Optocoupler – Overview

Owing to the increasing degree of automation, the separation of potential between control circuits (control side / field side) is becoming increasingly significant. The connection between the controller, which is the key component of every automated system, and the various sensors and actuators must be electrically safe and free of any feedback. Optocouplers are finding increasing use here. They provide the necessary degree of safety and feature other technical properties such as:

- Low power consumption on the controller side
- High switching frequency
- No contact bounce
- Wear-free switching
- Vibration resistance
- Use independent of positioning
- No need for mechanical parts
- Long service life
- High insulation voltage

Accordingly, optocouplers are a good alternative to the traditional, mechanical relay interfaces. Modules with different input voltages and enclosure technologies are available for industrial use.

CE marking

Weidmüller’s optocouplers carry the CE mark and comply with the requirements laid down by EN 50 081 part 1 and EN 50 082 part 2. They can be used in a wide range of applications and industries.

Suitable ESD measures must be taken during installation. Overvoltage protection must be provided for long leads as protection from lightning.
Optocoupler – Overview

Our highlight
MICROSERIES

Coupler modules in terminal format

The slot-in width of 6.1 mm allows space-saving installation of the MICROSERIES relays in industrial automation applications. The MICROSERIES is particularly suitable for the modification and extension of equipment and machinery, where it helps to make optimum use of the limited space available in switchgear cabinets.

Holding and ejecting mechanism

The innovative holding and ejecting mechanism clips the assembled module securely onto the base terminal. Using the reliable eject function, the coupler can be removed quickly and simply from the base.

Relay and optocoupler module

Plug-in relay and optocoupler modules allow individual adjustment to function of the base module. Relay and optocouplers, are available with different power outputs, with either AgSnO and gold contacts.

Connection technology

Most of our relay couplers are available with screw or tension clamp connections.

Marking

The tab surfaces enable equipment to be clearly marked using a WS marker.

Pluggable cross-connectors

The ZGV 4N plug-in cross-connectors are available in various colours and with different numbers of poles. They allow reliable and distinct cross-connections between the four input and output potentials.
Optocoupler – Overview

Control side of the optocoupler interface:

Basic structure of the optocoupler interface:
The key component is the actual optoelectronic unit (optocoupler) which is responsible for the coupling.

One important variable of this component is the current transfer rate (CTR). The CTR factor is stated as a percentage and describes the relationship between dispensed input current IF and the maximum available output current IC.

Example: IF = 10 mA; CTR = 100 % => IC = 10 mA.

However, the CTR variable is influenced by various parameters such as ambient temperature, degree of efficiency of the luminescence diode or geometric dimensions within the component, and itself declines over time. This means that the switching thresholds change over time, partly as a result of ageing.

In order to eliminate this effect as far as possible, Weidmüller optocouplers use almost exclusively optoelectronic semiconductors with high long-term stability in terms of CTR behaviour.

The insulation strength of the component is also important, because the actual coupling of the input and output circuits results from optical transfer. This means that even in the event of a fault, the optical component will guarantee separation of both circuits. By using optoelectronic coupling elements in accordance with DIN VDE 0884, Weidmüller’s optocouplers represent the ultimate in safety.

The circuitry within the module as a whole also deserves to be mentioned, with features including “protective separation” in accordance with DIN VDE 0106 part 101.

Optocouplers for galvanic isolation or “protective separation”:
The partial discharge level test as per DIN VDE 0884 is the primary prerequisite for “protective separation” with optoelectronic coupler modules. Double or reinforced insulation for “protective separation” must be discharge-proof. High-voltage testing, a standard procedure for relays, is not possible with semiconductors because it may actually destroy them. In the case of coupler modules with integrated optocouplers, “protective separation” for the specified rated voltage is achieved when the following requirements are satisfied:

- Testing of the optocouplers as per DIN VDE 0884
- Adherence to creepage and clearance path on circuit boards and connection elements in accordance with EN 50 178, DIN VDE 0106 and 0109.

A distinction is made between three basic circuits on the input side of the optocoupler interfaces:

- **Pure DC input**
  Here there is a reversed polarity protection diode which prevents damage to the module in the case of reversed input polarity.

- **AC/DC input**
  Here it is not possible to reverse the polarity of the DC input signal. The disadvantage of the DC/AC input circuit (with DC signal trigger) is the lower switching frequency of the module, because the charge capacitor (CL, necessary for AC input signals) reduces the maximum switching frequency.

- **AC input**
  Here again, the charging capacity has a major influence on the maximum switching frequency of the module as a whole. Weidmüller optocouplers with AC/DC or AC input signals are rated for mains frequencies of approx. 40 – 60 Hz. In the case of AC input signals, the maximum switching frequency of the optocoupler module is less than half the mains frequency. A higher switching frequency is not possible, because this would result in constant switching in the rhythm of the mains frequency.

Load side of the optocoupler interface:
Weidmüller optocoupler modules have been dimensioned and developed for use in a wide range of applications and industries.

Possible demands made on the load side of the optocoupler modules include:

- power amplification
- AC/DC and DC/AC signal conditioning
- short-circuit protection
- interference immunity

To meet these requirements, the modules are assembled with additional electronic elements which then define the overall functioning of the optocoupler module.

Accordingly, there are always two versions for the load side of the optocoupler: output as a 2-pole or 3-pole circuit.

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Optocoupler – Overview

Optocoupler

2-pole DC output

![Image of 2-pole DC output](image)

The 2-pole DC output can be compared with a conventional switch. In this version it does not matter where the load is located (in the output circuit), although the necessary output supply voltage must be available with the right polarity.

Optocoupler modules are usually indicated with an output supply voltage range of, for example, 5 ... 48 Vdc. The voltage should on no account ever be lower or higher than these values. The load current should not be higher than the stated maximum output current. If current constantly exceeds this value, the output stage will be destroyed.

Derating diagrams show the relationship of output current to ambient temperature (indicated for the products on the following pages).

3-pole DC output

![Image of 3-pole DC output](image)

In order to function reliably, this kind of output level required potential-related output supply voltage with a single output. It is rated for either positive switching (joint reference potential: GND or 0V) or negative switching (joint reference potential: positive voltage pole).

Standards

The following standards are complied with:

- EN 50 178: Electronic equipment for use in high current installations
- DIN VDE 01206 part 101: Protection from dangerous body currents, basic requirements for “protective separation” in electrical equipment
- DIN VDE 0884: Optoelectronic couplers for “protective separation”
- DIN VDE 0109: Insulation coordination for equipment within low-voltage systems, including creepage and clearance distances for configured printed circuit boards

Protection circuits

All optocoupler modules have a protection circuit in the output (usually with a freewheel diode). The load side must be protected to prevent interference signals from coupling into other lines.

2-pole AC output

![Image of 2-pole AC output](image)

A special semiconductor module (TRIAC) is used for switching AC voltage in the output stage of the optocoupler. Here, as with the DC output, consideration must also be given to the key data such as voltage, frequency, maximum load current and ambient temperature.

Use of the zero voltage switch ensures that the load is only switched on at the zero crossover of the voltage. The modules are always equipped with suitable protection elements (varistor, RC combination) as protection from non-permissible voltage peaks.

3-pole DC output

![Image of 3-pole DC output](image)

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**Enclosure types for relay couplers**

**PLUGSERIES**

The modular component system represents a new generation of plug-in optocouplers. The key element is a PXS (screw clamp) or PXZ (tension clamp) innovative relay base. Both products reflect the functionality of relays or optos and Weidmüller’s experience in their commercial use. PLUGSERIES is the ideal connection system between the Solid State Relay (SSR) and the application.

**Modular principle**

The new PLUGSERIES is extremely easy to handle. Commercially available SSRs are simply plugged in, retaining clips provide a firm hold, and LED displays with a recovery diode can be plugged in.

- SSRs simply plugged in: suitable for standard and TD designs
- Independent connection technology: screw or tension clamp technology, nominal cross-sectional area 0.5 … 2.5 mm²
- Robust design of the retaining/disman- tling hook
- Control voltage 24 Vac/Vdc
- Rated switching voltage 24 Vdc, 24 Vac/Vdc, 230 Vac
- Up to 5 A continuous current
- Minimum wiring workload thanks to ZQV 2.5N plug-in cross-connectors
- Modular system allows easy handling:
  - Relay base, LED display, retaining hook and SSR
  - Clips on to the TS 35
  - Marking with WS tabs on retaining hook
- Plug-in LED with recovery diode.

**MICROSERIES**

Relay and optocoupler versions in the MICROSERIES are used in industrial automation applications for separating and coupling digital input and output signals. The space saving design makes them perfectly suited for use in sub-dis tributors or switchgear cabinets. With its compact shape, MICROSERIES combines the functions of the classical coupling level with the terminal level.

- Slot-in width 6.1 mm
- Pluggable cross-connection for four input and output potentials
- Tried and tested ZQV 4N cross-con- nector system
- Wide range of input voltage from 5 .. 230 V
- LED power light, reverse polarity protection diode, freewheel diode
- WEMID enclosure material (flammability V0 as per UL 94)
- Innovative holding and eject mechan- nism
- Marking surface to take standard WS 12/6 marking
- CE marking

Weidmüller’s relay couplers carry the CE mark and comply with the requirements laid down by EN 50 081 part 1 and EN 50 082 part 2. They can be used in both industrial-scale and smaller-scale applications.

Suitable ESD measures must be taken during installation. Overvoltage protection must be provided for long leads as protection from lightning.

**WAVESERIES**

Innovative electronic components require a housing or enclosure which reflects their specific functions. It must allow adjusting and control functions and support technical requirements, such as heat dissipation or electromagnetic compatibility. A compact design saves space in the switchgear cabinet and reduces assembly costs. Ergonomic design is increasingly important for top-quality relay coupler interfaces.

