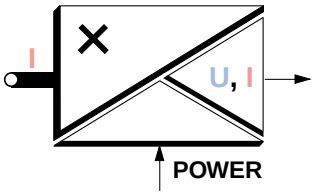
MCR-S-...-DCI
Current transducers up to 50 A programmable and configurable

1. Short description

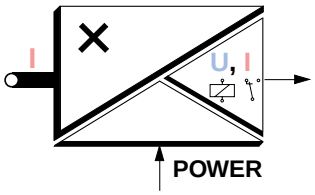
- **progressive adjustment of measuring range**
- **true r.m.s. value measurement**
- **electrical 3-way isolation in acc. with EN 61010**
- **with optional relay and transistor output**
- **22.5 mm ME housing**



The new MCR-S-…-DCI current transducers provide the user with the opportunity of ordering a pre-configured device, configuring the device himself with the DIP switches, or programming it with configuration software.



MCR-S-1/5-UI-DCI, the smallest module, provides not only the standard 1 A and 5 A input signals, but also the opportunity of setting current ranges of 0…0.18 to 0…10 A progressively. The MCR-S-10/50-UI-DCI with a measuring range of 0…9.38 A to 0…50 A is perfectly suited for measuring higher motor currents. DC, AC and distorted currents can be equally well measured.



These current transducers can be purchased with an optional transistor and relay output for alarm monitoring, for example.
When ordering, the desired configuration to which the equipment is to be adapted must be indicated (see ordering key).
If no details are given as to configuration, the devices will be supplied with the standard configuration (see ordering examples on pages 3 and 5).

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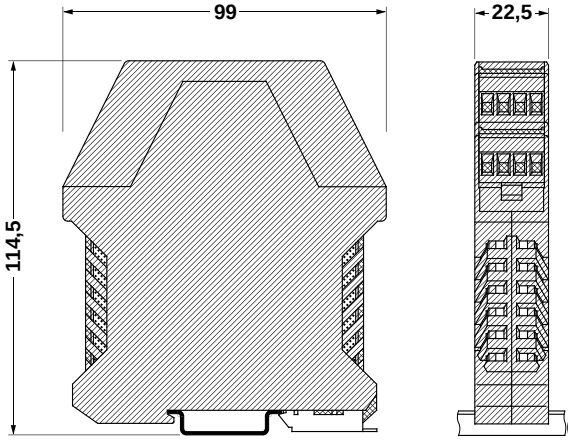


Fig. 5



Fig. 6

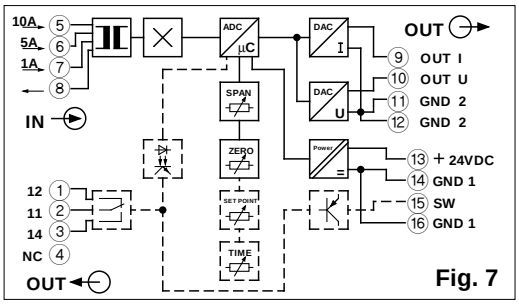


Fig. 7

MCR-S-1/5-UI(-SW)-DCI(-NC)

with signal conversion:
0…0.18 A to 0…10 A / 0(4)…20 mA
/ 0(2)…10 V /± 10 V
(planned) / 0(1)… 5 V /± 5 V

(IEC) [mm²]	rigid solid	flexible stranded	AWG	I [A]	U [V]
Connection data	0.2-2.5	0.2-2.5	24-14	*	*

* Electrical data is determined by the module.

2. Description

	Input current
MCR current transducer**,** for measurement of DC, AC and distorted currents:	0…0.18 to 0…10 A configured unconfigured
as above, however with relay and transistor output:	configured unconfigured

Type	Order No.	Pcs. Pkt.
MCR-S-1/5-UI-DCI [1]	**28 14 63 4**	1
MCR-S-1/5-UI-DCI-NC	**28 14 71 5**	1
MCR-S-1/5-UI-SW-DCI [1]	**28 14 65 0**	1
MCR-S-1/5-UI-SW-DCI-NC	**28 14 73 1**	1

2.1. Technical data

	MCR-S-1/5-UI-DCI(-NC)	MCR-S-1/5-UI-SW-DCI(-NC)
Measurement		
Input current (AC, DC or distorted currents)	0…0.18 A to 0…10 A	0…0.18 A to 0…10 A
Frequency range	15 Hz … 400 Hz	15 Hz … 400Hz
Type of connection	2.5 mm² screw terminal block	2.5 mm² screw terminal block
Overload capacity, continuous	2 x I_{nom}	2 x I_{nom}
Surge current strength for 1 s	10 x I_{nom} (max. 100 A)	10 x I_{nom} (max. 100 A)
Output		
Output current/ Load	0(4) … 20 mA / < 500 Ω	0(4) … 20 mA / < 500 Ω
Output voltage / Load	0(2) … 10 V / > 10 kΩ 0(1) … 5 V / > 10 kΩ ± 10 V, ± 5 V / > 10 kΩ	0(2) … 10 V / > 10 kΩ 0(1) … 5 V / > 10 kΩ ± 10 V, ± 5 V / > 10 kΩ
Switching output		
Relay output	—	1 PDT
• Contact material		$AgSnO_2$, hard gold plated
• Max. switching voltage		30 V AC / 36 V DC [2]
• Continuous current carrying capacity		50 mA
Transistor output		PNP output
• Max. transistor current		80 mA
• Output voltage at time of event		1 V below supply voltage
Threshold value setting		1 % to 110 %
Suppression time		0.1…20 s
Status display		yellow LED

[1] If no further details are given as to configuration, the device is supplied in the standard configuration (see order key 2.3.)!

[2] If the maximum values indicated are exceeded, the gold layer is destroyed! The following max. switching voltages and currents are then valid for further operation: 250 V AC/DC; 2A.

