

Filling level sensor

Original operating manual

Series with
Modbus[®] RTU interface
UFM MD
UFM MD Flex



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We reserve the right to make technical changes.
Read carefully before use.
Save for future use.

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1 About this document

This manual

- is part of the equipment
- applies to all series referred to
- describes safe and proper operation during all operating phases

1.1 Target groups

Operating company

- Responsibilities:
 - Always keep this manual accessible where the device is used on the system.
 - Ensure that employees read and observe this document, particularly the safety instructions and warnings, and the documents which also apply.
 - Observe any additional country-specific rules and regulations that relate to the system.

Qualified personnel, fitter

- Mechanics qualification:
 - Qualified employees with additional training for fitting the respective pipework.
- Electrical qualification:
 - Qualified electrician
- Transport qualification:
 - Qualified transport specialist
- Responsibility:
 - Read, observe and follow this manual and the other applicable documents, especially all safety instructions and warnings.

1.2 Other applicable documents

| | |
|---|--|
| To download: Resistance lists Resistance of materials used to chemicals |  |
| www.asv-stuebbe.de/pdf_resistance/300051.pdf | |
|  To download: Datasheet Technical specifications, conditions of operation | |
| www.asv-stuebbe.de/pdf_datasheets/300184.pdf | |
| To download: CE declaration of conformity Conformity with standards |  |
| www.asv-stuebbe.de/pdf_DOC/300150.pdf | |

Tab. 1 Other application documents, purpose and where found

1.3 Warnings and symbols

| Symbol | Meaning |
|--|--|
|  | <ul style="list-style-type: none"> • Immediate acute risk • Death, serious bodily harm |
|  | <ul style="list-style-type: none"> • Potentially acute risk • Death, serious bodily harm |
|  | <ul style="list-style-type: none"> • Potentially hazardous situation • Minor injury |
|  | <ul style="list-style-type: none"> • Potentially hazardous situation • Material damage |
|  | Safety warning sign ► Take note of all information highlighted by the safety warning sign and follow the instructions to avoid injury or death. |
| ► | Instruction |
| 1. , 2. , ... | Multiple-step instructions |
| ✓ | Precondition |
| → | Cross reference |
|  | Information, notes |

Tab. 2 Warnings and symbols

2 General safety instructions

 The manufacturer accepts no liability for damages caused by disregarding any of the documentation.

2.1 Intended use

The device measures or monitors the filling level of fluids via an ultrasonic sensor. The relay version switches off a consuming unit (e.g. pump) if limit values are exceeded or not achieved. The limit values are adjustable.

- Device must only be used for monitoring filling level in liquid media.
- Only use the device with suitable media (→ resistance lists).
- Adhere to the operating limits (→ [10.1 Technical specifications, Page 21](#)).

2.2 General safety instructions

 Observe the following regulations before carrying out any work.

2.2.1 Obligations of the operating company

Safety-conscious operation

- Only operate the device if it is in perfect technical condition and only use it as intended, staying aware of safety and risks, and in adherence to the instructions in this manual.
- Ensure that the following safety aspects are observed and monitored:
 - Intended use
 - Statutory or other safety and accident-prevention regulations
 - Safety regulations governing the handling of hazardous substances
 - Applicable standards and guidelines in the country where the pump is operated
- Make personal protective equipment available.

Qualified personnel

- Make sure all personnel tasked with work on the device have read and understood this manual and all other applicable documents, especially the safety, maintenance and repair information, before they start any work.
- Organize responsibilities, areas of competence and the supervision of personnel.
- The following work should be carried out by specialist technicians only:
 - Installation, repair and maintenance work
 - Work on the electrical system
- Make sure that trainee personnel only work on the device under supervision of specialist technicians.

2.2.2 Obligations of personnel

Only complete work on the device if the following requirements are met:

- System is empty
- System has been flushed
- System is depressurized
- System has cooled down
- System is secured against being switched back on again
- Do not make any modifications to the device.

2.3 Specific hazards

2.3.1 Hazardous media

- When handling hazardous media, observe the safety regulations for the handling of hazardous substances.
- Use personal protective equipment for all work on the device.
- Collect leaking pumped liquid and residues in a safe manner and dispose of in accordance with environmental regulations.

3 Layout and Function

3.1 Type plate

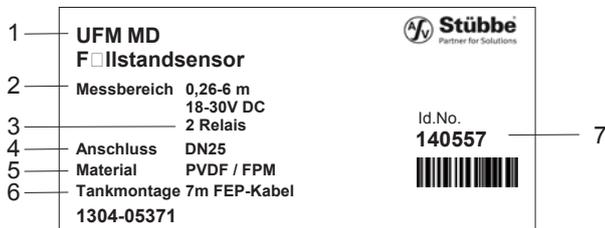


Fig. 1 Type plate

- 1 Device type
- 2 Filling level measurement range
- 3 Output
- 4 Connection (nominal width)
- 5 Media connection and gasket material
- 6 Installation type
- 7 ID number

Device type with Modbus® RTU interface:

- UFM MD Flex – Flex, relay output

3.2 Description

The device measures or monitors the filling level of fluids using an ultrasonic sensor. The relay version switches off a consuming unit (e.g. pump) if limit values are exceeded or not achieved. The limit values are adjustable.

The device is suitable for measuring the filling level in pressureless tanks and pressure tanks. Underpressure, vacuum, or outgassing media increase the measurement inaccuracy.

