Operating manual

crm+ Ultrasonic Sensors with two switched outputs

Set sensor parameters alternatively numerically using LED-display...

**Start here**

Press T1 and T2 simultaneously for about 3 s until welcome message has passed

For single detect point press T2 until ≤ - - - is displayed

For window mode operation set far detect point in mm or cm

Choose T1 for NCC or T2 for NOC

Set switched output D1

For single detect point press T2 until ≥ - - - is displayed

For window mode operation set far detect point in mm or cm

Choose T1 for NOC or T2 for NCC

Set switched output D2

**Ready**

**Fig. 1:** Assembly distances, indicating synchronisation/multiplex

Multiplex mode

The Add-on-menu allows to assign an individual address +01 to +10 to each sensor connected via the Sync/Com-channel (Pin5). The sensors perform the ultrasonic measurement sequentially from low to high address. Therefore any influence between the sensors is rejected.

The address +00 is reserved to synchronisation mode and deactivates the multiplex mode. (To use synchronised mode all sensors must be set to address +00.)

**Fig. 2:** Pin assignment with view onto sensor plug and colour coding of the microsonic connection cable

Start-up

crm+ sensors are delivered factory made with the following settings:

- Switched output on NOC
- Detecting distance at operating range and half operating range
- Measurement range set to maximum range

**Assembly instructions**

- Assemble the sensor at the installation location.
- Plug in the connector cable to the M 12 connector.

**Fig. 3:** TouchControl

**Operation**

crm+ sensors works maintenance free. Small amounts of dirt on the surface do not influence function. Thick layers of dirt and caked-on dirt affect sensor function and therefore must be removed.

**Note**

As a result of the design the assembly of PEEK film and PTFE joint ring is not gas-proof.

The chemical resistance has to be tested experimentally if necessary.

crm+ sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approx. 30 minutes of operation.

During normal mode operation, a yellow LED D2 signals that the switched output has connected.

During normal mode operation, the measured distance value is displayed on the LED-indicator in mm (up to 999 mm) or cm (from 100 cm). Scale switches automatically and is indicated by a point on top of the digits.

During Teach-in mode, the hysteresis loops are set back to factory settings.

If no objects are placed within the detection zone the LED-indicator shows ≤ - - -.

If no push-buttons are pressed for 20 seconds during parameter setting mode the made changes are stored and the sensor returns to normal mode operation.

You can lock the key pad to provide inputs, see «Key lock and factory setting».

You can reset the factory settings at any time, see «Key lock and factory setting».

**Show parameters**

Tapping push-button T1 shortly during normal mode operation shows «Par» on the LED-display. Each time you tap push-button T1 the actual settings of the switched output are shown.

Set the parameters of the sensor manually or use the Teach-in procedure to adjust the detect points.

**Product description**

- The crm+ sensor with with two switched outputs measures the distance to an object within the detection zone contactless. Depending on the adjusted detect distance the switched outputs are set.
- The ultrasonic transducer surface of the crm+ sensors is laminated with a PEEK film. The transducer itself is sealed against the housing by a PTFE joint ring. This composition ensures a high resistance against many aggressive substances.
- All settings are done with two push-buttons and a three-digit LED-display (TouchControl).
- Light emitting diodes (three-colour LEDs) indicate the switching status.
- The output functions are changeable from NCC to NOC.
- The sensors are adjustable manually using the numerical LED-display or may be trained using Teach-in processes.
- Useful additional functions are set in the Add-on-menu.
- Using the LinkControl adapter (optional accessory) all TouchControl and additional sensor parameter settings may be made by a Windows-Software.

**Safety Notes**

- Read the operating instructions prior to start-up.
- Connection, installation and adjustment works may only be carried out by expert personnel.
- No safety component in accordance with the EU Machine Directive.
- Personnel works may only be carried out by expert personnel.
- Made by a Windows-Software.
- Useful additional functions are set in the Teach-in processes.
- The output functions are changeable from NCC to NOC.

**Instruction**

- Made by a Windows-Software.
- Use the Teach-in procedure to adjust the detect points.
- The chemical resistance has to be tested experimentally if necessary.
- crm+ sensors have internal temperature compensation. Because the sensors heat up on their own, the temperature compensation reaches its optimum working point after approx. 30 minutes of operation.
- During normal mode operation, a yellow LED D2 signals that the switched output has connected.
- During normal mode operation, the measured distance value is displayed on the LED-indicator in mm (up to 999 mm) or cm (from 100 cm). Scale switches automatically and is indicated by a point on top of the digits.
- During Teach-in mode, the hysteresis loops are set back to factory settings.
- If no objects are placed within the detection zone the LED-indicator shows ≤ - - -.
- If no push-buttons are pressed for 20 seconds during parameter setting mode the made changes are stored and the sensor returns to normal mode operation.
- You can lock the key pad to provide inputs, see «Key lock and factory setting».
- You can reset the factory settings at any time, see «Key lock and factory setting».