2.2. General data

General data	MCR-S-1/5-UI-DCI(-NC)	MCR-S-1/5-UI-SW-DCI(-NC)
Supply voltage	20…30 V DC	20…30 V DC
Current consumption (without load)	approx. 60 mA	approx. 70 mA
Transmission error	< 0.5 % of range nom. value under nominal conditions: • meas. range: 0...1 A/5 A/10 A • type of input signal: 50 Hz -sin. • meas. method: true r.m.s value • ambient temperature: 23 °C • supply voltage: 24 V DC	< 0.5 % of range nom. value under nominal conditions • meas. range: 0...1 A/5 A/10 A • type of input signal: 50 Hz -sin. • meas. method: true r.m.s value • ambient temperature: 23 °C • supply voltage: 24 V DC
Temperature coefficient	< 0.025%/K	< 0.025%/K
Step -response(10- 90 %)	330 ms with AC/DC	330 ms with AC/DC
Protective isolation acc. to EN 50 178, EN 61 010		
• I/O (analog), I/O (relay), I/O (transistor), I/S [3]	277 V AC line to earth [4] 480 V AC line to line [4]	277 V AC line to earth [4] 480 V AC line to line [4]
Test voltage:		
• I/O (analog), I/O (relay), I/O (transistor), I/S	4 kV, 50 Hz, 1 min.	4 kV, 50 Hz, 1 min.
• O (analog)/O (relay), O (relay)/O (transistor)	4 kV, 50 Hz, 1 min.	4 kV, 50 Hz, 1 min.
• O (analog)/O (transistor), O (analog)/S	500 V, 50 Hz, 1 min.	500 V, 50 Hz, 1 min.
Ambient temperature range	-20 °C to 60 °C	-20 °C to 60 °C
Module warm-up time	> 2 min.	> 2 min.
Function standby signal	green LED	green LED
Protection type	IP 20	IP 20
Installed position/ mounting	any	any
Dimensions (W/H/D) in mm	22.5 x 99 x 114.5	22.5 x 99 x 114.5
Housing material	polyamide PA, unreinforced	polyamide PA, unreinforced

[3] Abbreviations: I ≙ Input
O ≙ Output
S ≙ Supply

[4] Suitable for measuring in 480 V AC three-phase systems

2.3. Order key for the MCR-S-1/5-UI(-SW)-DCI current transducer

Standard configuration		Measuring lower range value		Measuring upper range (f.s.) value		Output signal
MCR-S-1/5-UI-DCI	/	0.00	/	5.00	/	1
		Measuring lower range value between 0.00 A…7.50 A 0.00 ≙ 0.00 A		Measuring upper range (f.s.) value between 0.5 A…10 A 5.00 ≙ 5.00 A		1 ≙ 0…20 mA 2 ≙ 4…20 mA 3 ≙ 0…10 V 4 ≙ 2…10 V 5 ≙ ±10 V 6 ≙ 0 … 5 V 7 ≙ 1 … 5 V 8 ≙ ± 5 V

Standard configuration		Meas. lower range value		Meas. upper range (f.s.) value		Output signal		Threshold value		Suppression time		Switching behavior of relay and transistor		
MCR-S-1/5-UI-SW-DCI	/	0.00	/	5.00	/	1	/	50	/	3.0	/	A	/	O
		Meas. lower range value between 0.00 A…7.50 A 0.00 ≙ 0.00 A		Meas. upper range (f.s.) value between 0.5 A…10 A 5.00 ≙ 5.00 A		1 ≙ 0…20 mA 2 ≙ 4…20 mA 3 ≙ 0…10 V 4 ≙ 2…10 V 5 ≙ ±10 V 6 ≙ 0 … 5 V 7 ≙ 1 … 5 V 8 ≙ ± 5 V		Switching threshold between 1 … 110 % 50 ≙ 50 % of measuring upper range (f.s.) value set (here: 2.5 A)		between 0.1 … 20 s 3.0 ≙ 3 s		A ≙ Operating current controlled R ≙ Quiescent current controlled		O ≙ Exceeded U ≙ Fallen below

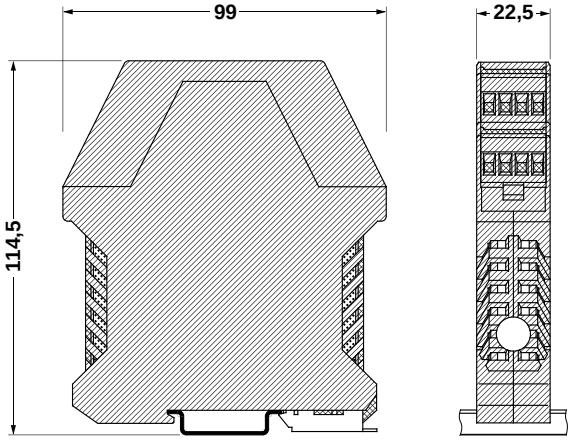


Fig. 8



Fig. 9

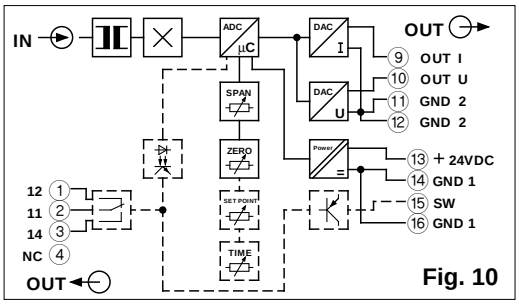


Fig. 10

MCR-S-10/50-UI(-SW)-DCI(-NC)

with signal conversion:
0…9.38 A to 0…50 A / 0(4)…20 mA
/ 0(2)…10 V /± 10 V
(planned) / 0(1)… 5 V /± 5 V

(IEC) [mm²]	rigid solid	flexible stranded	AWG	I [A]	U [V]
Connection data	0.2-2.5	0.2-2.5	24-14	*	*

* Electrical data is determined by the module.