The device is integrated within the control of the consuming unit using the following inputs and outputs:

- 2 relay outputs (changeover contact, SPDT)
Control via limit values or Modbus
- 2 optically isolated inputs (optocoupler) for
 - Launching applications
 - Reading the status of the inputs via the Modbus
- Modbus RS485 interface
The Modbus RTU is a popular data exchange format. Devices with an RTU RS485 interface can be connected to one another and communicate with a master device.
- Flex
 - Connection and sensor housing separate
 - Process connection linked to the connection housing via cable
 - Sensor housing installed from above into a tank or container

- Versions available:
 - UFM 200 (PVDF):
Measurement range 0,12 – 1,8 m
 - UFM 200 (PE/Epoxy):
Measurement range 0,08 – 2,0 m
 - UFM 600 (PVDF):
Measurement range 0,25 – 6 m

The UNI display (optional) shows measured value. It can be used for all measuring instruments of the UNI display device platform PTM, HFT and UFM. The UNI display offers the following additional functions:

- Graphic filling level display
- Displays status of the relay outputs
- Displays status of inputs
- Menu-guided device setting
- Data logger function with date stamp
- Saving and transfer of parameter settings to other sensors
- Memory function on microSD card
- Firmware update

3.3 Layout

3.3.1 UFM 200 Flex



Fig. 2 Housing and flex sensor layout

- 1 Plug connector cable
- 2 Fastening clamp
- 3 Sensor housing
- 4 Fastening clamp
- 5 Spacer
- 6 Connection housing
- 7 Pipe clamp
- 8 Sensor cable
- 9 Ground connection

3.3.2 UFM 600 Flex

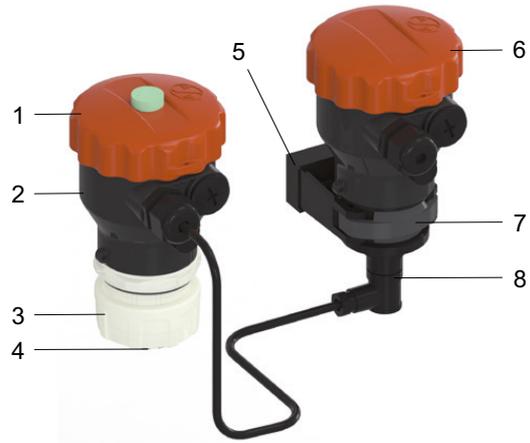


Fig. 3 Housing and flex sensor layout

- 1 Housing cover
- 2 Sensor housing
- 3 Process connection
- 4 Sensor
- 5 Spacer
- 6 Connection housing
- 7 Pipe clamp
- 8 Sensor cable

3.3.3 UNI display

The UNI display is fitted on to the connection housing (remove housing cover). The transparent cover supplied allows the measured values to be read during operation.

The device can be adjusted and put into operation using the UNI display.

The UNI display can be removed again once it has been put into operation. The UNI display remains attached if the intention is to display measured values permanently.

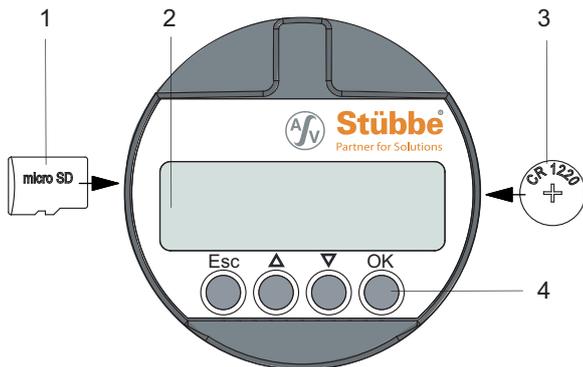


Fig. 4 UNI display layout

- 1 microSD card (with spring ejection)
- 2 Display
- 3 Battery
- 4 Operating buttons

3.3.4 Measured value display

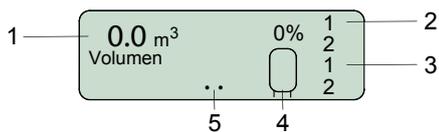


Fig. 5 Display of measured values

- 1 Filling level display (absolute and as a percentage)
- 2 Relay status display
Normal display = contact open
Inverted display = contact closed
- 3 Input status display
Normal display = switch on input open
Inverted display = switch on input closed
- 4 Graphical filling level display
- 5 Measuring signal
no dot = no signal
one dot = good
two dots = very good

4 Transport, Storage and Disposal

4.1 Unpacking and inspection on delivery

1. Unpack the device when received and inspect it for transport damage and completeness.
2. Check that the information on the type plate agrees with the order/design data.
3. Report any transport damage to the manufacturer immediately.
4. If fitted immediately: Dispose of packaging material according to local regulations.
 - If fitted at a later point: leave device in its original packaging.

4.2 Transportation

- ▶ Device should preferably be transported in the original packaging.

4.3 Storage

NOTE

Material damage due to inappropriate storage!

- ▶ Store the device properly.
1. Make sure the storage room meets the following conditions:
 - Dry
 - Frost-free
 - Vibration-free
 - Not in direct sunlight
 - Storage temperature +10 °C to +60 °C
 2. Device should preferably be stored in the original packaging.

4.4 Disposal

- 
 Plastic parts can be contaminated by poisonous or radioactive media to such an extent that cleaning will not be sufficient.


WARNING

Risk of poisoning and environmental damage from medium.

- ▶ Use personal protective equipment when carrying out any work on the device.
- ▶ Prior to the disposal of the device: Neutralize residues of medium in the device.

