

# Underwater settled solids detector MUDSonic



## SAFETY INSTRUCTIONS

- Installation, commissioning and maintenance operations must only be performed by qualified personnel.
- Connect the device to a suitable supply voltage as indicated on the identification plate.
- Turn off the main supply before any installation and maintenance works.
- Operate the device only in accordance with the conditions described in this manual.

## DESCRIPTION

A complete system includes a MUDSonic TS immersion probe and a MUDSONIC MF operating unit.

The detection is done by measuring the absorption of ultrasonic waves.

The probe evaluates the concentration of solid particles by attenuation of the signal.

The probe is immersed at a fixed height in the tank; It triggers a switch when the concentration (predefined) is reached (sludge level rising by settlement).

The trigger point and timer are adjustable on site (real operating conditions).

## RESTRICTIONS

MUDSonic is designed to work in very dense sludge; Detection of low concentrations is not reproducible.

If in doubt, contact us.

Presence of bubbles of air on the sensor leads to measurement errors.

## TECHNICAL FEATURES

### MUDSonic MF operating unit:

Power supply:	100 to 255 V AC - 50/60 Hz (MF G) or 10 to 30 V DC and 12 to 24 V AC (MF D)
Power consumption:	1 ... 5 W
Ambient temperature:	-10 ... +45 °C
Relay outputs	<b>2 Contacts, potential-free (N.O.)</b> (Limit exceeded, below the limit) <b>1 Contact, potential-free, fault alarm (N.O.)</b>

### In case of power failure, all contacts are open.

Switching power:	250 V AC, 3 A / 30 V DC, 1 A
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**Caution: The contacts are not protected against overload; Provide an external circuit breaker.**

Housing dimensions:	22.5 x 100 x 122 mm
DIN Rail:	35 x 7.5 mm (DIN EN 60715)
Protection:	IP 40
Connections:	Screw connectors; Cables 1.5 mm <sup>2</sup> max.
Display:	2½ digit, LED, 5x7, dot matrix display 1 Blue LED, relay energized 3 Yellow LED, detection range (LOW/ MEDIUM/ HIGH)
Adjustment:	Rotary switch on front
Delay:	Adjustable from 0.1 up to 9.9 s

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22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL

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## TECHNICAL FEATURES (Continued)

### Probe MUDSonic TS

Detector material:	PVC
Cable:	TPK, 10 m long, shielded, 2x 0.34mm <sup>2</sup> Other cable lengths and materials on request. (Max. length 50m)
Dimensions:	145 x 90 x 25 mm
Protection:	IP 68 acc. EN 60529
Measuring technic:	Ultrasonic signal
Operating temperature:	-20 °C ... +60 °C

**EC Conformity:** The instrument meets the legal requirements of the current European Directives

## ADJUSTABLE DETECTION TRIGGER POINT

Adjustment along 3 measuring ranges, LOW - Medium - HIGH (each 1 to 100 %)

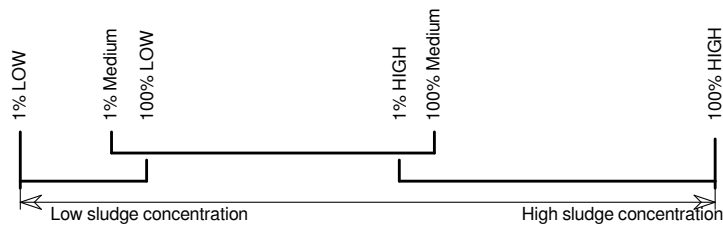
**Note: Change to another detection range is done through the rotating switch.**

After the 100 % of the LOW range, it switches to 1% of Medium range. After the 100 % of the Medium range, it switches to 1% of HIGH range.

The 100% of HIGH range is the highest possible detection value. LOW range: Yellow LED is lit.

