

# MACX MCR-SL-CAC- 5-I(-UP)

## Current transducer for 1 A and 5 A AC

Data sheet  
103161\_en\_03

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### 1 Description

The MACX MCR-SL-CAC-5-I(-UP) current transducers convert sinusoidal alternating currents of 1 A or 5 A into standard analog signals of 0 to 20 mA or 4 to 20 mA. The DIP switches, which can be accessed on the top of the housing, can be used to configure the input and output current. The MACX MCR-SL-CAC-5-I current transducer has a supply voltage range of 19.2 to 30 V DC.

The MACX MCR-SL-CAC-5-I-UP current transducer includes a wide-range version with a supply voltage range of 19.2 to 253 V AC/DC.

#### Features

- Wide-range version (MACX MCR-...-UP) up to 253 V AC/DC
- 24 V DC version with additional supply via DIN rail connector
- Input/output can be configured via DIP switch
- Operating state indication via LED



#### NOTE: Correct usage in potentially explosive areas

The module is a category 3 item of electrical equipment. It is absolutely vital to follow the instructions provided here during installation and observe the information in the "Safety regulations and installation notes".



Make sure you always use the latest documentation.  
It can be downloaded from the product at [phoenixcontact.net/products](https://phoenixcontact.net/products).



This data sheet is valid for all products listed on the following page:

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### 3 Ordering data

| Description                                                                                                                                                                                                                                                                                                                                | Type                           | Item no. | Pcs./Pkt. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------|-----------|
| Current measuring transducer for 1 A and 5 A AC, the output signal 0...20 mA or 4...20 mA, can be configured using a DIP switch with an operating mode indication through an LED                                                                                                                                                           | MACX MCR-SL-CAC- 5-I           | 2810612  | 1         |
| Current measuring transducer for 1 A and 5 A AC, the output signal 0...20 mA or 4...20 mA, can be configured using a DIP switch with an operating mode indication through an LED                                                                                                                                                           | MACX MCR-SL-CAC- 5-I-UP        | 2810625  | 1         |
| Accessories                                                                                                                                                                                                                                                                                                                                | Type                           | Item no. | Pcs./Pkt. |
| Primary-switched power supply unit, QUINT POWER, Screw connection, DIN rail mounting, input: 1-phase, output: 24 V DC / 2.5 A                                                                                                                                                                                                              | QUINT4-SYS-PS/1AC/24DC/ 2.5/SC | 2904614  | 1         |
| DIN rail connector, color: gray, nominal current: 8 A (parallel contacts), rated voltage (III/2): 125 V, number of positions: 5, pitch: 3.81 mm, locking: without, mounting: without, type of packaging: packed in cardboard, Item with gold-plated contacts, bus connectors for connecting with electronics housings, 5 parallel contacts | ME 22,5 TBUS 1,5/ 5-ST-3,81 GY | 2201937  | 50        |
| DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos.                                                                                                                                                                                                                                         | ME 17,5 TBUS 1,5/ 5-ST-3,81 GN | 2709561  | 10        |

## 4 Technical data

| Input Current measuring input    |                                                                      |                              |
|----------------------------------|----------------------------------------------------------------------|------------------------------|
| Configurable/programmable        | Via DIP switches                                                     |                              |
| Input current range              | 0 A AC ... 1 A AC (configurable)<br>0 A AC ... 5 A AC (configurable) |                              |
| Overload capacity                | 2 x I <sub>N</sub> (continuous)                                      |                              |
| Surge strength                   | 20 x I <sub>N</sub> (1 s)                                            |                              |
| Nominal frequency f <sub>N</sub> | 50 Hz                                                                |                              |
| Frequency measuring range        | 45 Hz ... 65 Hz                                                      |                              |
| Curve type                       | Sine                                                                 |                              |
| Output Current output            |                                                                      |                              |
| Non-load voltage                 | 15 V                                                                 |                              |
| Current output signal            | 0 mA ... 20 mA (configurable)<br>4 mA ... 20 mA (configurable)       |                              |
| Max. current output signal       | 25 mA                                                                |                              |
| Configurable/programmable        | Via DIP switches                                                     |                              |
| Ripple                           | < 10 mV <sub>PP</sub> (500 Ω / 20 mA)                                |                              |
| Load/output load current output  | < 500 Ω (20 mA)                                                      |                              |
| Status display                   | LED red (error), LED green (ready)                                   |                              |
| Supply                           | MACX MCR-SL-CAC- 5-I                                                 | MACX MCR-SL-CAC- 5-I-UP      |
| Nominal supply voltage           | 24 V DC -20 % ... +25 %                                              |                              |
| Supply voltage range             | 19.2 V DC ... 30 V DC                                                | 19.2 V AC/DC ... 253 V AC/DC |
| Max. current consumption         | < 32 mA (at U <sub>B</sub> =24 V DC, I <sub>OUT</sub> =20 mA)        | < 33 mA (24 V DC)            |
| Power consumption                | < 0.9 W (at U <sub>B</sub> =24 V DC, I <sub>OUT</sub> =20 mA)        | < 0.8 W (24 V DC)            |
| Reverse polarity protection      | yes                                                                  | yes                          |