-
1. Remove battery and dispose of in accordance with local regulations.
 2. Remove electronic parts and dispose of in accordance with local regulations.
 3. Dispose of plastic parts in accordance with local regulations.

5 Installation and connection

5.1 Check operating conditions

1. Ensure the design of the fitting is consistent with the purpose intended:
 - Materials used (→ [3.1 Type plate, Page 6](#)).
 - Medium (→ order and design data).
2. Ensure the required operating conditions are met:
 - Resistance of body and seal material to the medium (→ resistance lists).
 - No underpressure or vacuum in the tank.
 - Temperature and pressure (→ [10.1 Technical specifications, Page 21](#)).
3. Consult with the manufacturer regarding any other use of the device.

5.2 Install device

5.2.1 Installing device in the tank

- ✓ Carefully select installation location in the tank:
 - Perpendicular to the surface of the fluid
 - Observe minimum distance to maximum filling level (→ [10.1 Technical specifications, Page 21](#)).
 - If tank is filled to the top edge, then provide a dome or set up a support to install the device
- ✓ Avoid interferences:
 - Do not install over turbulence or the vortex caused by agitators.
 - Do not install near filling pipes
 - Tank superstructures or installation (supports, dome, ladders, struts) must not protrude into the measuring cone of the device (aperture angle approx. 15°).
 - If necessary, shield tank installations (ladders, struts ...) with baffle plates (plastic or metal - no false echoes)
 - Install the device in a standpipe for heavily foaming media

NOTE

Damage to the device.

- ▶ Device must only be tightened to the tank using the correct wrench.
-

1. Ensure that the O-ring for sealing the process connection is inserted.
2. Screw sensor housing into the tank using the wrench (only hand-tight).

5.2.2 Install device over the channel

- ✓ Select the installation location over the channel with care:
 - Perpendicular to the liquid
 - Observe minimum distance to maximum level (→ [10.1 Technical specifications, Page 21](#)).
- ✓ Avoid interferences:
 - Do not install over turbulence or vortices
 - Do not install near inlet pipes

NOTE

Damage to the device.

- ▶ Device must only be tightened to the tank using the correct wrench.
-

1. Mount console as a bracket for the device above the channel.
2. Screw sensor housing into the console using the wrench (only hand-tight).

5.3 Electrical connection of device

- ✓ Device is installed.
- ✓ Power supply is switched off and secured against being switched back on again.

 Cable without shielding can be used to connect the device. If electromagnetic interference is anticipated, then use shielded cable.
Terminal strips are pluggable.

DANGER

Risk of electrocution

- ▶ All electrical work must be carried out by qualified electricians only.
- ▶ Switch off system power supply and secure it against being switched back on again.

1. Unscrew the housing cover from the connection housing, remove UNI display if required.
2. Guide the connection cable through the cable glands and connect:
 - Cable
 - Connection diagram ([→ 10.4 Connection diagrams, Page 21](#)).
3. Tighten the cable glands securely.
4. Insert jumper
 - If the bus cable ends at this device, plug jumper on to “ON”
 - If the bus cable does not end at this device or is extended, plug jumper on to “OFF” ([→ 10.4.2 Modbus RTU termination, Page 22](#)).
5. Screw on the housing cover.
6. Cut connection cable to length.
7. Fit the plug ([→ 10.4.3 Flex sensor connection, Page 23](#)).
8. Connect sensor housing and connection housing ([→ 10.4.3 Flex sensor connection, Page 23](#)).
9. Connect ground connection with the equipotential bonding of the entire system ([→ Figure Housing and flex sensor layout, Page 7](#)).
10. Use earthed Modbus power supply (power supply unit with PE connection).

6 Operation

NOTE

Changing parameters affects the switching outputs immediately.

- ▶ Make sure that changing a parameter does not trigger a malfunction (e.g. a pump running dry).

i When switching on the device, all relay contacts are open for 3 s (NO).
After this the relay contacts assume the status which corresponds with the setting and the measured values.

6.1 Basic operation using the UNI display

i Description of menus and functions
(→ 7.2 Main menu, Page 14).

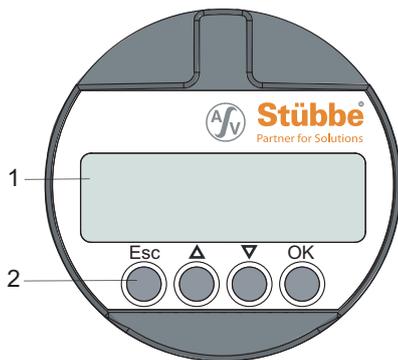


Fig. 6 UNI display

- 1 Display
- 2 Operating buttons

6.1.1 Measured value display

The display shows the measured value (e.g. volume).

| Button | Function |
|---------------------------|--|
| OK | Main menu |
| Esc | Switches measured value display to time and date view. |
| ▲ ▼ simultaneously | Changes the display direction. |

Tab. 3 Button functions with measured value display

6.1.2 Parameterizing

| Button | Functions |
|-------------------------|--|
| Esc | <ul style="list-style-type: none"> • Cancels input and switches to the higher-level menu. • Changes will not be saved. |
| ▲ | <ul style="list-style-type: none"> • Increases parameter value. • Previous menu/submenu • Press and hold to increase parameter value quickly. • Press ▼ at the same time to increase parameter value very quickly. |
| ▼ | <ul style="list-style-type: none"> • Reduces parameter value. • Previous menu/submenu. • Press and hold to reduce parameter value quickly. • Press ▲ at the same time to reduce parameter value very quickly. |
| OK | <ul style="list-style-type: none"> • Switches to the menu overview. • Switches to the menu/submenu selected. • Confirms parameter and saves value. |
| If no button is pressed | <ul style="list-style-type: none"> • The measured values are displayed after 2 minutes. • Changes will not be saved. |

Tab. 4 Button functions when parameterizing

6.2 Initial start-up with UNI display

 The UNI display can be removed again once it has been put into operation.