The WAVESERIES fulfills all these criteria, with outstanding features including:

- Assembly without tools
- Printed circuit board
- Pluggable PCB
- ZQV 2.5V pluggable cross-connection
- Hinged transparent cover
- Marking with WS tabs
- Clips onto TS 35

**Connection systems**

The user can choose between BLZ screw plug-in connectors and BLZF tension clamp plug-in systems, up to 2.5 mm² and finely stranded, for the greatest possible flexibility when wiring up the circuits.

**Printed circuit board**

If the lateral locking hook is squeezed on the head end, it can be pulled out of the enclosure together with the connection level and the circuit board. The circuit board can only be pulled out without current voltage.

**Cross-connection**

The ZQV 2.5 N/2 cross-connectors can be used to connect rows of Waveseries enclosures. The cross-connection can take up to 8 A of current. It can be used for bridging the supply voltage from one electronic module to another. The voltage at the cross-connection must not exceed 50 V.

**Ventilation slits**

Diagonal ventilation slits ventilate the lower parts of the enclosures and keep temperatures moderate.
Enclosure types for relay couplers

**DK SERIES**
All components in the DKO mini-coupler are of an extremely slim design: use of advanced surface-mounted parts (SMD) allows the width to be kept to just 6 mm. The range includes 4 or 5 screw connections for conductor cross-section of 0.5 ... 4 mm². The mini couplers offer a wide range of applications for coupling digital sensor/actuators or signals with automation devices and the process field. DKO optocouplers can be used to pick up and standardise signals from the field with different voltages.

**MCZ SERIES**
The MCZ enclosure is only 6 mm wide and one of the narrowest of its kind. Its outstanding technical features include:
- Tension clamp connection to reduce assembly costs
- Integrated input/output cross-connection to reduce wiring workload

MCZO mini-conditioners (optocouplers) have 4 or 5 tension spring connections. The cross-section of the clamping conductor is 0.5 ... 1.5 mm².

**EG SERIES**
The EG7 integral housing has a special status because it is suited only for the installation of 10 mm compact optocouplers. EG7 optocouplers can be mounted on either the TS 32 or TS 35. An RS EG7 snap-in base is also available for the OST plug-in optocouplers.

The closed EG 7 enclosures are equipped with tension clamp unit for screw connection.

Conductors with the following cross-sections can be connected:
- Integral housing EG 7: 0.5 ... 1.5 mm²
- OST clip-in base: 0.5 ... 2.5 mm²
**Optocoupler**

**Output current 24 Vdc / 2.5A**

- **Output voltage**: 0 V ... 30 Vdc
- **Output current (max.)**: 2.5 A
- **Voltage drop at max. load**: < 0.4 V
- **Switch-on delay/switch-off delay**: 2ms/18ms
- **Short-circuit proof/protective circuit**: No/integrated freewheel diode

**General data**

- **Ambient temp., fitted w/o distance**: -40 °C ... +50 °C
- **Ambient temp., fitted w. distance**: -40 °C ... +50 °C
- **Storage temperature**: -40 °C ... +50 °C

**Approvals**

- cUL, UL recognized

**Insulation coordinates (EN 50 178)**

- **Rated voltage**: 300 V
- **Rated impulse voltage**: 2.5 kV
- **Creepage and clearance path input - output**: 8 mm
- **Overvoltage category**: III
- **Pollution severity**: 2

**Dimensions**

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Tension clamp connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping range (rating - min./max.) mm²</td>
<td>2.5 / 0.5 / 2.5</td>
</tr>
<tr>
<td>Length x width x height mm</td>
<td>92.0 / 15.3 / 95.0</td>
</tr>
</tbody>
</table>

**Information**

**Ordering data**

- **Input**
  - **Rated voltage**: 15 Vdc ... 30 Vdc
  - **Rated current**: approx. 10mA
  - **Power rating**: 250 mW
  - **Auxiliary voltage**: No
  - **Status indicator**: LED green

<table>
<thead>
<tr>
<th>Type</th>
<th>Order No.</th>
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<tbody>
<tr>
<td>POS 24VDC/24VDC 2A</td>
<td>8810840000</td>
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<tr>
<td>POZ 24VDC/24VDC 2A</td>
<td>8810920000</td>
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<tr>
<td>SSR 24V AC/DC/24 VDC 3A</td>
<td>8576340000</td>
</tr>
</tbody>
</table>

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**Plugseries**

**Output current 24 Vdc / 5A**

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**Output**
- Output voltage: 0 V ... 30 Vdc
- Output current (max.): 5 A
- Voltage drop at max. load: < 0.3 V
- Switch-on delay/switch-off delay: 2ms
- Short-circuit proof/Protective circuit: No/integrated free-wheel diode

**General data**
- Ambient temp., fitted w/o distance: -40°C...+50°C
- Ambient temp., fitted w. distance: -40°C...+50°C
- Storage temperature: -40°C...+50°C
- Approvals: cUL, UL recognized
- Standards: EN 50178
- Rated voltage: 300V
- Rated impulse voltage: 2.5kV
- Creepage and clearance path input - output: 8mm
- Overvoltage category: III
- Pollution severity: 2

**Dimensions**
- Screw connection:华东 / 0.5 / 2.5
- Tension clamp connection: 2.5 / 0.5 / 2.5
- Length x width x height: 92.0 / 15.3 / 95.0

**Ordering data**
- **24VDC/24VDC 5A**
  - Input:
    - Rated voltage: 15 Vdc...30 Vdc
    - Rated current: approx. 10mA
    - Power rating: 250 mW
    - Auxiliary voltage: No
    - Status indicator: LED green

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Output current 24 Vuc / 1A

**Output**
- Output voltage: 0 V ... 30 Vuc
- Output current (max.): 1 A
- Voltage drop at max. load: < 0.9 V
- Static-state curr. (closed circuit curr.): < 1 mA
- Switch-on delay/Switch-off delay: 5ms/12ms
- Short-circuit proof/Protective circuit: No/Integrated freewheel diode

**General data**
- Ambient temp., fitted w/o distance: -40 °C...+50 °C
- Ambient temp., fitted w. distance: -40 °C...+50 °C
- Storage temperature: -40 °C...+50 °C
- Approvals: cUL, UL recognized

**Insulation coordinates (EN 50 178)**
- Standards: EN 50178
- Rated voltage: 300V
- Rated impulse voltage: 4kV
- Creepage and clearance path input - output: 8mm
- Overvoltage category: II
- Pollution severity: 2

**Dimensions**
- Screw connection:
  - Clamping range (rating- / min. / max.): 2.5 / 0.5 / 2.5
  - Length x width x height: 92.0 / 15.3 / 95.0
- Tension clamp connection:
  - Clamping range (rating- / min. / max.): 2.5 / 0.5 / 2.5
  - Length x width x height: 92.0 / 15.3 / 87.0

**Ordering data**

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<tr>
<th>Input</th>
<th>24VDC/24VUC 1A</th>
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<tr>
<td>Rated voltage</td>
<td>15 Vdc...30 Vdc</td>
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<tr>
<td>Power rating</td>
<td>approx. 10mA</td>
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<tr>
<td>Auxiliary voltage</td>
<td>No</td>
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<tr>
<td>Status indicator</td>
<td>LED green</td>
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**Ordering data**

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<thead>
<tr>
<th>Complete module</th>
<th>24VDC/24VUC 1A</th>
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<td>Screw connection</td>
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<td>Tension clamp connection</td>
<td>Type</td>
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<td>Spare relay, pluggable</td>
<td>Type</td>
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<td>SSR 24V ACDC/24VACDC</td>
<td>Order No.</td>
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<tr>
<td>8576380000</td>
<td></td>
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</table>
**Optocoupler**