3. Description

	Input current
MCR current transducer, for measurement of DC, AC and distorted currents:	0…9.38 to 0…50 A configured unconfigured
as above, however with relay and transistor output:	configured unconfigured

Type	Order No.	Pcs. Pkt.
MCR-S-10/50-UI-DCI [1]	**28 14 64 7**	1
MCR-S-10/50-UI-DCI-NC	**28 14 72 8**	1
MCR-S-10/50-UI-SW-DCI [1]	**28 14 66 3**	1
MCR-S-10/50-UI-SW-DCI-NC	**28 14 74 4**	1

3.1. Technical data

	MCR-S-10/50-UI-DCI(-NC)	MCR-S-10/50-UI-SW-DCI(-NC)
Measurement		
Input current (AC, DC or distorted currents)	0…9.38 A to 0…50 A	0…9.38 A to 0…50 A
Frequency range	15 Hz … 1 kHz	15 Hz … 1 kHz
Type of connection	Through connection 10.5 mm ∅	
Overload capacity, continuous	depending on conductor pushed through	
Surge current strength for 1 s	depending on conductor pushed through	
Output		
Output current/ Load	0(4) … 20 mA / < 500 Ω	0(4) … 20 mA / < 500 Ω
	0(2) … 10 V / > 10 kΩ	0(2) … 10 V / > 10 kΩ
	0(1) … 5 V / > 10 kΩ	0(1) … 5 V / > 10 kΩ
Output voltage / Load	± 10 V, ± 5 V / > 10 kΩ	± 10 V, ± 5 V / > 10 kΩ
Switching output	—	
Relay output		1 PDT
• Contact material		$AgSnO_2$, hard gold plated
• Max. switching voltage		30 V AC / 36 V DC [2]
• Continuous current carrying capacity		50 mA
Transistor output		PNP output
• Max. transistor current		80 mA
• Output voltage at time of event		1 V below supply voltage
Threshold value setting		1 % to 110 %
Suppression time		0.1…20 s
Status display		yellow LED

[1] If no further details are given as to configuration, the device is supplied in the standard configuration (see order key 3.3.)!

[2] If the maximum values indicated are exceeded, the gold layer is destroyed! The following max. switching voltages and currents are then valid for further operation: 250 V AC/DC; 2 A.

3.2. General data

General data	MCR-S-10/50-UI-DCI(-NC)	MCR-S-10/50-UI-SW-DCI(-NC)
Supply voltage	20…30 V DC	20…30 V DC
Current consumption (without load)	approx. 60 mA	approx. 70 mA
Transmission error	< 0.5 % of range nom. value under nominal conditions: • measuring range: 0...50 A • type of input signal: 50 Hz -sin. • meas. method: true r.m.s value • ambient temperature: 23 °C • supply voltage: 24 V DC	< 0.5 % of range nom. value under nominal conditions • measuring range: 50 A • type of input signal: 50 Hz -sin. • meas. method: true r.m.s value • ambient temperature: 23 °C • supply voltage: 24 V DC
Temperature coefficient	< 0.025%/K	< 0.025%/K
Step-response (10- 90 %)	40 ms with DC /330 ms with AC	40 ms with DC /330 ms with AC
Protective isolation acc. to EN 50 178, EN 61 010	277 V AC line to earth [4]	277 V AC line to earth [4]
• I/O (analog), I/O (relay), I/O (transistor), I/S [3]	480 V AC line to line [4]	480 V AC line to line [4]
Test voltage:		
• I/O (analog), I/O (relay), I/O (transistor), I/S	4 kV, 50 Hz, 1 min.	4 kV, 50 Hz, 1 min.
• O (analog)/O (relay), O (relay)/O (transistor)	4 kV, 50 Hz, 1 min.	4 kV, 50 Hz, 1 min.
• O (analog)/O (transistor), O (analog)/S	500 V, 50 Hz, 1 min.	500 V, 50 Hz, 1 min.
Ambient temperature range	-20 °C to 60 °C	-20 °C to 60 °C
Module warm-up time	> 2 min.	> 2 min.
Function standby signal	green LED	green LED
Protection type	IP 20	IP 20
Installed position/ mounting	any	any
Dimensions (W/H/D) in mm	22.5 x 99 x 114.5	22.5 x 99 x 114.5
Housing material	polyamide PA, unreinforced	polyamide PA, unreinforced

[3] Abbreviations: I ≙ Input
O ≙ Output
S ≙ Supply

[4] Suitable for measuring in 480 V AC three-phase systems

3.3. Order key for the MCR-S-10/50-UI(-SW)-DCI current transducer

Standard configuration	/	Measuring lower range value	/	Measuring upper range (f.s.) value	/	Output signal
MCR-S-10/50-UI-DCI	/	0.0	/	50.0	/	1
		Measuring lower range value between 0.0 A…37.5 A 0.0 ≙ 0.0 A		Measuring upper range (f.s.) value between 10 A…50 A 50.0 ≙ 50.0 A		1 ≙ 0…20 mA 2 ≙ 4…20 mA 3 ≙ 0…10 V 4 ≙ 2…10 V 5 ≙ ±10 V 6 ≙ 0 … 5 V 7 ≙ 1 … 5 V 8 ≙ ± 5 V

Standard configuration	/	Meas. lower range value	/	Meas. upper range (f.s.) value	/	Output signal	/	Threshold value	/	Suppres-sion time	/	Switching behavior of relay and transistor	/	
MCR-S-10/50-UI-SW-DCI	/	0.0	/	50.0	/	1	/	50	/	3.0	/	A	/	O
		Meas. lower range value between 0,0 A…37.5 A 0.0 ≙ 0.0 A		Meas. upper range (f.s.) value between 10 A…50 A 50.0 ≙ 50.0 A		1 ≙ 0…20 mA 2 ≙ 4…20 mA 3 ≙ 0…10 V 4 ≙ 2…10 V 5 ≙ ±10 V 6 ≙ 0 … 5 V 7 ≙ 1 … 5 V 8 ≙ ± 5 V		Switching threshold between 1 … 110 % 50 ≙ 50 % of measur-ing upper range (f.s.) value set (here: 25 A)		between 0.1 … 20 s 3.0 ≙ 3 s		A ≙ Operating current controlled R ≙ Quiescent current controlled		O ≙ Exceeded U ≙ Fallen below

4. Complies with EMC guideline 89/336/EEC and low voltage directive 73/23/EEC

CE

EMC (electro magnetic compatibility)		
Immunity to interference in acc. with EN 50082-2		
• Electrostatic discharge (ESD)	EN 61000-4-2	8kV discharge in air **3)**
• Electromagnetic HF field	EN 61000-4-3	10 V/m **2)**
• Fast transients (Burst)	EN 61000-4-4	I / O / S **4)**: 2 kV / 5 kHz **3)**
• Surge voltage capacities (Surge)	EN 61000-4-5	I / O **4)**: 2 kV / 42 Ω **3)** S **4)**: 1 kV / 2 Ω **3)**
• Conducted disturbance	EN 61000-4-6	I / O / S **4)**: 10 V **2)**
Noise emission in acc. with EN 50081-1		
	EN 55011	Class A

