The problem

The real world can be measured in many ways, for example, via temperature, humidity, air pressure and so forth. The parameters of these different physical qualities change continuously. Elements that monitor statuses and changes in statuses of a given environment, must reflect these continual changes.

Within the framework of industrial monitoring tasks, the statuses of an environment are monitored by using sensors. These sensors should provide signals that enable connected evaluating and monitoring installations to draw detailed conclusions concerning the status of, for example, a production process. The sensor signals trace the continuous changes in the monitored range. The signals can be in analogue or digital form; which means in normal cases, an electrical voltage or current value is produced that corresponds proportionally to the monitored physical quantities. Increasing automation with the intention of achieving or maintaining certain predetermined statuses makes the processing of analogue values increasingly important. This is also true of fields beyond those where this has been necessary and standard for a long time, for example, processing technology in the chemical industry. Standard electrical signal values are the norm within the framework of this processing technology.

Current values from 0...20 mA, 4...20 mA or voltage values from 0...10 V have been introduced as sensor output values for differing physical quantities. Weidmüller has taken account the need for increasing automation with the processing of these analogue signals, and offers a wide range of products that are designed for handling sensor signals. This means, units are made available for standard signals (0...20 mA, 4...20 mA, 0...10 V) that generate output signal values proportional to the variable input signals, and at the same time enable the safe separation of, for example, sensor circuits of an evaluation circuit. This safe separation is particularly important to avoid mutual interference of multiple sensor circuits, for example, ground loops in interlinked measurement circuits. The wide range of products includes all functions for converting separation and monitoring signals. The different designs in connection with the respective functions cover practically all applications in industrial measurement technology.

With these new products, Weidmüller offers the possibility of taking into account the demands of modern automation technology with the inclusion of analogue signals. These products guarantee an elementary function between signals from the field and the further processing systems. The mechanical characteristics of these products correspond to those of the well-known Weidmüller products and are part of a continuous, ongoing concept. The signal conditioners can be combined together with other Weidmüller products.

They have been electrically and mechanically designed to ensure that only a minimum of wiring and maintenance costs are necessary.

The product program

contains the following functions:
- Current transformer
- Voltage transformer
- Thermocouple conditioners for resistance thermometers
- Frequency signal conditioner
- Potentiometer conditioner
- AC signal conditioner
- Bridge measurement conditioner
- Limit value monitoring modules
- AD/DA converter

These products are categorised according to functionality as pure signal conversion, 2-way-isolation, 3-way-isolation and as passive separation.
2-way-isolation separates the signals galvanically and decouples the measurement circuits. In so doing it eliminates potential differences caused by long cable lengths and common reference points. Furthermore, the galvanic isolation offers protection against destruction by overvoltage, and against inductive and capacitive interferences.

3-way-isolation also decouples the supply voltage from the input and output circuits, and enables the function with only one operating voltage.

The passive isolator offers a further elementary advantage; it needs no additional voltage supply. The supply to the modules ensues via the input circuit and is then transferred to the output. This current loop supply is distinguished by very low power consumption.

There are a large number of products available for measuring temperatures. RTD PT100 signals, in 2-, 3- and 4-wire technology, are converted to standardised 0 – 20 mA, 4 – 20 mA and 0 – 10 V signals.

The modules which can be connected to commercially available thermocouples have cold junction compensation as standard. Furthermore, the modules amplify and linearize the voltage signals from the thermocouple. This guarantees an exact conditioning of analogue signals by eliminating sources of interference and errors.

Frequency converters convert frequencies to standard analogue signals. This enables controllers connected in series to directly process impulse trains when making speed or rotational speed measurements.

It is inconceivable to think about automation without analogue-digital-analogue converters. To bring together the aforementioned analogue form of describing the environment and the customary digital processing, within the framework of process monitoring, it is necessary to convert analogue signals into digital signals. Weidmüller offers modules for the following standard input and output signals: 0...20 mA, 4...20 mA and 0...10 V. 8-bit and 12-bit digital modules are available. All modules have an added input for making instantaneous measurements.

Current monitoring modules enable the monitoring of current values up to 60 A in alternating or direct voltages. Over range or under range values trip the switching output. Modules with analogue outputs enable the continuous monitoring of currents via connected controls.

Voltage monitoring modules can be used to monitor direct and alternating voltages. Voltage fluctuations, resulting from switching operations or network overloads, can be reliably recognised and reported via the adjustable threshold function.

Modules for monitoring of revolutions and torque enable the control of cyclic movements on conveyor belts, ventilators and pumps. The output responds after a set amount of time, should the expected impulse not be received. The reliable potential-free relay contact, signalises the interference to the responsible component group.
Design Overview

Mini Coupler / Mini Conditioner

DK Mini Coupler / MCZ Mini Conditioner
- Extensive range of electronic functions in terminal format
- Pluggable cross-connections with mini conditioners
- Mini couplers with screw-in cross-connection combs
- Mini couplers with screw connections
- Mini conditioners with tension clamp connections

WAVESERIES

WAVEANALOG / WAVEANALOG PRO / WAVECONTROL
- Pluggable PCB for fast service when the configuration is changed
- Pluggable cross-connection in base socket housing to distribute the power supply, marking (CC) in the block diagram on the head plate
- Pluggable connections with optional screw or tension clamp connection

RS profiles

Analog-/Digital-Converters
- Mounts onto TS 32 and TS 35 mounting rails
- Open, cost-saving design
- Variable housing width
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<td>Screw/ tens. clamp</td>
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</tr>
<tr>
<td>Frequency/DC</td>
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<td>0…15Hz</td>
<td>no</td>
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<tr>
<td>Limit value monitoring</td>
<td>0…20mA</td>
<td>Switching output</td>
<td>PNP 2-channel</td>
<td>no</td>
<td>19.2…28.8Vdc</td>
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<td>12</td>
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<td>no</td>
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<td>8-bit</td>
<td>no</td>
<td>19.2…28.8Vdc</td>
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<td>no</td>
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</tr>
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<td>8-bit</td>
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<td>6</td>
<td>Tens. clamp</td>
<td></td>
<td>8260280000/</td>
</tr>
<tr>
<td>Function</td>
<td>Input</td>
<td>Output</td>
<td>Galvanic isolation</td>
<td>Voltage supply</td>
<td>Setting</td>
<td>Module width/mm</td>
<td>Connection type</td>
<td>Cat. No.</td>
<td>Page</td>
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<tr>
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<td>0…20mA</td>
<td>no</td>
<td>19.2…28.8Vdc</td>
<td>Fixed</td>
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<td>Screw</td>
<td>1165860000</td>
<td>211</td>
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<td>4…20mA</td>
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<td>19.2…28.8Vdc</td>
<td>Fixed</td>
<td>70</td>
<td>Screw</td>
<td>1169260000</td>
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<td>0…10V</td>
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<td>19.2…28.8Vdc</td>
<td>Fixed</td>
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<td>Fixed</td>
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<tr>
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<td>4…20mA</td>
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<td>19.2…28.8Vdc</td>
<td>Fixed</td>
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<td>no</td>
<td>19.2…28.8Vdc</td>
<td>Fixed</td>
<td>70</td>
<td>Screw</td>
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<td>213</td>
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<td>0…20mA</td>
<td>no</td>
<td>19.2…28.8Vdc</td>
<td>Fixed</td>
<td>70</td>
<td>Screw</td>
<td>1160660000</td>
<td>213</td>
</tr>
</tbody>
</table>

| Current monitoring | 0…1/5/10 Aac | 1) | 2-way | 21.6…26.4Vdc | DIP sw./P* | 22.5 | Screw | 8516560000 | 196 |
| Current monitoring | 0…1/5/10 Aac | 1) | 2-way | 21.6…26.4Vdc | DIP sw./P* | 22.5 | Screw | 8516570000 | 196 |
| Current monitoring | 0…2/25/30 Aac | 1) | 2-way | 21.6…26.4Vdc | DIP sw./P* | 22.5 | Screw | 8545830000 | 198 |
| Current monitoring | 0…2/25/30 Aac | 1) | 2-way | 21.6…26.4Vdc | DIP sw./P* | 22.5 | Screw | 8545840000 | 198 |
| Current monitoring | 0…20/40/60 Aac | 2) | 2-way | 12…30Vdc | DIP sw./P* | 22.5 | Screw | 8526600000 | 199 |
| Voltage monitoring | 0.1…2A | Switching output | PNP | no | 18…30Vdc | Fixed | 6 | Screw | 8026930000 | 201 |
| Voltage monitoring | 0.1…50mA | Opto-coupler | yes | 10…250Vdc | Op. point | 22.5 | Screw | 1157160000 | 200 |
| Voltage monitoring | 0.1…250mA | Opto-coupler | yes | 10…250Vdc | Op. point | 22.5 | Screw | 1156360000 | 200 |
| Voltage monitoring | 0.1…250mA | Opto-coupler | yes | 10…250Vdc | Op. point | 22.5 | Screw | 1156460000 | 201 |
| Voltage monitoring | 0.2…2.2A | Switching output | PNP | no | 18…30Vdc | Fixed | 6 | Screw | 8026930000 | 200 |
| Voltage monitoring | 0.2…2.2A | Switching output | PNP | no | 18…30Vdc | Fixed | 6 | Screw | 8026930000 | 200 |

1) Switch output / 1 changeover contact
2) 0…10 V, 0 (4)…20 mA switchable
3) 4…20 mA / current loop supply
4) Switch output / 1 changeover contact
5) 0…10 V, 0 (4)…20 mA switchable
Passive Isolator

This module is a reasonably priced passive separator for galvanically separating standard 0.4...20 mA signals. It draws its power from the measurement signal and requires no further auxiliary power. The measurement signal is transmitted 1:1. The module is distinguished by its low power consumption as well as a response current <100 µA.

Ordering data
for TS 35

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Output</td>
</tr>
<tr>
<td>Response current</td>
<td>0...20 mA (max. 10 V)</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>approx. 5 ms at 500 Ω working resistance impedance</td>
</tr>
<tr>
<td>Max. overload capacity at input</td>
<td>&lt; 10 mVeff</td>
</tr>
<tr>
<td>Output</td>
<td>0...20 mA (max. 15 V)</td>
</tr>
<tr>
<td>Set time (T99)</td>
<td>approx. 200 kHz</td>
</tr>
<tr>
<td>Residual ripple</td>
<td>0.1 % from end value, ± 0.05 % from mean/100 Ω working resistance</td>
</tr>
<tr>
<td>Chopper frequency</td>
<td>&lt; 50 ppm/K from measurement value for working resistance 0 Ω</td>
</tr>
<tr>
<td>Transmission error</td>
<td>510 Veff</td>
</tr>
<tr>
<td>Temperature effect</td>
<td></td>
</tr>
<tr>
<td>Voltage strength</td>
<td></td>
</tr>
<tr>
<td>Input/output</td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td></td>
</tr>
<tr>
<td>Approvals</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>IMVG EN 50081-1</td>
</tr>
<tr>
<td>- assembled without spacing</td>
<td>EN 50081-2</td>
</tr>
<tr>
<td>- assembled with 20 mm spacing</td>
<td>CE, UL, CSA</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>25 °C...+40 °C</td>
</tr>
<tr>
<td>Conductor</td>
<td>25 °C...+50 °C</td>
</tr>
<tr>
<td>Conductor cross-section</td>
<td>40 °C...+85 °C</td>
</tr>
<tr>
<td>Overall width</td>
<td>AWG 22...12</td>
</tr>
<tr>
<td></td>
<td>1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>6 mm</td>
</tr>
</tbody>
</table>

Dimensions and accessories see Working resistance diagram.

IE = IA = 20 mA
UE (V)

MCZ CCC 0...20 mA/0...20 mA

This module is a reasonably priced passive separator for galvanically separating standard 0.4...20 mA signals. It draws its power from the measurement signal and requires no further auxiliary power. The measurement signal is transmitted 1:1. The module is distinguished by its low power consumption as well as a response current <100 µA.
RTD Thermocouple Conditioners

- for 2 and 3 wire sensors

The temperature module converts measurement values from a PT 100 into analogue measurement signals. The module supplies the sensor with power. The module is distinguished by its accuracy and linearity.

### MCZ PT100/3 CLP

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0…100 °C</td>
<td>8425720000</td>
</tr>
<tr>
<td>0…120 °C</td>
<td>8483680000</td>
</tr>
<tr>
<td>0…150 °C</td>
<td>8604420000</td>
</tr>
<tr>
<td>0…200 °C</td>
<td>8473010000</td>
</tr>
<tr>
<td>0…300 °C</td>
<td>8473020000</td>
</tr>
<tr>
<td>-50…+150 °C</td>
<td>8473000000</td>
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<tr>
<td>-40…100 °C</td>
<td>8604430000</td>
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</table>

**PT 100 (according to IEC 751)**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>Connection</td>
<td>3-wire / 2-wire*</td>
</tr>
<tr>
<td>Max. wire resistance</td>
<td>each 50 Ω</td>
</tr>
<tr>
<td>Leadwire resistance effect</td>
<td>0.006 °C/Ω</td>
</tr>
<tr>
<td>Max. supply current</td>
<td>0.8 mA</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>4…20 mA**</td>
</tr>
<tr>
<td>Max. load resistance</td>
<td>750 Ω at 24 V</td>
</tr>
<tr>
<td>Residual ripple of supply voltage</td>
<td>max. 1.5 V at 100 Hz</td>
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<tr>
<td>Set time</td>
<td>10 ms</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.2 % max.</td>
</tr>
<tr>
<td>Linearity</td>
<td>0.5 % v. FSR</td>
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<tr>
<td>Temperature coefficient</td>
<td>&lt;0.1 % v. FSR</td>
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<tr>
<td>Open circuit recognition</td>
<td>yes</td>
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<tr>
<td>EMC</td>
<td>EMVG</td>
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<td>Approvals</td>
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<td></td>
<td>EN 50082-2</td>
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<td>CE, UL, CSA</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 °C…+50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>30 °C…+85 °C</td>
</tr>
<tr>
<td>Conductor</td>
<td>AWG 22…12</td>
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<td>Conductor cross-section</td>
<td>1.5 mm²</td>
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<td>Overall width</td>
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* Putting a bridge between Pins 4 and 5

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**Ordering data**

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<td>MCZ PT100/3 CLP</td>
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**Technical data**

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<td>Max. wire resistance</td>
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<td>Leadwire resistance</td>
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<td>Supply current</td>
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<table>
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<td>Load</td>
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<td>Supply voltage</td>
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</tr>
<tr>
<td>Residual ripple of supply voltage</td>
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<tr>
<td>Set time</td>
<td></td>
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<td>Accuracy</td>
<td></td>
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<td>Linearity</td>
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<td>Temperature coefficient</td>
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<td>Open circuit recognition</td>
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<td>Conductor cross-section</td>
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<td>Overall width</td>
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</table>

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**Dimensions and accessories see**

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**Dimensions and accessories see**
Frequency Signal Conditioners

- Tension clamp connection
- LED-Display
- Adjustable frequency output

The option of reading-in the analogue signals from the field via counter inputs of the control is made possible by converting the analogue signals to frequencies. It is recommended that twisted and shielded 2-wire cables are used.

