Monitoring Relay MR 50

Standard signals 0/4 ... 20 mA, 0/2 ... 10 V DC

Features

- Input standard signals 0/4 ... 20 mA, 0/2 ... 10 V DC
- Measuring range programmable
- Basic accuracy 0.1 % +/- 1 Digit
- Installed units: mV, V, mA, A, Ω, kΩ, μS/cm, mS/cm, °C, °F, min⁻¹, rpm, bar, mbar, hPa, mm, cm, m, %, °, l, l/min, m³, m³/h, ppm custom units programmable
- Simulator function
- Fault monitoring for break of wire in the measuring circuit
- Programmable fault function
  - Analog output min. or max. overflow
  - Alarm outputs min. or max. function
- Integrated transmitter supply 24 V DC max. 30 mA
- 4 alarm outputs (relay SPDT)
- Isolated analog output 0/4 ... 20 mA; 0/2 ... 10 V DC
- Full 3-port isolation

General

The Monitoring Relay MR50 has inputs for industry standard signals 0/4 ... 20 mA and 0/2 ... 10 V DC. Measuring value and programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors.

Simple programming, up to 4 alarm outputs (SPDT) and optional available fully isolated free programmable analog output 0/4 ... 20 mA; 0/2 ... 10 V DC meets the demand for different applications. Peak value indication for minimum and maximum measured values are stored in the background and can be read out from the display at any time.

Short information

- Programming: The device is programmed by frontal buttons, in connection with the LCD display.
- Inputs: Standard signal 0/4 ... 20 mA and 0/2 ... 10 V DC
- Alarm outputs: The alarm outputs can be programmed as max. or min. function. Switch-on delay and switch-off delay time is programmable from 1 s up to 9 h. The switching status is displayed through LED’s.
- Fault function: A break of wire in the measuring circuit could be monitored. The switching function of the analog and alarm output(s) is programmable in case of an fault.
### Technical data

#### Power supply
- **Supply voltage**: 230 V AC ±10 %, 115 V AC ±10 %, or 24 V DC ±15 %
- **Power consumption**: < 5 VA
- **Operating temperature**: -10 ... 55 °C (14 ... 131 °F)
- **Rated voltage**: 250 VAC acc. to DIN EN 60664-1 between input/relay output/analog output/supply voltage
degree of pollution 2, overvoltage category III
- **Test voltage**: 4 kV DC between input/relay output/analog output/supply voltage

#### Input
- **Input**: 0/4 ... 20 mA; 0/2 ... 10 V DC
- **Fault detection**: Break of wire in the measuring circuit
- **Input resistance**: Current input 10 Ω, voltage input 10 kΩ
- **Basic accuracy**: <0.1 %, ±1 Digit
- **Temperature coefficient**: 0.01 %/K

#### Output
- **Alarm outputs A1-A4**: Relay SPDT < 250 V AC < 250 VA < 2 A cosφ ≥ 0.3, < 300 V DC < 40 W <2 A
- **Analog output**: 0/4 ... 20 mA burden ≤500 Ω; 0/2 ... 10 V burden >500 Ω, galv. isolated, output changes automatically (burden impedance dependent).
- **Accuracy**: 0.2 %; TK 0.01 %/K
- **Fault function**: For break of wire detection
  - → Analog output 0 mA, < 3.6 mA or > 21.5 mA programmable
  - → Alarm output(s) min. or max. function programmable

#### Display
- **Graphic LCD-Display 128x64 pixels, white background illuminated**

#### Case
- **Polyamide (PA) 6.6, UL94V-0, DIN rail mounting TS 35**
- **Weight**: approx. 450 g
- **Connection**: Screw terminals 0.14 ... 2.5 mm² (AWG 26 ... 14)
- **Protection**: Case IP30, terminals IP20, German BGV A3

<table>
<thead>
<tr>
<th>Standardize IEC61326 05/2004</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 61000-4-2 (ESD)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-3 (E-field)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-4 (Magnetic filed)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-11 (Voltage dip)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-4 (Burst)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-5 (Surge)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-6 (HF current feed)</td>
<td>Case</td>
</tr>
<tr>
<td>IEC 61000-4-4 (Burst)</td>
<td>DC power supply connection</td>
</tr>
<tr>
<td>IEC 61000-4-5 (Surge)</td>
<td>DC power supply connection</td>
</tr>
<tr>
<td>IEC 61000-4-6 (HF current feed)</td>
<td>DC power supply connection</td>
</tr>
<tr>
<td>CISPR16-1/16-2</td>
<td>Radiated interference</td>
</tr>
</tbody>
</table>

#### Electrical robustness
- **AC power supply connection**: 4 kV/8 kV contact/air, 0.5 period, ±100%
- **DC power supply connection**: 2 kV, 1 kV L/N, 2 kV L,N/PE, 3 V

#### Certificates
- **IEC 61000-4-2 (ESD)**: Passed
- **IEC 61000-4-3 (E-field)**: Passed
- **IEC 61000-4-4 (Burst)**: Passed
- **IEC 61000-4-5 (Surge)**: Passed
- **IEC 61000-4-6 (HF current feed)**: Passed
- **CISPR16-1/16-2**: Passed
Connection diagram

Supply voltage

Analog output 0/4 ... 20 mA, 0/2 ... 10 V DC

Alarm outputs
A1 ... A4

Transmitter supply
24 V DC max. 30 mA

Current
Voltage

2-wire sensor

Dimensions

Terminals 21 - 28
Terminals 11 - 18

Terminals 41 - 48
Terminals 31 - 38
Controls and indicators

Description
The operation of the device is implemented in 2 levels. The required parameter is called up with the button \[button\]. The selection within a parameter and the setting-adjustment of a value is implemented with the buttons \[up\] and \[down\].