The UNI display remains attached if the intention is to display measured values permanently.

If the display is upside down, press ▲ ▼ buttons simultaneously.

- ✓ Device is installed properly.
 - ✓ Device is connected properly with the power supply and ready for operation.
1. Unscrew the housing cover.
 2. Insert UNI display on to the electronic equipment (white plug-in location).
 3. Configure device (→ 7.2 Main menu, Page 14).
 4. Remove UNI display if necessary.
 5. Screw on housing cover or transparent cover.

6.3 Managing several devices

 Using the UNI display and microSD card, parameter sets can be transferred between devices or archived on a PC.

 All microSD cards or microSDHC cards with FAT32 formatting are supported. Files must be maintained in the master directory.

Files should be named in Format 8.3 (e.g. PARA_1.ASV), otherwise only an abbreviated file name is displayed.

The memory function always names the files STUEBBE.ASV. If a STUEBBE.ASV file already exists on the microSD card, then this file is overwritten.

6.3.1 Backing up parameter sets

1. Save the parameter set from the device on to the microSD card (→ 7.7 Service menu, Page 17).
2. Insert the microSD card into the PC, then transfer and archive the STUEBBE.ASV file.

6.3.2 Parameterizing several devices

1. Parameterize the first device (→ 7.2 Main menu, Page 14).
2. Save the parameter set from the device on to the microSD card (→ 7.7 Service menu, Page 17).
3. Attach the UNI display, with the microSD cards inserted, on to the next device.
4. Save the parameter set from the microSD card on to the device (→ 7.7 Service menu, Page 17).

6.4 Reading the data logger

 Series of measurements can be created and read using the UNI display and microSD card.

1. Insert microSD card into a UNI display and attach the UNI display to the device.
2. Set up the data logger function (→ 7.6 Diagnostics menu, Page 16).
3. Remove the microSD card and read the log file (csv format) on the PC.

6.5 Updating firmware

 Current sensor firmware or UNI display firmware can be obtained via the Internet (→ www.asv-stuebbe.com/service/downloads).



In the event that the updating is interrupted (→ 9.1.1 Fixing software loading errors, Page 20).

1. Download the latest version of the sensor firmware (for example UFR_Vxx.HEX for Flex version) and UNI display firmware (UNI_Vxxx.HEX) from the Internet and save on the microSD card.
2. Insert the microSD card in a UNI display and attach the UNI display to the device.
3. Save sensor firmware or UNI display firmware from the microSD card on to the device (→ 7.7 Service menu, Page 17).
4. Observe release notes. If “reset factory settings” is necessary:
 - Note all parameters.
 - Perform “reset factory settings” (→ 7.2 Main menu, Page 14).
 - Reset the device (→ 7.7 Service menu, Page 17).
5. Check date and time, and reset if necessary (→ 7.3 Basic settings menu, Page 14).

7 Menus and functions

7.1 Measured value display

The display shows the measured value (e.g. volume).

| Button | Function |
|--------------------|--|
| OK | Main menu |
| Esc | Switches measured value display to time and date view. |
| ▲ ▼ simultaneously | Changes the display direction. |

Tab. 5 Button function with measured value display

7.2 Main menu

| Main menu | Function |
|----------------|--|
| Basic settings | Performs basic settings (→ 7.3 Basic settings menu, Page 14). |
| Output | Adjusts the behavior of the outputs (→ 7.4 Output menu, Page 15). |
| Display | Sets the display options (→ 7.5 Display menu, Page 16). |
| Diagnostics | Checks the diagnostics functions (→ 7.6 Diagnostics menu, Page 16). |
| Service | Performs the service functions (→ 7.7 Service menu, Page 17). |

Tab. 6 Main menu

7.3 Basic settings menu

| Submenu values | Function |
|---|--|
| Language | |
| German English French Spanish Italian | Sets the operating language |
| Lighting | |
| automatic | The display lighting switches on automatically for 15 seconds: • if the display value changes by 5% |
| using any button | The display lighting switches on for 15 s each time a button is pressed. |
| off | Display lighting is always off. |
| on | Display lighting is always on. |
| Integration time | |

| Submenu values | Function |
|---|--|
| 0 ... 60 s | Sets measurement interval for ultrasonic sensor to compensate for height fluctuations. An average is calculated and displayed using the measurement interval. This removes the effect of short-term height fluctuations. A long integration time delays the reaction to height fluctuations. |
| Basic calibration | |
| min. filling height | Setting % display filling level. The value set is displayed as "0%": ▶ ▲ ▼ – sets filling height for 0% ▶ OK – accepts setting. |
| max. filling height | Setting % display filling height. The value set is displayed as "100%": ▶ ▲ ▼ – sets filling height for 100% ▶ OK – accepts setting. |
| Tank volume | |
| xx.y m ³ xxxxx l | ▶ ▲ ▼ – sets volume of tank to be measured ▶ OK – accepts setting. |
| xxxx mm | ▶ ▲ ▼ – sets height of tank to be measured ▶ OK – accepts setting. |
| xxxx mm | ▶ ▲ ▼ – Sets installation height (height above tank floor) of the sensor. ▶ OK – accepts setting. |
| 100% | ▶ ▲ ▼ – tank height = 100% (yes/no). ▶ OK – accepts setting. |
| Container shape | |
| Linear Spherical tank Horizontal tank | ▶ ▲ ▼ – sets tank shape. ▶ OK – accepts setting. ▶ ▲ ▼ – sets number of tanks (1 ... 5) for accumulation tanks. ▶ OK – accepts setting. |
| Sensor | |
| | Display of measurement range for the sensor installed. |