### Technical data

**Input ranges**

- MCZ VFC 0…10 V
- MCZ CFC 0…20 mA
- MCZ CFC 4…20 mA

**Overload limits, input**

- 30 V

**Input resistance**

- 100 kΩ

**Voltage drop, input**

- ±10 %, internal

**Output**

- 1 kHz, 4 kHz, 8 kHz, 16 kHz
- DL switch
- ±10 %, internal
- PNP, Ub: 0.7 V
- max. 20 mA
- LED, pulsing

**Output frequency, end value**

- 1 kHz, 4 kHz, 8 kHz, 16 kHz
- DL switch
- ±10 %, internal
- PNP, Ub: 0.7 V
- max. 20 mA
- LED, pulsing

**Output level**

- 1 V at 20 mA
- 8…6.4 at 20 mA

**Output current**

- max. 20 mA
- max. 20 mA

**Display**

- LED, pulsing

**Supply voltage**

- 24 Vdc ±10 %

**Power consumption**

- 14 mA, w/o load
- 200 mA

**Making current limit**

- yes

**Polarisation protection**

- yes

**Accuracy**

- 0.2 % v. FSR

**Temperature coefficient**

- < 250 ppm/°C

**Coordination of insulation according to EN 50178**

**Voltage strength input/output**

- 1 kVdc

**Rated voltage**

- 100 V

**Rated surge voltage**

- 1.5 kV

**Overvoltage category**

- III

**Voltage strength I/O to mounting rail**

- 4 kV/ac 1 min

**Operating temperature**

- 0 °C...+50 °C

**Storage temperature**

- 25 °C...+85 °C

**Overall width**

- 6 mm

**Conductor cross-section**

- 1.5 mm²

---

**Ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCZ VFC</td>
<td>8461470000</td>
<td>MCZ CFC</td>
<td>8461480000</td>
<td>MCZ CFC</td>
<td>8461490000</td>
</tr>
<tr>
<td>0…10 V</td>
<td></td>
<td>0…20 mA</td>
<td></td>
<td>4…20 mA</td>
<td></td>
</tr>
<tr>
<td>0…20 mA</td>
<td></td>
<td>50 mA</td>
<td></td>
<td>50 mA</td>
<td></td>
</tr>
<tr>
<td>50 Ω</td>
<td></td>
<td>1 V at 20 mA</td>
<td></td>
<td>5.8…6.4 at 20 mA</td>
<td></td>
</tr>
<tr>
<td>1 kHz, 4 kHz, 8 kHz, 16 kHz</td>
<td>DL switch</td>
<td>±10 %, internal</td>
<td>PNP, Ub: 0.7 V</td>
<td>max. 20 mA</td>
<td>LED, pulsing</td>
</tr>
<tr>
<td>1 kHz, 4 kHz, 8 kHz, 16 kHz</td>
<td>DL switch</td>
<td>±10 %, internal</td>
<td>PNP, Ub: 0.7 V</td>
<td>max. 20 mA</td>
<td>LED, pulsing</td>
</tr>
</tbody>
</table>

---

* without DC/DC converter
input supply via current loop
Frequency Signal Conditioners

- Screw connection
- LED-Display
- Adjustable frequency output

For EMC reasons, frequency processing modules must be used in conjunction with shielded cables. This measure prevents interference of analogue and frequency signals by other signal cables and vice versa.

Block diagram/settings

<table>
<thead>
<tr>
<th>DKA U/f and DKA I/f</th>
<th>DKA U/f</th>
<th>DKA I/f</th>
<th>DKA I/*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIP switch</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Ordering data

- **for TS 32**
- **for TS 35**

with combi foot TS 32/TS 35

**Technical data**

- **Input ranges**
- **Overload limits, input**
- **Input resistance**
- **Voltage drop, input**
- **Output**
- **Output frequency, end value**
- **Frequency adjustment**
- **Readjustment range**
- **Output level**
- **Display**
- **Decoupling diode**

- **Supply voltage**
- **Power consumption**
- **Making current limit**
- **Polarisation protection**
- **Accuracy**

**Coordination of insulation to DIN VDE 0160, Draft 11/94**

Voltage strength input/output

- **Rated voltage**
- **Rated surge voltage**
- **Overvoltage category**
- **Voltage strength to mounting rail**
- **Operating temperature**
- **Storage temperature**
- **Overall width**
- **Conductor cross-section**

**Accessories**

- **End plate**
- **Dimensions and accessories see**

### DKA U/f

- **Type**: DKA U/f
- **Cat. No.**: 8242040000
- **Input current loop supplied**: yes

### DKA I/f

- **Type**: DKA I/f
- **Cat. No.**: 8258870000
- **Input current loop supplied**: yes

### DKA I/*

- **Type**: DKA I/*
- **Cat. No.**: 8081330000
- **Input current loop supplied**: yes

For EMC reasons, frequency processing modules must be used in conjunction with shielded cables. This measure prevents interference of analogue and frequency signals by other signal cables and vice versa.

* without DC/DC converter

Input current loop supplied
Frequency Signal Conditioners

- Screw connection
- LED-Display
- Adjustable frequency output
- multiplex capable

For EMC reasons, frequency processing modules must be used in conjunction with shielded cables. This measure prevents interference of analogue and frequency signals by other signal cables and vice versa.

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DKA f/U</td>
<td>8283810001</td>
<td>0…50/100/500 Hz</td>
<td>0…1/5/10/16 kHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 kΩ</td>
<td>0/10 V</td>
</tr>
<tr>
<td>DKA f/I</td>
<td>8311870001</td>
<td>0…50/100/500 Hz</td>
<td>0…1/5/10/16 kHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 kΩ</td>
<td>0/10 V</td>
</tr>
</tbody>
</table>

### Technical data

#### Input ranges

- Overload limits, input
- Input resistance
- Voltage drop, input
- Output frequency, end value
- Frequency adjustment
- Readjustment range
- Output current
- Display
- Decoupling diode

#### Supply voltage

- 24 Vdc ±10 %
- 32 mA + ILoad

#### Accuracy

- 0.5 % (8-bit resolution)

### Coordination of insulation to DIN VDE 0160, Draft 11/94

- Voltage strength input/output
- Rated voltage
- Rated surge voltage
- Overvoltage category
- Voltage strength to mounting rail
- Operating temperature
- Storage temperature
- Overall width
- Conductor cross-section

### Dimensions and accessories see

Page 305
Monitoring Revolutions

DK LW

If only one revolution limit is to be evaluated, the potentiometer for \( f_{\text{max}} \) must be set to end stop or the potentiometer for \( f_{\text{min}} \) to left stop. Then only the other is in each case active for setting the limit value.

Block diagram/settings

<table>
<thead>
<tr>
<th>Technical data</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>DK LW</td>
<td>8258680000</td>
</tr>
<tr>
<td>Number of inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input nominal level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload limits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching threshold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decoupling diode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status LED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuit proof</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage strength to mounting rail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall width</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conductor cross-section</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation stripping length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions and accessories see</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ordering data</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>for TS 32</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>for TS 35</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>initiators, NPN, or PNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - 6250 U/min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 switchable revolutions ranges: 10-130, 100-1300, 1000-7800 r.p.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 potentiometers for upper/lower revs limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V dc = High, O V = Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 V dc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High &gt;18 V, Low &lt;7 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;0.5 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>approx. 3.5 mA (24 V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional PNP or NPN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output active, if f within set revs limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0: 1.8 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 mA max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>green LED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V –10 % + 20 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 mA, w/o load, without initiator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 kVeff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0…+50 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-40…+60 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5…4 mm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiator power supply via module possible</td>
<td></td>
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</tr>
</tbody>
</table>

Initiators, NPN, or PNP

Monitoring Revolutions

If only one revolution limit is to be evaluated, the potentiometer for \( f_{\text{max}} \) must be set to end stop or the potentiometer for \( f_{\text{min}} \) to left stop. Then only the other is in each case active for setting the limit value.

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<td>DK LW</td>
<td>8258680000</td>
</tr>
<tr>
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<tr>
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<td></td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decoupling diode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status LED</td>
<td></td>
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<tr>
<td>Short-circuit proof</td>
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<tr>
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<tr>
<td>Power consumption</td>
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<tr>
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<tr>
<td>Accessories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End plate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions and accessories see</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Preprocessing Logic

- Screw connection
- Logic function and time function combined
- Individually programmable (further functions on request)

**Block diagram**

<table>
<thead>
<tr>
<th>Ordering data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>for TS 32</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>for TS 35</td>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

**Technical data**

| Logical function | Number of inputs | Input nominal level | Overload limits | Switching threshold | Pulse duration | Input current | Output | Output level | Output current | Decoupling diode | Status LED | Short-circuit proof | Operating voltage | Power consumption | Reverse polarity protection | Isolation resistance | Voltage strength to mounting rail | Operating temperature | Storage temperature | Overall width | Conductor cross-section | Insulation stripping length |
|------------------|------------------|---------------------|-----------------|--------------------|-------------------|---------------|--------|-------------|-----------------|------------------|------------|----------------------|-------------------|-------------------|----------------------|--------------------------|------------------------|-----------------|----------------|---------------------|---------------------|
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
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|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
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|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
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|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
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|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |
|                  |                  |                     |                 |                    |                   |               |        |             |                 |                  |            |                     |                   |                  |                     |                         |                       |                |              |                     |                     |

**Accessories**

<table>
<thead>
<tr>
<th>End plate</th>
<th>Ordering example: RS FUP-FLOP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions see**

---

**Type| Cat. No.**
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DK PL</td>
<td>8248340000*</td>
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</tbody>
</table>

Programmable, see note

---

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
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<tbody>
<tr>
<td>AD DKT4</td>
<td>0697560000</td>
</tr>
<tr>
<td></td>
<td>8248340002</td>
</tr>
</tbody>
</table>

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* (not programmed - function next page)
Analogue Signal Processing

Remark:
The module is programmed according to customers specifications. Up to 5 inputs can be linked with various logic and timer functions, e.g.: AND, OR, EXOR, NAND, NOR, EXNOR, delay elements, etc. The output is either low or high active.

824834 0001 DKPL
A = (E1 OR E2) AND (E3 OR E4) AND E5

Inputs 1 - 5 determine the divider factor
Input 1 = divider factor 1: \( F_{OUT} = F_{IN} \times 1 \)
Input 2 = divider factor 2: \( F_{OUT} = F_{IN} \times 10 \)
Input 5 = divider factor 5: \( F_{OUT} = F_{IN} \times 1000 \)

Input Output
1 \( f_{OUT} = f_{IN} \)
2 \( f_{OUT} = f_{IN} / 10 \)
3 \( f_{OUT} = f_{IN} / 100 \)
4 \( f_{OUT} = f_{IN} / 1000 \)
5 \( f_{OUT} = f_{IN} / 10000 \)

Note: A new divider factor can only be used if the operating voltage is switched off. \( f_{max.} = 3 \text{ kHz} \)

824834 0002 DKPL
Inputs 1 and 2 have the function of a RS FLIP-FLOP
Inputs 3, 4 and 5 have no function

Input Output
1 0 0 0 0 0
2 0 0 0 1 0
3 0 0 0 1 0
4 0 0 1 0 0
5 0 0 1 0 1
6 0 0 1 1 0
7 0 0 1 1 1
8 0 1 0 0 0
9 0 1 0 0 1
10 0 1 0 1 0
11 0 1 0 1 1
12 0 1 1 0 0
13 0 1 1 0 1
14 0 1 1 1 0
15 0 1 1 1 1
16 1 0 0 0 0
17 1 0 0 0 1
18 1 0 0 1 0
19 1 0 0 1 1
20 1 0 1 0 0
21 1 0 1 0 1
22 1 0 1 1 0
23 1 0 1 1 1
24 1 1 0 0 0
25 1 1 0 0 1
26 1 1 0 1 0
27 1 1 0 1 1
28 1 1 1 0 0
29 1 1 1 0 1
30 1 1 1 1 0
31 1 1 1 1 1
32 1 1 1 1 1

824834 0003 DKPL
A = (E1 OR E2) AND (E3 OR E4) AND E5

Inputs 1 and 2 have the function of a RS FLIP-FLOP
Inputs 3, 4 and 5 have no function

Input Output
21 6
00 0 (is stored)
01 No change of stored state
10 No change of stored state
11 1 (is stored)

824834 0004 DKPL
Input 1: Signal A of an incremental generator
Input 2: Signal B 90° shifted
Input 3: Enable High Active
Input 4: Output signal inverts High Active
Input 5: No function
Output: For each slope of signal A or B, the output is set to 20 - 30 μs.
(\( F_{OUT} = 4 \times F_{IN} \))

FIN max. = 1 kHz

824834 0005 DKPL
Input 1: Signal A of an incremental generator
Input 2: Signal B 90° shifted
Input 3: Enable High Active
Input 5: No function
Output: For each slope of signal A or B, the output is set to 20 - 30 μs.
(\( F_{OUT} = 4 \times F_{IN} \))

FIN max. = 1 kHz

824834 0006 DKPL
Input 1: \( F_{OUT} = F_{IN} \)
Input 2: \( F_{OUT} = F_{IN} \times 10 \)

Input Output
1 \( f_{OUT} = f_{IN} \)
2 \( f_{OUT} = f_{IN} / 10 \)
3 \( f_{OUT} = f_{IN} / 50 \)
4 \( f_{OUT} = f_{IN} / 1000 \)
5 \( f_{OUT} = f_{IN} / 10000 \)

824834 0007 DKPL
Input 1: Signal A of an incremental generator
Input 2: Signal B 90° shifted
Input 3: Enable High Active
Input 4: Output signal inverts High Active
Input 5: No function
Output: For each slope of signal A or B, the output is set to 20 - 30 μs.
(\( F_{OUT} = 4 \times F_{IN} \))

FIN max. = 1 kHz

824834 0008 DKPL
Input 1: Signal A of an incremental generator
Input 2: Signal B 90° shifted
Input 3: Enable High Active
Input 5: No function
Output: For each slope of signal A or B, the output is set to 20 - 30 μs.
(\( F_{OUT} = 4 \times F_{IN} \))

FIN max. = 1 kHz

824834 0009 DKPL
Input 1: Signal A of an incremental generator
Input 2: Signal B 90° shifted
Input 3: Enable High Active
Input 5: No function
Output: For each slope of signal A or B, the output is set to 20 - 30 μs.
(\( F_{OUT} = 4 \times F_{IN} \))

FIN max. = 1 kHz

824834 0010 DKPL
RS FLIP-FLOP with superior S-input (connection 2)
Input connections 3, 4 and 5 must have 0 V or remain open!

Connection 1 Logic Connection 2 Logic Connection 6 Logic
0 V or open L 0 V or open L previous state is stored
24 Vdc H 0 V or open L 0 V or open L
24 Vdc H 0 V or open L previous state is stored

824834 0501 DKPL
The module allows the input frequency at connection 1 to be divided with 2 fixed divider factors. Depending on connection 2, the output frequency is transmitted from output connection 6.
Connections 3, 4 and 5 have no function.