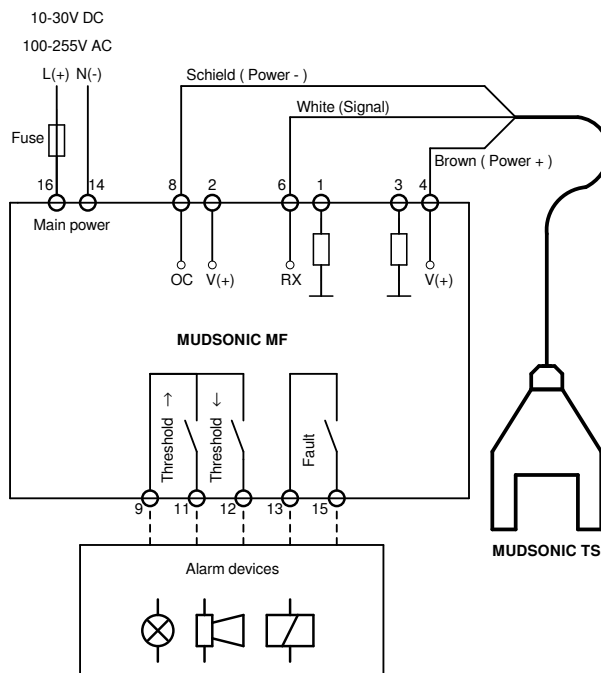
Medium range: 2 Yellow LEDs are lit.

HIGH range: 3 Yellow LEDs are lit.



The 3 ranges may overlap, but not necessarily, it depends on the fluid.

## ELECTRICAL CONNECTION



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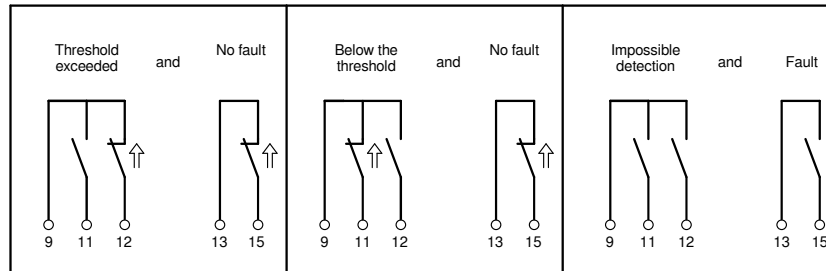
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## OPERATING STATUS



### Relay status

Contacts open when:

9 - 11 Contacts is open when threshold is exceeded (rising signal).

9 - 12 Contacts opens when value drops below the threshold (decreasing signal).

13-15 Contact opens in case of fault.

### Please note:

To ensure cable break monitoring, the connected PLC must respond to the status of N.O. contact.

When an error occurs or in case of power failure, all contacts are open (9-11, 9-12, 13-15).

## SWITCHING ON THE POWER

After switching on the supply voltage, the device starts a test routine in which all LEDs and the digital display are activated (LED test).

After about 5 s the software version is briefly displayed.

Then, the display jumps to menu step 0 (threshold display).

## SET CONTROLS: ROTARY SWITCH AND PUSH-BUTTON

### Rotate:

In menu, step 0, the set limit value is displayed and adjusted.

In menu, step 1: delay is selected to be adjusted ( TD )

In menu, step 2: the delay is set between 0.1 to 9.9 seconds.

With left turn, "-": to decrease

With right turn, "+": to increase

### Press on the rotary switch:

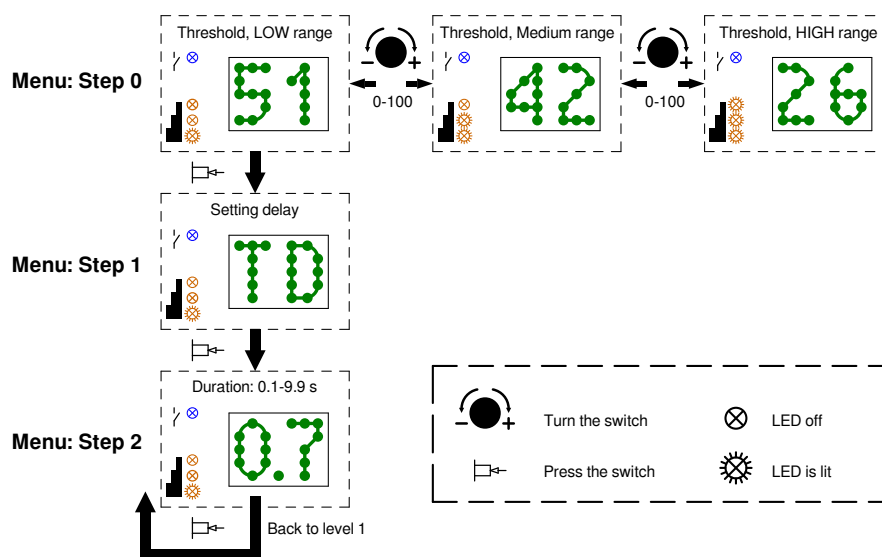
To select the sub-menus.

