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Troubleshooting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Function menu index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional Safety Manual</td>
<td>– SIL Declaration of Conformity</td>
<td>– FMP45 and RMA422 have a SIL 2 rating (MIN, MAX and range)</td>
</tr>
<tr>
<td>(FMP45)</td>
<td>– Introduction</td>
<td>– The documentation is available on the Internet.</td>
</tr>
<tr>
<td>(RMA422)</td>
<td>– Structure of the measuring system</td>
<td>→ <a href="http://www.endress.com">www.endress.com</a>.</td>
</tr>
<tr>
<td>– Description of the safety requirements and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>boundary conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Proof-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Repairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Appendix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Certificate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Instructions (depending on the selected</td>
<td>– Safety, installation and operating</td>
<td>Additional safety instructions (XA, XB, XC, ZE, ZD) are supplied with certified device versions.</td>
</tr>
<tr>
<td>version &quot;Approval&quot;)</td>
<td>instructions for devices, which are suitable</td>
<td>Please refer to the nameplate for the relevant safety instructions.</td>
</tr>
<tr>
<td></td>
<td>for use in potentially explosive atmospheres</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or as overfill protection (WHG, German Water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resources Act).</td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

**Levelflex M; Levelflex M + process transmitter**

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6

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**Installation and commissioning**

**Installation instructions/engineering**

At least two probes are required in redundancy for the measurement of the maximum and minimum level in a steam generator (voting 1oo2, "one out of two"). To increase availability, it is recommended that three probes be installed in a voting 2oo3 ("two out of three").

The Levelflex M transmitter can be installed directly in the tank or in a bypass.

A rod probe of suitable length can be used if the limiter is installed in a stilling well (protective tube) or bypass (≤ DN150) provided by the customer. A coaxial probe must be used if the limiter is freely installed in the boiler or in stilling well or bypass (≥ DN150).

The level sensor must be arranged, installed and protected in such a way that its function is not hampered by:
- Foam and turbulence in the boiler water
- Buildup of dirt
- Mechanical influences during operation (e.g. vibrations)
- Position changes in relation to the protective tube or other electrodes, which could lead to a short-circuit.

**Behavior during normal operation and in case of error**

The integrated broken probe detection function must be enabled (→ 13, "Commissioning")!

**Voting 1oo2**

During normal operation
- If the limit value (LLW/HLW) to be monitored is reached, at least one of the sensors shows a message on the display.

In case of error
- In the event of a dangerous detected device failure (e.g. error current):
  - The system is no longer single-fault safe. Immediate action is necessary!
- In the event of a dangerous undetected device failure:
  - Failure detection by comparing signals or
  - Failure detection by performing recurrent function testing.
  - The device is no longer single-fault safe. Immediate action is necessary!

**Voting 2oo3**

During normal operation
- If the limit value (LLW/HLW) to be monitored is reached, at least two of the sensors show a message on the display.

In case of error
- In the event of a dangerous detected device failure (e.g. error current):
  - The system is still single-fault safe (1oo2). Repair the defective sensor!
- In the event of a dangerous undetected device failure:
  - Failure detection by comparing signals (1-2, 2-3, 3-1) or
  - Failure detection by performing recurrent function testing.
  - The device is no longer single-fault safe. Immediate action is necessary!

The fault must be acknowledged manually after checking or replacing the probe(s).

Note!
Errors that occur during commissioning or measuring are displayed immediately as plain-text errors on the display. In addition, a unique error code is also output. A description of the error codes is provided in the Operating Instructions (→ 6, "Supplementary device documentation").

If two or more system or process errors occur, the error with the highest priority is the one shown on the display!
Gas phase compensation

If the device version with automatic time-of-flight compensation in steam applications is used, the guidelines on reference length and safety distance to the max. level must be adhered to:

- Reference length \( L_{\text{ref}} = 300 \text{ mm or 550 mm} \) (depending on the device version)
- Safety distance \( = 150 \text{ mm} \)

The useable measuring range of the level probe is between the end of the probe (MIN) and the safety distance (MAX; 150 mm below reference length \( L_{\text{ref}} \)).