Connection 1 Logic Connection 2 Logic Connection 6 Logic
0 V or open L 0 V or open L previous state is stored
24 Vdc H 0 V or open L 0 V or open L
24 Vdc H 0 V or open L previous state is stored
Threshold Monitoring

Current sensor

- Screw connection
- Mounts onto on mounting rail
- Wide spectrum of functions
- In part, individually adjustable

Block diagram/settings

Ordering data

for TS 32
for TS 35
with combi foot TS 32/TS 35

Technical data

Input signal
Input resistance
Voltage drop, input
Cut-off frequency
Switchable input range
Switching point settings
Hysteresis
Output
Output level
Output current
Function
Status LED
Operating voltage
Power consumption
Galvanic isolation
Voltage strength to mounting rail
Operating temperature
Storage temperature
Overall width
Conductor cross-section

EMC resistance

Burst acc. to EN 61000-4-4
Input/outputs
Power supply
ESD acc. to EN 61000-4-2
Contact discharge
Air discharge

Accessories

End plate

Dimensions see

DKSC 0-10 V
DKSC 0-20 mA
DKI 2A

<table>
<thead>
<tr>
<th>Input</th>
<th>Cat. No.</th>
<th>Output</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>0…10 V</td>
<td>8019640000</td>
<td>0.1…2 A</td>
<td>8017400000</td>
<td>DKSC 0-10 V</td>
<td></td>
</tr>
<tr>
<td>60 kΩ</td>
<td>100 Hz</td>
<td>1 V</td>
<td>125 mV at 2 A</td>
<td>DKSC 0-20 mA</td>
<td></td>
</tr>
<tr>
<td>2 threshold Uth 1 and Uth 2 with 2 front potentiometers each 1 %</td>
<td>100 Hz</td>
<td>2 threshold Uth 1 and Uth 2 with 2 front potentiometers each 1 %</td>
<td>20 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>double switch output per PNP Ub- 1.2 V</td>
<td>50 mA</td>
<td>double switch output per PNP Ub- 1 V</td>
<td>approx. 15 mA</td>
<td>DKI 2A</td>
<td></td>
</tr>
<tr>
<td>Un &lt;Uth1: output 1 active</td>
<td>In &lt;Uth1: output 1 active</td>
<td>green LED</td>
<td>18…30 Vdc</td>
<td>AP DK5</td>
<td></td>
</tr>
<tr>
<td>Un &gt;Uth2: output 2 active</td>
<td>In &gt;Uth2: output 2 active</td>
<td>approx. 15 mA</td>
<td>approx. 10 mA</td>
<td>8268870000</td>
<td></td>
</tr>
<tr>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>0687560000</td>
<td></td>
</tr>
<tr>
<td>24 Vdc ±20 %</td>
<td>24 Vdc ±20 %</td>
<td>Fixed:ON &gt;90 mA</td>
<td>OFF &lt;50 mA</td>
<td>AP DK5</td>
<td></td>
</tr>
<tr>
<td>approx. 15 mA</td>
<td>approx. 15 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DKSC 0-10 V
DKSC 0-20 mA
DKI 2A

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>S1</th>
<th>S2</th>
<th>0…100 mV</th>
</tr>
</thead>
<tbody>
<tr>
<td>on</td>
<td>on</td>
<td>on</td>
<td>10…100 mV</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
<td>30 mV…1 V</td>
<td></td>
</tr>
<tr>
<td>off</td>
<td></td>
<td>300 mV…10 V</td>
<td></td>
</tr>
</tbody>
</table>
Threshold Monitoring

The Setpoint Controller allows cost effective units to be built for monitoring analogue signals. An upper and lower limit value, which covers the entire signal range, can be set by the user via 2 potentiometers. The respective statuses of the upper and lower limit value are indicated at the 2 digital outputs (upper limit value under/over flow; lower limit value under/over flow).

Block diagram

<table>
<thead>
<tr>
<th>Ordering data</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Technical data</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>for TS 35</td>
<td>MCZ SC 24 V/0…10V 8260280000</td>
<td>Voltage supply</td>
<td>MCZ SC 24 V/0…20 mA 8227350000</td>
<td>Voltage supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 Vdc ± 20 % 15 mA</td>
<td>Supply voltage</td>
<td>24 Vdc ± 20 % 15 mA</td>
<td>Supply voltage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0…10 V 60 kHz</td>
<td>Supply current</td>
<td>0.5…2 mA 50 kΩ</td>
<td>Supply current</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100 Hz</td>
<td>Input resistance</td>
<td>1 V 40 mA</td>
<td>Input resistance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.03…1 V on off 250 ppm max.</td>
<td>Voltage drop at full scale</td>
<td>0.3…10 V off x 250 ppm max.</td>
<td>Voltage drop at full scale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 % of the end value</td>
<td>Max. input current</td>
<td>250 µs (switch threshold at 90% of the max. input signal; RL ≤ 1 kΩ)</td>
<td>Max. input current</td>
<td></td>
</tr>
<tr>
<td></td>
<td>via 2 potentiometers (12 turns)</td>
<td>Cut-off frequency</td>
<td>2 channel switching PNP max. 50 mA &lt; 1.2 V at 50 mA</td>
<td>Cut-off frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>active High for U_{input} ≤ U_{th1} (set via P1)</td>
<td>Temperature coefficient Tk</td>
<td>2 channel switching PNP max. 50 mA &lt; 1.2 V at 50 mA</td>
<td>Temperature coefficient Tk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>active High for U_{input} &gt; U_{th2} (set via P2)</td>
<td>1 % of the end value</td>
<td>via 2 potentiometers (12 turns)</td>
<td>1 % of the end value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 250 µs (switch threshold at 90% of the max. input signal; RL ≤ 1 kΩ)</td>
<td>Hysteresis of switching threshold</td>
<td>active High for I_{input} &lt; I_{th1} (set via P1)</td>
<td>Hysteresis of switching threshold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 channel switching PNP max. 50 mA &lt; 1.2 V at 50 mA</td>
<td>Function of output 1</td>
<td>active High for I_{input} &gt; I_{th2} (set via P2)</td>
<td>Function of output 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>none</td>
<td>Response time</td>
<td>&lt; 250 µs (switch threshold at 90% of the max. input signal; RL ≤ 1 kΩ)</td>
<td>Response time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 kVeff / 1 min</td>
<td>Output</td>
<td>none</td>
<td>4 kVeff / 1 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 °C...+50 °C</td>
<td>Output current per output</td>
<td>0 °C...+50 °C</td>
<td>Output current per output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-25 °C...+60 °C</td>
<td>Voltage drop at output transistor</td>
<td>-25 °C...+60 °C</td>
<td>Voltage drop at output transistor</td>
<td></td>
</tr>
<tr>
<td>Conductor</td>
<td>AWG 22...12</td>
<td>Insulation coordination/safe separation to EN 50178</td>
<td>AWG 22...12</td>
<td>Insulation coordination/safe separation to EN 50178</td>
<td></td>
</tr>
<tr>
<td>Conductor cross-section</td>
<td>1.5 mm²</td>
<td>Separation input / output</td>
<td>1.5 mm²</td>
<td>Separation input / output</td>
<td></td>
</tr>
<tr>
<td>Approvals</td>
<td>UL, CSA</td>
<td>Dielectric strength I/O to mounting rail</td>
<td>UL, CSA</td>
<td>Dielectric strength I/O to mounting rail</td>
<td></td>
</tr>
<tr>
<td>Overall width</td>
<td>8 mm</td>
<td>Ambient temperature</td>
<td>8 mm</td>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>Dimensions and accessories see</td>
<td>Page 306</td>
<td>Storage temperature</td>
<td>Page 306</td>
<td>Storage temperature</td>
<td></td>
</tr>
</tbody>
</table>

Analogue Signal Processing
Passive Isolator DC/DC

WAVEANALOG DC/DC
- input loop powered
- galvanic isolation
- 1-, 2-channel versions
- low power consumption
- safe separation

**Approvals:**

- CE
- UL
- CSA
- GL

**Ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS5 CCC LP</td>
<td>8444950000</td>
</tr>
<tr>
<td>WAS5 CCC LP</td>
<td>8444960000</td>
</tr>
</tbody>
</table>

**Technical data**

- **Input signal**
  - Input voltage max.
  - Input current max.
  - Operating current
  - Voltage drop

- **Output signal**
  - Load resistance
  - Accuracy at \( T_s = 23 \, ^\circ C \)
  - Influence of load resistance
  - Temperature coefficient
  - Set time
  - Residual ripple
  - Chopper frequency

**General**

- **Operating temperature**
- **Storage temperature**
- **Dimensions L / H / W mm**
- **Approvals**

**Coordination of Insulation according to EN 50178, 04/98 (safe separation)**

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Overvoltage category</th>
<th>Contamination class</th>
<th>Clearance and creepage distance</th>
<th>Isolation voltage / voltage strength</th>
<th>Input/output, channel / channel</th>
<th>Input/output to mounting rail</th>
<th>Standards/specifications</th>
<th>EMC standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 V</td>
<td>II</td>
<td>II</td>
<td>2</td>
<td>4 ( kVA ) / 1 s</td>
<td>4 ( kVA ) / 1 s</td>
<td>4 ( kVA ) / 1 min</td>
<td>EN 50178 (safe separation)</td>
<td>EN 50081, EN 50082, EN 50501</td>
</tr>
</tbody>
</table>

**Dimensional data**

- Dimensions and accessories see Page 298 + 308
- \( T_s = 23 \, ^\circ C \) single module
### DC/DC-Signal Conditioners

**WAVE ANALOG DC/DC**
- Voltage supply on output side
- 2-way-isolation
- Analogue signal conditioning
- Galvanic isolation between input/output signal
- Input loop powered
- Cross-connectable voltage supply via cross-connectors

#### Block Diagram

#### Ordering Data

| Screw connection | WAS4 CCC DC | 8444980000 | WAS4 CCC DC | 8444990000 | WAS4 CVC DC | 8445000000 |
| Tension clamp connection | WAS4 CCC DC | 8445010000 | WAS4 CCC DC | 8445020000 | WAS4 CVC DC | 8445030000 |

#### Technical Data*

| Input signal | 4 ... 20 mA | 4 ... 20 mA | 4 ... 20 mA |
| Input voltage max. | 7 V | 7 V | 7 V |
| Input current max | 25 mA | 25 mA | 25 mA |
| Output signal | 4 ... 20 mA | 4 ... 20 mA | 4 ... 20 mA |
| Load resistance | ± 0.2% of FS | ± 0.2% of FS | ± 0.2% of FS |
| Accuracy at Ta = 23 °C | ± 250 ppm / K of FS | ± 250 ppm / K of FS | ± 250 ppm / K of FS |
| Temperature coefficient | ± 30 ms (typ. 20 ms) | ± 30 ms (typ. 20 ms) | ± 30 ms (typ. 20 ms) |
| Response time | ± 15 Hz (typ. 20 Hz) | ± 15 Hz (typ. 20 Hz) | ± 15 Hz (typ. 20 Hz) |

#### General

| Voltage supply | 24 Vdc ±20% | 24 Vdc ±20% | 24 Vdc ±20% |
| Power consumption | ≤ 32 mA at L_{out} = 20 mA | ≤ 32 mA at L_{out} = 20 mA | ≤ 20 mA at L_{out} = 10 mA |
| Current carrying capacity of cross-connection | 2 A | 2 A | 2 A |
| Operating temperature | 0 °C ... +55 °C (mounted) | 0 °C ... +55 °C (mounted) | 0 °C ... +55 °C (mounted) |
| Storage temperature | -20 °C ... +85 °C | -20 °C ... +85 °C | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 | 92.4 / 112.5 / 12.5 | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA | CE, UL, CSA | CE, UL, CSA |

#### Coordination of Insulation according to EN 50178, 04/98

| Rated voltage | 300 V | 300 V | 300 V |
| Rated surge voltage | 4 kV | 4 kV | 4 kV |
| Overvoltage category | II | II | II |
| Contamination class | 2 | 2 | 2 |
| Clearance and creepage distance | ≥ 3 mm | ≥ 3 mm | ≥ 3 mm |
| Isolation voltage, voltage strength | 4 kV / 1 / 1 min | 4 kV / 1 / 1 min | 4 kV / 1 / 1 min |
| Standards/specifications | EN 50178 | EN 50081, EN 50082, EN 55011 | EN 50178 |
| EMC standards | EN 50178 | EN 50081, EN 50082, EN 55011 |

#### Dimensions and Accessories

Page 298 + 308

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*Tu = 23 °C single module
## DC/DC-Signal Conditioners

### WAVEANALOG DC/DC
- Voltage supply on both sides
- 2-way-isolation
- Analogue signal conditioning
- Galvanic isolation between input/output signal
- Cross-connectable voltage supply via cross-connectors

### Approvals:

![Block diagram](image)

<table>
<thead>
<tr>
<th>Ordering data</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw connection</td>
<td>WAS4 CCC DC</td>
<td>8445070000</td>
<td>WAS4 CCC DC</td>
<td>8446970000</td>
<td>WAS4 CVC DC</td>
<td>8447020000</td>
</tr>
<tr>
<td>Tension clamp connection</td>
<td>WAS4 CCC DC</td>
<td>8445080000</td>
<td>WAS4 CCC DC</td>
<td>8446990000</td>
<td>WAS4 CVC DC</td>
<td>8447030000</td>
</tr>
</tbody>
</table>

### Technical data

#### Input signal
- Input current max: 0 ... 20 mA
- Input resistance: 50 Ω

#### Output signal
- Load resistance: ± 50 Ω
- Accuracy at Tu=23 °C: ± 0.2% of FS
- Temperature coefficient: ± 250 ppm / K of FS
- Response time: ≤ 30 ms (typ. 16 ms)
- Cut-off frequency (-3 dB): ≤ 15 Hz (typ. 25 Hz)

### General

#### Voltage supply
- Rated voltage: 24 Vdc ±20% (19.2 ... 28.8 Vdc)

#### Power consumption input
- ≤ 11 mA at Iin = 20 mA

#### Power consumption output
- ≤ 32 mA at Iout = 20 mA

#### Other specifications
- Rated surge voltage: 4 kV

### Coordination of insulation according to EN 50178, 04/98

<table>
<thead>
<tr>
<th>Standards/specifications</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>300 V</td>
<td></td>
<td>300 V</td>
<td></td>
<td>300 V</td>
<td></td>
</tr>
<tr>
<td>Rated surge voltage</td>
<td>4 kV</td>
<td></td>
<td>4 kV</td>
<td></td>
<td>4 kV</td>
<td></td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>class III</td>
<td></td>
<td>class III</td>
<td></td>
<td>class III</td>
<td></td>
</tr>
<tr>
<td>Contamination class</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Clearance and creepage distance</td>
<td>3 mm</td>
<td></td>
<td>3 mm</td>
<td></td>
<td>3 mm</td>
<td></td>
</tr>
<tr>
<td>Isolation voltage, voltage strength</td>
<td>4 kVac / 1 min</td>
<td></td>
<td>4 kVac / 1 min</td>
<td></td>
<td>4 kVac / 1 min</td>
<td></td>
</tr>
<tr>
<td>Input/output to mounting rail</td>
<td>4</td>
<td></td>
<td>4</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Approvals</td>
<td>CE, UL, CSA</td>
<td></td>
<td>CE, UL, CSA</td>
<td></td>
<td>CE, UL, CSA</td>
<td></td>
</tr>
</tbody>
</table>