**PLUGSERIES**

**Output current 230 Vac / 2A**

```
Output voltage 12 V ... 275 Vac
Output current (max.) 2 A
Voltage drop at max. load < 1 V
Static state curr. (load circuit curr.) < 1 mA
Switch-on delay/switch-off delay 12ms/20ms
Short-circuit proof/protective circuit No/RC-element

**General data**
Ambient temp., fitted w/o distance -40 °C ... +50 °C
Ambient temp., fitted w. distance -40 °C ... +50 °C
Storage temperature -40 °C ... +50 °C
Approvals cUL, UL recognised

**Insulation coordinates (EN 50 178)**
EN 50178
Rated voltage 300V
Rated impulse voltage 4.0kV
Creepage and clearance path input - output 8mm
Overvoltage category III
Pollution severity 2

**Dimensions**
<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Tension clamp connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping range (rating / min. / max.) mm²</td>
<td>2.5 / 0.5 / 2.5</td>
</tr>
<tr>
<td>Length x width x height mm</td>
<td>92.0 / 15.3 / 95.0</td>
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</table>

**Ordering data**

**24VDC/230VAC 2A**

<table>
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<tr>
<th>Input</th>
<th>15 Vdc ... 30 Vdc</th>
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<tbody>
<tr>
<td>Rated voltage</td>
<td>approx. 10mA</td>
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<tr>
<td>Rated current</td>
<td>250 mW</td>
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<tr>
<td>Power rating</td>
<td>No</td>
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<tr>
<td>Auxilary voltage</td>
<td>LED green</td>
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<table>
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<tr>
<th>Information</th>
<th>POS 24VDC/230VAC 2A</th>
<th>POZ 24VDC/230VAC 2A</th>
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<tr>
<td>Order No.</td>
<td>8810680000</td>
<td>8810930000</td>
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<table>
<thead>
<tr>
<th>Information</th>
<th>SSR 24VAC/230VAC 2A</th>
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<tbody>
<tr>
<td>Order No.</td>
<td>8576370000</td>
</tr>
</tbody>
</table>

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**Plug Series**

**Output current 230 Vac / 4A**

- **Output voltage**: 12 V...275 Vac
- **Output current (max.)**: 3 A (4 A at 20°C)
- **Voltage drop at max. load**: < 1.1 V
- **Switch-on delay/switch-off delay**: 120ms/20ms
- **Short-circuit proof/protective circuit**: No/RC-element

**General data**
- **Ambient temp., fitted w/o distance**: -40°C...+50°C
- **Ambient temp., fitted w. distance**: -40°C...+50°C
- **Storage temperature**: -40°C...+50°C
- **Approvals**: cUL, UL recognized

**Insulation coordinates (EN 50 178)**
- **Rated voltage**: 300V
- **Rated impulse voltage**: 4.0kV
- **Creepage and clearance path input - output**: 8mm
- **Overvoltage category**: II
- **Pollution severity**: 2

**Dimensions**
- **Screw connection**: mm² 2.5 / 0.5 / 2.5
- **Tension clamp connection**: mm² 2.5 / 0.5 / 2.5
- **Length x width x height**: 92.0 / 15.3 / 95.0

**Information**
- **Rated voltage**: 24VDC/230VAC 4A
- **Rated current**: approx. 10mA
- **Auxiliary voltage**: 15 Vdc...30 Vdc
- **Power rating**: approx. 0mA
- **Status indicator**: approx. 10mA
- **Status indicator (output)**: approx. 10mA

**Ordering data**

- **Complete module**
  - **Type**: POS 24VDC/230VAC 4A
  - **Order No.**: 8810910000

- **Spare relay, pluggable**
  - **Type**: SSR 24V AC/DC/230VAC 4A
  - **Order No.**: 8576360000

**Input**
- **Rated voltage**: 15 Vdc...30 Vdc
- **Rated current**: approx. 10mA
- **Auxiliary voltage**: No
- **Status indicator**: LED green
PLUGSERIES

Accessories

Schrack RP3SL
Relay for high switch-on current

Technical data

<table>
<thead>
<tr>
<th>Empty base for assembly on the TS 35 mounting rail</th>
<th>Screw connection</th>
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<tbody>
<tr>
<td>Rated current</td>
<td>16 A</td>
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<tr>
<td>Rated voltage</td>
<td>250 V</td>
</tr>
<tr>
<td>Voltage strength coil / contacts</td>
<td>≤ 4 kV</td>
</tr>
<tr>
<td>Protection</td>
<td>IP 20</td>
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<tr>
<td>Rated cross-sectional area</td>
<td>2.5 mm²</td>
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<tr>
<td>Stripping length</td>
<td>8 mm</td>
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<td>Ambient temperature</td>
<td>–40°C ... +60°C</td>
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<td>Flammability class as per UL 94</td>
<td>V-0</td>
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Order data

<table>
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<tr>
<td>PLED 230 Vdc</td>
<td>20</td>
<td>8536770000</td>
</tr>
<tr>
<td>PLED 230 Vac</td>
<td>20</td>
<td>8536780000</td>
</tr>
<tr>
<td>PLRC 200 nF/200 Ω</td>
<td>20</td>
<td>8566530000</td>
</tr>
<tr>
<td>ZOV 2.5N/4-2SW</td>
<td>60</td>
<td>1784270000</td>
</tr>
<tr>
<td>ZOV 2.5N/4-2RT</td>
<td>60</td>
<td>1784280000</td>
</tr>
<tr>
<td>ZOV 2.5N/4-2BL</td>
<td>60</td>
<td>1784290000</td>
</tr>
<tr>
<td>WS 15/5</td>
<td>200</td>
<td>1606960000</td>
</tr>
<tr>
<td>WS 15/5</td>
<td>96</td>
<td>1609880000</td>
</tr>
</tbody>
</table>

Operating control display

DC version

AC version

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**MICROSERIES**

**Output current 24 Vdc / 0.1A**

Universal interface between control and sensor/actuator
- Pluggable cross-connection ZQV 4N
- Solid-state relay interchangeable
- Width 6.1 mm
- Screw or tension clamp connection technology
- Mounting on TS35

### Technical data

#### Input
- Rated voltage: 24 Vdc +/- 20 %
- Rated current: 0.1 A
- Power rating: 140 mW
- Max. input frequency: 5.7 mA
- Auxiliary voltage: 180 mW
- Status indicator: LED green

#### Output
- Output voltage: 24 Vdc
- Output current (max.): 0.1 A
- Voltage drop at max. load: 0.1 A
- Block-state curr. (closed circuit curr.): No
- Switch-on delay/Switch-off delay: No/integrated freewheel diode
- Short-circuit proof/Protective circuit: No

### General data

- Ambient temp., fitted w/ distance: -25 °C...+60 °C
- Ambient temp., fitted w/o distance: -25 °C...+60 °C
- Storage temperature: -40 °C...+60 °C
- CE, UL/UR

### Ordering data

#### Connection technology
- Screw connection Tension clamp c.

<table>
<thead>
<tr>
<th>Type</th>
<th>(Qty.=10) Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOS 24Vdc / 24Vdc 0.1A</td>
<td>8607340000</td>
</tr>
<tr>
<td>MOZ 5Vdc / 24Vdc 0.1A</td>
<td>8635010000</td>
</tr>
</tbody>
</table>

#### Information

- Mounting on TS35

### Accessories

- Pluggable cross-connection ZQV 4N

---

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Output current 24 Vdc / 2A

Universal interface between control and sensor/actuator
• Plugable cross-connection ZQV 4N
• Solid-state relay interchangeable
• Width 6.1 mm
• Screw or tension clamp connection technology
• Mounting on TS35

Technical data

<table>
<thead>
<tr>
<th>Input</th>
<th>24Vdc +/- 20 %</th>
<th>120 Vac ± 10 % / ± 15 %</th>
<th>230 Vac ± 10 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>24 Vdc</td>
<td>120 Vac</td>
<td>230 Vac</td>
</tr>
<tr>
<td>Rated current</td>
<td>2.0 A</td>
<td>2.0 A</td>
<td>2.0 A</td>
</tr>
<tr>
<td>Power rating</td>
<td>140 mA</td>
<td>3.4 mA</td>
<td>7.4 mA</td>
</tr>
<tr>
<td>Max. input frequency</td>
<td>300 Hz</td>
<td>10 Hz / 60 Hz</td>
<td>1.7 VA</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>LED green</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Status indicator</td>
<td>No</td>
<td>LED green</td>
<td>LED green</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th>Output</th>
<th>3 V … 33 Vdc</th>
<th>3 V … 33 Vdc</th>
<th>3 V … 33 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>2.0 A</td>
<td>2.0 A</td>
<td>2.0 A</td>
</tr>
<tr>
<td>Voltage drop at max. load</td>
<td>&lt; 120 mV</td>
<td>&lt; 120 mV</td>
<td>&lt; 120 mV</td>
</tr>
<tr>
<td>approx. 10 µA</td>
<td>approx. 10 µA</td>
<td>approx. 10 µA</td>
<td></td>
</tr>
</tbody>
</table>

General data

| Ambient temp., fitted w. distance | -25 °C…+50 °C | -25 °C…+50 °C | -25 °C…+50 °C |
| Ambient temp., fitted w/o distance | -40 °C…+60 °C | -40 °C…+60 °C | -40 °C…+60 °C |
| Storage temperature | -25 °C…+60 °C | -25 °C…+60 °C | -25 °C…+60 °C |

Approvals

<table>
<thead>
<tr>
<th>Insulation coordinates (EN 50 178)</th>
<th>CE,nU,U</th>
<th>CE,nU,U</th>
<th>CE,nU,U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>EN 50178</td>
<td>EN 50178</td>
<td>EN 50178</td>
</tr>
<tr>
<td>Insulation coordinates (EN 50 178)</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Rated impulse voltage</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Clearance and creepage path input - output</td>