| Submenu values | Function |
|---|---|
| Time | |
| DD.MM.YYYY HH:MM | Display/setting of date and time. The first position in the date is underlined. ▶ ▲▼ – adjusts value ▶ OK – accepts value and sets next position ▶ After setting minutes, OK returns you to the basic settings menu |
| Modbus settings | |
| Interface | Setting baud rate. ▶ ▲▼ – selects value between 2400 and 38400. ▶ OK – accepts setting. |
| All bus participants must have the same settings for baud rate / parity | Setting parity Same parity 1 stop bit No parity 2 stop bits ▶ ▲▼ – adjusts value. ▶ OK – accepts setting. |
| Address | Setting slave address The first position in the address is underlined. ▶ ▲▼ – selects value between 1 and 247. ▶ OK – accept value and set next position. ▶ After setting the last number, OK returns you to the basic settings menu. |
| All bus participants must have different addresses | |

Tab. 7 Basic settings menu

7.4 Output menu

7.4.1 Selecting relay output

 The relay output is set first, and then the switch type. The switch behavior can then be set depending on the switch type selected. All 4 relay outputs are set in the same way.

| Submenu values | Function |
|--------------------|---|
| Relay 1 Relay 2 | ▶ ▲▼ – selects relay to be set The set values are displayed. |

Tab. 8 Output menu (relay)

7.4.2 Setting

| Submenu values | Function |
|--|--|
| Switch type | |
| Distance Filling height Filling volume | Sets switch type: • Switches on / off with a change of ... |
| Switching point 1 | |
| | Sets switching point 1. In window mode, the value for switching point 1 must always be above the value for switching point 2. |
| Switch delay 1 | |
| 0 ... 60 s | Sets the switch delay for switching point 1. The switch delay is the period after which the relay switches once a switching point has been reached. The switch delay prevents, for example, the relay from rattling in hysteresis mode. |
| Switching point 2 | |
| | As for switching point 1 |
| Switch delay 2 | |
| 0–60 s | As for switch delay 1 |
| Opener/Closer | |
| NO NC | Sets switch function: • NO – closer • NC – opener The relay outputs do not assume the switch function set here until approximately 3 seconds after switching on. |
| Mode | |
| Hysteresis Window | Sets mode: • Hysteresis – Switches on when pressure/temperature increases at switch 1 – Switches off when pressure/temperature falls at switch 2 • Window – Switches on between switching point 1 and switching point 2 – Switches off under switching point 1 or over switching point 2 |

Tab. 9 Output menu

7.5 Display menu

| Submenu values | Function |
|--------------------------------------|--|
| Distance Filling height Volume | Setting the reference value and unit for the filling level display: <ul style="list-style-type: none"> ▶ ▲▼ – selects the reference value. ▶ Press OK; this will open the selection submenu for the respective unit. ▶ ▲▼ – selects the unit. ▶ OK – accepts setting |

Tab. 10 Display menu

7.6 Diagnostics menu

 The data logger functions requires a microSD card. The data logger function saves the data in CSV format on the microSD card.

After the adjustable recording duration (per file) has expired, a new file is written until the microSD card is full or the data logger function is deactivated.

| Submenu values | Function |
|----------------------------|---|
| Slave pointer | |
| Distance / height / volume | Displays minimum and maximum measured values for filling level |
| | Resets slave point via Service – Reset – Slave pointer |
| Status | |
| Sensor OK | No error message, device functions normally. |
| Exxx | Error message (→ Table 15 Troubleshooting, Page 19). |
| Data logger | |
| off | Data logger function switched off. |
| Hour, day, month, year | Sets the recording duration for the data logger function. Measurement interval and file name correspond to the following table. |

Tab. 11 Diagnostics menu

| Recording duration (per file) | Measurement interval | File name |
|-------------------------------|----------------------|-------------------------------------|
| Hour | 5 s | monthdayhour.csv e.g. 061814.csv |
| Day | 2 min | yearmonthday e. g. 20140618.csv |
| Month | 1 h | yearmonth.csv e.g. 201406.csv |
| Year | 1.8 h | year.csv e.g 2014.csv |

Tab. 12 Data logger settings

7.7 Service menu

- 

The UNI display supports all microSD or microSDHC cards with FAT32 formatting. Relevant file must be maintained in the master directory.

If transmission errors occur when loading a parameter set, then the UNI display will restore its factory settings.

The UNI display only displays files in 8.3 format.

| Submenu values | Function |
|----------------------------|---|
| Reset | |
| Factory settings | Resets all parameters to the delivery state: ▶ OK – Delivery state is set. |
| Slave pointer | Resets slave pointer for filling level. |
| Info | |
| | Displays version of sensor firmware and UNI display firmware. |
| Memory | |
| to intermediate memory | Saves all parameters from the device on to the intermediate memory. |
| from intermediate memory | Saves all parameters from the intermediate memory on to the device. |
| to microSD card | Saves all parameters from the device on to the microSD card. |
| from the microSD card | Saves all parameters from the microSD card on to the device. |
| Update firmware | |
| firmware update for device | Load sensor firmware from the microSD card: ▶ Press and hold OK until “Bootloader” is displayed. ▶ Press OK - to list the existing files on the microSD card. ▶ ▲▼ – Select file (for example, UFR_Vxxx.HEX for Flex version) ▶ OK – the new firmware is loaded on to the device and started immediately. |
| UniDisplay | Load UNI display firmware from the microSD card: ▶ Press and hold OK + Esc until “UNIBOOT” is displayed. ▶ Press OK - to list the existing files on the microSD card. ▶ ▲▼ – Selects file (UNI_Vxxx.HEX). ▶ OK – the new firmware is loaded into the device and immediately started. |

Tab. 13 Service menu

8 Maintenance

⚠ DANGER

Risk of electrocution!