**Page 298 + 308**

---

*Tu = 23 °C single module
### DC/DC Signal Conditioners

**WAVEANALOG DC/DC**
- Voltage supply on both sides
- 2-way-isolation
- Analogue signal conditioning
- Galvanic isolation between input/output signal
- Cross-connectable voltage supply via cross-connectors

**Approvals:**

![CE, UL, CSA]

### Ordering data

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Tension clamp connection</th>
<th>Input/output</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS4 VCC DC</td>
<td>WAS4 VCC DC</td>
<td>WAS4 VCC DC</td>
</tr>
<tr>
<td>8447050000</td>
<td>8447080000</td>
<td>8447100000</td>
</tr>
</tbody>
</table>

### Technical data*

**Input signal**
- Input voltage max.: 0 ... 10 V
- Input resistance: 500 Ω
- Accuracy at Tu=23°C: ±0.2% of FS
- Temperature coefficient: ≤250 ppm/K of FS
- Response time: ≤30 ms (typ. 25 ms)
- Cut-off frequency (-3 dB): ≥13 Hz (typ. 17 Hz)

**Output signal**
- Load resistance: 2 kΩ
- Output voltage max.: 15 V
- Accuracy at Tu=23°C: ±0.2% of FS
- Temperature coefficient: ≤250 ppm/K of FS
- Response time: ≤30 ms (typ. 25 ms)
- Cut-off frequency (-3 dB): ≥13 Hz (typ. 17 Hz)

### General

**Voltage supply**
- 24 Vdc ±20% (19.2 ... 28.8 Vdc)
- Power consumption input: ≤11 mA at Uin = 10 V
- Power consumption output: ≤32 mA at Uout = 20 mA
- Current carrying capacity of cross-connection: ≤2 A

**Operating temperature**
- 0 °C ... +55 °C (mounted)
- 20 °C ... +85 °C
- Dimensions L / H / W mm: 92.4 / 112.5 / 12.5

**Storage temperature**
- -20 °C ... +85 °C

**Approvals**

CE, UL, CSA

### Coordination of insulation according to EN 50178, 04/98

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Overvoltage category</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 V</td>
<td>B</td>
</tr>
<tr>
<td>300 V</td>
<td>II</td>
</tr>
</tbody>
</table>

**EMC standards**

- EN 50178
- EN 50081, EN 50082, EN 55011

**Dimensions and accessories see**

Page 298 + 308

---

*Tu = 23 °C single module
## DC/DC Signal Conditioners

**WAVEanalog DC/DC**
- 3-way-isolation
- analogue signal conditioning
- indication LED
- cross-connectable voltage supply via cross-connectors

### Ordering data

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS5 CCC</td>
<td></td>
<td>8540180000*</td>
</tr>
<tr>
<td>WAS5 CCC</td>
<td></td>
<td>8540190000*</td>
</tr>
</tbody>
</table>

### Technical data**

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 20 mA / 0 ... 20 mA</td>
<td>WAS5 CCC</td>
<td>8540250000</td>
</tr>
<tr>
<td>0 ... 20 mA / 4 ... 20 mA</td>
<td>WAS5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>0 ... 20 mA / 0 ... 10 V</td>
<td>WAS5 CVC</td>
<td>8540270000</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output signal</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 20 mA</td>
<td></td>
<td>8540180000*</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td></td>
<td>8540190000*</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

### General

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 V</td>
<td></td>
<td>8540180000*</td>
</tr>
<tr>
<td>300 V</td>
<td></td>
<td>8540190000*</td>
</tr>
<tr>
<td>300 V</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>300 V</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power consumption</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1.8 W at Iout = 20 mA</td>
<td>WAS5 CCC</td>
<td>8540250000</td>
</tr>
<tr>
<td>≤ 600 Ω at Iout = 20 mA</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>≤ 4 kΩ</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current carrying capacity of cross-connection</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 600 Ω at Iout = 20 mA</td>
<td>WAS5 CCC</td>
<td>8540250000</td>
</tr>
<tr>
<td>≤ 600 Ω at Iout = 20 mA</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>≤ 4 kΩ</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 °C ... +85 °C</td>
<td>WAS5 CCC</td>
<td>8540250000</td>
</tr>
<tr>
<td>20 °C ... +85 °C</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>300 °C</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

### Dimensions L / H / W mm

<table>
<thead>
<tr>
<th>Dimensions L / H / W mm</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>92.4 / 112.5 / 17.5</td>
<td>WAS5 CCC</td>
<td>8540250000</td>
</tr>
<tr>
<td>92.4 / 112.5 / 17.5</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>92.4 / 112.5 / 17.5</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

### Approvals

<table>
<thead>
<tr>
<th>Coordination of insulation according to EN 50178, 04/98</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE, cUL</td>
<td>WAS5 CCC</td>
<td>8540250000</td>
</tr>
<tr>
<td>CE, cUL</td>
<td>WAZ5 CCC</td>
<td>8540260000</td>
</tr>
<tr>
<td>CE, cUL</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standards/specifications</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 50118</td>
<td></td>
<td>8540250000</td>
</tr>
<tr>
<td>EN 50081, EN 50082, EN 55011</td>
<td></td>
<td>8540260000</td>
</tr>
<tr>
<td>EN 50118</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions and accessories see</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page 298 + 308</td>
<td></td>
<td>8540250000</td>
</tr>
<tr>
<td>Page 298 + 308</td>
<td></td>
<td>8540260000</td>
</tr>
<tr>
<td>Page 298 + 308</td>
<td></td>
<td>8540280000</td>
</tr>
</tbody>
</table>

** TU = 23 °C single module
* Input/output 4 ... 20 mA/4 ... 20 mA possible

---

**NEW**
## DC/DC Signal Conditioners

### WAVEANALOG DC/DC
- 3-way-isolation
- analogue signal conditioning
- indication LED
- cross-connectable voltage supply via cross-connectors

### Block diagram

### Ordering data
<table>
<thead>
<tr>
<th>Connection</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw connection</td>
<td>WAS5 CCC</td>
</tr>
<tr>
<td>Tension clamp</td>
<td>WAS5 CVC</td>
</tr>
<tr>
<td>Input/output</td>
<td>8540200000</td>
</tr>
</tbody>
</table>

### Technical data

#### Input signal
- Input current max: 25 mA
- Input resistance: 0 ... 20 mA 110 Ω
- Input resistance: 0 ... 20 mA 600 Ω
- Input resistance: 0 ... 20 mA 25 mA
- Input resistance: 0 ... 10 V 600 Ω
- Input resistance: 0 ... 10 V 110 Ω
- Input resistance: 0 ... 10 V 25 mA
- Accuracy at Tu=23 °C: 0.2%
- Temperature coefficient: ± 250 ppm / K
- Response time: ≤ 45 ms
- Cut-off frequency (-3 dB): 10 Hz

#### Output signal
- Load resistance: 0 ... 10 V ≥ 1 kΩ
- Load resistance: 4 ... 20 mA ≤ 110 Ω
- Load resistance: 0 ... 20 mA ≤ 600 Ω
- Load resistance: 0 ... 10 V ± 250 ppm / K
- Load resistance: 4 ... 20 mA ± 250 ppm / K
- Load resistance: 4 ... 20 mA ≤ 110 Ω
- Load resistance: 4 ... 20 mA ≤ 25 mA
- Load resistance: 4 ... 20 mA ≤ 110 Ω
- Load resistance: 0 ... 20 mA ≤ 600 Ω
- Load resistance: 0 ... 10 V ± 250 ppm / K
- Load resistance: 4 ... 20 mA ± 250 ppm / K

#### General
- Voltage supply: 24 Vdc ±25%
- Power consumption: ≤ 2 W
- Current carrying capacity of cross-connection: 2 A
- Operating temperature: 0 °C ... +55 °C
- Storage temperature: -20 °C ... +85 °C
- Dimensions: 92.4 / 112.5 / 17.5 mm

### Approvals
- Coordination of insulation according to EN 50178, 04/98
- Standards/specifications: EN 50178, EN 50081, EN 50082, EN 55011

### Dimensions and accessories see
- Page 298 + 308

---

*Tu = 23 °C single module
## DC/DC Signal Conditioners

**WAVEANALOG DC/DC**
- 3-way-isolation
- analogue signal conditioning
- indication LED
- cross-connectable voltage supply via cross-connectors

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS5 VCC</td>
<td>8540310000</td>
</tr>
<tr>
<td>WAS5 VCC</td>
<td>8540320000</td>
</tr>
<tr>
<td>WAS5 VCC</td>
<td>8540319000</td>
</tr>
</tbody>
</table>

### Technical data*

<table>
<thead>
<tr>
<th>Input signal</th>
<th>0 ... 10 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage max.</td>
<td>15 V</td>
</tr>
<tr>
<td>Input resistance</td>
<td>typ. 100 kΩ</td>
</tr>
<tr>
<td>Output signal</td>
<td>0 ... 20 mA</td>
</tr>
<tr>
<td>Load resistance</td>
<td>≥ 650 Ω</td>
</tr>
<tr>
<td>Accuracy at Tu = 23 °C</td>
<td>± 250 ppm / K</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>± 250 ppm / K</td>
</tr>
<tr>
<td>Response time</td>
<td>≤ 45 ms</td>
</tr>
<tr>
<td>Cut-off frequency (3 dB)</td>
<td>≤ 45 ms</td>
</tr>
</tbody>
</table>

### General

| Voltage supply                   | 24 Vdc ±25%       |
| Power consumption                | (18 Vdc ... 24 Vdc ... 30 Vdc) |
| Current carrying capacity        | ≥ 2 A             |
| Operating temperature            | ≥ 2 A             |
| Storage temperature              | 0 °C ... +55 °C   |
| Dimensions L/H/W mm              | ≥ 3 mm            |
| Approvals                         | ≥ 3 mm            |

**Cooperation of insulation according to EN 50178, 04/98**

| Rated voltage                    | 300 V             |
| Rated surge voltage              | 3.4 kV            |
| Overvoltage category             | III               |
| Contamination class              | 2                 |
| Clearance and creepage distance  | ≥ 3 mm            |
| Coupling capacity                | 1 nF              |
| Input/output to supply           | 1 nF              |
| Isolation voltage, voltage strength | 4 kVeff / 1 min  |
| Input/output to mounting rail    | 4 kVeff / 1 min   |

**Standards/specifications**

- EN 50178
- EN 50081, EN 50082, EN 55011
- CE, cUL

### Approvals:

- Coordination of insulation according to EN 50178, 04/98

| Rated voltage                    | 300 V             |
| Rated surge voltage              | 4 kV              |
| Overvoltage category             | II                |
| Contamination class              | 2                 |
| Clearance and creepage distance  | ≥ 3 mm            |
| Coupling capacity                | 1 nF              |
| Input/output to supply           | 1 nF              |
| Isolation voltage, voltage strength | 4 kVeff / 1 min  |
| Input/output to mounting rail    | 4 kVeff / 1 min   |

**Standards/specifications**

- EN 50178
- EN 50081, EN 50082, EN 55011
- CE, cUL

### Dimensions and accessories see

Page 298 + 308

---

*Tu = 23 °C single module
DC/DC Signal Conditioners

WAVEANALOG DC/DC 20 kHz

- 3-way-isolation
- transmission frequency 20 kHz
- analogue signal conditioning
- cross-connectable voltage supply via cross-connectors

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>WAS5 CCC HF</th>
<th>WAS5 CCC HF</th>
<th>WAS5 CVC HF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCC HF</td>
<td>8447190000</td>
<td>84470000</td>
<td>844720000</td>
<td>8447220000</td>
</tr>
<tr>
<td>CVC HF</td>
<td>8447170000</td>
<td>844716000*</td>
<td>8447170000*</td>
<td>8447180000*</td>
</tr>
</tbody>
</table>

**TU = 23 °C single module

Ordering data
Screw connection
Tension clamp connection
Input/output

Technical data**

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Input current max</th>
<th>Input resistance</th>
<th>Output signal</th>
<th>Load resistance</th>
<th>Accuracy at Tu=23 °C</th>
<th>Temperature coefficient</th>
<th>Response time</th>
<th>Cut-off frequency (3 dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 20 mA</td>
<td>50 mA</td>
<td>50 Ω</td>
<td>0 ... 20 mA</td>
<td>&lt; 0.2% of FS</td>
<td>≤ 250 ppm / K of FS</td>
<td>≤ 250 ppm / K of FS</td>
<td>≤ 40 μs (typ. 30 μs)</td>
<td>≥ 15 kHz (typ. 20 kHz)</td>
</tr>
</tbody>
</table>

General
Voltage supply
24 Vdc ±25% (18 ... 30 Vdc)
Power consumption
< 1.5 W at Iout = 20 mA
Current carrying capacity of cross-connection
≤ 3 A
Operating temperature
0 °C ... +55 °C
Storage temperature
-20 °C ... +85 °C
Dimensions L / H / W mm
92.4 / 112.5 / 17.5
CE, UL, CSA

Approvals:
CE, UL, CSA

Coordination of insulation according to EN 50178, 04/98
Rated voltage
300 V
Rated surge voltage
4 kV
Overvoltage category
II
Contamination class
2
Clearance and creepage distance
≥ 3 mm
Coupling capacity
1 nF
Isolation voltage, voltage strength
4 kVeff / 1 min
Input/output to supply
4 kVeff / 1 min
Input/output to mounting rail
4 kVeff / 1 min

Standards/specifications
EN 50178
EN 50081, EN 50082, EN 55011

EMC standards
EN 50178
EN 50081, EN 50082, EN 55011

Dimensions and accessories see
Page 298 + 308

* Input/output 4 ... 20 mA/4 ... 20 mA possible

**TU = 23 °C single module
## DC/DC Signal Conditioners

### WAVEANALOG DC/DC 20 kHz
- 3-way-isolation
- transmission frequency 20 kHz
- analogue signal conditioning
- cross-connectable voltage supply via cross-connectors

### Approvals:

![CE, UL, CSA]

![CCC HF](image)

![Type Cat. No.](image)

**Type**  | **Cat. No.** |
--- | --- |
WAS5 CCC HF | 8447250000 |
WAZ5 CCC HF | 8447260000 |

**Ordering data**
- Screw connection
- Tension clamp connection
- Input/output

### Technical data*

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Output signal</th>
<th>Voltage supply</th>
<th>Power consumption</th>
<th>Current carrying capacity of cross-connection</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
<th>Dimensions L / H / W mm</th>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>24 Vdc ±25% (18 ... 30 Vdc)</td>
<td>&lt; 1.5 W at Iout = 20 mA</td>
<td>≤ 2 A</td>
<td>0 °C ... +55 °C</td>
<td>20 °C ... +85 °C</td>
<td>92.4 / 112.5 / 17.5</td>
<td>CE, UL, CSA</td>
</tr>
</tbody>
</table>