<td>&gt;= 5.5 mm</td>
<td>&gt;= 5.5 mm</td>
<td>&gt;= 5.5 mm</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pollution severity</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Dimensions

| Clamping range (rating- / min. / max.) | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 |
| Length x width x height | 99.0 x 6.1 x 92.0 | 99.0 x 6.1 x 92.0 | 99.0 x 6.1 x 92.0 |
| CE U,U,U | Mounting on TS35 | Mounting on TS35 | Mounting on TS35 |

| Screw connection | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 |
| Tension clamp c. | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 |

| Screw connection | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 |
| Tension clamp c. | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 |

| Screw connection | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 |
| Tension clamp c. | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 |

| Screw connection | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 |
| Tension clamp c. | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 |

| Screw connection | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 | 2.50 / 0.50 / 4 |
| Tension clamp c. | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 | 1.50 / 0.50 / 2.50 |

Ordering data

<table>
<thead>
<tr>
<th>Connection technology</th>
<th>MOS 24Vdc / 24Vdc 2A</th>
<th>MOS 120Vac / 24Vdc 2A</th>
<th>MOS 230Vac / 24Vdc 2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type (Qty.=10)</td>
<td>8607350000</td>
<td>8607700000</td>
<td>8607720000</td>
</tr>
<tr>
<td>Order No.</td>
<td>MOS 24Vdc / 24Vdc 2A</td>
<td>MOS 120Vac / 24Vdc 2A</td>
<td>MOS 230Vac / 24Vdc 2A</td>
</tr>
</tbody>
</table>

Accessories

Information

<table>
<thead>
<tr>
<th>Pluggable cross-connection ZQV 4N</th>
<th>Pluggable cross-connection ZQV 4N</th>
<th>Pluggable cross-connection ZQV 4N</th>
</tr>
</thead>
</table>

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### MICROSERIES

#### Plug-in solid state relay

<table>
<thead>
<tr>
<th>Type</th>
<th>Order no.</th>
<th>Nominal control voltage</th>
<th>24 Vdc</th>
<th>60 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSS Relay 24 V / 24 V 0.1 Adc</td>
<td>406180000</td>
<td>16 Vdc / 30 Vdc</td>
<td>7 mA ± 10 %</td>
<td>2.8 mA ± 10 %</td>
</tr>
<tr>
<td>SSS Relay 24 V / 24 V 2 Adc</td>
<td>4061230000</td>
<td>10 Vdc / 40 Vdc</td>
<td>ca. 4 kOhm</td>
<td>ca. 20 kOhm</td>
</tr>
</tbody>
</table>

#### Bipolar transistor

- Voltage: 3 ... 48 Vdc
- Current: 100 mA
- Resistance: ca. 3.2 kOhm

#### MOS-FET

- Voltage: 3 ... 33 Vdc
- Current: 2 A
- Resistance: < 120 mOhm

#### Technical data

<table>
<thead>
<tr>
<th>Input</th>
<th>24 Vdc</th>
<th>60 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control voltage min / max</td>
<td>16 Vdc / 30 Vdc</td>
<td>52 Vdc / 72 Vdc</td>
</tr>
<tr>
<td>Control current at UIN = 24 V</td>
<td>7 mA ± 10 %</td>
<td>2.8 mA ± 10 %</td>
</tr>
<tr>
<td>Release voltage</td>
<td>10 Vdc</td>
<td>40 Vdc</td>
</tr>
<tr>
<td>Control circuit resistance</td>
<td>ca. 4 kOhm</td>
<td>ca. 20 kOhm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>24 Vdc</th>
<th>60 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching voltage</td>
<td>18 Vdc / 30 Vdc</td>
<td>36 Vdc / 72 Vdc</td>
</tr>
<tr>
<td>Switching/continuous current at UIN &gt; 5 Vdc</td>
<td>7 mA ± 10 %</td>
<td>3.0 mA ± 10 %</td>
</tr>
<tr>
<td>Conducting state voltage</td>
<td>10 Vdc</td>
<td>20 Vdc</td>
</tr>
<tr>
<td>Test voltage between control circuit / switching circuit</td>
<td>&lt; 1 Vdc</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>2.5 kV</td>
<td></td>
</tr>
</tbody>
</table>

### Order data

<table>
<thead>
<tr>
<th>Type</th>
<th>Order no.</th>
<th>Nominal control voltage</th>
<th>24 Vdc</th>
<th>60 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSS Relay 24 V / 24 V 0.1 Adc</td>
<td>406180000</td>
<td>16 Vdc / 30 Vdc</td>
<td>7 mA ± 10 %</td>
<td>2.8 mA ± 10 %</td>
</tr>
<tr>
<td>SSS Relay 24 V / 24 V 2 Adc</td>
<td>4061230000</td>
<td>10 Vdc / 40 Vdc</td>
<td>ca. 4 kOhm</td>
<td>ca. 20 kOhm</td>
</tr>
</tbody>
</table>

### Dimensional drawings

- Print picture

---

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### MICROSERIES

#### Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Qty</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS 12/6</td>
<td>200</td>
<td>1061160000</td>
</tr>
<tr>
<td>Labels, laser mark</td>
<td>1686360000</td>
<td></td>
</tr>
<tr>
<td>Screwdriver</td>
<td>9008330000</td>
<td></td>
</tr>
</tbody>
</table>

#### General data – MICROSERIES

<table>
<thead>
<tr>
<th>Clamping conductor</th>
<th>Tension clamp connection</th>
<th>Screw connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid H07V-U:mm²</td>
<td>0.5 ... 2.5</td>
<td>0.5 ... 4.0</td>
</tr>
<tr>
<td>Flexible H07V-K:mm²</td>
<td>0.5 ... 2.5</td>
<td>0.5 ... 2.5</td>
</tr>
<tr>
<td>&quot;f&quot; with wire end ferrule as per DIN 46 228 / 1:mm²</td>
<td>0.5 ... 1.5</td>
<td>0.5 ... 1.5</td>
</tr>
<tr>
<td>&quot;f&quot; with wire end ferrule with plastic collar:mm²</td>
<td>0.5 ... 1.5</td>
<td>0.5 ... 1.5</td>
</tr>
<tr>
<td>Max. clamping range:mm²</td>
<td>0.13 ... 2.5</td>
<td>0.13 ... 4.0</td>
</tr>
<tr>
<td>Plug gauge as per IEC 60 947-1 size</td>
<td>A 2</td>
<td>A 3</td>
</tr>
</tbody>
</table>

#### Technical data

| Rated torque | 0.6 |
| Constant current of the cross-connection 2-pole A | 10 |
| Constant current of the cross-connection multi-pole A | 10 |
| Stripping length:mm | 10 |
| Protection: | IP 20 | IP 20 |
| Enclosure material: | Wemid | Wemid |
| Flammability class per UL 94: | V-0 | V-0 |
| Rated current: | A 6 | A 6 |
| Rated voltage: | 250 | 250 |

#### Pluggable cross-connection

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of poles</th>
<th>Qty</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>ZQV 4N / 2 GE</td>
<td>2</td>
<td>1758250000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 3 GE</td>
<td>3</td>
<td>1762630000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 4 GE</td>
<td>4</td>
<td>1762620000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 10 GE</td>
<td>10</td>
<td>1762620000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 41 GE</td>
<td>41</td>
<td>1756270000</td>
</tr>
<tr>
<td>Red</td>
<td>ZQV 4N / 2 RT</td>
<td>2</td>
<td>1799950000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 3 RT</td>
<td>3</td>
<td>1799960000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 4 RT</td>
<td>4</td>
<td>1794010000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 10 RT</td>
<td>10</td>
<td>1794040000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 41 RT</td>
<td>41</td>
<td>1794070000</td>
</tr>
<tr>
<td>Blue</td>
<td>ZQV 4N / 2 BL</td>
<td>2</td>
<td>1793960000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 3 BL</td>
<td>3</td>
<td>1793970000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 4 BL</td>
<td>4</td>
<td>1794020000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 10 BL</td>
<td>10</td>
<td>1794050000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 41 BL</td>
<td>41</td>
<td>1794080000</td>
</tr>
<tr>
<td>Black</td>
<td>ZQV 4N / 2 SW</td>
<td>2</td>
<td>1793970000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 3 SW</td>
<td>3</td>
<td>1794050000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 4 SW</td>
<td>4</td>
<td>1794090000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 10 SW</td>
<td>10</td>
<td>1794060000</td>
</tr>
<tr>
<td></td>
<td>ZQV 4N / 41 SW</td>
<td>41</td>
<td>1794090000</td>
</tr>
</tbody>
</table>

#### Other accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Qty</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>12 x 6 mm</td>
<td>200</td>
</tr>
<tr>
<td>Labels, laser mark</td>
<td>484 labels/Bogen</td>
<td></td>
</tr>
<tr>
<td>Screwdriver</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

#### Dimensioned drawing

- Tension clamp connection
- Screw connection
WAVESERIES

Output voltage 24 Vdc, negative switching, wide input range

![Optocoupler Diagram]

### Output
- **Output voltage**: 18 Vdc...24 Vdc...30 Vdc
- **Output current (max.)**: 2A, negative switching
- **Voltage drop at max. load**
- **Switch-on delay/switch-off delay**: 1 ms/6 ms
- **Short-circuit proof/protective circuit**: Nonvaristor

### General data
- **Ambient temp., fitted w/o distance**: -25 °C...+50 °C
- **Ambient temp., fitted w. distance**: -25 °C...+50 °C
- **Storage temperature**: -40 °C...+85 °C
- **Approvals**: UL/CSA

### Insulation coordinates (EN 50 178)
- **Standards**: EN 50178
- **Rated voltage**: 300V
- **Rated impulse voltage**: 6.0kV