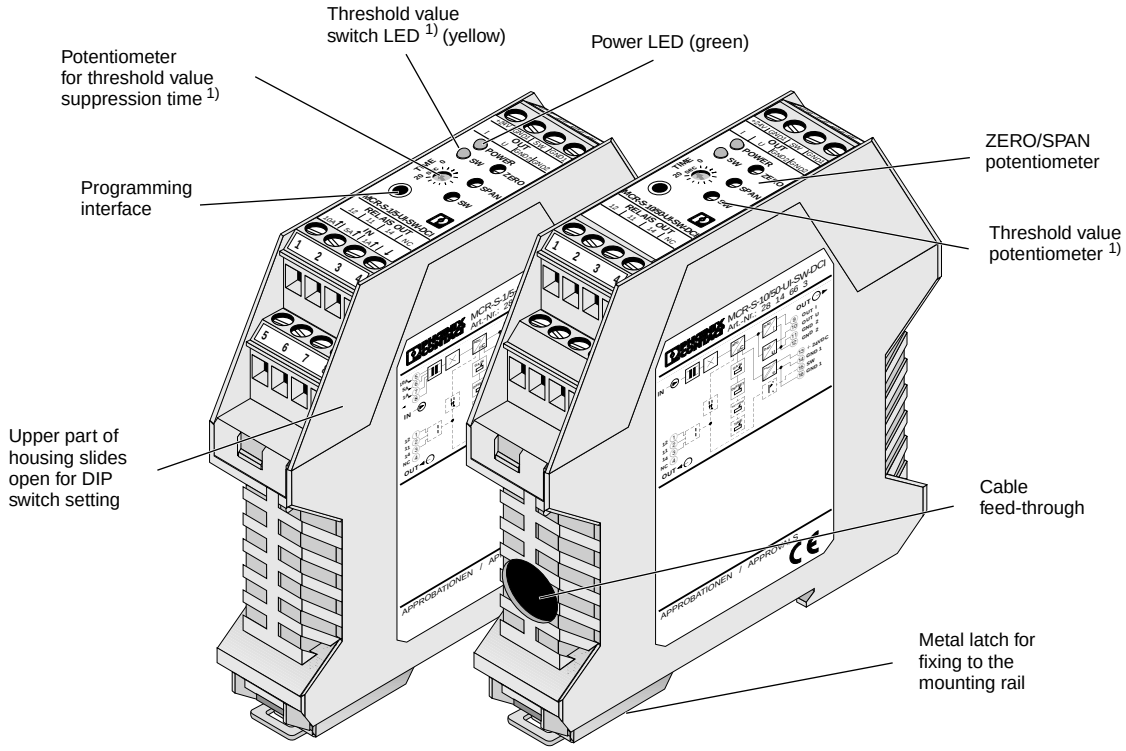
EN 61000 corresponds to IEC 1000 EN 55011 corresponds to CISPR11

1) Suitable for measuring in 400 V AC three-phase systems.
2) Criterion A: Normal operating behavior within the defined limits.
3) Criterion B:Temporary impairment of operational behavior that the device corrects itself.

Class A: Area of application: industry, without special installation measures

4) I ≙ Input / O ≙ Output / S ≙ Supply

5. Function elements



MCR-S-1/5-UI-SW-DCI **MCR-S-10/50-UI-SW-DCI**

1) Only for MCR-S-…-SW-DCI(-NC) versions.

Fig. 11

6. Connection and Operation Notes

6.1.Versions

This product information is valid for the following types of current transducers:

Type	Order No.	Measuring range	Threshold value function	preconfigured
MCR-S-1/5-UI-DCI	28 14 63 4	0…0.18 A to 0…10 A	no	no [1]
MCR-S-1/5-UI-DCI-NC	28 14 71 5		no	yes [2]
MCR-S-1/5-UI-SW-DCI	28 14 65 0		yes	no [1]
MCR-S-1/5-UI-SW-DCI-NC	28 14 73 1		yes	yes [2]
MCR-S-10/50-UI-DCI	28 14 64 7	0…9.38 A to 0…50 A	no	no [1]
MCR-S-10/50-UI-DCI-NC	28 14 72 8		no	yes [2]
MCR-S-10/50-UI-SW-DCI	28 14 66 3		yes	no [1]
MCR-S-10/50-UI-SW-DCI-NC	28 14 74 4		yes	yes [2]

[1] Configuration is done using the order key following user specifications.
[2] The module is supplied in the standard configuration.

6.2. Before start-up

When operating the electric measuring transducer, certain parts of the module can carry dangerous voltage. Ignoring the warnings can lead to serious injury and/or cause damage.
The MCR-S-…DCI modules should only be installed and put into operation by qualified staff. The staff must have studied the warnings in these operating instructions thoroughly.
Safe and trouble-free operation of this device can only be guaranteed if transport, storage and installation are carried out correctly and operation and maintenance are carried out with care.
The measuring transducer may not be put into operation if the housing is open.
Qualified staff as described in these operating instructions means those persons referred to as electricians or with an electro-technical training as defined in VDE 0105 Part 1/DIN EN 50110-1.

6.3. Description

The MCR-S-…-DCI, active current transducers convert direct, alternating and distorted currents from 0… 0.18 A to 0…10 A (MCR-S-1/5-...-DCI) and from 0…9.38 A to 0…50 A (MCR-S-10/50-…-DCI) to analog standard signals.
On the output side, the analog standard signals of 0(4)…20 mA, 0(2)…10 V, ±10 V, 0(1)…5 V, ±5 V with simple (e.g. 0…10 V) and inverse (e.g. 10…0 V) signal flow direction can be used.
An option for the current transducers with threshold output (MCR-S-…-SW-DCI) is a PNP transistor switching output (80 mA) and a relay switching output (2 A).

6.4. Method of operation

Connecting to the input terminal blocks (MCR-S-1/5-…-DCI), or passing the live conductor through the current transducer (MCR-S-10/50-…-DCI) evokes a magnetic flow in the annular strip-wound core. The density of magnetic flow is measured with the aid of a Hall sensor and converted proportionally from the input current to a voltage (Hall voltage). A downstream true r.m.s. converter enables DC, AC and distorted currents to be measured. The signal is amplified for further conditioning and made available at the output as a proportional analog signal.