- ▶ All electrical work must be carried out by qualified electricians only.

⚠ WARNING

Risk of injury and poisoning due to hazardous or hot media.

- ▶ Use personal protective equipment for all work on the device.
- ▶ Allow device to cool.
- ▶ Make sure the device is depressurized.
- ▶ Block the media supply to the device.
- ▶ Empty the pipe and safely collect the media. Dispose of it in accordance with environmental regulations.
- ▶ Switch off the power supply to the system.
- ▶ Secure power supply against being switched back on again.
- ▶ Provide warning of maintenance and repair work and set up warning signs.

8.1 Servicing

| Interval | Action |
|--------------|---|
| As necessary | <ul style="list-style-type: none"> • Clean device with a damp cloth. |
| Six-monthly | Visual and function check: <ul style="list-style-type: none"> • Normal operating conditions unchanged • No leaks • No unusual operating noises or vibrations |
| Yearly | <ul style="list-style-type: none"> • Replace UNI display battery. |

Tab. 14 Servicing activities

- ▶ Perform maintenance tasks according to the table.

8.2 Maintenance

8.2.1 Removing the device

- ✓ System is empty.
 - ✓ System has been flushed.
 - ✓ System is depressurized.
 - ✓ System has cooled down.
 - ✓ System is secured against being switched back on again.
1. Unscrew the housing cover from the connection housing, remove UNI display if required.
 2. Disconnect connection cable.
 3. Screw on the housing cover.
 4. Disassemble device from the process pipework.
 5. Decontaminate device if required.

8.2.2 Replacement parts and return

1. Have the following information ready to hand when ordering spare parts (→ 3.1 Type plate, Page 6).
 - Device type
 - ID number
 - Nominal pressure and diameter
 - Connection and gasket material
2. Please complete and enclose the document of compliance for returns (→ www.asv-stuebbe.com/service/downloads).



3. Only use spare parts from ASV Stübbe.

9 Troubleshooting

WARNING

Risk of injury and poisoning due to hazardous media liquids!

- ▶ Use personal protective equipment when carrying out any work on the device.

| Error | Possible cause | Corrective action |
|--|---|---|
| Medium is leaking out of the flange | Pre-tension of the O-ring too small | ▶ Tighten sensor housing using wrench. |
| "Display Vx.yy UNI" displayed | Error occurred when updating firmware | ▶ Reload firmware (→ 9.1.1 Fixingsoftware loading errors, Page 20). |
| "FAIL" displayed Signal diagnosis: E005 - No echo | Cable connection to the sensor defective (only with Flex version) | ▶ Check sensor cable (→ 10.4.3 Flex sensor connection, Page 23). ▶ Replace sensor cable. |
| | No echo Sensor incorrectly aligned Sensor defective | ▶ Check the perpendicular alignment of the sensor and correct if necessary. ▶ Switch sensor housing. |
| Display "< min. !" or "> max. !" Signal diagnosis: E005 - Lower limit range or E006 - Upper limit range | Calculation of fill height and volume not possible | ▶ Check settings ¹⁾ and correct if necessary (→ 7.3 Basic settings menu, Page 14). |
| Display remains dark | Faulty power supply | ▶ Ensure power supply is present. |
| | Wrong version of UNI display firmware | ▶ Reload firmware (→ 9.1.1 Fixingsoftware loading errors, Page 20). |
| Display is upside down | Wrong display direction | ▶ Press ▲ ▼ buttons simultaneously to change display direction. |

Tab. 15 Troubleshooting

1) Specific gravity of medium, volume expansion. Tank volume and container form

| Modbus errors | Possible cause | Corrective action |
|-------------------------------|---|--|
| Faulty/instable data transfer | Bus participants have the same address | ▶ Specify different addresses for each bus participant (→ 7.3 Basic settings menu, Page 14). |
| | Bus participants have different baud rates/parities | ▶ Set the same baud rate and parity for all bus participants (→ 7.3 Basic settings menu, Page 14). |
| | Modbus is incorrectly terminated | ▶ Terminate Modbus correctly with jumper (→ 5.3 Electrical connection of device, Page 11). |

Tab. 16 Troubleshooting Modbus errors

9.1 Troubleshooting

9.1.1 Fixingsoftware loading errors

 If an error occurs when updating the sensor firmware or the UNI display firmware (e.g. power failure), it may not be possible to call up the “Update firmware” menu.

 The latest sensor firmware or UNI display firmware is available on the Internet
(→ www.asv-stuebbe.com/service/downloads).



1. Save latest sensor firmware (for example, UFR_Vxxx.HEX for Flex version) or UNI display firmware (UNI_Vxxx.HEX) on a microSD card.
2. Disconnect device from the power supply.
3. Insert UNI display and microSD card with current firmware where necessary.
4. Press hold OK in order to load the sensor firmware.
5. Press hold OK and ESC in order to load the UNI display firmware.
6. Switch on power supply.
7. OK, ▲▼ – Selects file.
8. Press OK.
The latest firmware is loaded.
9. Press “OK” again.
The latest firmware is launched.
10. Set the device again (→ 7.2 Main menu, Page 14).