### General
- Voltage supply
- Power consumption
- Current carrying capacity of cross-connection
- Operating temperature
- Storage temperature
- Dimensions L / H / W mm
- Approvals

### Coordination of insulation according to EN 50178, 04/98
- Rated voltage
- Rated surge voltage
- Overvoltage category
- Contamination class
- Clearance and creepage distance
- Coupling capacity
- Input / output to supply
- Isolation voltage / voltage strength
- Input/output to mounting rail
- Standards/specifications
- EMC standards

### Dimensions and accessories see
- Page 298 + 308

---

**Type**  | **Cat. No.** |
--- | --- |
WAS5 CVC HF | 8447280000 |
WAZ5 CVC HF | 8447290000 |

**Ordering data**
- Screw connection
- Tension clamp connection
- Input/output

### Technical data*

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Output signal</th>
<th>Voltage supply</th>
<th>Power consumption</th>
<th>Current carrying capacity of cross-connection</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
<th>Dimensions L / H / W mm</th>
<th>Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>24 Vdc ±25% (18 ... 30 Vdc)</td>
<td>&lt; 1.3 W at Iout = 5 mA</td>
<td>≤ 2 A</td>
<td>0 °C ... +55 °C</td>
<td>20 °C ... +85 °C</td>
<td>92.4 / 112.5 / 17.5</td>
<td>CE, UL, CSA</td>
</tr>
</tbody>
</table>

### General
- Voltage supply
- Power consumption
- Current carrying capacity of cross-connection
- Operating temperature
- Storage temperature
- Dimensions L / H / W mm
- Approvals

### Coordination of insulation according to EN 50178, 04/98
- Rated voltage
- Rated surge voltage
- Overvoltage category
- Contamination class
- Clearance and creepage distance
- Coupling capacity
- Input / output to supply
- Isolation voltage / voltage strength
- Input/output to mounting rail
- Standards/specifications
- EMC standards

### Dimensions and accessories see
- Page 298 + 308

---

*Tu = 23 °C single module
**DC/DC Signal Conditioners**

**WAVEANALOG DC/DC 20 kHz**
- 3-way-isolation
- transmission frequency 20 kHz
- analogue signal conditioning
- cross-connectable voltage supply via cross-connectors

**Ordering data**
- Screw connection
- Tension clamp connection
- Input/output

**Technical data**

<table>
<thead>
<tr>
<th>Input signal</th>
<th>0 ... 10 V</th>
<th>0 ... 10 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage max.</td>
<td>15 V</td>
<td>15 V</td>
</tr>
<tr>
<td>Input resistance</td>
<td>500 kΩ</td>
<td>500 kΩ</td>
</tr>
<tr>
<td>Output signal</td>
<td>0 ... 20 mA</td>
<td>4 ... 20 mA</td>
</tr>
<tr>
<td>Load resistance</td>
<td>±500 Ω</td>
<td>±500 Ω</td>
</tr>
<tr>
<td>Accuracy at Tu=23 °C</td>
<td>±0.2% of FS</td>
<td>±0.2% of FS</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>±250 ppm / K of FS</td>
<td>±250 ppm / K of FS</td>
</tr>
<tr>
<td>Response time</td>
<td>±40 µs (typ. 30 µs)</td>
<td>±40 µs (typ. 30 µs)</td>
</tr>
<tr>
<td>Cut-off frequency (-3 dB)</td>
<td>≥15 kHz (typ. 20 kHz)</td>
<td>≥15 kHz (typ. 20 kHz)</td>
</tr>
</tbody>
</table>

**General**
- Voltage supply 24 Vdc ±25% (18 ... 30 Vdc)
- Power consumption < 1.5 W at Iout = 20 mA
- Current carrying capacity of cross-connection 2 A
- Operating temperature 0 °C ... +55 °C
- Storage temperature 20 °C ... +85 °C
- Dimensions L / H / W mm 92.4 / 112.5 / 17.5
- Approvals CE, UL, CSA

**Coordination of insulation according to EN 50178, 04/98**
- Rated voltage 300 V
- Rated surge voltage 4 kV
- Overvoltage category II
- Contamination class 2
- Clearance and creepage distance ≥3 mm
- Coupling capacity 1 nF
- Input / output to supply 4 kVeff / 1 min
- Isolation voltage, voltage strength 1 nF
- Input/output to mounting rail 4 kVeff / 1 min
- Standards/specifications EN 50178
- EMC standards EN 50081, EN 50082, EN 55011

**Approvals:**
- CE, UL, CSA
- Coordination of insulation according to EN 50178, 04/98
- Rated voltage 300 V
- Rated surge voltage 4 kV
- 2
- 1 nF
- 1 nF
- EN 50178
- EN 50081, EN 50082, EN 55011

*Tu = 23 °C single module*
### DC/DC Signal Conditioners

**WAVEANALOG DC/DC 20 kHz**
- 3-way-isolation
- transmission frequency 20 kHz
- analogue signal conditioning
- cross-connectable voltage supply via cross-connectors

#### Ordering data
- Screw connection
- Tension clamp connection
- Input/output

#### Technical data*

<table>
<thead>
<tr>
<th>Input signal</th>
<th>Output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage max.</td>
<td>Load resistance</td>
</tr>
<tr>
<td>0 ... 10 V</td>
<td>± 2 kΩ</td>
</tr>
<tr>
<td>500 kΩ</td>
<td>± 0.2% of FS</td>
</tr>
<tr>
<td>15 V</td>
<td>± 250 ppm / K of FS</td>
</tr>
<tr>
<td>Input resistance</td>
<td>Response time</td>
</tr>
<tr>
<td>0 ... 10 V</td>
<td>± 40 µs (typ. 30 µs)</td>
</tr>
<tr>
<td>± 0.2% of measurement range</td>
<td>± 15 kHz (typ. 20 kHz)</td>
</tr>
</tbody>
</table>

#### General
- Voltage supply
- Power consumption
- Current carrying capacity of cross-connection
- Operating temperature
- Storage temperature
- Dimensions L / H / W mm

#### Coordination of insulation according to EN 50178, 04/98

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Overvoltage category</th>
<th>Contamination class</th>
<th>Clearance and creepage distance</th>
<th>Coupling capacity</th>
<th>Isolation voltage, voltage strength</th>
<th>Input/output to supply</th>
<th>Input/output to mounting rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 V</td>
<td>4 kV</td>
<td>2</td>
<td>± 3 mm</td>
<td>1 nF</td>
<td>4 kV&lt;sub&gt;eff&lt;/sub&gt; / 1 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 V</td>
<td>4 kV</td>
<td>2</td>
<td>± 3 mm</td>
<td>1 nF</td>
<td>4 kV&lt;sub&gt;eff&lt;/sub&gt; / 1 min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Approvals:
- Coordination of insulation according to EN 50178, 04/98
- Rated surge voltage
- Overvoltage category
- Contamination class
- Clearance and creepage distance
- Coupling capacity
- Isolation voltage, voltage strength
- Input/output to supply
- Input/output to mounting rail
- Standards/specifications
- EMC standards
- Dimensions and accessories see

---

*Tu = 23 °C single module

---

### Block diagram

- **VVC HF**
  - 0 ... 10 V / 0 ... 10 V
  - ±0.2% of measurement range
  - ±250 ppm / K of measurement range
  - ≤ 40 µs (typ. 30 µs)
  - ≥ 15 kHz (typ. 20 kHz)

- **VVC HF**
  - ±10 V / ±10 V
  - ±0.2% of measurement range
  - ±250 ppm / K of measurement range
  - < 1.3 W at I<sub>out</sub> = 5 mA

---

### Approvals:
- Coordination of insulation according to EN 50178, 04/98
- Rated surge voltage
- Overvoltage category
- Contamination class
- Clearance and creepage distance
- Coupling capacity
- Isolation voltage, voltage strength
- Input/output to supply
- Input/output to mounting rail
- Standards/specifications
- EMC standards
- Dimensions and accessories see

---

*Ty = 23 °C single module
DC/DC Signal Conditioners (Configurable)

WAVEANALOG PRO DC/DC
- universally adjustable via DIP switch
- adjustment help via Internet
- 3-way-isolation
- voltage supply from 20 - 230 V ac/dc
- low power loss
- adjustable transmission frequency
- indication LED

Ordering data
Screw connection WAS4 PRO DC/DC
Type Cat. No. 8560740000
Tension clamp connection WAZ4 PRO DC/DC
Type Cat. No. 8560750000

Technical data*
Input (adjustable)
- Voltage uni-/bipolar adjustable 20 mV ... 200 V
- Voltage calibrated ranges 0 … ±60 mV, 0 … ±100 mV, 0 … ±150 mV, 0 … ±300 mV,
  0 … ±500 mV, 0 … ±1 V, 0 … ±5 V, 0 … ±10 V, 0 … ±100 V
- Current uni-/bipolar adjustable 0.1 mA ... 100 mA
- Current calibrated ranges 0 … ±0.3 mA, 0 … ±1 mA, 0 … ±5 mA, 0 … ±16 mA,
  0 … 20 mA, 0 … 50 mA
- Input resistance at current input range < 5 mA / > 5 mA approx. 100 Ω
  at voltage input approx. 1 MΩ
- Input capacity at current input approx. 1 nF
  Voltage input range < 500 mV / > 500 mV approx. 1 nF / approx. 500 pF
- Overload capacity at current input range < 5 mA / > 5 mA < 75 mA / < 300 mA
  Voltage input range < 500 mV / > 500 mV max. < 20 mA / < 3 mA continuous current

Output (adjustable)
- Voltage uni-/bipolar adjustable 0 … 10 V
- Voltage calibrated ranges 0 … ±10 V, 2 … 10 V, 0 … ±5 V, 1 … 5 V
- Current uni-/bipolar adjustable 0 … 20 mA
- Current calibrated ranges 0 … ±20 mA, 4 … 20 mA
- Offset -100%, -50%, 0%, +50%, 100% of measuring span of the chosen output range
- Load at output current < 12 V (600 Ω at 20 mA)
  at output voltage < 10 mA (1 kΩ at 10 V)
- Residual ripple < 25% measuring span of the chosen output range
- Gain error < 0.1% of FS
- Temperature coefficient < 60 ppm/K of FS
- Cut-off frequency > 10 kHz, < 10 Hz switch
- Voltage supply 20 ... 230 V ac/dc +10%
- Power consumption approx. 1 W
- Frequency range 48 ... 62 Hz
- Operating temperature 10 °C ... +70 °C
- Storage temperature -40 °C ... +85 °C
- Factory setting 20 … 230 V ac/dc +10%
- Dimensions L/H/B mm 92.4 / 112.5 / 12.5
- Weight approx. 100 g
- Approvals CE, cUL, GL
- Coordination of insulation according to EN 50178, 04/98
- Rated voltage 600 V
- Rated surge voltage 5 kV, 1.2/50 μs, acc. to IEC 620-4
- Overvoltage category II
- Contamination class 2
- Test voltage 4 kV input against output against auxiliary power
- Temperature coefficient < 60 ppm/K of FS
- Cut-off frequency > 10 kHz, < 10 Hz switch

Adjustment help WAVEtool
The service tool enables quick and uncomplicated configuration of WAVEANALOG PRO.
Download from Internet:
http://www.weidmuller.de
→ Products → Downloads (see page 192)

Switch position/setting options

Input range

<table>
<thead>
<tr>
<th>Input</th>
<th>S1</th>
<th>S2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... ±60 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±100 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±150 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±300 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±500 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±1 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±5 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±10 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±100 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±0.3 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±1 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±5 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±10 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Switch S2

<table>
<thead>
<tr>
<th>Output range</th>
<th>S1</th>
<th>S2</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... ±10 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±10 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±5 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 ... 5 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ... ±20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 ... 20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Offset (in % of output voltage)

<table>
<thead>
<tr>
<th>Offset</th>
<th>S1</th>
<th>S2</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-100 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-50 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+50 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+100 %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Zero pot. activated: additional ±25 %

Bandwidth 10 kHz

Set range can be documented on side of housing.

Switch S3

<table>
<thead>
<tr>
<th>Bandwidth 10 kHz</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions and accessories</td>
<td>see page 298 + 308</td>
</tr>
</tbody>
</table>

*TU = 23 °C single module
RTD Signal Conditioners

**WAVEANALOG RTD**

- 2-wire technology
- Configurable temperature range -200 °C ... +800 °C
- Configurable output current range 0 ... 20 mA / 4 ... 20 mA
- Cross-connectable voltage supply via cross-connectors

**Ordering data**

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>WT4 PT100/2 C 843220000*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension clamp connection</td>
<td>WT4 PT100/2 C 843220000*</td>
</tr>
<tr>
<td>Input/output</td>
<td>PT100/2 / 0(4) ... 20 mA</td>
</tr>
</tbody>
</table>

**Technical data**

<table>
<thead>
<tr>
<th>Input signal</th>
<th>PT100/2-wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>-200 °C ... +800 °C</td>
</tr>
<tr>
<td>DC supply current</td>
<td>1.45 mA</td>
</tr>
<tr>
<td>Conductor resistance</td>
<td>≤ 500 Ω</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 0.5% of measurement range</td>
</tr>
<tr>
<td>Measurement range</td>
<td>± 200 ppm / °C (typ. 80 ppm / °C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load resistance</td>
</tr>
<tr>
<td>Temperature coefficient</td>
</tr>
</tbody>
</table>

**General**

| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Current carrying capacity of cross-connection | < 48 mA at I_n = 20 mA |
| Operating temperature | B °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |

**Standards/specifications**

- EN 50178, IEC 751
- EN 50081, EN 50082
- EN 55011

**Dimensions**

- L / H / W mm | 92.4 / 112.5 / 12.5

**Approvals**

- CE, UL, CSA

**Aids**

- Voltage supply 24 Vdc, 50 mA
- Simulator for PT 100 or precision-resistance-decade
- Ampere-/voltmeter which can be calibrated to an accuracy of >0.1 % of the end value.
RTD Signal Conditioners

WAVEANALOG RTD

- 3-wire technology
- Configurable temperature range -200 °C ... +800 °C
- Configurable output current range 0 ... 20 mA / 4 ... 20 mA
- Cross-connectable voltage supply via cross-connectors

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw connection</td>
<td>WTS4 PT100/3 C</td>
<td>WTS4 PT100/3 V</td>
<td></td>
</tr>
<tr>
<td>Tension clamp connection</td>
<td>WTZ4 PT100/3 C</td>
<td>WTZ4 PT100/3 V</td>
<td></td>
</tr>
</tbody>
</table>