In sub-menu 2: Press to jump back to menu 1 (etc.).

### Note:

If none of the controls are activated for 10 seconds, the device is automatically returned to menu step 0.

**Changed settings are saved immediately.**



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## LIST OF DISPLAYS

Threshold 0-100% = current saved value

Threshold value flashes = ultrasound transmission is impossible:

- Concentration of sludge is too high.
- The probe is in the air.

Blue LED is lit = the threshold has been exceeded.  
The contact (9-11) opens.

1 yellow LED is lit: LOW range selected.  
2 yellow LEDs are lit: Medium range selected.  
3 yellow LEDs are lit: HIGH range selected.

Display: "ER" (Error) = probe fault or disconnected.  
The fault relay (13-15) opens.

## DELAY ( TD )

To adjust between 0.1 and 9.9 s (factory setting/ default value: 0.1 s)

## COMMISSIONING AND SETTING THE TRIGGER POINT

The adjustment takes place after installation and electrical connection.

In case of trouble, refer to the table "Errors"

The following illustrations show the position of the immersion probe in the liquid with corresponding displays.

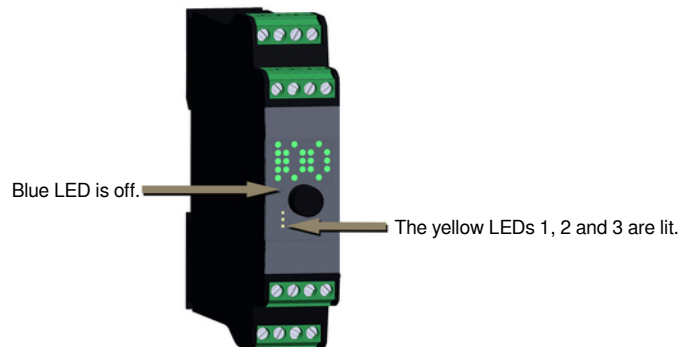
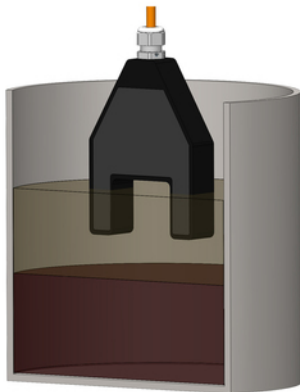
**Follow the chronological order.**

1) Immerse the probe in the clear phase liquid.

Turn the rotary switch to the right (+) until reading is "100" in the HIGH range (3 yellow LEDs lit).

**The blue LED must be off.**

If the blue LED keeps lit: it signifies that the liquid already contains too much solid.



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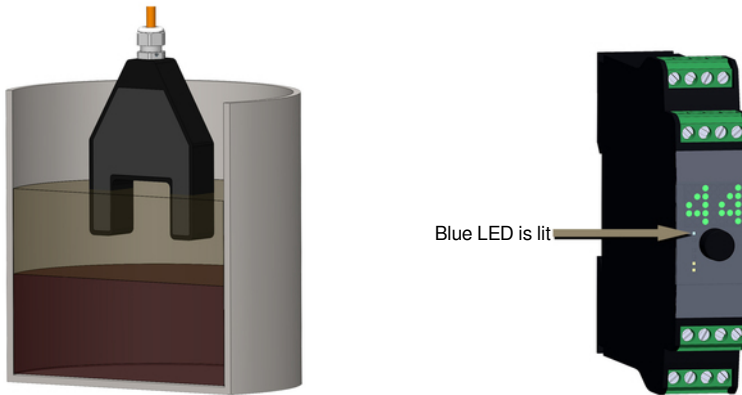
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## COMMISSIONING AND SETTING THE TRIGGER POINT (continued)

2) Slowly turn the switch to the left ( - ) until the blue LED lights up.  
This means that the liquid contains too much solid particles.  
Anyway, please continue, following the instructions.

If the value is less than 20 (e.g. 10 in the HIGH range), then turn the rotary switch to the left ( - ) to continue.  
Once value 1 of HIGH scale is reached, the display changes to 100 of Medium scale



**CAUTION: When changing the measuring range (from HIGH to MEDIUM, from MEDIUM to LOW), the blue LED lights up a short time and the relay switches - this only indicates that the measuring range has changed.**

Depending on the sludge settlement and immersion distance, a switching point could be found in each measuring range (LOW / MEDIUM / HIGH).

Then, the value must be the lowest value in the HIGH range and the highest value in the LOW range.