The information specified in the relevant Technical Information TI386F must be observed.

Note!
Coax probes with reference reflection can be installed in all tanks (freely in the tank or in a bypass). Coax probes are ready-mounted and calibrated ex works.

Rod probes are only recommended if a coax probe cannot be installed (e.g. where the diameter of the bypass is very small).

Rod probes with reference reflection are only suitable for installation in stilling wells and bypasses. The diameter \( D_{\text{ref}} \) of the probe rod in the range of reference distance \( L_{\text{ref}} \) must be appropriately selected in relation to the pipe internal diameter \( iD \), → the table on the next page. The pipe must be cylindrical in the range of reference distance \( L_{\text{ref}} \). Changes in the cross-section, e.g. at flange connections, must not exceed 5% of internal diameter \( iD \).

<table>
<thead>
<tr>
<th>Modification</th>
<th>Diameter ( D_{\text{ref}} ) of the probe in the range of ( L_{\text{ref}} )</th>
<th>Internal diameter ( iD ) of the stilling well/bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSP8N0008</td>
<td>25 mm</td>
<td>45 to 70 mm</td>
</tr>
<tr>
<td>* Others on request</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After installation, the settings must also be checked, and adjusted if necessary, by qualified staff. For this reason, the rod probe with reference reflection is only available on request.
Installation conditions

Installation and wiring

Installation and wiring of the device is described in the relevant Operating Instructions (→ 6, "Supplementary device documentation").

Note!
Correct installation is a prerequisite for safe operation of the device.

Orientation

The permitted orientation of the device is also described in the Operating Instructions.

Caution!
- The angle of inclination of the probe must not exceed 30°. The length of the probe is limited to 1000 mm if installed in a slanted position.

System components

A suitable transmitter power supply unit, e.g. RMA422, can be used if switching contacts are necessary. When using the RMA422, ensure that the unit cannot quit a status defined as safe in the event of power failure/power recovery (self-retaining). This can be achieved by means of switching using contactors for example.

Instrumentation options

A number of examples are shown (schematically) in the diagrams below for the FMP45 or the FMP45 + RMA422 wiring schemes when used in limiting devices.

Other wiring schemes that comply with the certificate are possible.

Wiring scheme and signal analysis of the Levelflex M (2-wire or 4-wire version):
1 x low level water (NW), 1 x high level water (HW)

1 x low level water (NW), 1 x high level water (HW), higher availability
2 x low level water (NW), 1 x high level water (HW)

![Diagram of Levelflex M; Levelflex M + process transmitter](image1)

2 x low level water (NW), 1 x high level water (HW), higher availability

![Diagram of Levelflex M; Levelflex M + process transmitter](image2)

Wiring scheme and signal analysis of the Levelflex M (2-wire or 4-wire version) in conjunction with the RMA422 process transmitter:

1 x low level water (NW), 1 x high level water (HW)

![Diagram of Levelflex M; Levelflex M + process transmitter](image3)
Levelflex M; Levelflex M + process transmitter

1 x low level water (NW), 1 x high level water (HW), higher availability

![Diagram 1]

2 x low level water (NW), 1 x high level water (HW)

![Diagram 2]

2 x low level water (NW), 1 x high level water (HW), higher availability

![Diagram 3]
2 x low level water (NW), 1 x high level water (HW), control

Caution!
Further components necessary for signal analysis!

\[ \text{AI1, AI2 Analog input} \]
\[ \text{DO1, DO2 Relay output} \]
\[ \text{AO1, AO2 Analog output} \]

2 x low level water (NW), 1 x high level water (HW), control

\[ \text{AI1, AI2 Analog input} \]
\[ \text{DO1, DO2 Relay output} \]
\[ \text{AO1, AO2 Analog output} \]
### Commissioning

Commissioning of the device is described in the relevant Operating Instructions (→ 6, "Supplementary device documentation").