6.5. Electrical connection

When operating this electric measuring transducer, the national regulations (e.g. Germany VDE 0100 "Conditions for the erection of power installations with nominal voltages below 1000 volts") must be observed during installation and selection of the electrical conductors.

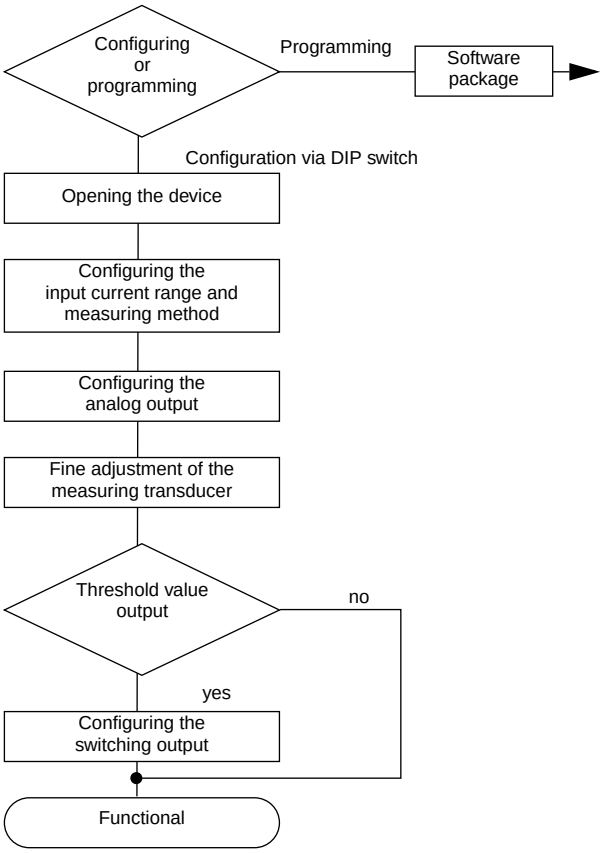
Pin configuration:

Connecting terminal block	Description
1	(12) N/C contact (only SW (threshold value) modules)
2	(11) Center contact (only SW modules)
3	(14) N/O contact (only SW modules)
4	
Terminal blocks ⑤ - ⑧ only for MCR-S-1/5-…-DCI:	
5	10 A input
6	5 A input
7	1 A input
8	Ground reference for 1, 5 and 10 A input
9	Current output
0	Voltage output
!	Ground reference for current or voltage output
"	Ground reference for current or voltage output
§	Operating voltage (+24 V DC)
$	Ground reference for operating voltage
%	Transistor output (only SW modules)
&	Ground reference for transistor output (only SW modules)

6.6. Start-up

Before putting this measuring transducer into operation, please ensure that the configuration data comply with the requirement. The configuration data for a preconfigured device are to be found on the right hand side of the housing. When using a non-configured measuring transducer, a standard configuration that can be found in "2.3. or 3.3. Order key" is set. Should the desired configuration not match that on the label on the side or the standard configuration, please observe the following point, "Functional diagram for configuration".

6.7. Functional diagram for configuration



6.7.1. Selecting the appropriate measuring transducer

How to select the appropriate measuring transducer can be found in "6.1. Versions" or "2.3. resp. 3.3. Order Key". The measured value must always be borne in mind: 0…0.18 A to 0…10 A (MCR-S-**1/5**-…) or 0…9.38 A to 0…50 A (MCR-S-**10/50**-…). If in doubt, always choose the largest possible measuring range.
There is also one version with relay and transistor output for each module type (MCR-S-…-**SW**-DCI).

6.7.2. Configuring or programming

The advantage of the MCR-S-…-DCI generation is that one has the choice between configuring and programming. Using the MCR/PI-CONF-WIN software, the user has the possibility of freely programming the true r.m.s. value current transducer.
Programming is described in the software manual. The convenient configuration software runs under all common windows operating systems.
In addition to the programming, modules can be parameterized using DIP switches and potentiometers.

In the rest of this chapter, the configuration is explained:

6.7.3. Opening the device

Using a screwdriver, the snap lock of the upper part of the housing is unlocked on both sides. The upper part of the housing and the electronics can now be pulled out by approx. 3 cm.

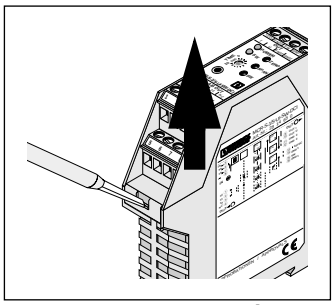
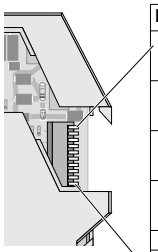


Fig. 12



DIP	Function of the DIP switches
10	Configuration via DIP switch / Programming via software
9	Input current measurement: true r.m.s. value / Arithmetic average
8	Operating / quiescent current behaviour (only SW version)
7	Threshold value exceeded / Threshold value fallen below (only SW version)
6	Setting the analog output signal
5	
4	
3	
2	Setting the input measuring range
1	

Fig. 13

Setting DIP switch 10 to configuration mode (**DIP switch 10** to **"OFF"**) switches all potentiometers to "active".

Configuration via:	**DIP**
DIP switch	OFF
Software (Any DIP switch (1-9) and potentiometer setting)	ON

6.7.4. Configuring the input current range and measuring method

(Rough setting via DIP switch)

You have the choice: True r.m.s. value or arithmetic average!

The measuring principle must be preset with DIP switch 9:

Measuring principle		DIP 9
True r.m.s. value	AC and DC without digit sign	OFF
Arithmetic average	DC with digit sign	ON

True r.m.s. value: The true r.m.s. value of an AC current corresponds by definition to the permanent value resulting from the momentary values of the current. This permanent value generates the same heat in an ohmic resistor as a DC current of the same strength. True r.m.s. value simply indicates that distorted and pulsating currents are also measured.

Arithmetic average: The arithmetic average serves to measure DC currents or filter a DC portion from a pulsating current. Using the arithmetic average on a symmetrical AC current would result in a measured value with the value "0".

The arithmetic average makes it possible to make bipolar DC currents available as analog standard signals at the output.