- **Creepage and clearance path input-output**: => 5.5 mm
- **Overvoltage category**: III
- **Pollution severity**: 2

### Dimensions

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Tension clamp connection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clamping range</strong></td>
<td><strong>Radius</strong></td>
</tr>
<tr>
<td>(rating / min. / max.) mm</td>
<td>(mm / mm)</td>
</tr>
<tr>
<td>Length x width x height mm</td>
<td>72.0 / 22.5 / 92.4</td>
</tr>
</tbody>
</table>

### Information

#### Ordering data

**Input**
- **Rated voltage**: 4.0 Vdc...6.0 Vdc
- **Rated current**: 7.5...10mA
- **Power rating**: 30...114 mW
- **Auxiliary voltage**: 5Vdc
- **Status indicator**: LED green in input

### Ordering data

<table>
<thead>
<tr>
<th>Complete module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>WOSB 5VDC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spare relay, plugable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
</tbody>
</table>

### Ordering data

<table>
<thead>
<tr>
<th><strong>Input</strong></th>
<th><strong>Rated voltage</strong></th>
<th><strong>Rated current</strong></th>
<th><strong>Power rating</strong></th>
<th><strong>Auxiliary voltage</strong></th>
<th><strong>Status indicator</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.0 Vdc...6.0 Vdc</td>
<td>7.5...10mA</td>
<td>30...114 mW</td>
<td>5Vdc</td>
<td>LED green in input</td>
</tr>
</tbody>
</table>

---

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**WAVE SERIES**

Output voltage 5-48 Vdc

---

<table>
<thead>
<tr>
<th>Output</th>
<th>Output voltage</th>
<th>5 Vdc…48 Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output current (max.)</td>
<td>100 mA</td>
</tr>
<tr>
<td></td>
<td>Voltage drop at max. load</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Switch-on delay/Switch-off delay</td>
<td>8 ms/55 ms</td>
</tr>
<tr>
<td></td>
<td>Short-circuit proof/Protective circuit</td>
<td>No/varistor, integral freewheeling diode</td>
</tr>
</tbody>
</table>

**General data**

- Ambient temp., fitted w/o distance: -25 °C…+60 °C
- Ambient temp., fitted w. distance: -25 °C…+60 °C
- Storage temperature: -40 °C…+85 °C
- Approvals: UL/CSA

**Insulation coordinates (EN 50 178)**

- Standards: EN 50178
- Rated voltage: 300V
- Rated impulse voltage: 6.0 kV
- Creepage and clearance path input - output: >= 5.6 mm
- Overvoltage category: II
- Pollution severity: 2

**Dimensions**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Screw connection</th>
<th>Tension clamp connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering data**

**Complete module**

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Type: WOS1 3.5-15VDC 5KHZ</th>
<th>Order No.: 827590000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension clamp connection</td>
<td>Type</td>
<td>Order No.</td>
</tr>
</tbody>
</table>

**Spare relay, pluggable**

<table>
<thead>
<tr>
<th>Type</th>
<th>Order No.</th>
</tr>
</thead>
</table>

**Information**

**Input**

- Rated voltage: 3.5 Vdc…15 Vdc
- Rated current: 10…25 mA
- Power rating: 32 … 375 mW
- Auxiliary voltage: No
- Status indicator: LED green in input

---

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WAVESERIES

Output voltage 24 Vdc, 0.5 A, short-circuit proof

Output

- Output voltage: 12 Vdc...24 Vdc...28 Vdc
- Output current (max.): 500 mA
- Voltage drop at max. load: 500 mA
- Short-circuit proof: Yes
- Protective circuit: max. 96 h

General data

- Ambient temp., fitted w/o distance: -25 °C...+60 °C
- Ambient temp., fitted w. distance: -25 °C...+60 °C
- Storage temperature: -40 °C...+85 °C
- Approvals: UL/CSA
- Insulation coordinates: EN 50178

Rated voltage: 300 V
Rated impulse voltage: 6.0 kV
Overvoltage category: III
Pollution severity: 2
Creepage and clearance path input - output: => 5.5 mm

Dimensions

- Screw connection: mm
  - Clamping range (rating- / min. / max.): 1.5 / 0.5 / 2.5
  - Length x width x height: 72.0 / 22.5 / 92.4
- Tension clamp connection: mm
  - Clamping range (rating- / min. / max.): 1.5 / 0.5 / 2.5
  - Length x width x height: 72.0 / 22.5 / 92.4

Ordering data

12VUC/24VDC 0.5A

- Rated voltage: 10 Vdc...12 Vdc...14 Vdc
- Rated current: 15mA ac/12mA dc
- Power rating: 0.18 VA / 0.14 W
- Auxiliary voltage: No
- Status indicator: LED green in output

15-60VDC 1KHZ

- Rated voltage: 15 Vdc...60 Vdc
- Rated current: 1.4...4.1mA
- Power rating: 21...246 mW
- Auxiliary voltage: No
- Status indicator: LED green in output

115VUC/24VDC 0.5A

- Rated voltage: 115 Vuc, max. 130 Vuc
- Rated current: 2.9mA ac/3.1mA dc
- Power rating: 0.16 VA / 0.23 W
- Auxiliary voltage: No
- Status indicator: LED green in output

230VUC/24VDC 0.5A

- Rated voltage: 230 Vuc, max. 250 Vuc
- Rated current: 11.5mA ac/8.6mA dc
- Power rating: 2.6 VA / 0.4 W
- Auxiliary voltage: No
- Status indicator: LED green in output

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WAVESERIES

Output voltage 24 Vdc, 5 A, short-circuit proof

Derating curve

Output current (A) vs. Ambient temperature (°C)

Output voltage 19.2 Vdc...24 Vdc...28.8 Vdc
Output current (max.) 5 A
Voltage drop at max. load
 Shock state curr. / closed circuit curr. approx. 8 mA/25 ms
Switch-on delay/Switch-off delay
Short-circuit proof/Protective circuit
Yes/max. 96 h
General data
Ambient temp., fitted w/o distance -25 °C...+50 °C
Ambient temp., fitted w. distance -25 °C...+50 °C
Storage temperature -40 °C...+85 °C
Approvals UL/CSA
Insulation coordinates (EN 50 178)
Standards EN 50178
Rated voltage 300V
Rated impulse voltage 6.0kV
Creepage and clearance path input - output => 5.5 mm
Overvoltage category II
Pollution severity 2

Dimensions
Screw connection
Tension clamp connection
Clamping range (rating / min. / max.) mm
Length x width x height mm

Ordering data

Complete module
Screw connection Type
Order No.
Tension clamp connection Type
Order No.
Spare relay, pluggable Type
Order No.

Input
Rated voltage
Rated current
Power rating
Auxiliary voltage
Status indicator

24VUC/24VDC 5A
24 Vuc +/- 10 %
16.3mA ac/13.5mA dc
0.39 VA / 0.32 W
No
LED green in output

115VUC/24VDC 5A
115 Vuc, max. 130 Vuc
3.1mA ac/2.8mA dc
0.35 VA / 0.32 W
No
LED green in output

230VUC/24VDC 5A
230 Vuc, max. 250 Vuc
12mA ac/11mA dc
2.7 VA / 0.4 W
No
LED green in output

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**WAVESERIES**

**Output voltage 230 Vac, 3.5 A**

### Derating curve

<table>
<thead>
<tr>
<th>Ambient temperature [°C]</th>
<th>Output current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3.5 A</td>
</tr>
<tr>
<td>20</td>
<td>3.2 A</td>
</tr>
<tr>
<td>40</td>
<td>2.9 A</td>
</tr>
<tr>
<td>60</td>
<td>2.6 A</td>
</tr>
<tr>
<td>80</td>
<td>2.3 A</td>
</tr>
<tr>
<td>100</td>
<td>2.0 A</td>
</tr>
<tr>
<td>120</td>
<td>1.8 A</td>
</tr>
<tr>
<td>150</td>
<td>1.5 A</td>
</tr>
</tbody>
</table>

**Output**

- **Output voltage**: 24 Vac...250 Vac
- **Output current (max.)**: 3.5 A
- **Voltage drop at max. load**: \(0.5\%\)
- **Max. output current (with load circuit)**: 3.5 A
- **Switch-on delay/switch-off delay**: max. 20 ms/max. 20 ms
- **Short-circuit proof/Protective circuit**: No/RC-combination with resistor

**General data**

- **Ambient temp. fitted w/o distance**: \(-25 °C...+50 °C\)
- **Ambient temp. fitted w. distance**: \(-25 °C...+50 °C\)
- **Storage temperature**: \(-40 °C...+85 °C\)
- **Approvals**: UL/CSA
- **Insulation coordinates (EN 50178)**: EN 50178
- **Rated voltage**: 300V
- **Rated impulse voltage**: 6.0kV
- **Creepage and clearance path input - output**: \(≥ 5.5\) mm
- **Overvoltage category**: II
- **Pollution severity**: 2

### Dimensions

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Tension clamp connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping range (min. / max.)</td>
<td>mm</td>
</tr>
<tr>
<td>Length x width x height</td>
<td>mm</td>
</tr>
<tr>
<td>Information</td>
<td></td>
</tr>
</tbody>
</table>

### Ordering data

<table>
<thead>
<tr>
<th>Input</th>
<th>15-60VUC/24VDC 5A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>15 Vac...60 Vac 56 Vac</td>
</tr>
<tr>
<td>Rated current</td>
<td>3.3...5.3mA ac/3.5...5.4mA dc</td>
</tr>
<tr>
<td>Power rating</td>
<td>0.31 VA / 0.33 W</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>No</td>
</tr>
<tr>
<td>Status indicator</td>
<td>LED green in input</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>115VUC/230VAC 3.5A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>115 Vac, max. 130 Vac</td>
</tr>
<tr>
<td>Rated current</td>
<td>3.8mA ac/7.2mA dc</td>
</tr>
<tr>
<td>Power rating</td>
<td>0.44 VA / 0.82 W</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>No</td>
</tr>
<tr>
<td>Status indicator</td>