#### Caution!
The integrated broken probe detection function must be enabled!
If this function is switched off, it can be enabled as follows:

**Case A**

FMP45 without gas phase compensation:
1. With the probe uncovered, perform a mapping ("Range of mapping" (052) and "Start mapping." (053)).
2. Activate the "Broken probe det" (019) function in the "Safety settings" (01) function group.

To ensure that the broken probe detection function works correctly, a mapping must have been performed in the tank beforehand.
The mapping must be at least 1 m in length since it has to cover the launch area.

**Case B**

FMP45 with gas phase compensation:
1. The value 300 must be entered in the "Unlock parameter" (0A4) in the "Diagnostics" (0A) function group.
2. Adjusting the threshold for broken probe detection:
   In the "Broken probe" (0D9) submenu in the "Service" (0D) function group, change the "Reflection factor" (0D93) parameter from 0.4 to 1.1.
3. Activate the "Broken probe det" (019) function in the "Safety settings" (01) function group.
4. To lock, enter the value 100 in the "Unlock parameter" (0A4) in the "Diagnostics" (0A) function group.

Optional (only possible via FieldCare):
Read the envelope curves to verify the settings.
Under "Read curve", click "Threshold broken probe" and check whether the broken probe threshold at the zero point is approx. 100 mV lower than the largest negative reflection of the launch.

#### Note!
A number of parameters are preconfigured in devices with automatic time-of-flight compensation (gas phase compensation) and they must not be changed (→ 18, Section "Repairs").

Also note the following in devices with automatic time-of-flight compensation (gas phase compensation):

- The probe length must be configured to the value "2 times the physical probe length LN" as the expected shifts of the level echo are in this range.
- If a reset was carried out, the initial settings made in delivery status must be restored (→ parameter values in table, → 18).
- If the "Medium property" parameter was changed, the "upper block. distance" parameter must be reconfigured subsequently (→ parameter value in table, → 18).
Configuration

The configuration is performed as follows depending on the application:

Steam boiler approval without WHG, without gas phase compensation

Option 1
- The parameters are safety-oriented with the "WHG" setting in 018 (→ information in the following table). Modifications are not possible as the settings are locked.

Option 2
- As an alternative to activating the "WHG" setting, it is also possible to make the safety-oriented setting manually. In doing so, please observe the information in the table below.

Steam boiler approval with WHG, without gas phase compensation

- The parameters are safety-oriented with the "WHG" setting in 018 (→ information in the following table). Modifications are not possible as the settings are locked.

Steam boiler approval without WHG, with gas phase compensation

Note!
The "WHG" setting may not be selected in 018.
- The safety-oriented setting must be made manually. In doing so, please observe the information in the table below!

"threshold near", "threshold attenuation constant" and "threshold far" are preset at the factory and may not be modified.

Note!
The parameters in *italics* are located on the service level, which can be opened with the code "300".