| General data                                                                                                  |                                                                                                                 |                         |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------|
| Measuring principle                                                                                           | True r.m.s. value measurement at 50 Hz                                                                          |                         |
| Maximum transmission error                                                                                    | ≤ 0.5 % (of nominal range value under nominal conditions)                                                       |                         |
| Additional error                                                                                              | approx. 2 % (45 Hz)<br>approx. 1 % (65 Hz)                                                                      |                         |
| Temperature coefficient, typical                                                                              | < 0.015 %/K                                                                                                     |                         |
| Maximum temperature coefficient                                                                               | < 0.02 %/K                                                                                                      |                         |
| Step response (10-90%)                                                                                        | ≤ 300 ms<br>200 ms                                                                                              |                         |
| Mounting position                                                                                             | any                                                                                                             |                         |
| Degree of protection                                                                                          | IP20                                                                                                            |                         |
| Dimensions W/H/D                                                                                              | 22.5 mm / 104 mm / 114.5 mm ( MACX MCR-SL-CAC- 5-I )<br>22.5 mm / 104 mm / 114.5 mm ( MACX MCR-SL-CAC- 5-I-UP ) |                         |
| Type of housing                                                                                               | Polyamide PA non-reinforced                                                                                     |                         |
| Safe isolation                                                                                                | MACX MCR-SL-CAC- 5-I                                                                                            | MACX MCR-SL-CAC- 5-I-UP |
| Safe isolation                                                                                                | acc. to EN 61010                                                                                                | acc. to EN 61010        |
| Overvoltage category                                                                                          | III                                                                                                             | III                     |
| Degree of pollution                                                                                           | 2                                                                                                               | 2                       |
| Ambient conditions                                                                                            |                                                                                                                 |                         |
| Ambient temperature (operation)                                                                               | -20 °C ... 65 °C<br>-4 °F ... 149 °F                                                                            |                         |
| Ambient temperature (storage/transport)                                                                       | -40 °C ... 85 °C (-40 °F ... 185 °F)                                                                            |                         |
| Permissible humidity (operation)                                                                              | 10 % ... 95 % (non-condensing)                                                                                  |                         |
| Maximum altitude for use above sea level                                                                      | ≤ 2000 m                                                                                                        |                         |
| Electrical isolation                                                                                          |                                                                                                                 |                         |
| Input/output                                                                                                  |                                                                                                                 |                         |
| Test voltage                                                                                                  | 4 kV AC (50 Hz, 60 s)                                                                                           |                         |
| Output/supply                                                                                                 |                                                                                                                 |                         |
| Test voltage                                                                                                  | 2 kV AC (50 Hz, 60 s)                                                                                           |                         |
| Connection data                                                                                               |                                                                                                                 |                         |
| Connection method                                                                                             | Screw connection                                                                                                |                         |
| Conductor cross section, rigid                                                                                | 0.2 mm² ... 2.5 mm²                                                                                             |                         |
| Conductor cross section, flexible                                                                             | 0.2 mm² ... 2.5 mm²                                                                                             |                         |
| Conductor cross section AWG                                                                                   | 24 ... 14                                                                                                       |                         |
| Stripping length                                                                                              | 8 mm                                                                                                            |                         |
| Conformance with EMC directive                                                                                |                                                                                                                 |                         |
| Noise immunity according to EN 61000-6-2 When being exposed to interference, there may be minimal deviations. |                                                                                                                 |                         |
| Noise emission according to EN 61000-6-4                                                                      |                                                                                                                 |                         |

**Conformance/Approvals**

CE

CE-compliant

ATEX

 II 3 G Ex nA IIC T4 Gc X

UKCA Ex (UKEX)

