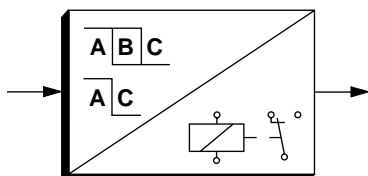# Threshold Value Switches
MCR-SWS/...

1. Description

- Relay/transistor output
- Limit indicator
- Selectable hysteresis

The MCR-SWS threshold value switch is used to monitor simple automation processes. Standard analog signals 0...10 V or 0...20 mA are processed on the input side.

The single-ended current input can be isolated using jumpers and therefore used as a differential current input. Using the differential input, several threshold value switches can be connected in series to monitor the current level.
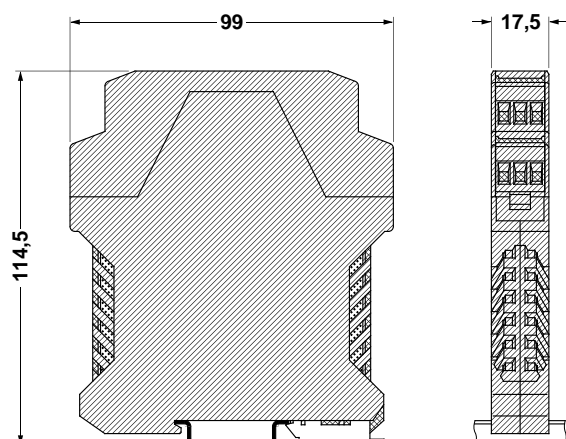
From the analog input signals 0...10 V or 0(4)...20mA, a setpoint (limit value) is set in the module using a potentiometer. If the input signal reaches the setpoint (limit value), a relay contact is closed at the output.

After the setpoint (limit value) has been set, the required hysteresis can be set using another potentiometer. Both switching points control a relay.
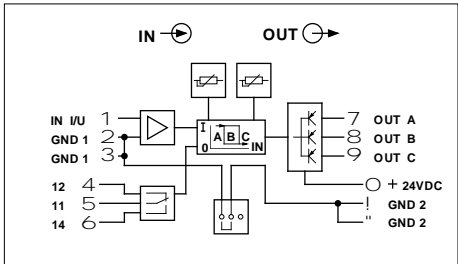
Simple automation processes can be monitored using the changeover contact.

The three signal area states (A, B, and C) - below, within, and above the hysteresis - are provided as transistor outputs for monitoring. LEDs indicate the three signal areas.

The modules are 17.5 mm (0.689 in.) wide, have robust screw and plug-in connections, and can be mounted on all popular DIN rails.

2. Technical Data

	rigid	flexible	
	[mm²]		AWG
Connection data	0.2-2.5	0.2-2.5	24-14

Description	Input Signal
MCR threshold value switches,	0...10 V
with selectable hysteresis and relay/transistor output	0(4)...20 mA

Technical Data

MCR-SWS/…

with signal input:
0…10 V
0…20 mA
4…20 mA

UL UR CSA

Type	Order No.	Pcs. Pkt.
MCR-SWS/U	**27 66 46 5**	1
MCR-SWS/I	**27 66 47 8**	1

	MCR-SWS/U	MCR-SWS/I
Input		
Input signal	0…10 V	0(4)…20 mA
Input resistance	≥ 100 kΩ	≤ 120 Ω
Setting potentiometer	270° potentiometer with scale	270° potentiometer with scale
Setting range for the setpoint	0…10 V	0…20 mA
Setting range for the hysteresis	0.1…10 V	0.2…20 mA
Setting precision for the hysteresis	±30 mV	±60 µA
Internal hysteresis at the lower/upper switching point	30 mV	60 µA
Output		
Transistor level	PNP outputs	
Output voltage	20…30 V DC	
Maximum output current	100 mA	
Relay level		
Type of contact	1 Form C contact	
Maximum switching voltage/switching current	250 V AC/2 A	
Cycles, mechanical	10×10^{6}	
General Data		
Supply voltage	20…30 V DC	
Current consumption	60 mA	
Temperature coefficient	$\leq 0.02\%$/K	
Step-response (10 - 90%)	< 0.025 s	
Ambient operating temperature range	-20°C to +65°C (-4ºF to +149ºF)	
Electromagnetic compatibility	CE Conformance with EMC Directive 89/336/EEC	
• Noise emission	EN 50 081-1	
• Immunity to interference	EN 50 082-2	