<td>LED green in input</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>230VUC/230VAC 3.5A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>230 Vac, max. 250 Vac</td>
</tr>
<tr>
<td>Rated current</td>
<td>11.8mA ac/3.3mA dc</td>
</tr>
<tr>
<td>Power rating</td>
<td>2.7 VA / 0.75W</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>No</td>
</tr>
<tr>
<td>Status indicator</td>
<td>LED green in input</td>
</tr>
</tbody>
</table>

**Complete module**

<table>
<thead>
<tr>
<th>Screw connection Type</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOS2 15-60VAC 66VDC</td>
<td>8275440000</td>
</tr>
<tr>
<td>WOS2 115VUC</td>
<td>825950000</td>
</tr>
<tr>
<td>WOS2 230VAC 3.5A</td>
<td>827540000</td>
</tr>
</tbody>
</table>

**Spare relay, pluggable**

<table>
<thead>
<tr>
<th>Type</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Information**

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WAVESERIES

Output volt. 24 Vdc, 0.5 A, short-circuit proof, 4 channels

Output
- Output voltage: 12 Vdc…24 Vdc…28 Vdc
- Output current (max.): 0.5 A per channel
- Voltage drop at max. load
- Switch-on delay/switch-off delay: <20 ms/<50 ms
- Short-circuit proof/protective circuit: Yes/varistor, polarity reversal protection

General data
- Ambient temp., fitted w/o distance: -25 °C...+50 °C
- Ambient temp., fitted w. distance: -25 °C...+50 °C
- Storage temperature: -40 °C...+85 °C
- Approvals: UL/CSA
- Insulation coordinates (EN 50 178)
- Standards: EN 50178
- Rated voltage: 150V
- Rated impulse voltage: 6.0kV
- Creepage and clearance path input-output => 3 mm
- Overvoltage category: III
- Pollution severity: 2

Dimensions
- Screw connection: mm² 1.5 / 0.5 / 2.5
- Length × width × height: mm 92.4 / 22.5 / 112.4

Ordering data

**24VUC/24VDC 0.5A**
- Rated voltage: 16 Vuc...30 Vuc
- Rated current: 2.8mA ac/0.7mA dc
- Power rating: 0.4 VA / 0.3 W
- Auxiliary voltage: No
- Status indicator: LED green in output

**115VUC/24VDC 0.5A**
- Rated voltage: 115 Vuc, max. 130 Vuc
- Rated current: 1.4mA ac/0mA dc
- Power rating: 0.16 VA / 0.23 W
- Auxiliary voltage: No
- Status indicator: LED green in output

**230VUC/24VDC 0.5A**
- Rated voltage: 230 Vuc, max. 250 Vuc
- Rated current: 1.4mA ac/0mA dc
- Power rating: 0.16 VA / 0.23 W
- Auxiliary voltage: No
- Status indicator: LED green in output

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WAVESERIES

For high switching frequency up to 100kHz

Output
- Output voltage: 21.6 Vdc...24 Vdc...26.4 Vdc
- Output current (max.): 50 mA
- Voltage drop at max. load
- Switch-on delay/Switch-off delay: 1 µs/7 µs
- Short-circuit proof/Protective circuit: Non-waistor, polarity reversal protection

General data
- Ambient temp., fitted w/o distance: -25 °C...+60 °C
- Ambient temp., fitted w. distance: -25 °C...+60 °C
- Storage temperature: -40 °C...+85 °C
- Approvals: UL/CSA

Insulation coordinates (EN 50 178)
- Standards: EN 50178
- Rated voltage: 300V
- Rated impulse voltage: 6.0kV
- Creepage and clearance path input - output: => 5.5 mm
- Overvoltage category: III
- Pollution severity: 2

Dimensions
- Screw connection: 1.5 / 0.5 / 2.5 mm²
- Tension clamp connection: 12.0 / 22.5 / 92.4 mm

Information

Ordering data

5VTTL 50KHZ
- Input:
  - Rated voltage: 5 V TTL
  - Rated current: 13mA
  - Power rating: 65 mW
  - Auxiliary voltage: 5 V
  - Status indicator: LED green in input

12-28VDC 100KHZ
- Input:
  - Rated voltage: 12 Vdc...28 Vdc
  - Rated current: 8mA
  - Power rating: 190 mW
  - No auxiliary voltage
  - Status indicator: LED green in input

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**MCZ-SERIES**

**MiniConditioner MCZ O**

Universal interface between control and sensor/actuator

- Direct switching of load currents up to 2Adc
- MCZ O with following features:
  - Tension clamp connection technology
  - Pluggable cross-connection
  - Width 6mm

### Technical data

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>Output voltage</td>
</tr>
<tr>
<td>24 Vac +/- 20 %</td>
<td>24 Vac +/- 20 %</td>
</tr>
<tr>
<td>1.11mA ac/9.9mA dc</td>
<td>1.11mA ac/9.9mA dc</td>
</tr>
<tr>
<td>230mW / 280mWmA</td>
<td>230mW / 280mWmA</td>
</tr>
<tr>
<td>dc: 10 Hz / ac: 5 Hz</td>
<td>dc: 10 Hz / ac: 5 Hz</td>
</tr>
<tr>
<td>Power rating</td>
<td>Voltage drop at max. load</td>
</tr>
<tr>
<td>20 mA</td>
<td>&lt;= 1 V</td>
</tr>
<tr>
<td>Max. input frequency</td>
<td>Output current (max.)</td>
</tr>
<tr>
<td>20 mA</td>
<td>&lt;= 1 V</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>Voltage drop at max. load</td>
</tr>
<tr>
<td>No</td>
<td>Short-circuit proof</td>
</tr>
<tr>
<td>Status indicator</td>
<td>Integrated freewheel diode</td>
</tr>
<tr>
<td>LED green</td>
<td>No</td>
</tr>
</tbody>
</table>

### General data

- Ambient temp., fitted w. distance
  - -25 °C...+50 °C
  - -40 °C...+85 °C

- Ambient temp., fitted w/o distance
  - -25 °C...+40 °C
  - -40 °C...+40 °C

- Storage temperature
  - -25 °C...+50 °C
  - -40 °C...+60 °C

### Approvals

- CE, UL, CSA

### Insulation coordinates (EN 50 178)

- Rated voltage: 240V
- Rated impulse voltage: 300V
- Creepage and clearance path input - output: >= 5.5 mm
- Overvoltage category: III
- Pollution severity: II

### Dimensions

- Clamping range (rating / min. / max.): 1.50 / 0.50 / 1.50
- Length x width x height: 91.0 x 6.0 x 64.0

### Ordering data

<table>
<thead>
<tr>
<th>Connection technology</th>
<th>Type</th>
<th>Qty.</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension clamp c.</td>
<td>MCZ O 24VUC</td>
<td>10</td>
<td>8365940000</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Information</th>
<th>End plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AP MCZ1.0 8389030000</td>
</tr>
</tbody>
</table>

---

**Optocoupler**

**24 VUC**

- Input voltage: 48 V / 20 mA
- LED green
- 24 Vac +/- 20 %
- 13mA ac/12mA dc
- 230mW / 280mWmA
- dc: 10 Hz / ac: 5 Hz

**24VUC/24V 2A**

- Input voltage: 24 Vac +/- 20 %
- Output voltage: 24 Vac +/- 20 %
- 13mA ac/12mA dc
- 230mW / 280mWmA
- dc: 10 Hz / ac: 5 Hz

---

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## MiniConditioner MCZ O

Universal interface between control and sensor/actuator

MCZ O with following features:
- Tension clamp connection technology
- Pluggable cross-connection
- Width 6mm

### Technical data

<table>
<thead>
<tr>
<th>Input</th>
<th>120VUC</th>
<th>230VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>120 Vac ±5% -15%</td>
<td>230 Vac ±5% -15%</td>
</tr>
<tr>
<td>Rated current</td>
<td>3mA</td>
<td>10 mA</td>
</tr>
<tr>
<td>Power rating</td>
<td>350mW / 400mA</td>
<td>2.3 VA</td>
</tr>
<tr>
<td>Max. input frequency</td>
<td>Ac: 5 Hz duty factor 1:2, dc: 20 Hz duty factor 1:2</td>
<td>Ac: 5 Hz duty factor 1:2</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Status indicator</td>
<td>LED green</td>
<td>LED green</td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>5…48 Vdc</td>
<td>5…48 Vdc</td>
</tr>
<tr>
<td>Output current (max.)</td>
<td>50 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td>Voltage drop at max. load</td>
<td>&lt; 1.6 V</td>
<td>&lt; 1.6 V</td>
</tr>
<tr>
<td>Block-state curr. (closed circuit curr.)</td>
<td>0.16 mA</td>
<td>0.16 mA</td>
</tr>
<tr>
<td>Switch-on delay/ Switch-off delay</td>
<td>&lt; 30 ms max. - 40 ms</td>
<td>&lt; 30 ms max. - 40 ms</td>
</tr>
<tr>
<td>Short-circuit proof/ Protective circuit</td>
<td>No/Integrated freewheel diode</td>
<td>No/Integrated freewheel diode</td>
</tr>
<tr>
<td>General data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temp., fitted w. distance</td>
<td>-25 °C...+50 °C</td>
<td>-25 °C...+50 °C</td>
</tr>
<tr>
<td>Ambient temp., fitted w/o distance</td>
<td>-20 °C...+40 °C</td>
<td>-20 °C...+40 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C...+60 °C</td>
<td>-40 °C...+85 °C</td>
</tr>
<tr>
<td>Approvals</td>
<td>CE, UL, CSA</td>
<td>CE, UL, CSA</td>
</tr>
<tr>
<td>Insulation coordinates (EN 50 178)</td>
<td>EN 50178</td>
<td>EN 50178</td>
</tr>
<tr>
<td>Standards</td>
<td>300V</td>
<td>300V</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>6.0kV</td>
<td>6.0kV</td>
</tr>
<tr>
<td>Rated impulse voltage</td>
<td>=&gt; 5.5 mm</td>
<td>=&gt; 5.5 mm</td>
</tr>
<tr>
<td>Creepage and clearance path input - output</td>
<td>III</td>
<td>III</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Pollution severity</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamping range (rating / min. / max.) mm</td>
<td>1.50 / 0.50 / 1.50</td>
<td>1.50 / 0.50 / 1.50</td>
</tr>
<tr>
<td>Length x width x height mm</td>
<td>91.0 x 6.0 x 64.0</td>
<td>91.0 x 6.0 x 64.0</td>
</tr>
</tbody>
</table>

### Ordering data

<table>
<thead>
<tr>
<th>Connection technology</th>
<th>Type</th>
<th>Qty.</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension clamp c.</td>