 II 3 G Ex nA IIC T4 Gc

PxCIF21UKEX2810612X

UL, USA / Canada

UL 508 Recognized

EAC Ex

 2Ex nA IIC T4 Gc

BY/112 02.01 TP012 103.01 00078

## 5 Safety regulations and installation notes

- The EPL Gc (ATEX category 3) device is designed for installation in zone 2 potentially explosive areas. It satisfies the requirements of the following standards.  
EN 60079-0, EN 60079-15  
For detailed information, please refer to the declarations of conformity.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described.
- When installing and operating the device, observe the applicable regulations and safety directives (including national safety directives), as well as the generally recognized technical regulations.
- Observe the safety information, conditions, and limits of use specified in the product documentation. Comply with them.
- The device is designed for installation in zone 2 potentially explosive areas.
- The device is not designed for use in atmospheres with a danger of dust explosions.
- The device must not be opened or modified. Do not repair the device yourself, replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from violation.
- The housing of the device provides basic insulation against the neighboring devices for 300 V<sub>eff</sub>. If several devices are installed next to each other, this must be taken into account, and additional insulation must be installed if necessary! If the neighboring device is equipped with basic insulation, no additional insulation is necessary.
- Provide overcurrent protection ( $I \leq 16 \text{ A}$ ) within the installation.
- The devices described in this document are for use in manufacturing industry environments. They are not designed for use in private environments. They are as Class A devices.
- These devices are Class A items of equipment (EN 61000-6-4). When using the equipment in residential areas, it may cause radio interference. In this case, the operator is obligated to implement appropriate measures.
- The installer of the system is responsible for the safety of the system in which the device is installed.
- If the device is not used as described in the documentation, the intended protection can be negatively affected.



### **WARNING: Danger to life by electric shock!**

The device is only to be used as described here. Phoenix Contact accepts no liability if the device is used for anything other than its designated use. Any use other than the designated use may lead to malfunction or irreversible damage of the device.

The IP20 protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. Install the module in a housing with at least IP54 degree of protection according to EN 60529. The stated limits concerning mechanical or thermal loads on the module may not be exceeded.

Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).



The "attention symbol" on the device label means: Follow the installation instructions to avoid impairing the intended protection!



The device contains valuable recyclable materials, which should be utilized.

Dispose of the device separately from other waste, i.e., via an appropriate collection site.

### 5.1 Installation in the Ex area (zone 2)

- Observe the specified conditions for use in potentially explosive areas.
- The device is to be installed in a housing (control or distributor box) that satisfies the requirements of EN/IEC 60079-15 and has at least IP54 degree of protection (EN/IEC 60529).
- When installing and connecting the supply and signal circuits observe the requirements of EN/IEC 60079-14.
- Only devices which are designed for operation in Ex zone 2 and are suitable for the conditions at the installation location may be connected to the circuits in the Ex zone.
- In potentially explosive areas, connecting and disconnecting cables and plugs in non-intrinsically safe circuits, the latching of devices onto and unlatching devices from the DIN rail connector, and the actuation of DIP switches is only permitted in a de-energized state or when the atmosphere is not potentially explosive.
- The device must be stopped and immediately removed from the Ex area if it is damaged, was subject to an impermissible load, stored incorrectly or if it malfunctions.

## 6 Installation

### 6.1 Connection notes



**NOTE: electrostatic discharge!**

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-1.

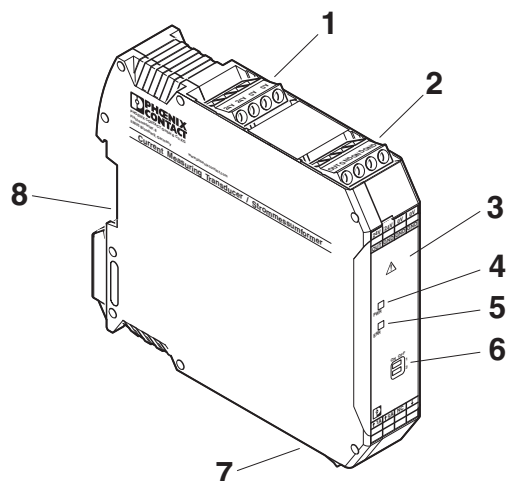


**NOTE: Potential damage to the device**

Incorrect connection of the device can result in its destruction.

### 6.2 Structure

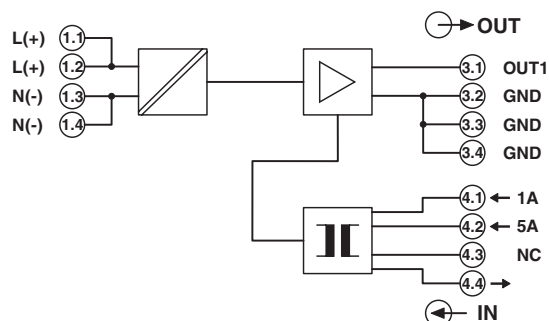
Figure 1 Structure



- 1 Supply voltage
- 2 Output: Standard signals
- 3 Transparent cover
- 4 LED green PWR: Device status
- 5 Error indicator "ERR" red LED
- 6 DIP switch
- 7 Input
- 8 Connection option for DIN rail connector

### 6.3 Block diagram

Figure 2 Block diagram



## 6.4 Power supply

**NOTE:**

Never connect the supply voltage directly to the DIN rail connector. It is not permitted to draw power from the DIN rail connector or from individual modules.

### Power supply via the power terminals

The power of the current transducer is supplied via the connection terminal blocks 1.1, 1.2 L(+) and 1.3, 1.4 N(-).