10 Appendix

10.1 Technical specifications

 Technical data (→ Data sheet).

10.2 Dimensions

 Dimensions (→ Data sheet).

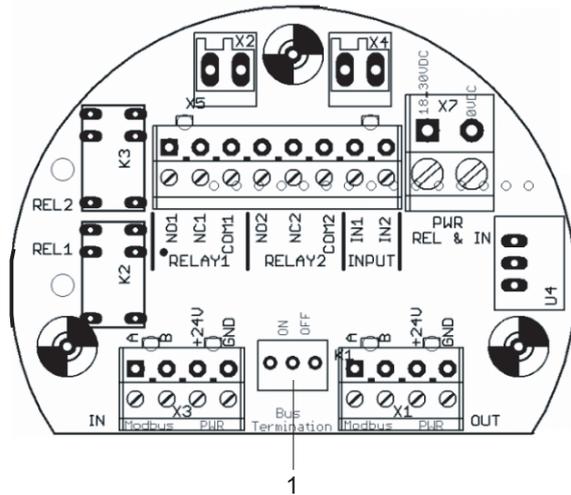
10.3 Accessories

| Description | Ident. number |
|---|---------------|
| UNI display | 144153 |
| <ul style="list-style-type: none"> • Display and control unit • with PA transparent cover for the connector head • Languages: DE, EN, FR, ES, IT | |
| Battery, CR1220, 3 V | 144328 |
| Memory card, microSD | 144329 |

Tab. 17 Accessories

10.4 Connection diagrams

10.4.1 Modbus RTU connection plan



1 Bus termination

Terminal allocation

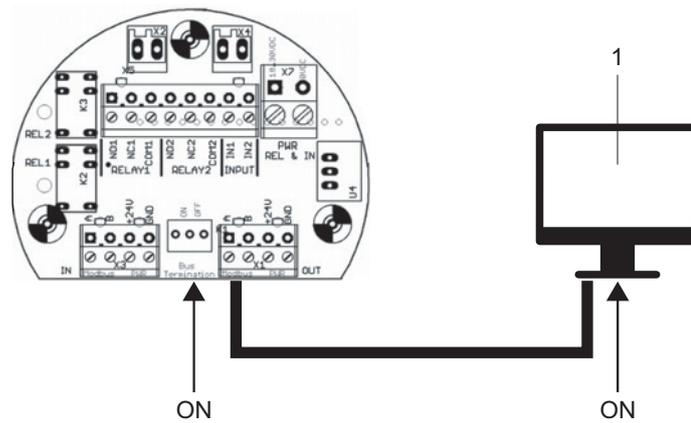
| Terminal strip | Terminal | Connection |
|----------------|---------------|------------------------------------|
| X 1 | A | RS485 A |
| | B | RS485 B |
| | +24V | Modus power supply |
| | GND | Power supply earth |
| X 3 | A | RS485 A |
| | B | RS485 B |
| | +24V | Modus power supply |
| | GND | Power supply earth |
| X5 | NO1 | Relay 1 switch output closer |
| | NC1 | Relay 1 switch output opener |
| | COM1 | Relay 1 COM |
| | NO2 | Relay 2 switch output closer |
| | NC2 | Relay 2 switch output opener |
| | COM2 | Relay 2 COM |
| | IN1 | Start button |
| IN2 | Stop button | |
| X7 | 18 ... 30 VDC | Power supply (18 ... 30 VDC) |
| | 0 VDC | Reference potential for the inputs |

10.4.2 Modbus RTU termination

 The Modbus RS485 must be terminated for devices which are at the end of the bus cable.

Termination for one device

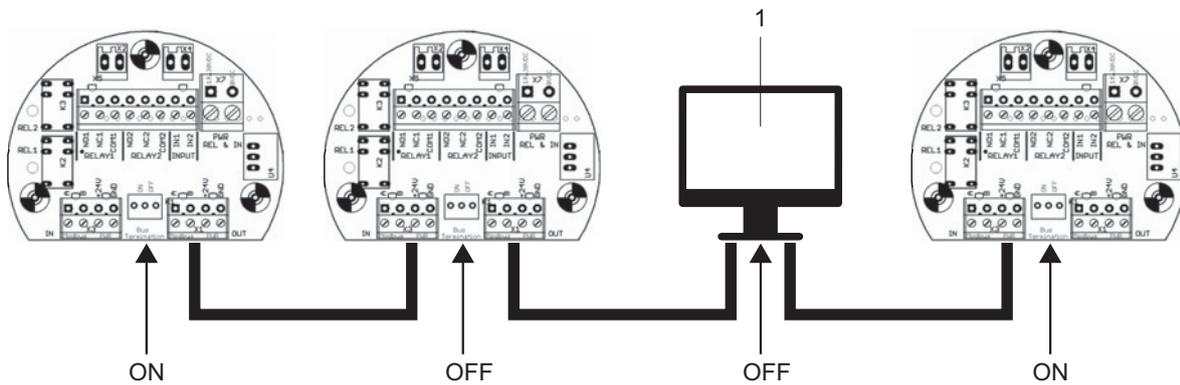
Plug the jumper on to the left and center pin (Position ON).



1 Master device/PWR

Termination for several devices

Plug the jumper on to the center and right pin (Position OFF).