<table>
<thead>
<tr>
<th>FieldCare/Display - plain text display</th>
<th>Value/parameter</th>
<th>Display VU331</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety settings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>output on ALARM</td>
<td>Max. 110 %, 22 mA</td>
<td>010</td>
<td>Parameter must be configured in this way</td>
</tr>
<tr>
<td>outp. echo loss</td>
<td>ALARM</td>
<td>012</td>
<td>Parameter must be configured in this way</td>
</tr>
<tr>
<td>delay time</td>
<td>1 s</td>
<td>014</td>
<td>→ Note 1</td>
</tr>
<tr>
<td>in safety distance</td>
<td>self holding</td>
<td>016</td>
<td>→ Note 3</td>
</tr>
<tr>
<td>Filtering/averaging/delay</td>
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<td></td>
</tr>
<tr>
<td>For software 01.02.zz:</td>
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</tr>
<tr>
<td>envelope statistics</td>
<td>0</td>
<td>0D21</td>
<td>→ Note 2</td>
</tr>
<tr>
<td>For software 01.04.zz:</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>envelope statistics up</td>
<td>0</td>
<td>0D23</td>
<td>→ Note 2</td>
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<tr>
<td>envelope statistics down</td>
<td>0</td>
<td>0D24</td>
<td>→ Note 2</td>
</tr>
<tr>
<td>max. low pass</td>
<td>10 s</td>
<td>0D14</td>
<td>→ Note 2</td>
</tr>
<tr>
<td>delta at min.</td>
<td>0 mm</td>
<td>0D15</td>
<td>→ Note 2</td>
</tr>
<tr>
<td>General:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAM filt. length</td>
<td>5</td>
<td>0D11</td>
<td>→ Note 2</td>
</tr>
<tr>
<td>MAM filt. border</td>
<td>1</td>
<td>0D12</td>
<td>→ Note 2</td>
</tr>
<tr>
<td>output damping</td>
<td>0</td>
<td>058</td>
<td>→ Note 2</td>
</tr>
</tbody>
</table>
### Echo detection

For software 01.04.zz:

- **Detection window**
  - Off
  - Parameter **must** be configured in this way

- **Merging echoes**
  - Parable fit
  - Parameter **must** be configured in this way

**General:**

- **Threshold near**
  - \(0.04 \times 0D85, \text{if } "\text{Tank prop.}" (002) = \text{coax probe}(4), 0.07 \times 0D85, \text{otherwise}\)
  - Parameter **must** be configured in this way

- **Threshold attenuation constant**
  - \(0D86\)
  - \(0D36\) → Note 3, 5

- **Threshold far**
  - \(0.04 \times 0D87, \text{if } "\text{Tank prop.}" (002) = \text{coax probe}(4), 0.07 \times 0D87, \text{otherwise}\)
  - Parameter **must** be configured in this way

- **EOP evaluation**
  - On
  - Parameter **must** be configured in this way

- **EOP in upper area**
  - Echo preferred (factory setting)
  - Parameter **must** be configured in this way
  → Also Note 4

- **First echo factor**
  - 6 dB
  - Parameter **must** be configured in this way

- **Max. filling speed**
  - 0 mm/s (factory setting)
  - Parameter **must** be configured in this way

- **Max. drain speed**
  - 0 mm/s (factory setting)
  - Parameter **must** be configured in this way

**Other**

- **Hysterese width**
  - 0 mm (factory setting)
  - Parameter **must** be configured in this way

- **Communication address**
  - 0
  - Parameter **must** be configured in this way

- **Current output mode**
  - "Standard" if previously "fixed current"
  - Parameter **must** be configured in this way

- **Simulation**
  - Sim./OFF
  - Parameter **must** be configured in this way

---

**Note!**

1. This parameter determines the reaction time of the device in the event of echo loss; a setting of less than 30 s is recommended.
2. This parameter determines the reaction time of the device; deviating settings are possible. In case of changes in "process cond." (004) it is automatically adjusted. The corresponding reaction time is indicated in the documentation BA245F.
3. This parameter can be selected differently, depending on the application.
4. In the "Tank properties" (002) function, "aluminum tank" may not be used!
5. In the case of devices with gas phase compensation, these parameters are preset at the factory and may not be modified.

A measuring condition (echo) which results in an ALARM in the "Safety distance SD" area can be reset or deleted by

- confirming the ALARM in Pos. 017 locally by means of the VU331 LCD display;
- confirming the alarm via the communication protocol [HART] (FieldCare; "ackn. alarm" under safety settings).
**Locking**

The device must be locked once the Levelflex M has been calibrated as per the Operating Instructions. To do this, hardware locking (recommended) or software locking can be activated.