Technical data

- Input signal: PT100/3-wire PT100/3-wire
- Temperature range: -200 °C ... +800 °C
- Supply current: 1.45 mA
- Conductor resistance: ≤ 50 Ω
- Output signal: 0(4) ... 20 mA 0 ... 10 V
- Load resistance: ≤ 500 Ω ≥ 1 kΩ
- Accuracy at Tu=23 °C: ± 0.5% of measurement range
- Temperature coefficient: ± 200 ppm / °C (typ. 80 ppm / °C)
- Measurement range: ≥ 200 K
- 100 K ≤ measurement range < 200 K
- 40 K ≤ measurement range < 100 K

General

- Voltage supply: 24 Vdc ±20% (19.2 ... 28.8 Vdc)
- Current carrying capacity of cross-connection: ≤ 2 A
- Operating temperature: 0 °C ... +55 °C
- Storage temperature: 20 °C ... +85 °C

Standards/specifications

EN 50178, IEC 751
EN 50081, EN 50082, EN 50011

EMC standards

EN 50081, EN 50082, EN 50111

Dimensions L / H / W mm

92.4 / 112.5 / 12.5

Approvals

CE, UL, CSA

Dimensions and accessories see

Page 298 + 308

Preconfigured modules

<table>
<thead>
<tr>
<th>Input</th>
<th>0 ... 20 mA</th>
<th>4 ... 20 mA</th>
<th>0 ... 10 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw connection</td>
<td>0 ... 100 °C</td>
<td>8432150001</td>
<td>8432150011</td>
</tr>
<tr>
<td>Tension clamp connection</td>
<td>special balancing</td>
<td>8432159999**</td>
<td>8432159999**</td>
</tr>
</tbody>
</table>

** You must indicate the temperature range when ordering
Please indicate additional output signal of current output

Aids

- Voltage supply 24 Vdc, 50 mA
- Simulator for PT 100 or precision-resistance-decade
- Ampere-/voltmeter which can be calibrated to an accuracy of >0.1 % of the end value.
RTD Signal Conditioners

WAVEANALOG RTD
- 2-, 3- and 4-wire technology
- configurable temperature range -200 °C ... +800 °C
- configurable output current range 0 ... 20 mA / 4 ... 20 mA
- cross-connectable voltage supply via cross-connectors

Approvals:

Block diagram

Ordering data

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension clamp connection</td>
<td>WTS4 PT100/4 C</td>
<td>8432270000*</td>
</tr>
<tr>
<td>Input/output</td>
<td>WTZ4 PT100/4 C</td>
<td>8432280000</td>
</tr>
<tr>
<td>Input signal</td>
<td>PT100/4 / 0(4) ... 20 mA</td>
<td>8432270001</td>
</tr>
<tr>
<td>Output signal</td>
<td>PT100/4 / 0 ... 10 V</td>
<td>8432280001</td>
</tr>
<tr>
<td>Load resistance</td>
<td>≤ 50 kΩ (3- &amp; 4-wire)</td>
<td>≤ 50 kΩ (3- &amp; 4-wire)</td>
</tr>
<tr>
<td>Supply current</td>
<td>1.45 mA</td>
<td>1.45 mA</td>
</tr>
<tr>
<td>Measurement range</td>
<td>± 0.1% of measurement range</td>
<td>± 0.1% of measurement range</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>± 0.2% of measurement range</td>
<td>± 0.2% of measurement range</td>
</tr>
<tr>
<td>Measurement range</td>
<td>± 0.1% of measurement range</td>
<td>± 0.1% of measurement range</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>24 Vdc ± 20% (19.2 ... 28.8 Vdc)</td>
<td>24 Vdc ± 20% (19.2 ... 28.8 Vdc)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 48 mA at fbus = 20 mA</td>
<td>&lt; 48 mA at fbus = 10 mA</td>
</tr>
<tr>
<td>Current carrying capacity of cross-connection</td>
<td>2 A</td>
<td>2 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 °C ... +65 °C</td>
<td>0 °C ... +65 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 °C ... +85 °C</td>
<td>-20 °C ... +85 °C</td>
</tr>
<tr>
<td>Standards/specifications</td>
<td>EN 50178, IEC 751, EN 50081, EN 50082, EN 50011</td>
<td>EN 50178, IEC 751, EN 50081, EN 50082, EN 50011</td>
</tr>
<tr>
<td>Dimensions L / H / W mm</td>
<td>92.4 / 112.5 / 12.5</td>
<td>92.4 / 112.5 / 12.5</td>
</tr>
<tr>
<td>Approvals</td>
<td>UL, CSA</td>
<td>UL, CSA</td>
</tr>
<tr>
<td>Dimensions and accessories see</td>
<td>Page 298 + 308</td>
<td>Page 298 + 308</td>
</tr>
</tbody>
</table>

* without balancing
*** T0 = 23 °C single module

Preconfigured modules

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>40 ... 50 °C</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>-20 °C ... 75 °C</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>-40 °C ... 110 °C</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>-60 °C ... 165 °C</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>-80 °C ... 215 °C</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>-100 °C ... 360 °C</td>
</tr>
<tr>
<td>0 ... 20 mA</td>
<td>0 ... 10 V</td>
<td>-200 °C ... 540 °C</td>
</tr>
</tbody>
</table>

Aids
- Voltage supply 24 Vdc, 50 mA
- Simulator for PT 100 or precision-resistance-decade
- Ammeter/voltmeter which can be calibrated to an accuracy of ±0.1 % of the end value.

* Please indicate the temperature range and the sensor type (2-, 3- or 4-wire).
* Please indicate additional output signal of current output.

Please note: RTD Signal Conditioners
- Voltage supply 24 Vdc, 50 mA
- Simulator for PT 100 or precision-resistance-decade
- Ampere/voltmeter which can be calibrated to an accuracy of ±0.1 % of the end value.

* Please indicate the temperature range and the sensor type (2-, 3- or 4-wire).
* Please indicate additional output signal of current output.

1) only modules with current output

= on

= off

1) only modules with current output

Page 188
**RTD-Signal Isolating Transformer (Configurable)**

**WAVEANALOG PRO RTD**
- Measurement from PT 100, Ni 100, R, potentiometer
- Universally adjustable via DIP switch
- 3-way-isolation
- Status LED
- Linearization
- Cross-connectable voltage supply via cross-connectors

**EMC standards**
- EN 50081, EN50082, EN55011

**Test voltage**
- 2 kV eff

**Clearance and creepage distance**
- 3 mm

**Contamination class**
- 2

**Overvoltage category**
- III

**Rated voltage**
- 300 V

**Approvals**
- CE, cUL, GL

**Weight**
- Approx. 100 g

**Factory setting**
- PT 100/3 0...100 °C / 4...20 mA

**Operating temperature**
- 0...55°C

**Current carrying capacity of cross-connection**
- ≤ 2 A

**Power consumption**
- 830 mW ... 880 mW ... 980 mW @ I out = 20 mA

**Supply voltage**
- 18 Vdc ... 24 Vdc ...

**Open circuit recognition**
- Output signal > 10 V or > 20 mA, LED blinks

**Influence of wire resistances**
- Max. +0.25°C at 50 Ω wire resistance

**Temperature coefficient**
- Potentiometer: 0.2% of FS / 0.3% of FS
- Resistance: 450 Ω / 900 Ω

**Step response (switchable via DIP switch)**
- Potentiometer: < 500 ms / < 1.1 s

**Potentiometer univerally adjustable via DIP switch**

**Selection of minimum input values**
- Switch 1

**Selection of the measurement range**
- Switch 2

**Technical data**
- Type: Cat. No.
  - WAZ5 PRO RTD 8560700000
  - WAS5 PRO RTD 8560700000

**Adjustment help**
- WAVEtool
  - This service tool enables quick and uncomplicated configuration of WAVEANALOG PRO.
  - Download from Internet:
    - http://www.weidemüller.de
  - Products
  - Downloads

- (see page 192)

**General**
- Supply voltage
- Power consumption
- Current carrying capacity of cross-connection
- Operating temperature
- Storage temperature
- Factory setting
- Dimensions L/H/B mm
- Weight

**Approvals**
- Coordination of insulation according to DIN EN 50178, 04/9

**Rated voltage**
- 300 V

**Surge voltage**
- 4 kV

**Overvoltage category**
- I

**Contamination class**
- 2

**Clearance and creepage distance**
- 3 mm

**Test voltage**
- 2 kVac

**Standard specifications**
- EN 50178, EC751
- EN 50081, EN50082, EN50511

**Dimensions and accessories see**
- *Tu = 23 °C single module
Thermo-Signal Conditioners

WAVEANALOG Thermo

- thermocouples K, J, T, E, N, R, S, B configurable
- temperature range -200 °C ... +1820 °C
- no adjustment necessary
- cold junction compensation
- configurable output signal
- cross-connectable voltage supply via cross-connectors

Approvals:

Block diagram

Ordering data

<table>
<thead>
<tr>
<th>Screw connection</th>
<th>WT44 Thermo Select</th>
<th>84323000000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension clamp connection</td>
<td>WT14 Thermo Select</td>
<td>84323100000</td>
</tr>
</tbody>
</table>

Technical data

**Input signal**
Thermocouple acc. to IEC584 (fully insulated)

- Types:
  - K: -200 °C ... +1372 °C
  - J: -200 °C ... +1200 °C
  - T: -200 °C ... +400 °C
  - E: -200 °C ... +1000 °C
  - N: -200 °C ... +1300 °C
  - R: -50 °C ... +1760 °C
  - S: -50 °C ... +1760 °C
  - B: +50 °C ... +1820 °C

**Output signal**

- **Load resistance**
  - ≤ 500 Ω
  - (0 ... 20 mA)
  - (4 ... 20 mA)

- **Load resistance**
  - ≥ 1 kΩ
  - (0 ... 10 V)

**Accuracy at Tu = 23 °C**

- Type K:
  - -200 °C ... -150 °C ± (5 K + 0.1% of set range)
  - -150 °C ... -100 °C ± (5 K + 0.1% of set range)
  - -100 °C ... 0 °C ± (5 K + 0.1% of set range)

- Type J:
  - -200 °C ... -150 °C ± (5 K + 0.1% of set range)
  - -150 °C ... -100 °C ± (5 K + 0.1% of set range)
  - -100 °C ... 0 °C ± (5 K + 0.1% of set range)

- Type T:
  - -200 °C ... -150 °C ± (5 K + 0.1% of set range)
  - -150 °C ... -100 °C ± (5 K + 0.1% of set range)
  - -100 °C ... 0 °C ± (5 K + 0.1% of set range)

- Type E:
  - -200 °C ... -150 °C ± (5 K + 0.1% of set range)
  - -150 °C ... -100 °C ± (5 K + 0.1% of set range)
  - -100 °C ... 0 °C ± (5 K + 0.1% of set range)

- Type N:
  - -200 °C ... -150 °C ± (5 K + 0.1% of set range)
  - -150 °C ... -100 °C ± (5 K + 0.1% of set range)
  - -100 °C ... 0 °C ± (5 K + 0.1% of set range)

- Type R:
  - -50 °C ... +1760 °C ± (10 K + 0.1% of set range)

- Type S:
  - -50 °C ... +1760 °C ± (10 K + 0.1% of set range)

- Type B:
  - 50 °C ... +1820 °C ± (25 K + 0.1% of set range)

**Temperature coefficient**

- ± (200 ppm v. Span + 0.075 K)

**Response time without filter**

- ≤ 1 s

**Response time with filter**

- ≤ 6 s

**General**

- **Power supply**
  - 24 Vdc ±20% (19.2 ... 28.8 Vdc)
  - ≤ 38 mA at iLo = 20 mA

- **Current carrying capacity of cross-connection**
  - ≤ 2 A

- **Open circuit recognition**
  - LED blinks (output value: > 20 mA and > 10 V)

- **Operating temperature**
  - 0 °C ... +55 °C

- **Storage temperature**
  - -20 °C ... +85 °C

- **Standards/specifications**
  - EN 50178, IEC584
  - EN 50081, EN 50082, EN 55011

- **EMC standards**
  - CE, UL, CSA

- **Dimensions L / H / W mm**
  - 92.4 / 112.5 / 12.5

- **Approvals**
  - CE, UL, CSA

- **Dimensions and accessories see**

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Switch position/setting options

<table>
<thead>
<tr>
<th>SW 1</th>
<th>SW 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td><strong>Span</strong></td>
</tr>
<tr>
<td>K</td>
<td>0 °C</td>
</tr>
<tr>
<td>J</td>
<td>10 °C</td>
</tr>
<tr>
<td>T</td>
<td>20 °C</td>
</tr>
<tr>
<td>E</td>
<td>30 °C</td>
</tr>
<tr>
<td>N</td>
<td>40 °C</td>
</tr>
<tr>
<td>R</td>
<td>50 °C</td>
</tr>
<tr>
<td>S</td>
<td>60 °C</td>
</tr>
</tbody>
</table>

**General**

- **Switch position/setting options**
  - **SW 1**
  - 0 °C ... 1050 °C
  - 0 °C ... 200 °C
  - 150 °C ... 500 °C
  - 750 °C ... 1400 °C
  - 1450 °C ... 1800 °C
  - 1850 °C ... 2000 °C

- **SW 2**
  - 0 °C ... 1050 °C
  - 0 °C ... 200 °C
  - 150 °C ... 500 °C
  - 750 °C ... 1400 °C
  - 1450 °C ... 1800 °C
  - 1850 °C ... 2000 °C

- **Filter 8**
  - on
  - off

- **Output 6**
  - 0 ... 10 V
  - 0 ... 20 mA
  - 4 ... 20 mA

- **Filter 8**
  - on
  - off

* Tu = 23 °C single module
Thermo Signal Isolating Transformers (Configurable)

**WAVEANALOG PRO Thermo**
- 3-way-isolation
- thermocouples K, J, T, E, N, R, S, B configurable
- temperature range -200 °C ... +1820 °C
- no adjustment necessary
- cold junction compensation
- configurable output signal
- cross-connectable voltage supply via cross-connectors

**Approvals:**
- CE, cUL, GL
- EMC standards EN 50081, EN50082, EN55011
- Standards/specifications EN 50178, IEC751
- Storage temperature -20 °C ... +85 °C
- Operating temperature 0 °C ... +55 °C

**Dimensions and accessories see Page 298 + 308**

**Weight:** 100 g

**Supply voltage:**
- Switching on the filter function

**Output (adjustable)**
- Output voltage
- Offset voltage
- Load resistance
- Output current
- Offset current
- Load resistance
- Step response
- all connected filter function
- Max. wire resistance
- Open circuit recognition
- Range of man. fine adjustment
- Status LED:

**General**
- Supply voltage:
  - 18 Vdc
  - 24 Vdc
  - 30 Vdc
- Power consumption:
  - 800 mW ...
  - 850 mW ...
  - 950 mW
- Current carrying capacity of cross-connection
- Operating temperature
  - 0 °C ...
  - ±5 °C
  - ±20 °C ...
  - ±85 °C
- Storage temperature
- Standards/specifications
  - EN 50178, EN5751
  - EN 50361, EN50082, EN50511
- EMC standards
- Factory setting
- Dimensions L/H/W mm
  - 92.4 / 112.5 / 17.5
- Weight
  - 100 g
- Approvals
  - CE, cUL, GL
- Dimensions and accessories see
- Dimensions and accessories see