**Measurements**

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>3-digit LED-display</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 0.35 m</td>
<td>D1</td>
</tr>
<tr>
<td>≤ 0.40 m</td>
<td>D2</td>
</tr>
<tr>
<td>≤ 1.10 m</td>
<td>D3</td>
</tr>
<tr>
<td>≤ 2.00 m</td>
<td>D4</td>
</tr>
<tr>
<td>≤ 4.00 m</td>
<td>D5</td>
</tr>
</tbody>
</table>

**Legend**

- 1 +U brown
- 2 -U blue
- 3 D2 black
- 4 D1 white
- 5 Sync/Com. grey
Key lock and factory setting

- **Activate/deactivate TouchControl**: Activate or deactivate TouchControl.
- **Reset to factory setting**: Reset to factory setting.
- **Turn supply voltage OFF**:
  - While pressing T1, turn supply voltage OFF for ca. 1 s until »off« is displayed.
  - To activate or deactivate press T1.
  - DO: high
  - DO: standard
  - DO: slight

Useful additional functions in Add-on menu (for experienced users only, settings not required for standard applications)

- **Start here**: Press T1 and T2 simultaneously for about 13 s until »End« is shown in the LED-display.

If no change is displayed press T2 until countdown and »End« is displayed.

**Normal mode operation**

- **Teach-in switched output D1**: Teach-in switched output D1.
- **Teach-in switched output D2**: Teach-in switched output D2.

**Normal mode operation**

- **Hysteresis switched output D1**: Hysteresis switched output D1.
- **Hysteresis switched output D2**: Hysteresis switched output D2.

**Note**: Changes in the Add-on menu may impair the sensor function. A6, A8, A10, A11, A13 have influence on the response time of the sensor.

**Usefull additional functions in Add-on menu (for experienced users only, settings not required for standard applications)**

- **Adjust detect point D1**:
  - Place object at position 1
  - Press T1 until »End« is shown
  - Press T2 until »d« is shown
  - Adjust detect point D1

- **Adjust window mode D1**:
  - Place object at position 2
  - Press T1 until countdown passed from »8« to »0« and NOC or NCC symbol is displayed

- **Adjust two-way reflector barrier D1**:
  - Place reflector at position
  - Press T2 until »End« is shown
  - Press T1 until »d« is shown
  - Adjust window mode D1

- **Set NOC/NCC D1**:
  - Press T1 until »Add« is shown
  - Press T1 and T2 simultaneously for about 13 s

- **Normal mode operation**
  - **Hysteresis switched output D1**: Hysteresis switched output D1.
  - **Hysteresis switched output D2**: Hysteresis switched output D2.

**Response time**

- **Measurement filter**

**Filter strength**

- **Response time**

**Foreground suppression**

- **Multiplex mode device addressing**

**Multiplex mode highest address**

- **Measurement range**

**Calibration display**

**Detection zone sensitivity**

**Placing reflector for calibration**

- Place reflector at position

**Measuring range**

- **Maximum value**: 999 cm
  - Minimum value: sensor-distant window limit - 1
  - Maximum value: 250 mm or 900 mm for all other types.

**Detection zone**

- **Turn supply voltage OFF**: Turn supply voltage OFF.
  - While pressing T1, turn supply voltage ON for ca. 1 s until »on« has passed through the display.
  - To activate or deactivate press T1.

**Calibration**

- Place reflector vertically disposed in front of sensor.
  - A6: high
  - A8: standard
  - A13: slight

Adjust document to suit display.

Includes TP-series & TouchControl...
### Technical data

#### Operating voltage $U_o$
- 5 V to 30 V DC, reverse polarity protection
  - 10 %
  - ±10 %
- 5 V to 30 V DC, reverse polarity protection
  - ±10 %
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  - ±10 %
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  - ±10 %
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#### Voltage ripple
- ≤ 0.18 mm
- ≤ 0.18 mm
- ≤ 0.18 mm
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- ≤ 0.18 mm
- ≤ 0.18 mm
#### Housing
- Stainless steel 1.4571, plastic parts: PBT, TPU;
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#### Weight
- 150 g
- 150 g
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#### Class of protection to EN 60529
- IP 67
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#### Sync/Com
- 2 push-buttons (TouchControl)
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#### Ultrasonic transducer
- PEEK film, PTFE
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#### Storage temperature
- -40°C to +85°C
- -25°C to +70°C
- -25°C to +70°C
- -25°C to +70°C
- -25°C to +70°C
- -25°C to +70°C
#### Operating range
- 0 mm to 30 mm
- 3 mm to 70 mm
- 0 mm to 30 mm
- 0 mm to 30 mm
- 0 mm to 30 mm
- 0 mm to 30 mm
#### Resolution, sampling rate
- 0.025 mm
- 0.025 mm
- 0.025 mm
- 0.025 mm
- 0.025 mm
- 0.025 mm
#### Repeatability
- ±0.15 %
- ±0.15 %
- ±0.15 %
- ±0.15 %
- ±0.15 %
- ±0.15 %

### Detection zones

#### Detection zone for different objects
- The dark grey areas are determined with a thin round bar (10 or 27 mm dia.) and indicate the typical operating range with a thin round bar (10 or 27 mm dia.)
- It is not possible to evaluate ultrasonic reflections outside this area.
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