MCR-S-1/5-…DCI: Ideal exploitation of the measuring ranges

Span pot: **-25 %**	**Nom. range*: 0 %**	Span pot: **+ 25 %**	**DIP 1**	**DIP 2**
1 A input: Measuring range: 0…0.18 A to 0…1.1 A				
0…0.75 A	0…1.00 A	0… 1.10 A	OFF	OFF
0…0.48 A	0…0.65 A	0… 0.81 A	OFF	ON
0…0.30 A	0…0.40 A	0… 0.50 A	ON	OFF
0…0.18 A	0…0.25 A	0… 0.31 A	ON	ON
5 A input: Measuring range: 0…0.94 A to 0…5.5 A				
0…3.75 A	0…5.00 A	0… 5.50 A	OFF	OFF
0…2.43 A	0…3.25 A	0… 4.06 A	OFF	ON
0…1.50 A	0…2.00 A	0… 2.50 A	ON	OFF
0…0.94 A	0…1.25 A	/	ON	ON
10 A input: Measuring range: 0…4.87 A to 0…11 A				
0…7.50 A	0…10.0 A	0… 11.00 A	OFF	OFF
0…4.87 A	0 … 6.5 A	0 … 8.12 A	OFF	ON

MCR-S-10/50-…DCI: Ideal exploitation of the measuring ranges

Span pot: **-25 %**	**Nom. range*: 0 %**	Span pot: **+ 25 %**	**DIP 1**	**DIP 2**
Measuring range: 0…9.38 A to 0…55 A				
0…37.5 A	0…50.0 A	0… 55.0 A	OFF	OFF
0…24.4 A	0…32.5 A	0… 40.6 A	OFF	ON
0…15.0 A	0…20.0 A	0… 25.0 A	ON	OFF
0…9.38 A	0…12.5 A	0… 15.6 A	ON	ON

*** The nominal range has been adjusted!**

6.7.5. Configuring the analog output

Output	DIP 3	DIP 4	DIP 5	DIP 6
0…20 mA	OFF	OFF	OFF	OFF
20… 0 mA	OFF	OFF	OFF	**ON**
4…20 mA	OFF	OFF	**ON**	OFF
20… 4 mA	OFF	OFF	**ON**	**ON**
0…10 V	OFF	**ON**	OFF	OFF
10… 0 V	OFF	**ON**	OFF	**ON**
0… 5 V	OFF	**ON**	**ON**	OFF
5… 0 V	OFF	**ON**	**ON**	**ON**
1… 5 V	**ON**	OFF	**ON**	OFF
5… 1 V	**ON**	OFF	**ON**	**ON**
-10… 10 V	**ON**	**ON**	OFF	OFF
10…-10 V	**ON**	**ON**	OFF	**ON**
-5… 5 V	**ON**	**ON**	**ON**	OFF
5… -5 V	**ON**	**ON**	**ON**	**ON**

6.7.6. Configuring the threshold value output

The relay and transistor output of the threshold value versions (MCR-S-…-SW-DCI) are set after the input measuring range and the analog output have been adjusted.

Setting the switching threshold:

The following illustrations (Fig. 14-Fig. 17, page 10) show the four possibilities of switching behavior of the relay and transistor output. The splitting of the various operational behaviors in threshold value operation is carried out on the principle of operating current or quiescent current and after threshold value triggering when below the threshold value point or when it is exceeded.

If necessary, the corresponding switching behaviour can be set via DIP switch 7 and DIP switch 8.

Functional diagram	**Switching behavior of relay and transistor output**	**DIP 7**	**DIP 8**
Fig. 14	Operating current-controlled when threshold value is exceeded	OFF	OFF
Fig. 15	Operating current-controlled when below threshold value	ON	OFF
Fig. 16	Quiescent current-controlled when threshold value is exceeded	OFF	ON
Fig. 17	Quiescent current-controlled when below threshold value	ON	ON

6.7.6.1. Switching behavior of relay and transistor output of the MCR current transducer

Functional diagram: Operating current-controlled when threshold value is exceeded

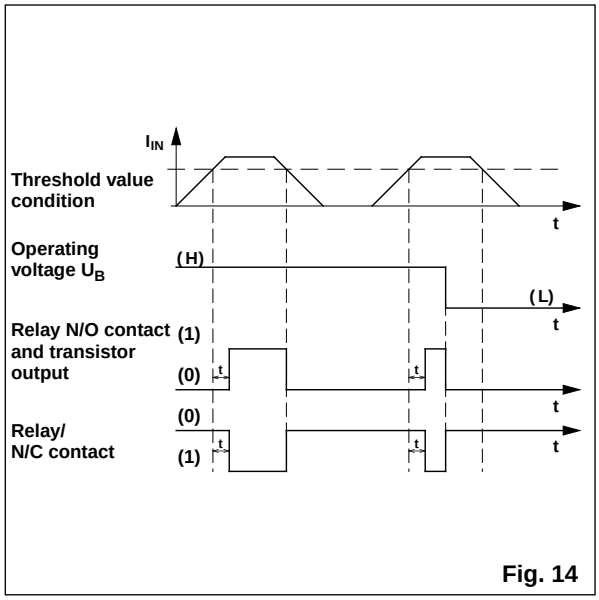


Fig. 14

Functional diagram: Operating current-controlled when below threshold value

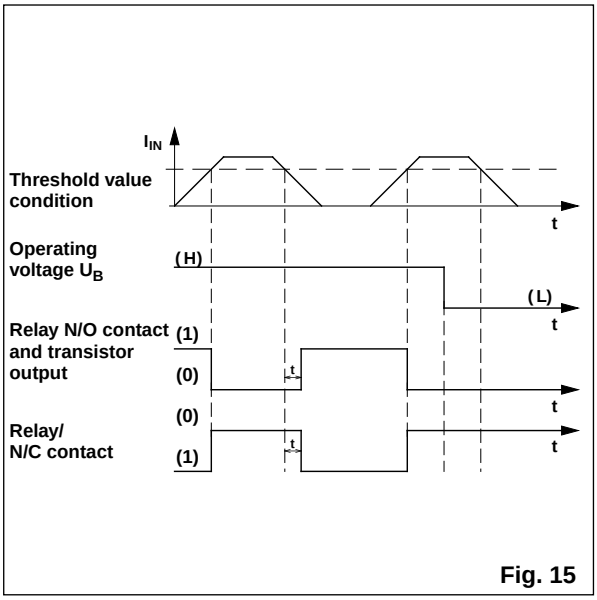


Fig. 15

Functional diagram: Quiescent current-controlled when threshold value is exceeded