$\mathcal{CE}$

Conformance With EMC Directive 89/336/EEC in Accordance With EN 50081-2, EN 50082-2

EMC (electromagnetic compatibility)		
Noise immunity in accordance with EN 50082-2		
• Electrostatic discharge (ESD)	EN 61000-4-2	8 kV air discharge [2]
• Electromagnetic HF field		
Amplitude modulation	ENV 50140	10 V/m
Pulse modulation	ENV 50140	10 V/m
• Fast transients (burst)	EN 61000-4-4	Input/output/supply 2 kV/5 kHz [2]
• Surge current loads (surge)	ENV 50142	Supply: 0.5 kV/2 Ω [2]
• Conducted interference	ENV 50141	Input/output/supply 10 V
Noise emission in accordance with EN 50081-2	EN 55011	Class A

EN 61000 corresponds to IEC 1000/
EN 55011 corresponds to CISPR11

[2] Criterion B: Temporary adverse effects on the operating
characteristics, which the device corrects automatically.

Class A: Industrial application, without special
installation measures

MCR-SWS/... – Threshold Value Switches

1 LEDs for switching transistor areas

2 Threshold value potentiometer

3 Hysteresis potentiometer

4 Signal input
(plug-in screw-cage terminal block)

5 Relay output
(plug-in screw-cage terminal block)

6 Switching transistor outputs
(plug-in screw-cage terminal block)

7 Power supply
(plug-in screw-cage terminal block)

8 Upper part of the housing can be removed to
set the jumpers

9 Metal lock for fastening on the DIN rail
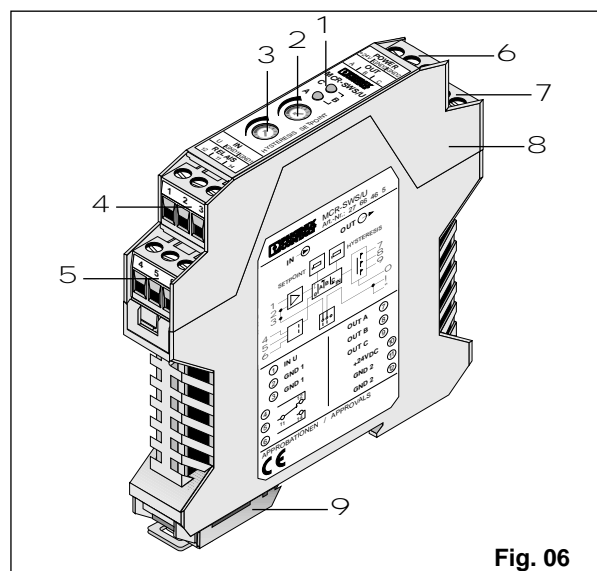

Fig. 06

3. Setting the Hysteresis

Example: switching point 5 V, hysteresis ±1 V (4V…6V) or switching point 10 mA, hysteresis ±2 mA