<td>MCZ O 120VUC</td>
<td>10</td>
<td>8421060000</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Information</th>
<th>End plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AP MCZ 8389030000</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Information</th>
<th>End plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AP MCZ 8389030000</td>
</tr>
</tbody>
</table>
MiniConditioner MCZ O

Module can be used as an universal interface:
- Between control and actuator, to convert signals from 24 Vdc to 5 VTTL
- Between control and actuator, to convert signals from 5 VTTL to 5…48 Vdc

**Technical data**

<table>
<thead>
<tr>
<th>Input</th>
<th>Rated voltage</th>
<th>24 Vdc +/- 16 %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rated current</td>
<td>4.7mA</td>
</tr>
<tr>
<td></td>
<td>Power rating</td>
<td>1.12 mW</td>
</tr>
<tr>
<td>Max. input frequency</td>
<td>100 kHz duty factor 1:2, 50 kHz duty factor 1:10</td>
<td></td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>5 V TTL</td>
<td></td>
</tr>
<tr>
<td>Status indicator</td>
<td>LED green</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Output voltage</th>
<th>5 V TTL (4.75…5.25 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output current (max.)</td>
<td>8 mA, fan out = 20 LS-TTL</td>
</tr>
<tr>
<td>Voltage drop at max. load</td>
<td>1 µs (at 20 Vdc)/2.5 µs (at 28 Vdc)</td>
<td></td>
</tr>
<tr>
<td>Block-state curr. (closed circuit curr.)</td>
<td>10 mA</td>
<td></td>
</tr>
<tr>
<td>Switch-on delay/Switch-off delay</td>
<td>2.4 kHz</td>
<td></td>
</tr>
<tr>
<td>Short-circuit proof/Protective circuit</td>
<td>LED green</td>
<td></td>
</tr>
</tbody>
</table>

**General data**

| Ambient temp., fitted w. distance | -25 °C…+50 °C |
| Ambient temp., fitted w/o distance | -25 °C…+50 °C |
| Storage temperature | -40 °C…+40 °C |

| Approvals | CE, UL, CSA |
| Insulation coordinates (EN 50 178) | EN 50178 |
| Rated voltage | 240V |
| Rated impulse voltage | 6.0kV |
| Clearance and clearance path input - output | >= 5.5 mm |
| Overvoltage category | II |
| Pollution severity | III |

**Dimensions**

| Clamping range (rating / min. / max.) | 1.50 / 0.50 / 1.50 |
| Length x width x height | 91.0 x 6.0 x 64.0 |

**Ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>Qty.</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCZ O 24VDC</td>
<td>10</td>
<td>8324610000</td>
</tr>
<tr>
<td>MCZ O 5VTTL</td>
<td>10</td>
<td>8398940000</td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th>Information</th>
<th>End plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AP MCZ</td>
</tr>
</tbody>
</table>

**Optocoupler**

24VDC/5VTTL

- INPUT: VCC, GND
- OUTPUT: TTL

5VTTL/5…48 VDC

- INPUT: VCC, GND
- OUTPUT: 5…48 V = / 100 mA

**Type Qty. Order No.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Qty.</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCZ O 24VDC</td>
<td>10</td>
<td>8324610000</td>
</tr>
<tr>
<td>MCZ O 5VTTL</td>
<td>10</td>
<td>8398940000</td>
</tr>
</tbody>
</table>

**End plate**

| Information | AP MCZ | 8398920000 |
**Minicoupler DKO**

- Coupling of digital sensor-/actuator signals between PLC and process
- Low-cost solution for adaption of level and potential
- Low input power
- Screw connection technology
- 6 mm width
- Mounting on TS35

---

**Technical data**

**Input**
- Rated voltage
- Rated current
- Power rating
- Max. input frequency
- Auxiliary voltage
- Status indicator

**Output**
- Output voltage
- Output current (max.)
- Voltage drop at max. load
- Block-state curr. / closed circuit curr.
- Switch-on delay / Switch-off delay
- Short-circuit proof / Protective circuit

**General data**
- Ambient temp., fitted w. distance
- Ambient temp., fitted w/o distance
- Storage temperature
- Approvals
- Insulation coordinates (EN 50178)
- Standards
- Rated voltage
- Rated impulse voltage
- Cleanliness category
- Pollution severity

**Dimensions**
- Clamping range (rating / min. / max.) mm
- Length x width x height mm

**Information**

**Ordering data**

**Connection technology**
- Screw connection

**Accessories**
- End plate
- Information
Minicoupler DKO

- Coupling of digital sensor-/actuator signals between PLC and process
- Low-cost solution for adaption of level and potential
- Low input power
- Screw connection technology
- 6 mm width
- Mounting on TS35

Technical data

<table>
<thead>
<tr>
<th>Input</th>
<th>Rated voltage</th>
<th>Rated current</th>
<th>Power rating</th>
<th>Max. input frequency</th>
<th>Auxiliary voltage</th>
<th>Status indicator</th>
<th>Output</th>
<th>Output voltage</th>
<th>Output current (max.)</th>
<th>Voltage drop at max. load</th>
<th>Block-state curr. (closed circuit curr.)</th>
<th>Switch-on delay/Switch-off delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VUC</td>
<td>24 Vdc +/- 10 %</td>
<td>&lt;= 15 mA</td>
<td>0.16 mA</td>
<td>&lt;= 50 µA</td>
<td>&lt;= 900 mW</td>
<td>5 V...48 Vdc</td>
<td>20 mA</td>
<td>24 V</td>
<td>&lt;= 15 mA</td>
<td>&lt;= 500 mV</td>
<td>approx. 55 µs/approx. 80 µs</td>
<td>&lt;= 1 ms/approx. 1 ms</td>
</tr>
<tr>
<td>24VDC 3KHZ</td>
<td>24 Vdc +/- 10 %</td>
<td>&lt;= 15 mA</td>
<td>0.16 mA</td>
<td>&lt;= 50 µA</td>
<td>&lt;= 900 mW</td>
<td>5 V...48 Vdc</td>
<td>20 mA</td>
<td>24 V</td>
<td>&lt;= 15 mA</td>
<td>&lt;= 500 mV</td>
<td>approx. 55 µs/approx. 80 µs</td>
<td>&lt;= 1 ms/approx. 1 ms</td>
</tr>
<tr>
<td>24VDC 3KHZ</td>
<td>24 Vdc +/- 10 %</td>
<td>&lt;= 15 mA</td>
<td>0.16 mA</td>
<td>&lt;= 50 µA</td>
<td>&lt;= 900 mW</td>
<td>5 V...48 Vdc</td>
<td>20 mA</td>
<td>24 V</td>
<td>&lt;= 15 mA</td>
<td>&lt;= 500 mV</td>
<td>approx. 55 µs/approx. 80 µs</td>
<td>&lt;= 1 ms/approx. 1 ms</td>
</tr>
</tbody>
</table>

General data

- Ambient temp., fitted w. distance
- Ambient temp., fitted w/o distance
- Storage temperature

- Insulation coordinates (EN 50 178)
- Rated voltage
- Rated impulse voltage
- Creepage and clearance path input - output
- Overvoltage category
- Pollution severity

Dimensions

- Screw connection
- Length x width x height

Ordering data

Connection technology
- Screw connection

Information

Accessories

- End plate
Minicoupler DKO

- Coupling of digital sensor-/actuator signals between PLC and process
- Low-cost solution for adaption of level and potential
- Low input power
- Screw connection technology
- 6 mm width
- Mounting on TS35

**Technical data**

<table>
<thead>
<tr>
<th><strong>Input</strong></th>
<th><strong>Output</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>24 Vdc +/- 10 %</td>
</tr>
<tr>
<td>Rated current</td>
<td>8.5 mA</td>
</tr>
<tr>
<td>Max. input frequency</td>
<td>3 kHz</td>
</tr>
<tr>
<td>Auxiliary voltage</td>
<td>20 mA</td>
</tr>
<tr>
<td>Voltage drop at max. load</td>
<td>&lt;= 900 mV</td>
</tr>
<tr>
<td>Block-state curr.</td>
<td>50 μA</td>
</tr>
<tr>
<td>Switch-on delay/switch-off delay</td>
<td>approx. 50 μs/approx. 80 μs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>General data</strong></th>
<th><strong>Standards</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temp., fitted w. distance</td>
<td>-25 °C…+50 °C</td>
</tr>
<tr>
<td>Ambient temp., fitted w/o distance</td>
<td>-25 °C…+40 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C…+85 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Approvals</strong></th>
<th><strong>Insulation coordinates (EN 50 178)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>EN 50178</td>
</tr>
<tr>
<td>EN 50178</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dimensions</strong></th>
<th><strong>Screw connection</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping range (rating- / min. / max.) mm²</td>
<td>4 / 0.50 / 4</td>
</tr>
<tr>
<td>Length x width x height mm</td>
<td>65.0 x 6.0 x 57.0</td>
</tr>
</tbody>
</table>

**Ordering data**

<table>
<thead>
<tr>
<th><strong>Connection technology</strong></th>
<th><strong>Type</strong></th>
<th><strong>(Qty.=10)</strong></th>
<th><strong>Order No.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw connection</td>
<td>DKO 35 24VDC 3KHZ E.U</td>
<td>8248790000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DKO 35 24VDC 100Hz E.U</td>
<td>8181990000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DKO 35 24VDC 100Hz E.O</td>
<td>8215600000</td>
<td></td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th><strong>Information</strong></th>
<th><strong>Connection technology</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>End plate</td>
<td>AP DKE 0687600000</td>
</tr>
</tbody>
</table>
**Minicoupler DKO**

- Coupling of digital sensor-/actuator signals between PLC and process
- Low-cost solution for adaption of level and potential
- Low input power