Button combinations (press buttons simultaneously):
- \[down\] + \[button\] 1 parameter back
- \[up\] + \[button\] Parameter is set to "0" or minimum value.

After the switching on the supply voltage, the device initializes itself. In the display the message indicating device type and software version is shown. After the initialization, the device is running in the working level. The peak value storage is called up and the setpoints of the alarm outputs can be programmed.

The configuration level is called up by activation of the button \[button\] for 2 seconds. In this case, all parameters which determine the properties of the device are programmed. After the last menu item, or if no button is pressed for longer than 2 minutes, a skip-back into the working level is implemented automatically and the current measured value is indicated in the display. The configuration level can be exited at any time by holding down button \[button\] for 2 seconds.

Error reports
In case of occurring faults, the messages are shown on the display in plain text. This simplifies location of the error. See description page 11.

Operational startup reference!
The device is preset with an ex-works default setting. Therefore it must be adapted to each special application. See Page 6.
**Note on the representation**

- Parameter appears only with corresponding configuration
- Parameter appears only with corresponding equipment version

**Working level**

**Actual-value displays**
Change between the two representations for the actual value display with the buttons ▲ and ▼.

Only the current value can either be displayed, or in addition, the adjusted values for the switching points of the alarm outputs. This selection is stored and is also retained after a voltage breakdown.

**Peak value display**
for minimum and maximum measured value.
Delete with the button ▲ or with every power cut-off.

**Setpoint alarm output A1** (switching function MIN or MAX)
Allocation of the fault detection in the measuring circuit (break of wire with buttons ▲ and ▼).

**Setpoint alarm output A2** (switching function MIN or MAX)
Setting possible from −9999 ... 9999 Digit with buttons ▲ and ▼.

*Note: Setpoints for alarm outputs A1 ... A4 have to be configured in the same way.*
Configuration level

Display

Working level

Description (represented values are default settings)

1

MR50

Language

Input

Press 2s

1.1

User Language

deutsch

english

Select language

1.1

MR50

Language

Input

2

MR50

Language

Input

2.1

Input signal

0 - 20 mA

4 - 20 mA

0 - 10 V DC

2 - 10 V DC

Selection with buttons ➧ and ➦.

2.2

Digital filter

OFF

or in steps of 0.5 s in the range from 0.5 ... 40s

Selection with buttons ➧ and ➦.

3

MR50

Input

Display

3.1

Display contrast

Setting possible from 0 ... 100% with buttons ➧ and ➦.

3.2

Unit

mV

V

Display

Display unit

The selected unit will be displayed and used for programming the characteristic curve.

Installed units:

mV, V, mA, A, Ω, S/cm, S/cm, °C, °F, min⁻¹, rpm, bar, mbar, hPa, kPa, m, cm, m, %, l, l/min, m³, m³/h, ppm and custom.

custom = max. 5 characters are free programmable.

Selection with buttons ➧ and ➦.

Continue page 7
3.3 Custom unit
Maximal 5 characters possible (see character set below). Only appears if custom is selected.
Scrolling through the characters is possible with buttons ▲ and ▼.
The selected character will be entered with button Enter. After that, the cursor jumps to the next position. Selection procedure as before. If 5 characters are entered or no more character wanted, the parameter custom unit will excite automatically.
Characters:
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
äöüß
. ? ! , : _ % / \ + - *
μ Ω Å ° 1 2 3 -1 -2

3.4 Number of decimal places
0, 0.0, 0.00, 0.000
Selection with buttons ▲ and ▼.

3.5 Start value for display
Setting possible from -9999 ... 9999 Digit with buttons ▲ and ▼.

3.6 End value for Display
Setting possible from -9999 ... 9999 Digit with buttons ▲ and ▼.

3.7 Measured value correction
Setting possible from -9999 ... 9999 Digit with buttons ▲ and ▼.
4.1 Selection of the analog output

- 0–20 mA (0-10 V DC)
- 4–20 mA (2-10 V DC)

Selection with buttons ↑ and ↓.

Automatic changeover to voltage signal in case of load impedance > 500 Ω.

4.2 Start value analog output

Setting possible from –9999 ... 9999 Digit with buttons ↑ and ↓.

4.3 End value analog output

Setting possible from –9999 ... 9999 Digit with buttons ↑ and ↓.

Note: If start value > end value the output works with a decreasing characteristic.

4.4 Correction analog output

Selection with buttons ↑ and ↓.