<table>
<thead>
<tr>
<th>Type of locking</th>
<th>Code/action</th>
<th>Position/VU331 display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware (recommended)</td>
<td>3 keys together &quot;lock&quot;</td>
<td>Locally via VU331 display (keys O and S and F)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of unlocking</th>
<th>Code/action</th>
<th>Position/VU331 display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware; if locked</td>
<td>3 keys together &quot;unlock&quot;</td>
<td>Locally via VU331 display (keys O and S and F)</td>
</tr>
</tbody>
</table>

**Unlocking**

The device is unlocked by firstly removing the hardware lock by locally pressing all the three keys together via the VU331 LCD display and then by setting the "Overfill protection" parameter (Position 018) to "Standard" if necessary.

<table>
<thead>
<tr>
<th>Type of unlocking</th>
<th>Code/action</th>
<th>Position/VU331 display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware; if locked</td>
<td>3 keys together &quot;unlock&quot;</td>
<td>Locally via VU331 display (keys O and S and F)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of unlocking</th>
<th>Code/action</th>
<th>Position/VU331 display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware; if locked</td>
<td>3 keys together &quot;unlock&quot;</td>
<td>Locally via VU331 display (keys O and S and F)</td>
</tr>
</tbody>
</table>

**Operation**

The level sensor can be operated for more than 24 hours without supervision as part of a limiting device. Adhere to the conditions as per EN 12952-7, section 7.3.9 in this regard. 72-hour operation or operation without supervision are thus also covered.

**Device response after power interruption**

After the device is switched on or after power interruption, the measured value is only available after 17 s.
**Error of measurement**

**Levelflex M FMP45**

Under the influence of the gas phase, the propagation speed of the measuring signals changes with the result that a greater error of measurement is to be expected as the pressure increases. A level that is too low is displayed systematically (→ T1386F/00).

The impact on the measuring signal can be compensated with the gas phase compensation option (product version "U, V, Y (TSP8N0008)").

If the gas phase compensation option is used, the greater the reference distance \(L_{\text{ref}}\) and smaller the measuring range, the higher the accuracy under reference operating conditions:

![Graph showing measuring error vs. distance liquid/flange](image-url)

**Note!**

If there are fast changes in pressure, there may be an additional error, since the measured reference distance is filtered with twice the time constant of the level measurement. Furthermore, states of non-equilibrium, e.g. caused by heating, can lead to density and pressure gradients in the medium as well as to condensation of steam at the probe. As a result, levels that are somewhat different may be measured at different places in the tank. Application-specific influences of this type can increase the specified error of measurement (typically up to a factor 2 to 3).

**Process transmitter RMA422**

The measured error (full scale) is 1 % for use of process transmitter RMA422 in limiting devices.
Maintenance

Please refer to the relevant Operating Instructions (→ 6, "Supplementary device documentation") for instructions on maintenance and recalibration.

Alternative monitoring measures must be taken to ensure process safety during configuration, testing and maintenance work on the device.

Caution!
- During operation, the Levelflex M FMP45 is hot!
  Risk of serious burns to the hands and arms.
- Steam or hot water can come out when the probe is released!
  Risk of serious scalding to the whole body!
- Only carry out installation and maintenance work when the device has cooled down!
- Only disassemble the Levelflex M FMP45 when the boiler pressure is 0 bar!

Checking device operativeness

Testing

The operativeness and safety of the limiter must be checked at regular intervals.

Perform the proof-test so that correct functioning of the limiting device is verified in combination with all components. To do this, check the measurement and trip function, e.g. by reducing or increasing the water level.

Note!
Suitable test sequences for Levelflex M are described in SD174F, chapter "Proof-test".

Repairs

Repairs on the devices must always be carried out by Endress+Hauser. Safety functions cannot be guaranteed if repairs are carried out by anybody else.