- Screw connection technology
- 6 mm width
- Mounting on TS35

### Technical data

**Input**
- Rated voltage: 24 Vdc ±10 %
- Rated current: 6 mA
- Power rating: 145 mW
- Max. input frequency: 200 Hz
- Status indicator: LED green
- Voltage drop at max. load: < 800 mV
- Max. input: 5…48 Vdc
- Input current: 6 mA
- Max. power: 145 mW
- Input frequency: 200 Hz
- Input current: 500 mA
- Input voltage: 24 Vdc ±10 %
- Input current: 6 mA
- Input voltage: 48 Vdc

**Output**
- Output voltage: 48 Vdc
- Output current (max.): 0.5 A
- Voltage drop at max. load: < 800 mV
- Block-state curr. / Protective circuit: No diode
- Output voltage: 5…48 Vdc
- Output current: 500 mA
- Output voltage: 500 mA
- Output current: 500 mA
- Output voltage: 5 V TTL
- Output current: 8 mA
- Output voltage: 24 Vdc
- Output current: 4.7 mA
- Output voltage: 4.8 Vdc
- Output current: 4.7 mA

**General data**
- Ambient temp., fitted w. distance: -25 °C...+50 °C
- Ambient temp., fitted w/o distance: -25 °C...+40 °C
- Storage temperature: -40 °C...+85 °C
- CE
- EN 50178
- 300 V
- 4.0 kV

**Dimensions**
- Screw connection: 4 / 0.50 / 4
- Length x width x height: 65.0 x 6.0 x 57.0 mm
- Screw connection: 4 / 0.50 / 4
- Length x width x height: 65.0 x 6.0 x 57.0 mm
- Screw connection: 4 / 0.50 / 4
- Length x width x height: 77.0 x 6.0 x 62.0 mm

**Ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>(Qty.=10)</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKO 35 24VDC E:U</td>
<td></td>
<td>8216580000</td>
</tr>
<tr>
<td>DKO 25 24VDC E:O</td>
<td></td>
<td>8215630000</td>
</tr>
<tr>
<td>DKO DK5 24VDC 50KHZ</td>
<td></td>
<td>8230640000</td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th>Information</th>
<th>End plate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AP DKO 8215630000</td>
</tr>
<tr>
<td></td>
<td>AP DKO 8216580000</td>
</tr>
<tr>
<td></td>
<td>AP DKO 8230640000</td>
</tr>
</tbody>
</table>

Clearwater Tech - Phone: 800.894.0412 - Fax: 208.368.0415 - Web: www.clrwtr.com - Email: info@clrwtr.com
### Minicoupler DKO

- Coupling of digital sensor-/actuator signals between PLC and process
- Low-cost solution for adaption of level and potential
- Low input power
- Screw connection technology
- 6 mm width
- Mounting on TS35

### Technical data

#### Input
- Rated voltage: 24 Vuc +/- 20%
- Rated current: 13 mA ac / 12 mA dc
- Power rating: max. 220 mA / 196 mW
- Max. input frequency: < 10 Hz
- Auxiliary voltage: +24 V

#### Output
- Output voltage: 24 Vdc +/- 20%
- Output current (max.): 2 A
- Voltage drop at max. load: 2 mA/7 ms

#### General data
- Ambient temp., fitted w. distance: -25 °C...+50 °C
- Ambient temp., fitted w/o distance: -25 °C...+40 °C
- Storage temperature: -40 °C...+85 °C

### Insulation coordinates (EN 50178)
- Rated voltage: 300 V
- Rated impulse voltage: 6.0 kV
- Creepage and clearance path input - output: >= 5.5 mm
- Overvoltage category: IV

### Overvoltage category
- Screw connection: 4 / 0.50 / 4
- Length x width x height: 77.0 x 6.0 x 62.0

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>(Qty.=10)</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKO D5 24VUC</td>
<td>8228630000</td>
<td></td>
</tr>
<tr>
<td>DKO 35 115VUC</td>
<td>8017960000</td>
<td></td>
</tr>
<tr>
<td>DKO 35 230VUC</td>
<td>8008160000</td>
<td></td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Information</th>
<th>End plate</th>
<th>AP DKO</th>
<th>8209660000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input bottom</td>
<td>Input bottom</td>
<td>Input bottom</td>
<td>Input bottom</td>
</tr>
</tbody>
</table>
EG-7

- Combination foot for TS15, TS32 or TS35
- Optional pluggable on clip-in base RS EG7
- Width 10 mm
- Protective separation according to VDE 0884

**Technical data**

<table>
<thead>
<tr>
<th>Input</th>
<th>5VDC</th>
<th>12VUC</th>
<th>24VUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>6.8 mA</td>
<td>40 mA / 65 mA</td>
<td>70 mA / 90 mA</td>
</tr>
<tr>
<td>Power rating</td>
<td>15Hz</td>
<td>15Hz</td>
<td>15Hz</td>
</tr>
<tr>
<td>Status indicator</td>
<td>LED green</td>
<td>LED green</td>
<td>LED green</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt;=50 µA 6ms/12ms</td>
<td>&lt;=50 µA 6ms/12ms</td>
<td>&lt;=50 µA 6ms/12ms</td>
</tr>
<tr>
<td>Block-state curr.</td>
<td>No Integrated free-wheel diode</td>
<td>No Integrated free-wheel diode</td>
<td>No Integrated free-wheel diode</td>
</tr>
<tr>
<td>Output voltage</td>
<td>5…48Vdc 100 mA</td>
<td>5…48Vdc 100 mA</td>
<td>5…48Vdc 100 mA</td>
</tr>
<tr>
<td>Output current</td>
<td>&lt;=1.5 V</td>
<td>&lt;=1.5 V</td>
<td>&lt;=1.5 V</td>
</tr>
<tr>
<td>Output currant (max.)</td>
<td>100 mA</td>
<td>100 mA</td>
<td>100 mA</td>
</tr>
<tr>
<td>Ambient temp., fitted w. distance</td>
<td>-25 °C…+60 °C</td>
<td>-25 °C…+60 °C</td>
<td>-25 °C…+60 °C</td>
</tr>
<tr>
<td>Ambient temp., fitted w/o distance</td>
<td>-25 °C…+60 °C</td>
<td>-25 °C…+60 °C</td>
<td>-25 °C…+60 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C…+60 °C</td>
<td>-40 °C…+60 °C</td>
<td>-40 °C…+60 °C</td>
</tr>
</tbody>
</table>

**Approvals**

- CE
- EN 50178
- EN 50178
- EN 50178

**Dimensions**

- Complete module: 44.0 x 10.0 x 96.0
- Complete module: 95.0 x 10.0 x 99.0
- Complete module: 44.0 x 10.0 x 96.0
- Complete module: 95.0 x 10.0 x 99.0

**Ordering data**

- Complete module: EGO EG7 5VDC K-FU
- Pluggable: EGT EG7 5VDC
- Complete module: EGO EG7 12VUC K-FU
- Pluggable: EGT EG7 12VUC
- Complete module: EGO EG7 24VUC K-FU
- Pluggable: EGT EG7 24VUC

**Accessories**

- Locking socket RS EG7: 8193830000
**EG-SERIES**

**EG 7**
- Combination foot for TS15, TS32 or TS35
- Optional pluggable on clip-in base RS EG7
- Width 10 mm
- Protective separation according to VDE 0884

### Technical data

**Input**
- Rated voltage: 48VUC +/- 20 %, 115VUC +/- 20 %, 230VAC +6/-15 %
- Rated current: 3.4mA ac/3.3mA dc, 9mA ac/3.3mA dc, 14mA ac/3.3mA dc
- Power rating: 135 mW/155 mVA, 0.4 W / 0.6 VA, 3.2 VA
- Max. input frequency: 15Hz, 10Hz
- Status indicator: LED green

**Output**
- Output voltage: 5…48Vdc
- Output current (max.): 150 mA, 100 mA, 102 mA
- Voltage drop at max. load: < 1.5 V, < 1.5 V, < 1.5 V
- Block-state curr. (closed circuit curr.): 5mA/15mA, 5mA/15mA, 5mA/15mA
- Short-circuit proof/Protective diode: No, No, No/Integrated free-wheel diode

**General data**
- Ambient temp., fitted w. distance: -25 °C...+60 °C, -25 °C...+60 °C, -25 °C...+60 °C
- Ambient temp., fitted w/o distance: -40 °C...+60 °C, -40 °C...+60 °C, -40 °C...+60 °C
- Storage temperature: -25 °C...+60 °C, -25 °C...+60 °C, -40 °C...+60 °C
- Approvals: CE, CE, CE

### Insulation coordinates (EN 50178)
- Rated impulse voltage: 300V, 600V, 300V
- Creepage and clearance path input - output: >= 5.5 mm, >= 5.5 mm, >= 5.5 mm
- Overvoltage category: III, III, III

### Dimensions
- Clamping range (rating / min. / max.): 1.50 / 0.50 / 1.50, 2.50 / 0.50 / 2.50, 44.0 x 10.0 x 96.0
- Length x width x height: 95.0 x 10.0 x 99.0

### Information
- Dimensions pluggable opto-coupler:
  - Complete module: 48VUC
  - Pluggable: 115VUC, 230VAC
- Dimensions pluggable opto-coupler:
  - Complete module: 115VUC
  - Pluggable: 230VAC
- Dimensions pluggable opto-coupler:
  - Complete module: 230VAC
  - Pluggable: 230VAC

### Ordering data
- **Type**: EG0 EG7 48VUC K-FU, EG7 115VUC K-FU, EG7 230VAC K-FU
- **Order No.**: 8803550000, 8803570000, 8803590000

### Accessories
- **Information**: Locking socket RS EG7, 8193830000

---

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For long control wires

- RC-Input circuit to disable interfering signals
- Safe switching behavior in case of interfering pulses on the control side

### Technical data

#### Input
- Rated voltage: 230 Vac +6/-15 %
- Rated current: 3.8mA
- Power rating: 870 mVA
- Max. input frequency: 12Hz
- Auxiliary voltage: 5...48Vdc
- Status indicator: LED green

#### Output
- Output voltage: 5...48Vdc
- Output current (max.): 100 mA
- Voltage drop at max. load: < 1.5 V
- Block-state curr. (closed circuit curr.): < 50 µA
- Switch-on delay/ Switch-off delay: 5ms/15ms
- Short-circuit proof/Protective circuit: No transistor, integral freewheeling diode

#### General data
- Ambient temp., fitted w. distance: -25 °C...+60 °C
- Ambient temp., fitted w/o distance: -25 °C...+60 °C
- Storage temperature: -40 °C...+60 °C
- Approvals: CE

#### Insulation coordinates (EN 50178)
- Rated voltage: 300V
- Rated impulse voltage: 6.0kV
- Creepage and clearance path input - output: >= 5.5 mm
- Overvoltage category: III
- Pollution severity: 2

#### Dimensions
- Clamping range (rating- / min. / max.) mm²: 1.50 / 0.50 / 1.50
- Length x width x height mm: 44.0 x 10.0 x 96.0

#### Ordering data

#### Accessory
- Locking socket: RS EG7 8193830000