**Adjustment help WAVETOOL**
- This service tool enables quick and uncomplicated configuration of WAVEANALOG PRO.
- Download from the Internet:
  - http://www.weidmueller.de
  - Downloads

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>MAX.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td></td>
<td>-50°C</td>
<td>100°C</td>
<td>150°C</td>
<td>200°C</td>
<td>250°C</td>
<td>300°C</td>
<td>350°C</td>
<td>400°C</td>
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<tr>
<td>J</td>
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<td>800°C</td>
<td>850°C</td>
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<tr>
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<td></td>
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<td>1000°C</td>
<td>1050°C</td>
<td>1100°C</td>
<td>1150°C</td>
<td>1200°C</td>
<td>1250°C</td>
<td>1300°C</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>1350°C</td>
<td>1400°C</td>
<td>1450°C</td>
<td>1500°C</td>
<td>1550°C</td>
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<td>1700°C</td>
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<tr>
<td>S</td>
<td></td>
<td>1750°C</td>
<td>1800°C</td>
<td>500°C</td>
<td>600°C</td>
<td>700°C</td>
<td>800°C</td>
<td>900°C</td>
<td>1000°C</td>
</tr>
</tbody>
</table>

**Coordination of insulation acc. to DIN EN 50178, 04/98**
- Rated voltage
  - 300 V
- Surge voltage
  - 4 kV
- Overvoltage category
  - 3
- Contamination class
  - 2
- Clearance & creep. distance
  - 3 mm
- Test voltage
  - 2 kVeff

**Select the thermocoupler**

<table>
<thead>
<tr>
<th>Span</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°C</td>
<td>500°C</td>
<td>600°C</td>
<td>700°C</td>
<td>800°C</td>
<td>900°C</td>
</tr>
<tr>
<td>50°C</td>
<td>600°C</td>
<td>700°C</td>
<td>800°C</td>
<td>900°C</td>
<td>1000°C</td>
</tr>
<tr>
<td>100°C</td>
<td>1000°C</td>
<td>1100°C</td>
<td>1200°C</td>
<td>1300°C</td>
<td>1400°C</td>
</tr>
<tr>
<td>150°C</td>
<td>1400°C</td>
<td>1500°C</td>
<td>1600°C</td>
<td>1700°C</td>
<td>1800°C</td>
</tr>
</tbody>
</table>

**Select the minimum temperature**

<table>
<thead>
<tr>
<th>Output</th>
<th>SW1</th>
<th>SW2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...20mA</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4...20mA</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>
The adjustment help – WAVE\textsc{tool} – enables quick and uncomplicated configuration of WAVE\textsc{analog PRO DC}, WAVE\textsc{analog PRT RTD}, WAVE\textsc{analog PRO THERMO}.

Menu for selecting the functions

Once the required input and output parameters have been entered, the program determines the correct switch setting and gives instructions for the electrical connection of the module. Where necessary, it also determines and displays the required calibration values. The entire process can be printed out or saved as a PDF file for installation documentation purposes.

Download from the Internet:
http://www.weidmueller.de \(\rightarrow\) Products \(\rightarrow\) Download
Current monitoring

Monitoring flows of currents enables a constant control of individual devices and installation components. Discrepancies or disruptions arising in the electrical circuit can easily be evaluated as breakdowns. Targeted rectifying procedures can be taken. The WAVECONTROL range of products convert sinusoidal/non-sinusoidal AC/DC currents up to 60 A to standard analogue signals. The measurement processes are based on 2 basic principles. One principle is alternating currents up to 10 A ac and 50/60 Hz are measured using the transformer process. The module is looped directly into the measurement circuit. A Hall-effect element comes in to operation at 10 A ac/dc.

The potential-free wire is inserted through the module, allowing currents up to 60 A ac/dc to be measured. Quite often, there are high-frequency parts of signals on the wire to be measured. In order to be able to take these parts of the signals into consideration, so-called TRMS converters (TRUE Root Mean Square) are connected to the Hall sensors. This enables measurements up to 2 kHz, independent of the shape of the curve. Standard signals (0...20, 4...20 mA, 4...20 A current loop supply, 0...10 V) or a switch output are on offer.
Analogue Signal Processing

WAVECONTROL

- Less wiring costs thanks to cross-connections
- Very good marking options
- Fast commissioning – pluggable replacement PCBs
- Connection technology – screw or tension clamp via socket block
- Tool-free mounting
- Coding elements in the connections – false plugging not possible
- Galvanically isolated measurement circuit
- Measurements of direct and alternating currents possible
- TRMS versions for measuring non-sinusoidal signals
- Measurement range switch without calibration
- Relay version with selectable hysteresis
- Selectable working and closed-circuit current process for defined statuses (optional as normally open or normally closed contact)
- Error indication via LED indication
Current Monitoring

WAVECONTROL
- current ranges adjustable via DIP switch
- cross-connectable voltage supply via cross-connectors
- selectable hysteresis
- selectable working and closed-circuit current principle

Approvals:

Block diagram

Ordering data
- Screw connection
- Tension clamp connection

Technical data*
- Input current
- Input current
- Pass through diameter
- Measuring principle
- Connection type
- Measurement circuit voltage
- Max. measuring circuit

Output
- Contact set
- Min. switching voltage
- Max. switching voltage
- Continuous current AC
- Continuous current DC
- Max. switching current
- Status LED
- Threshold
- Hysteresis
- Temperature coefficient
- Response time (10...90%)
- Working/closed-circuit current principle

Coordination of insulation acc. to DIN EN 50178, 04/98

Rated voltage
- Surge voltage
- Overvoltage category
- Contamination class
- Clearance and creepage distance
- Test voltage

General
- Supply voltage
- Power consumption at rated voltage
- Reverse polarity protection
- Current-carrying capacity of the cross-connection
- Operating temperature range
- Storage/transport
- Factory setting
- Dimensions L/H/B (mm)
- Weight

Approvals
- Dimensions and accessories see

* Tu = 23 °C single module

Type | Cat. No. | Qty.
--- | --- | ---
WAS2 CMR 1/5/10 A ac | 8516560000 | 1
WAZ2 CMR 1/5/10 A ac | 8516570000 | 1

Type | Cat. No. | Qty.
--- | --- | ---
WAS2 CMR 20/40/60 A ac | 8513340000 | 1
WAZ2 CMR 20/40/60 A ac | 8526600000 | 1
Current Monitoring

WAVECONTROL

- input and output range adjustable via DIP switch
- no calibration required
- cross-connectable voltage supply via cross-connectors

Approvals:

Block diagram

WAS1 CMA
WAZ1 CMA
1/5/10 A ac selectable with analogue output
0...20 mA / 4...20 mA
0...10 V

Technical data*

Input
- Input current
- Input frequency
- Accuracy
- Measuring principle
- Connection type
- Measurement circuit voltage
- Max. measuring circuit

Output
- Current/voltage selectable
- Output voltage
- Load resistance
- Output signal limit
- Offset voltage
- Offset current
- Load resistance
- Status LED
- Temperature coefficient
- Response time (10 ... 90%)
- Coordination of insulation acc. to DIN EN 50178, 04/98
- (safe separation)

Output voltage
- 0...10 V
- 0...20 mA
- 4...20 mA
- max. 0.05 V
- ≤ 1 KΩ

Output signal limit
- approx. 13 V and 24 mA
- 0/4...20 mA current loop supply

Status LED
- green LED
- ON–> OK; blinks –> signal out of range; OFF –> Error
- ≤ 200 ppm/K
- typ. 700 ms

Temperature coefficient
- ≤ 200 ppm/K
- typ. 700 ms

Response time (10 ... 90%)
- typ. 700 ms

Coordination of insulation acc. to DIN EN 50178, 04/98
- (safe separation)

Rated voltage
- 300 V
- 6 kV
- 2
- 2
- 5.5 mm
- 4 kV eff

Surge voltage
- 300 V
- 6 kV
- 2
- 2
- 5.5 mm
- 4 kV eff

Overvoltage category
- 2
- 2
- 5.5 mm
- 4 kV eff

Contamination class
- 3
- 3
- 5.5 mm
- 4 kV eff

Clearance and creepage distance
- 5.5 mm
- 4 kV eff

Test voltage
- 13 Vdc...30 Vdc
- 150 Vdc
- 150 Vdc

General
- Supply
- Supply voltage
- Power consumption at rated voltage
- Reverse polarity protection

Operating temperature range
- 0...+50°C
- 20...+70°C
- 0...+50°C
- 20...+70°C

Storage/transport
- -20...+70°C
- -20...+70°C

Factory setting
- Dimensions L/H/W (mm)
- Weight

Approvals
- Dimensions and accessories see

* TU = 23 °C single module

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WAS1 LP CMA
WAZ1 LP CMA
1/5/10 A ac selectable with analogue output
4...20 mA
loop powered

Technical data*

Input
- Input current
- Input frequency
- Accuracy
- Measuring principle
- Connection type
- Measurement circuit voltage
- Max. measuring circuit

Output
- Current/voltage selectable
- Output current
- Offset current
- Load resistance
- Status LED
- Temperature coefficient
- Response time (10 ... 90%)
- Coordination of insulation acc. to DIN EN 50178, 04/98
- (safe separation)

Output current
- 4...20 mA
- max. 100 µA
- ≤ 600 Ω
- (at 24 V) RL = (Vcc - 13V) / 20 mA
- Dependent on voltage Vcc

Status LED
- green LED
- ON–> OK; blinks –> signal out of range; OFF –> Error
- ≤ 200 ppm/K
- typ. 700 ms

Temperature coefficient
- ≤ 200 ppm/K
- typ. 700 ms

Response time (10 ... 90%)
- typ. 700 ms

Coordination of insulation acc. to DIN EN 50178, 04/98
- (safe separation)

Rated voltage
- 300 V
- 6 kV
- 2
- 2
- 5.5 mm
- 4 kV eff

Surge voltage
- 13 Vdc...30 Vdc
- 150 Vdc
- 150 Vdc

Overvoltage category
- 3
- 3
- 5.5 mm
- 4 kV eff

Contamination class
- 3
- 3
- 5.5 mm
- 4 kV eff

Clearance and creepage distance
- 5.5 mm
- 4 kV eff

Test voltage
- 13 Vdc...30 Vdc
- 150 Vdc
- 150 Vdc

General
- Supply
- Supply voltage
- Power consumption at rated voltage
- Reverse polarity protection

Operating temperature range
- 0...+50°C
- 20...+70°C
- 0...+50°C
- 20...+70°C

Storage/transport
- -20...+70°C
- -20...+70°C

Factory setting
- Dimensions L/H/W (mm)
- Weight

Approvals
- Dimensions and accessories see

* TU = 23 °C single module

Page 298 + 308
WAVECONTROL

- input and output range adjustable via DIP switch
- no calibration required
- true TRMS value measurements
- hall sensor measurement method

Approvals:

Block diagram

Input / Output configurable

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS2 CMA 5/10A uc</td>
<td>8526910000</td>
<td>1</td>
</tr>
<tr>
<td>WAZ2 CMA 5/10A uc</td>
<td>8526920000</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>Qty.</th>
</tr>
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<tbody>
<tr>
<td>WAS2 CMA 20/25/30A uc</td>
<td>8545830000</td>
<td>1</td>
</tr>
<tr>
<td>WAZ2 CMA 20/25/30A uc</td>
<td>8545840000</td>
<td>1</td>
</tr>
</tbody>
</table>

5 A uc/10 A ac selectable (without additional adjustment)
0 Hz - 2 kHz (True RMS to DC Converter)
1% (0 Hz - 1 kHz) Crest factor 2 FSR
2% (0 Hz - 2 kHz) Crest factor 2 FSR
Contact-free current monitoring using Hall sensor
Push-through connection
8 mm
400 Vac, higher voltages dependent on wire insulation

Output voltage
Offset voltage
Load resistance
Output signal limit
Output current
Offset current
Load resistance
Status LED
Temperature coefficient
Response time (10...90%)
Coordination of insulation acc. to DIN EN 50178, 04/98
Rated voltage
Surge voltage
Oversupply category
Contamination class
Clearance and creepage distance
Test voltage
General
Supply voltage
Power consumption at rated voltage
Reverse polarity protection
Operating temperature range
Storage/transport
Dimensions L/H/B (mm)
Weight
Approvals
Dimensions and accessories see

* $T_u = 25\, ^\circ C$ single module
Current Monitoring

WAVECONTROL

- input and output range adjustable via DIP switch
- no calibration required
- cross-connectable voltage supply via cross-connectors
- true TRMS value measurements
- hall sensor measurement method

Approvals:

Block diagram

<table>
<thead>
<tr>
<th>Ordering data</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Qty.</th>
<th>WAS2 CMA 40/50/60A uc selectable with analogue output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw connection</td>
<td>WAS2 CMA</td>
<td>8513330000</td>
<td>1</td>
<td>40/50/60A uc selectable (without additional adjustment)</td>
</tr>
<tr>
<td>Tension clamp connection</td>
<td>WAZ2 CMA</td>
<td>8526590000</td>
<td>1</td>
<td>0 Hz - 2 kHz (true RMS to DC Converter)</td>
</tr>
</tbody>
</table>

Technical data*

<table>
<thead>
<tr>
<th>Input</th>
<th>WAS2 CMA 40/50/60A uc</th>
<th>WAS2 CMA 40/50/60A uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input current</td>
<td>0 Hz - 2 kHz (TRMS to DC Converter)</td>
<td></td>
</tr>
<tr>
<td>Input frequency</td>
<td>7% (0 Hz - 1 kHz) Crest factor 3 FSR</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>2% (0 Hz - 2 kHz) Crest factor 6 FSR</td>
<td></td>
</tr>
<tr>
<td>Measuring principle</td>
<td>Contact-free current monitoring using Hall sensor</td>
<td></td>
</tr>
<tr>
<td>Connection type</td>
<td>Push-through connection</td>
<td></td>
</tr>
<tr>
<td>Pass through diameter</td>
<td>8 mm</td>
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<tr>
<td>Measurement circuit voltage</td>
<td>420 Vac, higher voltages dependent on wire insulation</td>
<td></td>
</tr>
<tr>
<td>Max. measuring circuit</td>
<td>dependent on wire cross-section</td>
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Output

<table>
<thead>
<tr>
<th>Output</th>
<th>WAS2 CMA 40/50/60A uc</th>
<th>WAS2 CMA 40/50/60A uc</th>
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<tbody>
<tr>
<td>Current/voltage selectable</td>
<td>0 ... 10 V</td>
<td>0 ... 10 V</td>
</tr>
<tr>
<td>Output voltage</td>
<td>0 ... 20 mA</td>
<td>4 ... 20 mA</td>
</tr>
<tr>
<td>Offset voltage</td>
<td>0 ... 15V</td>
<td>max. 0.08 V</td>
</tr>
<tr>
<td>Load resistance</td>
<td>≤ 1 kΩ</td>
<td></td>
</tr>
<tr>
<td>Output signal limit</td>
<td>approx. 13 V and 24 mA</td>
<td></td>
</tr>
<tr>
<td>Offset current</td>
<td>0/4 ... 20 mA</td>
<td>max. 150 μA</td>
</tr>
<tr>
<td>Load resistance</td>
<td>≥ 600 Ω</td>
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</tr>
<tr>
<td>Status LED</td>
<td>green LED</td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>≤ 650 ppm/K</td>
<td></td>
</tr>
<tr>
<td>Response time (10% ... 90%)</td>
<td>type 700 ms</td>
<td></td>
</tr>
</tbody>
</table>

Coordination of insulation acc. to DIN EN 50178, 04/98

<table>
<thead>
<tr>
<th>Supply</th>
<th>WAS2 CMA 40/50/60A uc</th>
<th>WAS2 CMA 40/50/60A uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>300 V</td>
<td>6 kV</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Contamination class</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Clearance and creepage distance</td>
<td>≥ 5.5 mm</td>
<td></td>
</tr>
<tr>
<td>Test voltage</td>
<td>4 kV eff</td>
<td></td>
</tr>
</tbody>
</table>

General

<table>
<thead>
<tr>
<th>Supply</th>
<th>WAS2 CMA 40/50/60A uc</th>
<th>WAS2 CMA 40/50/60A uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption at rated voltage</td>
<td>WAS2 CMA 40/50/60A uc</td>
<td>WAS2 CMA 40/50/60A uc</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Operating temperature range

<table>
<thead>
<tr>
<th>WAS2 CMA 40/50/60A uc</th>
<th>WAS2 CMA 40/50/60A uc</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 50°C</td>
<td>0 ... 50°C</td>
</tr>
<tr>
<td>20 ... 70°C</td>
<td>20 ... 70°C</td>
</tr>
<tr>
<td>0 ... 50A uc: 4 ... 20 mA</td>
<td>92.4/112.4/22.5</td>
</tr>
<tr>
<td>150 g</td>
<td>CE, cUL</td>
</tr>
</tbody>
</table>

Approvals

Dimensions and accessories see

* T0 = 23 °C single module
Current Monitoring

- For AC/DC
- With and without adjustable switching threshold
- Opto-coupler output

This series is particularly suitable for monitoring small currents from 50 mA to 5 A.