1 Master device/PWR

10.4.3 Flex sensor connection

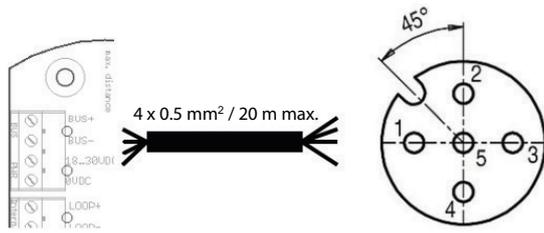


Fig. 7 UFM 600 Flex connection plan

| Sensor | | Angled socket connection head | |
|--------|------------|-------------------------------|------------|
| 1 | Bus (+) | 1 | Bus (+) |
| 2 | Bus (-) | 2 | Bus (-) |
| | | 3 | +5 V DC |
| 3 | 18–30 V DC | 5 | 18–30 V DC |
| 4 | 0 V DC | 4 | 0 V DC |

Tab. 18 UFM 600 Flex cable assignment

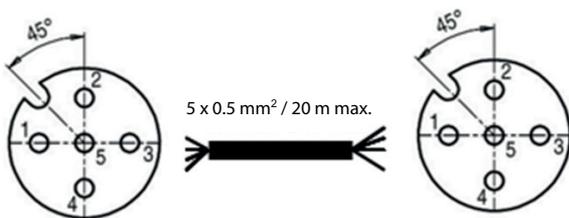


Fig. 8 UFM 200 Flex connection plan

| Angled socket sensor | | Angled socket connection head | |
|----------------------|------------|-------------------------------|------------|
| 1 | Bus (+) | 1 | Bus (+) |
| 2 | Bus (-) | 2 | Bus (-) |
| 3 | +5 V DC | 3 | +5 V DC |
| 4 | 0 V DC | 4 | 0 V DC |
| 5 | 18–30 V DC | 5 | 18–30 V DC |

Tab. 19 UFM 200 Flex cable assignment

10.4.4 Modbus functions

| Function Code | Name | Address ¹⁾ | Data type | Comment |
|-------------------------|------------------------|--------------------------------|------------------|---|
| 01 | Read Coil Status | 0x00 → RELAY1 0x01 → RELAY2 | Bit | Read relay status. |
| 02 | Read Input Status | 0x00 → INPUT1 0x01 → INPUT2 | Bit | Read input status. A "TRUE" logic level on the inputs are extended to minimum 5 seconds. |
| 03 | Read Holding Registers | 0x00 → UFM Version | Unsigned Integer | Value = 310 → V3.10 |
| | | 0x01 → Distance [mm] | Signed Integer | Value = 0 ... 10,000 → 0 ... 10 Bar |
| | | 0x02 → | Signed Integer | - |
| | | 0x08 → Error | Unsigned Integer | TRUE → Sensor error FALSE → Sensor OK |
| | | 0x09 → Device ID [UFM] | Unsigned Integer | Value = 50 → Device ID = 50 |
| | | 0x0A → Distance [mm] | Float_ABCD | IEEE 32-bit floating-point |
| | | 0x0C → Filling Level [cm] | Float_ABCD | IEEE 32-bit floating-point |
| | | 0x0E → Volume [l] | Float_ABCD | IEEE 32-bit floating-point |
| 0x14 → Temperature [°C] | Float_ABCD | IEEE 32-bit floating-point | | |
| 04 | Read Input Registers | - | - | - |
| 05 | Force Single Coil | 0x00 → RELAY1 0x01 → RELAY2 | Bit | Write relay status, if it is released to Modbus control (→ 7.4.2 Setting, Page 15). value = 0x0000 → Relay off value = 0xFF00 → Relay on |

Tab. 20 Modbus functions

1) The designation of the relay (coils), inputs and register starts with "1" (physical address "0").

10.4.5 Modbus RTU message formats

| Formats | Data | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|--|-------|---|---|---|---|---|---|------|------|-----|------|-------|---|---|---|---|---|---|---|---|------|------|
| Coding System | 8 bit binary | | | | | | | | | | | | | | | | | | | | | | |
| Number of data bits per character | <div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p style="text-align: center;">With Parity Checking</p> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td>Start</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>Par</td> <td>Stop</td> </tr> </table> </div> <div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Without Parity Checking</p> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td>Start</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>Stop</td> <td>Stop</td> </tr> </table> </div> | Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Par | Stop | Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Stop | Stop |
| Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Par | Stop | | | | | | | | | | | | | |
| Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Stop | Stop | | | | | | | | | | | | | |
| Parity | Even or No | | | | | | | | | | | | | | | | | | | | | | |
| Bit transfer rate | 2400, 4800, 9600, 19200, 38400 Selectable | | | | | | | | | | | | | | | | | | | | | | |
| Duplex | Half duplex Transceiver with Failsafe | | | | | | | | | | | | | | | | | | | | | | |
| Error checking | CRC (cyclic redundancy check) | | | | | | | | | | | | | | | | | | | | | | |
| Polynomial | (CRC-16 10100000000001) | | | | | | | | | | | | | | | | | | | | | | |
| Bit transfer order | LSB first | | | | | | | | | | | | | | | | | | | | | | |
| End of message | Idle line for 3.5 or more characters (>1.75 msec for >19200 Bps) | | | | | | | | | | | | | | | | | | | | | | |

Tab. 21 Modbus RTU Message Formats

Pre-set values

- Address: 41
- Transfer rate: 9600 bps
- Interface:
 - 8 data bits
 - Same parity
 - 1 stop bit