- Turn both potentiometers (setpoint P1 and hysteresis P2) as far to the left as possible.
- Send a signal (5 V or 10 mA), which corresponds to the setpoint to the signal input (U_{IN} or I_{IN}). LED C lights up.
- Turn P1 to the right until both LEDs light up (area B).
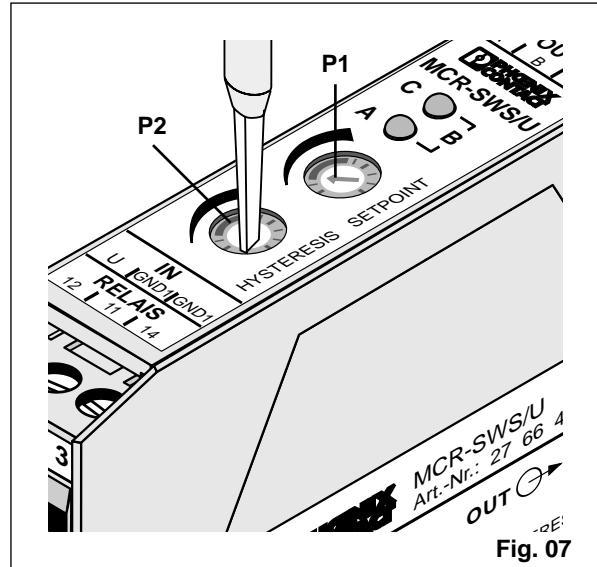- Send a signal (4 V or 8 mA), which corresponds to the lower hysteresis to the signal input (U_{IN} or I_{IN}). LED A lights up.
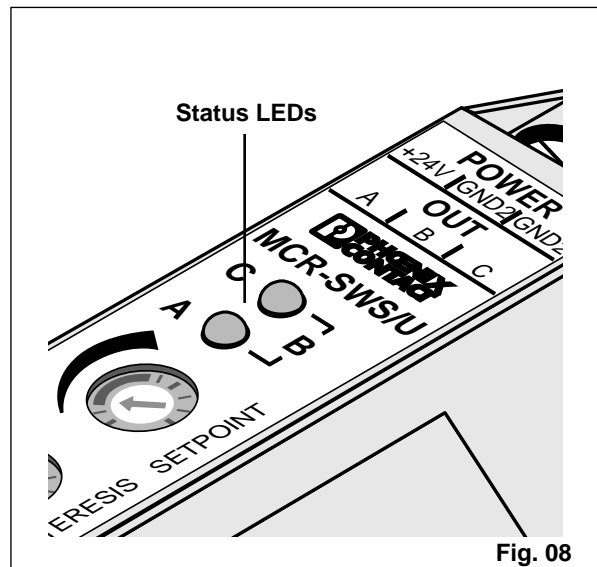- Turn P2 to the right until both LEDs light up.

Fig. 07

Status LEDs

Fig. 08

Check:

The exact setting has been made if the following criteria have been met:

- Transition from area A (LED A) to area B (both LEDs) is 4 V ±15 mV or 8 mA ±30 µA for a rising signal (0–>10 V or 0–>20 mA).
- Transition from area B (both LEDs) to area C (LED C) is 6 V ±15 mV or 12 mA ±30 µA.

Deviations are caused by the internal hysteresis of 30 mV or 60 µA.
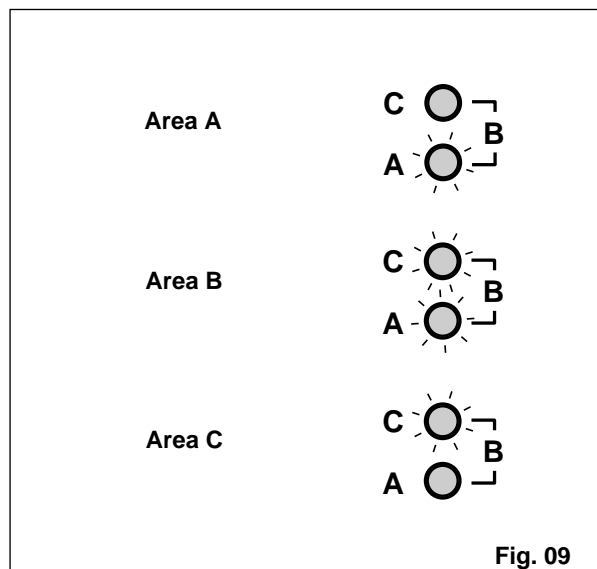

Area A

Area B

Area C

Fig. 09

4. Setting Differential Mode on the MCR-SWS/I

The input can be switched to differential mode to enable several threshold value switches with **current input 0…20 mA** to be connected in series.

The module is fitted with a single-ended input as standard.