A stable measurement should be in the following ranges:

HIGH (3 yellow LEDs): > 20 up to 80 → Over 80, the concentration of sludge is too high.

A reliable measurement is not possible.

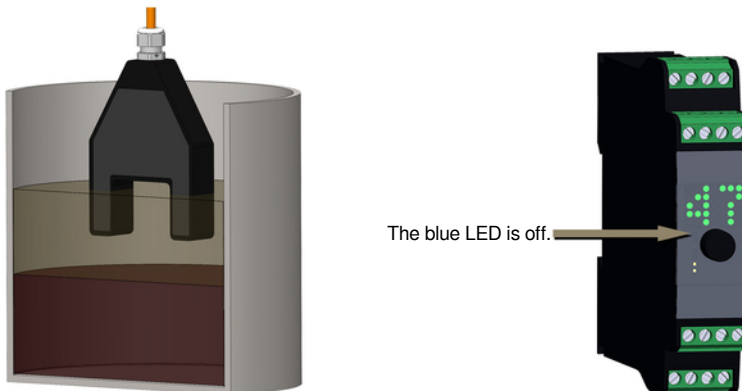
Below 20, change to the Medium scale or even the LOW one.

Medium (2 yellow LEDs): > 20 up to 80 → if the value exceeds 80, change to the HIGH range and below 20 to the LOW range.

LOW (1 yellow LED): > 20 up to 80 → Over 80, change to the Medium range.

3.) Turn the rotary switch to the right ( + ) until the blue LED goes off.

Now, the measurement reacts sensitively even with a slight increase in the solids content.



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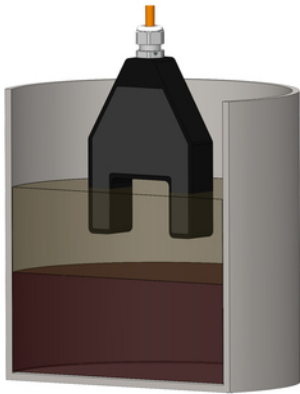
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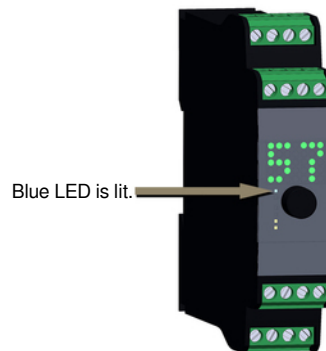
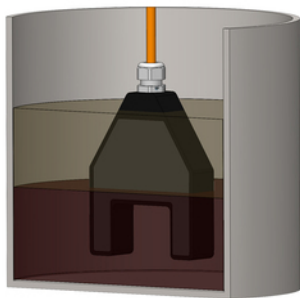
## COMMISSIONING AND SETTING THE TRIGGER POINT (continued)

- 4) Turn the rotary switch to the right (+) of about 10 points.  
Now, the measurement will react only at a great increase in the solids concentration.

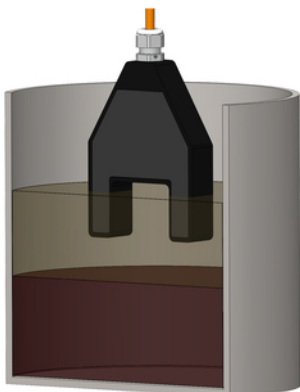


The closer the set value is to the limit value, the more sensitive the device is to the changing of solids content.

- 5) Plunge the probe in the sedimentation area for functional testing.  
Then, the relay must switch and the blue LED must light up.  
The system is now set up for your sludge and the probe can be installed at the desired level.



- 6) If necessary, set the time delay between 0.1 and 9.9 s



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## ERROR MESSAGES

Fault	Origin	Solution
Blue LED never goes off	Concentration over detection range Too many gas bubbles in the sludge	Check the measuring distance; Eliminate any obstacle; Prevent gas bubbles
Display is flashing	No reception of ultrasound; Concentration too high; The probe is in the air	Remove obstacle in the measuring path, or Plunge the probe
Display "ER"	Probe fault or the probe is not connected	Check the cable and its connections
Display "CR"	Memory fault	Reset to factory settings

## RESET TO FACTORY SETTINGS

Switch on the power supply.

Within FIRST 3 seconds (during the test routine) press the pressure switch for about 5 seconds:

The display counts up 1, 2, 3, .. 99, ST (ST = default values are loaded).

→ All settings are now reset to the factory settings (default values).

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