Exception in the case of Levelflex M FMP45:
The following components can be replaced by the customer if the person responsible for doing so has been trained beforehand by Endress+Hauser:
- Terminal module (2-wire)
- Power supply (4-wire)
- Probe rods and ropes

Contrary to the guidelines in the Operating Instructions, the following parameters are preconfigured in devices with automatic time-of-flight compensation (gas phase compensation) and must be reconfigured after the electronics has been replaced:

<table>
<thead>
<tr>
<th>Function group</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic setup</td>
<td>medium property</td>
<td>&gt; 7</td>
</tr>
<tr>
<td></td>
<td>tank property</td>
<td>Coax probe (with coax probe), bypass/pipe (with rod probe)</td>
</tr>
<tr>
<td>Extended calibr.</td>
<td>upper block. distance</td>
<td>Lref + 50 mm</td>
</tr>
<tr>
<td>Length adjustment</td>
<td>probe length</td>
<td>2 x LN</td>
</tr>
<tr>
<td>Extended calibr.</td>
<td>present map distance</td>
<td>0 mm (mapping deleted)</td>
</tr>
<tr>
<td>Safety settings</td>
<td>broken probe detection</td>
<td>ON</td>
</tr>
<tr>
<td>Service/broken probe</td>
<td>LBD broken probe</td>
<td>LN + 100 mm</td>
</tr>
<tr>
<td></td>
<td>reflection factor</td>
<td>1.1</td>
</tr>
<tr>
<td>Service/algorithm 2</td>
<td>reference dist.</td>
<td>Lref</td>
</tr>
<tr>
<td>Service/algorithm 2</td>
<td>ref. dist. win.</td>
<td>Lref</td>
</tr>
<tr>
<td>Service/algorithm 2</td>
<td>ref. dist. polarity</td>
<td>negative</td>
</tr>
</tbody>
</table>
Certificates

Levelflex M FMP45

Zertifikat
Certificate

Registrier-Nr. Registered No.
44 799 08 554124

Zeichen des Auftraggebers Auftragsdatum Date of order
Customer’s reference
13.03.2008

Aktenzeichen Aktenzeichen
File reference
8000054124

Prüfbericht Nr. Test report no.
WB 8107/08

Name und Anschrift des Auftraggebers Endress+Hauser GmbH&Co. KG
Name and address of the customer
Hauptstraße 1
76889 Maulburg
Deutschland

Tested in accordance with
5.5 Überprüfung der Funktionsfähigkeit gem.
Tabelle 1, Pos. A
5.6 Fehlermeldungen
Anhang D

Bezeichnung, Typ Levelflex M Typ FMP 45... (Geführtes Füllstand-Radar) als
Designation, Type
Begrenzungseinrichtung für Hochwasser (HW) und
Niedrigwasser (NW)

Beschreibung des Produktes
(Details s. Anlage 1)
Standaufnehmer in Form von Stab-, Seil- oder Koaxsonden
mit integriertem Messumformer (Elektronikansatz) und
elektrischem Ausgangssignal, der nach der Laufzeit-
methode arbeitet. Hochfrequenzimpulse werden auf die
Sonde eingekoppelt und entlang der Sonde geführt.
Die Impulse werden von der Produktoberfläche reflektiert,
von der Auswertelektronik empfangen und in die
Füllstandinformation umgesetzt.

Bemerkung
- Nach einer Spannungsunterbrechung ist zu beachten, dass der
  Messwert erst nach 1fs wieder zur Verfügung steht.
- Der Standaufnehmer kann für mehr als 24 Stunden ohne
  Beaufsichtigung als Teil einer Begrenzungseinrichtung
  betrieben werden, wenn die Anforderungen gem.
  EN 12952-7:2002, Abschnitt 7.3.9 eingehalten werden.
  Damit ist auch der 72 Stunden Betrieb bzw. der Betrieb ohne
  Beobachtung abgedeckt.