4.1. Opening the Device

The fastenings on both sides of the upper part of the housing can be loosened using a screwdriver 1 . The upper part of the housing and the electronics can now be pulled out approximately 3 cm (1.181 in.) 2 .
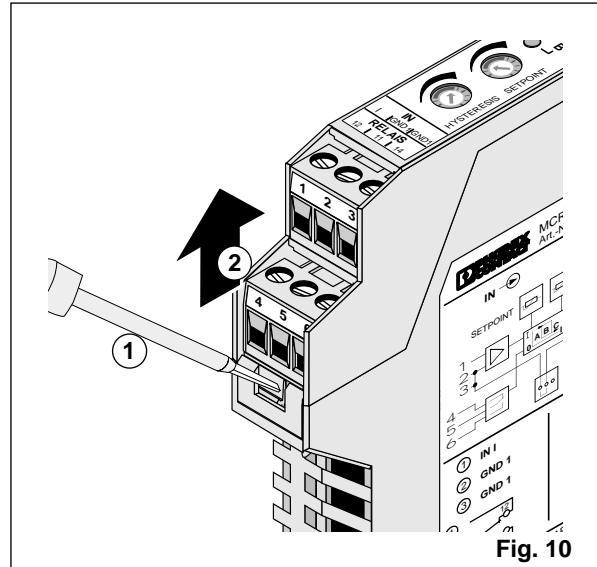
Fig. 10

4.2. Setting the Jumper 3

To switch to differential mode, jumper J is set to position D. After the setting has been made, the upper part of the housing is pushed back in until it locks into place.
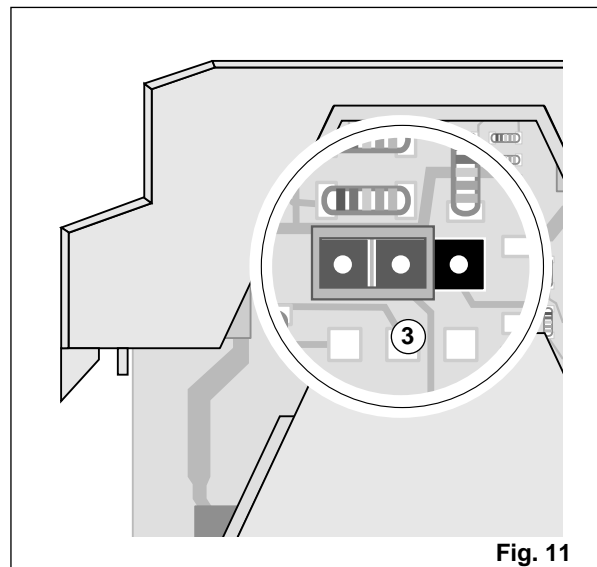
Fig. 11

Jumper Configuration
(corresponding module view in Fig. 11):
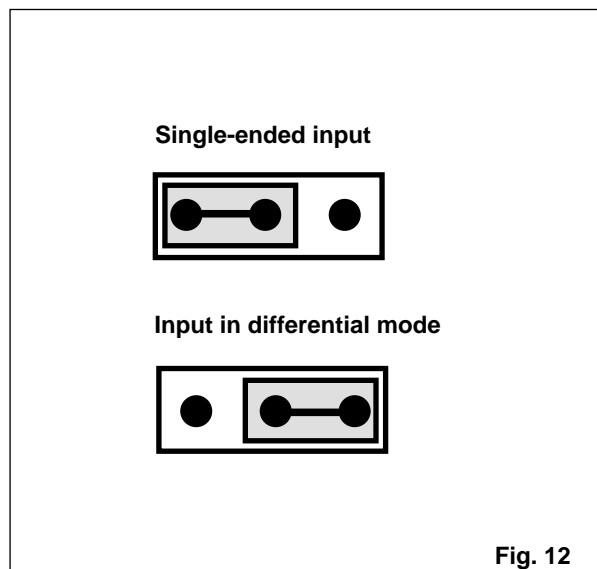• Single-ended input
• Position D = input in differential mode

Single-ended input

Input in differential mode

Fig. 12