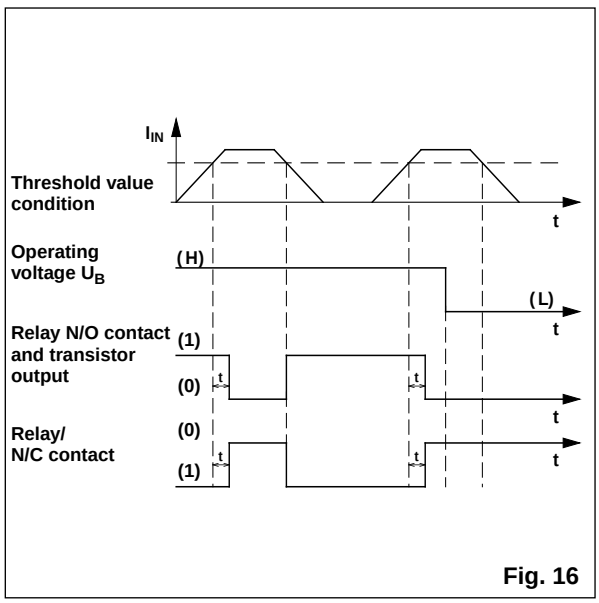


Fig. 16

Functional diagram: Quiescent current-controlled when below threshold value

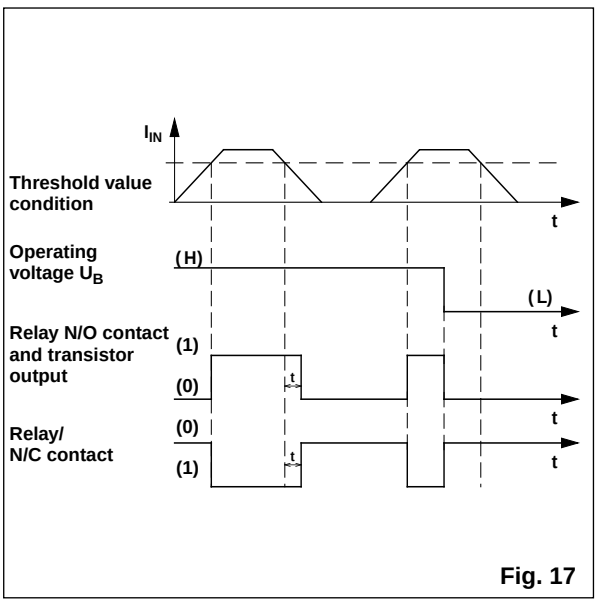


Fig. 17

(0) ≙ N/O contact and transistor open / N/C contact closed / LED off
(1) ≙ N/O contact and transistor closed / N/C contact open / LED on

t_1 can be set with software and potentiometer.

6.7.6.2 Fine adjustment of the measuring transducer

After roughly setting the input current range and pre–selecting the output signal, the module must be closed and connected to the signal lines and operating voltage following chapter 6.5. "Eletrical connection".

When the green LED lights up (operating voltage display) this shows that the operating voltage of 20…30 V DC is connected.

Attention! When using the MCR-S-1/5-…-DCI, please be sure to use the signal input terminal block to suit your measuring range!

Signal input range	Signal input terminal block	Ground terminal block
1 A	7	8
5 A	6	8
10 A	5	8

Please adhere to a warm-up phase for the module of 2 minutes before the adjustment procedure.

6.7.6.3. Analog output

ZERO and SPAN behavior (± 25 % each) are shown in the graphic below:

- **ZERO potentiometer** for zero adjustment.
- **SPAN potentiometer** for upper range (full scale) value adjustment.

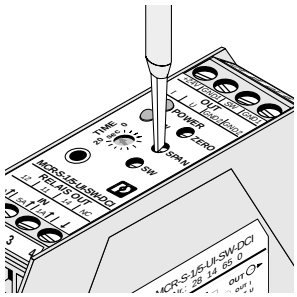


Fig. 18

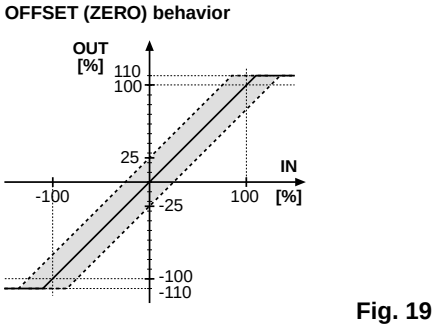


Fig. 19

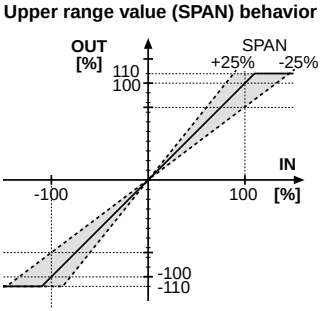


Fig. 20

Adjustment:

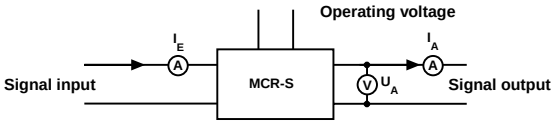


Fig. 21

- After the operating voltage and the signal lines have been connected, zero or offset must first be adjusted. No signal may be present at input (I_i = 0).
- The analog output must correspond to a preselected output signal from table 6.7.5. Any inaccuracy can be adjusted with the ZERO potentiometer.
- To adjust the measuring upper range (full scale) value, a current of preferably the strength of the upper range value should be given. If this is not possible, one of the following adjustment equations should be used:

$$I_O = I_0 + \left(\frac{I_I}{I_{MI}} * (I_{MO} - I_0) \right) \qquad U_O = U_0 + \left(\frac{I_I}{I_{MI}} * (U_{MO} - U_0) \right)$$

Example:The current transducer is to be set to the following values:

Input measuring range: 0…5 A	I_{MI} = 5 A
Output measuring range: 0…20 mA	I_0 = 0 mA
	I_{MO}= 20 mA
Constant current for configuration	I_I = 3 A

The output current calculated must be adjusted with the SPAN potentiometer to I_O = 12 mA. When the voltage output is used, the same adjustment procedure is necessary.