### Power supply via DIN rail connector

The current transducer MACX MCR-SL-CAC-5-I can additionally provide power supply via the DIN rail connector ME 22,5 TBUS (Item No. 2707437).

### Supply via the MACX MCR-SL-CAC-5-I module

In the event of a total current consumption up to 1 A by the modules in series, power can be supplied directly at the connection terminal blocks of the MACX MCR-SL-CAC-5-I-module.

We recommend connecting a 1.25 A fuse upstream.

### Supply via a system power supply unit

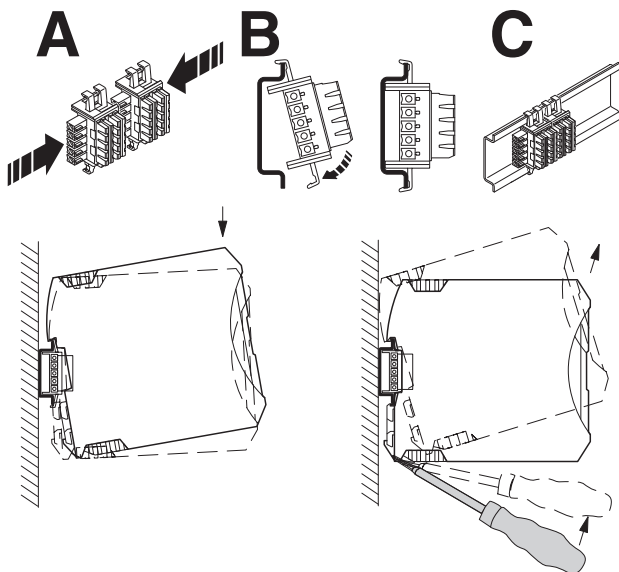
Use the QUINT4-SYS-PS/1AC/24DC/2.5/SC (Item No. 2904614) as the system power supply.

The power supply can be installed onto all 35 mm DIN rails in accordance with EN 60715. Normal mounting position is horizontal (with the input terminals facing upward). The minimum distance to other devices is 30 mm above/below.

If you would like to supply adjacent items using the power supply, use a DIN rail bus distributor. To do so, insert the DIN rail bus adapter ME 22,5 TBUS ADAPTER KMGY (Item No.: 2201756) and the DIN rail connector ME 17,5 TBUS 1,5/ 5-ST-3,81 KMGY (Item No.: 2713645) plugged together in the DIN rail.

## 6.5 Mounting

Figure 3 Mounting and removing



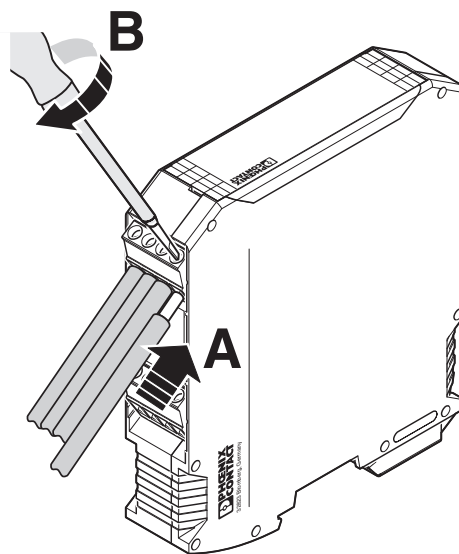
- Mount the module on a 35 mm DIN rail according to EN 60715.
- When using the DIN rail connector, first place it into the DIN rail (see A – C). It is used to bridge the power supply. It is also absolutely vital that you snap the module and the DIN rail connector into position in the correct direction: the snap-on foot should be at the bottom and the connector on the left.

## 6.6 Connection of the cables

Insert the wires in the corresponding connection terminal block.

Use a screwdriver to tighten the screw in the opening above the connection terminal block.

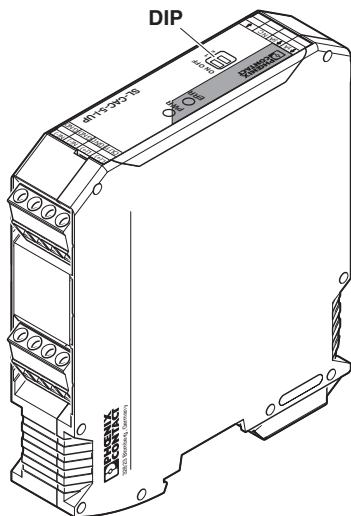
Figure 4 Connection of the cables



## 7 Configuration

The desired input/output signal configuration is selected using DIP switched.

Figure 5 DIP switches



### DIP 1: Input current (input)

- OFF = 1 A
- ON = 5 A

### DIP 2: Output current (output)

- OFF = 0 mA ... 20 mA
- ON = 4 mA ... 20 mA

## 8 Application example

Figure 6 Current measurement