TÜV NORD CERT GmbH
Zertifizierungskette für Produktsicherheit
Certificate chain for product safety

Hanover, 17.07.2008
Hanover, 2008-07-17

Bitte beachten sie auch die umseitigen Hinweise *
Please also pay attention to the information stated on the back

Langanachse: 20  •  42111 Essen  •  Fon +49 (0)201 825 5120  •  Fax +49 (0)201 825 3209 *

* Only refers to general terms and conditions and is therefore not shown
Levelflex M FMP45 + process transmitter RMA422

Zertifikat
Certificate

Registrier-Nr.
Registration No.
44 799 09 371035

Zeichen des Auftraggebers
Customer’s reference
--

Auftragsdatum
Order date
07.05.2009

Aktenzeichen
File reference
800087035

Prüfbericht Nr.
Test report no
09 799 371035

Name und Anschrift des Auftraggebers
Endress+Hauser GmbH+Co. KG
Hauptstraße 1
79689 Maulburg
Deutschland

Customer’s name and address

Geprüft nach
5.6 Überprüfung der Funktionsfähigkeit gem. Tabelle 1, Pos. A 5.6 Fehlererkennung, Anhang D
EN 61508:2001

Tested in accordance with

Beschreibung des Produktes
Geführtes Füllstand-Radar
Guided Level Radar

Gebrauch der Produkte
(Details siehe Anhang 1)

Type Description

Typenbezeichnung
Levelflex M Typ FMP45… mit Prozessmessumformer Typ RMA422 als Begrenzungseinrichtung für HW und NW bzw. für NW/HW und Regelung in 2-Drant oder 4-Drahtausführung

Type Description

Gerät-Nr.
--

Serial-no.

Bemerkung
- Nach einer Spannungsunterbrechung ist zu beachten, dass der Messwört erst nach 17s wieder zur Verfügung steht.
- Die Messgeräte können für mehr als 24 Stunden ohne Beaufschlagung als Teil einer Regelungseinrichtung betrieben werden, wenn die Anfor-
derungen gem. EN 12952-7:2002, Abschnitt 7.3.3 eingehalten werden. Der
mit ist auch die 72 Stunden Betrieb bzw. der Betrieb ohne Beobachtung abge-

Remark

Dieses Zertifikat bescheinigt das Ergebnis der Prüfung an dem vorgestellten Prüfgegenstand. Eine allgemeine gültige Aussage über die
Qualität der Produkte aus der laufenden Fertigung kann hieraus nicht abgeleitet werden.

This certifies the result of the examination of the product sample submitted by the manufacturer. A general statement concerning the quality
of the products from the series manufacture cannot be derived there from.

TÜV NORD CERT GmbH
Zertifizierungsstelle
Certification body for product safety

Hannover, 17.08.2009
Hannover, 2009-08-17

Bitte beachten sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf.

Geschäftsstelle Hannover, Am TÜV 1, 30519 Hannover, Tel +49 (0)511 985 1455, Fax +49 (0)511 985 1590
Anhang 1 zum Zertifikat Nr.:
Annex 1 to Certificate no.

44 799 09 371035

Rev. 1

Aktenzeichen: 800371035

File reference

Allgemeine Angaben
General information

Typenbezeichnung
Type Description

Levellflex M Typ FMP45... (Geführtes Füllstand-Radar) mit Prozessmessumformer Typ RMA422 (Software-Version 2.01) als Begrenzungseinrichtung für HW und NW bzw. für NW/HW und Regelung in 2-Draht oder 4-Drahtausführung

Beschreibung des Produktes
Description of product

Messeinrichtung bestehend aus:
- Prozessmessumformer zur Erfassung und Weiterverarbeitung analoger Messsignale
  Analogausgänge 4 bis 20 mA und/oder Relaisausgänge

Ausgangssignale
Output signals

TÜV NORD CERT GmbH
Zertifizierungsstelle
Certification body for product safety

Hannover, 17.08.2009
Hannover, 2009-08-17

Geschäftsstelle Hannover, Am TÜV 1, 30539 Hannover, Fax +49 (0)511 986 1455, Fax +49 (0)511 986 1300
Levelflex M; Levelflex M + process transmitter