6.7.6.4. Threshold value output

A current that corresponds to the threshold value is to be given for the module.

The TIME potentiometer must be set to "0 s" and the threshold value potentiometer is to be turned according to the following adjustment ruling. Following Fig. 14-17, page 10:

- Fig. 14: The threshold value potentiometer must be turned until the threshold value LED lights up.
- Fig. 15: The threshold value potentiometer must be turned until the threshold value LED goes off.
- Fig. 16: The threshold value potentiometer must be turned until the threshold value LED goes off.
- Fig. 17: The threshold value potentiometer must be turned until the threshold value LED lights up.

In order to avoid switching actions at the binary output level during a brief overload, a suppression time must be set with the TIME potentiometer. If an increased current is present for longer than the given suppression time, the preselected switching behavior becomes active. The possible adjustment range is between 0 and 20 seconds. When the yellow threshold value LED lights up (relay and transistor status display) the
N/O contact of the PDT contact is closed and the N/C contact of the PDT contact is open. The transistor output switches through.

7. Software package (adapter)

As an alternative to setting via DIP switch, programming is possible using MCR/PI-CONF-WIN, the configuration software (Order No. 28 14 79 9).

The software offers the following:

- Entering all the configuration parameters in the computer
- Saving the parameters entered in the computer in the measuring transducer
- Exporting the parameters available from the module
- Saving parameters in a drive of your choice
- Creating a side-panel label
- Printing the programmed module parameters
- Bar graph display
- Monitoring function
- Input of user characteristic curves possible

The software runs under Windows NT and Windows 3.x, 95 to 98. Interface converter MCR-TTL/RS232-E (Order No. 28 14 38 8) serves to connect the computer and the current measuring transducer. This converter has a stereo jack plug on one side for connection to the current measuring transducer and a 25-pos. SUB-D socket on the other side for connection to a computer. On the computer side, the interface converter must generally be connected with a cable adapter (25 to 9-pos. SUB-D plug connection, Order No. 27 61 29 5).



Fig. 22



Fig. 23

Configuring the analog output of the MCR-S-...-DCI module



Fig. 24

Configuring the input of the MCR-S-...-DCI module

8. Sample applications

8.1. Measurment of motor currents

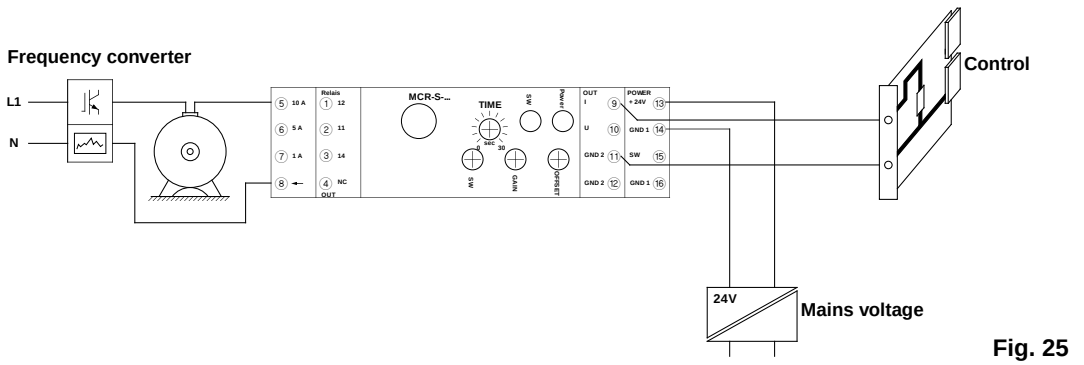


Fig. 25

By using MCR-S modules in one or more input phases of the motor, so-called motor monitoring can be carried out (Fig. 25). The MCR current measuring transducer can pass on corresponding standard signals about motor load to the controller or service personnel.
The true r.m.s. measurement means that AC, DC and distorted currents can be measured. Even higher frequency currents up to 1 kHz can be measured.

8.2. Recording motor current peak loads

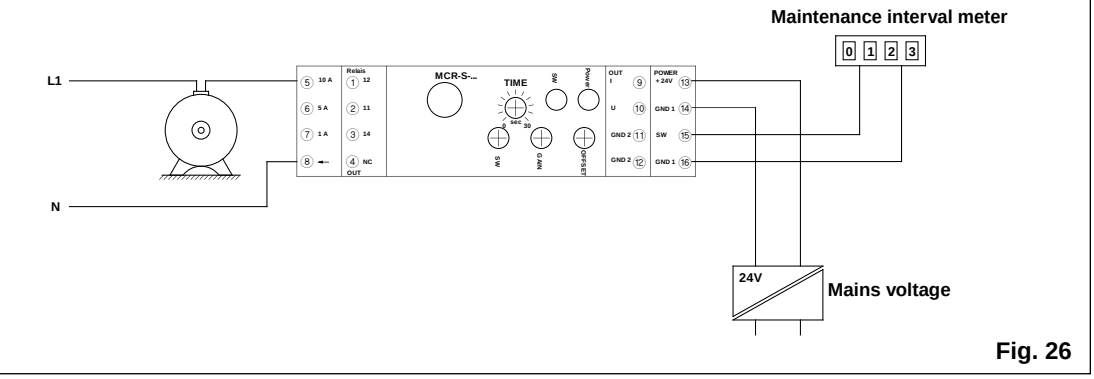


Fig. 26

Large industrial motors have to be overhauled and serviced at regular intervals. Installing an MCR current transducer in one phase of the motor feed line allows impulses to be generated with the relay or transistor switching output that can be measured with the aid of a simple meter (Fig. 26). The service personnel can provide efficient maintenance on the basis of the motor starts and peak loads corresponding to the number of overloads.

8.3. Monitoring lighting

MCR current transducers can be used for monitoring lighting. If the strength of the current in circuit is exceeded or fallen below after a suppressed turn-on time, there is a defect in the lighting circuit. If the lighting circuit fails, this signal status can be passed on to another control unit and the emergency lighting can be switched on. The same procedure can also be used with other consumers.

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