4.4.1 Correction start value analog output

Setting in the range ±2 mA or ±1 V with buttons ↑ and ↓.

4.4.2 Correction end value analog output

Setting in the range ±2 mA or ±1 V with buttons ↑ and ↓.

4.5 Fault action

Fault action of the analog output for break of wire in the measuring circuit.

- > 21 mA at analog output 0-20/4-20 mA
- < 3.6 mA at analog output 4-20 mA (2-10 V)
- 0 mA at analog output 0-20 mA (0-10 V)

Selection with buttons ↑ and ↓.
4.6 Alarm output 1

Function alarm output A1

OFF

Limit  Monitoring of the measuring value

Function alarm output A1

Limit/Fault det. Break of wire
Selection with buttons ▲ and ▼.

Switching function alarm output A1

NO, NC
Selection with buttons ▲ and ▼.

Fault det.

Direction of action alarm output A1

MIN, MAX
Selection with buttons ▲ and ▼.

Setpoint alarm output A1

Setting possible from -9999 ... 9999 digit
with buttons ▲ and ▼.

Hysteresis alarm output A1

Setting possible from 1 ... 9999 digit
with buttons ▲ and ▼.

Switch-on delay time alarm output A1

Setting possible from 0:00:00 ... 9:00:00 (h:mm:ss)
with buttons ▲ and ▼.

Switch-off delay time alarm output A1

Setting possible from 0:00:00 ... 9:00:00 (h:mm:ss)
with buttons ▲ and ▼.

Note: The parameter settings for A2 ... A4
have to be configured in the same way.
**Simulation**
Der MR50 works as actuator. The analog output changes in the programmed range. Setting possible with buttons and .

This parameter will **not** be excited automatically after 120 seconds.

**Parameter lock**
- **OFF**: no parameters locked
- **CONFIG**: Configuration level locked
- **ALL**: all parameters locked

Selection with buttons and .

**Code for Factory settings**

- **Factory settings**
  - **MR50**: Code
  - **End**

**Return to the working level**

22.4 bar
Input: 4-20 mA
<table>
<thead>
<tr>
<th>Error reports</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution!</td>
<td>The parameter can not be changed, because the parameter lock for the configurati-</td>
</tr>
<tr>
<td>Parameter locked</td>
<td>on level, or work and configuration level, is switched on.</td>
</tr>
<tr>
<td>switched on</td>
<td></td>
</tr>
<tr>
<td>Caution!</td>
<td>Supply voltage to low</td>
</tr>
<tr>
<td>Undervoltage</td>
<td></td>
</tr>
<tr>
<td>Caution!</td>
<td>At the check-up of the parameter memory, XX errors are detectet. The incorrect</td>
</tr>
<tr>
<td>XX Parameter error</td>
<td>parameter are resetted to the factory settings. Please check and correct para-</td>
</tr>
<tr>
<td>Please check</td>
<td>meters if necessary.</td>
</tr>
<tr>
<td>Caution!</td>
<td>As before, but the factory settings are incorrect. The device must be che-</td>
</tr>
<tr>
<td>XX Parameter error</td>
<td>ckd at works.</td>
</tr>
<tr>
<td>Calibration necessary</td>
<td></td>
</tr>
<tr>
<td>Change of decimals?</td>
<td>Change of decimal places</td>
</tr>
<tr>
<td>Some parameters not representable!</td>
<td>While changing number of decimal places, some parameters can be converted, but</td>
</tr>
<tr>
<td>Adapt parameters automatically?</td>
<td>however, not represented!</td>
</tr>
<tr>
<td>Selection &quot;No&quot;: Change of the decimal pla-</td>
<td>Selection &quot;Yes&quot;: Decimal places are changed automatically, where the affec-</td>
</tr>
<tr>
<td>ced is not carried out.</td>
<td>ted parameters are set to the maximum possible value. A subsequent verification</td>
</tr>
<tr>
<td>Selection &quot;Yes&quot;:</td>
<td>of the accepted parameters is absolutely necessary.</td>
</tr>
<tr>
<td>of the accepted parameters is absolutely</td>
<td></td>
</tr>
<tr>
<td>necessary.</td>
<td></td>
</tr>
<tr>
<td>Break of wire in the measuring circuit.</td>
<td></td>
</tr>
<tr>
<td>Text Input: 9999mV is flashing.</td>
<td></td>
</tr>
</tbody>
</table>
Ordering code

MR50 - □□□□□□

1. Input
   1 Standard signals 0/4 ... 20 mA; 0/2 ... 10 V DC
   Transmitter supply 24 DC V max. 30 mA

2. Alarm outputs
   2R 2 relay outputs A1, A2 SPDT

3. Alarm outputs
   00 not installed
   2R 2 relay outputs A3, A4 SPDT

4. Analog output
   00 not installed
   AO Analog output 0/4 ... 20 mA; 0/2 ... 10 V DC

5. Supply voltage
   0 230 V AC ± 10 % 50-60 Hz
   1 115 V AC ± 10 % 50-60 Hz
   5 24 V DC ± 15 %

6. Options
   00 without option

Works configuration according to customer specifications.