The adjustable switching threshold activates optionally one relay- or opto-coupler output each.

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMSI 0.05 DC O</td>
<td>1157160000</td>
</tr>
<tr>
<td>SMSI 0.25 DC O</td>
<td>1156360000</td>
</tr>
</tbody>
</table>

### Technical data

<table>
<thead>
<tr>
<th>Measurement circuit voltage</th>
<th>Max. permissible current in measurement circuit</th>
<th>Rated consumption – (W)</th>
<th>Rated consumption – (VA)</th>
<th>Adjustable switching threshold</th>
<th>Hysteresis between turn-on and turn-off point</th>
<th>Activation time t₁₄</th>
<th>Reaction time t₁₅</th>
<th>Voltage drop at input</th>
<th>Output voltage</th>
<th>Max. continuous output current</th>
<th>Saturation voltage</th>
<th>Auxiliary voltage</th>
<th>Auxiliary voltage rated data</th>
<th>Storage temperature</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td>10 V...250 Vdc</td>
<td></td>
</tr>
<tr>
<td>70 mA</td>
<td>70 mA</td>
<td>70 mA</td>
<td>70 mA</td>
<td>1 mA...50 mA</td>
<td>1 mA...50 mA</td>
<td>&lt;10 ms</td>
<td>&lt;10 ms</td>
<td>&lt;4 V</td>
<td>5 V...50 Vdc</td>
<td>100 mA</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td></td>
</tr>
<tr>
<td>200 mW</td>
<td>750 mW</td>
<td>&lt;/mW</td>
<td>750 mW</td>
<td>2% (250 mA)</td>
<td>2% (250 mA)</td>
<td>&lt;3 ms</td>
<td>&lt;3 ms</td>
<td>&lt;3 V</td>
<td>5 V...50 Vdc</td>
<td>100 mA</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td></td>
</tr>
<tr>
<td>n mA</td>
<td>n mA</td>
<td>n mA</td>
<td>n mA</td>
<td>5% (1 mA)</td>
<td>5% (1 mA)</td>
<td>&lt;3 ms</td>
<td>&lt;3 ms</td>
<td>&lt;3 V</td>
<td>5 V...50 Vdc</td>
<td>100 mA</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td>1.3 V</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

### Overvoltage category, input

- II
- I
- III
- II
- III
- II

### Overvoltage category, output

- II
- I
- III
- II
- III
- II

### Contamination class

- 2
- 2
- 2
- 2
- 2
- 2

### Dimensions and connection data

see page 306 + 307

---

**Block diagram/ timing diagram**

- Fig. V
- Fig. V

---

**SMSI DC O**

- With adjustable switching threshold
- Up to 50 mA
- Up to 250 mA
### SMSI AC O

**With adjustable switching threshold**
- up to 250 mA

**SMSI 0.25 AC O**
- Type Cat. No.: SMSI 0.25 AC O 115640000
- 10 V...250 Vac
  - 300 mA
  - 1075 mVA
  - ≤ 5%
  - ≤ 40 ms
  - ≤ 15 ms
  - < 4.3 V~eff (I = 250 mA)
  - 5 V...50 V
  - ≤ 1.3 V
  - 24 Vuc ±10%
  - 550 mW–/1150 mVA~
- –25 °C...+60 °C

**SMSI 2.5 AC O**
- Type Cat. No.: SMSI 2.5 AC O 115730000
- 10 V...250 Vac
  - 2.8 A
  - 250 mW
  - ≤ approx. 35%
  - ≤ 55 ms
  - ≤ 20 ms
  - < 200 mV
  - 24 Vuc ±10%
  - 100 mA
  - < 1.3 V
  - 23 mA–/47 mA~
- –25 °C...+60 °C

**SMSI 5 AC O**
- Type Cat. No.: SMSI 5 AC O 111210000
- 5...250 Vac
  - 1 A...5 A
  - ≤ 10 ms
  - ≤ 20 ms
  - < 200 mV
- –40 °C...+60 °C

### SMSI AC

**Current monitoring units with transistor output up to 5 A without switching threshold**

**SMSI 5 AC O**
- Type Cat. No.: SMSI 5 AC O 802693000
- 5...250 Vac
  - 1 A...5 A
  - ≤ 10 ms
  - ≤ 20 ms
  - < 200 mV
  - 24 Vuc ±10%
  - 100 mA
  - < 1.6 V
- –40 °C...+60 °C

### SMSI AC O

**Current monitoring with indicator up to 5 A without switching threshold**

**SMSI 5 AC**
- Type Cat. No.: SMSI 5 AC 111206000
- 5...250 Vac
  - 1 A...5 A
- –25 °C...+60 °C

---

**Fig. V**

**Fig. V**

**Fig. II**

**Fig. II**

---

**Analogue Signal Processing**
Current Monitoring

- For AC/DC
- Adjustable switching threshold
- Relay output

**SMSI DC R**
With adjustable switching threshold up to 250 mA

**SMSI AC R**
With adjustable switching threshold up to 250 mA

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMSI 0.25 DC R</td>
<td>1156660000</td>
<td>SMSI 0.25 AC R</td>
<td>1159960000</td>
</tr>
</tbody>
</table>

### Technical data

<table>
<thead>
<tr>
<th>Measurement circuit voltage</th>
<th>Max. permissible current in measurement circuit</th>
<th>Rated consumption — (VA)</th>
<th>Voltage drop at input</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V…250 Vac</td>
<td>350 mA</td>
<td>750 mVA $I = 250$ mA</td>
<td>$\leq 3$ V $I = 250$ mA</td>
</tr>
<tr>
<td>300 mA</td>
<td>1075 mVA $I = 250$ mA</td>
<td>$\leq 3$ V $I = 250$ mA</td>
<td></td>
</tr>
<tr>
<td>40 mA…250 mA</td>
<td>2% [250 mA:dev:&lt;1%] (40 mA)</td>
<td>2% [250 mA:dev:&lt;1%] (40 mA)</td>
<td></td>
</tr>
<tr>
<td>2% [250 mA:dev:&lt;1%] (40 mA)</td>
<td>2% [250 mA:dev:&lt;1%] (40 mA)</td>
<td>2% [250 mA:dev:&lt;1%] (40 mA)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjustable switching threshold</th>
<th>Max. continuous output current</th>
<th>Auxiliary voltage</th>
<th>Rated consumption auxiliary voltage</th>
<th>Max. switching current</th>
<th>Contact material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysteresis between turn-on and turn-off point</td>
<td>250 V</td>
<td>3 A</td>
<td>24 V – ±10%</td>
<td>24 V – ±10%</td>
<td></td>
</tr>
<tr>
<td>Activation time tA</td>
<td>Recovery</td>
<td>Output voltage</td>
<td>Auxiliary voltage</td>
<td>Rated consumption auxiliary voltage</td>
<td>Max. switching current</td>
</tr>
<tr>
<td>≤12 ms</td>
<td>≤15 ms</td>
<td>≤25 ms</td>
<td>≤25 ms</td>
<td>≤15 ms</td>
<td>≤25 ms</td>
</tr>
<tr>
<td>10 V…250 Vac</td>
<td>3 A</td>
<td>24 V – ±10%</td>
<td>24 V – ±10%</td>
<td>24 V – ±10%</td>
<td>24 V – ±10%</td>
</tr>
</tbody>
</table>

### Storage temperature

- Assembled without spacing TS
- Assembled with ≥20 mm spacing on TS

<table>
<thead>
<tr>
<th>Storage temperature</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>-25 °C…+60 °C</td>
<td>-25 °C…+60 °C</td>
</tr>
<tr>
<td>-25 °C…+60 °C</td>
<td>-25 °C…+60 °C</td>
</tr>
</tbody>
</table>

### Coordination of insulation to DIN VDE 0160,Draft 11/94

Overvoltage category, input : output

- Input 1 : output 2, input : output

<table>
<thead>
<tr>
<th>Overvoltage category, input : output</th>
<th>Contamination class</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>III</td>
<td>III</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Dimensions and connection data

see page 307

Fig. V

1 NC on request
**Current Monitoring**

---

**SMSI AC R**

**With adjustable switching threshold**

up to 2.5 A

---

**SMSI AC R**

Current monitoring with relay output up to 5 A without switching threshold

---

### Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMSI 2.5 AC R</td>
<td>1156960000</td>
</tr>
<tr>
<td>SMSI 5 AC R</td>
<td>1112260000</td>
</tr>
</tbody>
</table>

### Technical data

- **Measurement circuit voltage**
- **Max. permissible current in measurement circuit**
- **Rated consumption**
- **Voltage drop at input**
- **Adjustable switching threshold**
- **Hysteresis between turn-on and turn-off point**
- **Activation time tA**
- **Reaction time tR**
- **Recovery**
- **Max. continuous output current**
- **Auxiliary voltage**
- **Rated consumption auxiliary voltage**
- **Max. switching current**
- **Contact**
- **Contact material**

### Storage temperature

- Assembled without spacing on TS
- Assembled with a 20 mm spacing on TS

### Coordination of insulation to DIN VDE 0160,Draft 11/94

<table>
<thead>
<tr>
<th>Overvoltage category, input-output</th>
<th>Overvoltage category, input1-input2, Output1-output 2, input-output</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Dimensions and connection data

see page 307

---

**Fig. V**

---

**Fig. V**
Voltage Monitoring

- Voltage monitoring from 18 to 299 V
- One and three phase version
- Adjustable switching threshold

### SMSU 24 R

- Type: Cat. No.
  - SMSU 24 R: 1156760000

- Technical data
  - Voltage monitoring range (also Supply voltage)
    - 18 Vdc...27 Vdc or 18 Vac...27 Vac/50 Hz
    - 18 Vuc...24 Vuc
    - 1%...10%/5%
    - < 4 s
    - < 300 ms
  - Hysteresis/factory setting
    - a = assembled without spacing on mounting rail
    - b = assembled with ≥ 20 mm spacing on mounting rail
  - Max. output voltage: 250 V~
  - Max. switching current: 8 A
  - Max. continuous output current: 3 A
  - Contact: 1 changeover contact
  - Contact material: AgNi 0.15 gold-flashed
  - Switching capacity (resistive load): 2000 VA
  - Storage temperature: -40 °C...+60 °C
  - Ambient temperature: -25 °C...+50 °C
  - Coordination of insulation to DIN VDE 0160, Draft 11/94
  - Overvoltage category: input 1-input 2, output
  - Overvoltage category: input-output, output 1-output 2
  - Contamination class
  - Dimensions and connection data see page 306

### SMSU 48 R

- Type: Cat. No.
  - SMSU 48 R: 1157660000

- Technical data
  - Voltage monitoring range (also Supply voltage)
    - 36 Vdc...53 Vdc or 36 Vac...53 Vac/50 Hz
    - 36 Vuc...48 Vuc
    - 1%...10%/5%
    - < 2.5 s
    - < 300 ms
  - Hysteresis/factory setting
    - a = assembled without spacing on mounting rail
    - b = assembled with ≥ 20 mm spacing on mounting rail
  - Max. output voltage: 250 V~
  - Max. switching current: 8 A
  - Max. continuous output current: 3 A
  - Contact: 1 changeover contact
  - Contact material: AgNi 0.15 gold-flashed
  - Switching capacity (resistive load): 2000 VA
  - Storage temperature: -40 °C...+60 °C
  - Ambient temperature: -25 °C...+50 °C
  - Coordination of insulation to DIN VDE 0160, Draft 11/94
  - Overvoltage category: input 1-input 2, output
  - Overvoltage category: input-output, output 1-output 2
  - Contamination class
  - Dimensions and connection data see page 306
SMSU 110 R
SMSU 220 R
SMSU 260 R
SMSU 3x220 R
SMSU 1–24 DC
SMSU 1–230 AC/DC

Analogue Signal Processing

Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No.
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
SMSU 110 R | 115760000 | SMSU 220 R | 115760000 | SMSU 260 R | 1160160000 | SMSU 3x220 R | 115760000 | SMSU 1–230 AC/DC | 0555160000

83 Vdc...121 Vdc or
83 Vac...121 Vac/50 Hz
< 1.8 W
< 1.5 W
83 Vac...110 Vac
< 1%...10%/5%
< 4 s
< 300 ms

200 V...299 Vac/50 Hz
< 10 VA
< 1%...15%/5%
< 3 s
< 2 s

200 V...230 Vac 50 Hz
9 VA (L3); 60 mVA (L 1/L 2)
< 4 s
< 80 ms

200 V...260 V
150 V~...205 V~
–/7%
< 4 s
< 80 ms

On: 18.5 V, off: 5 V
15 ms
10 ms

24 Vdc ±10%
0.5 W

230 Vdc ±10%
0.9 W
1.1 W

24 V– ±10%
1 A
1 changeover contact
AgCdO, gold-flashed
106 switching operations
100 mA

24 V– ±10%
1 A
1 changeover contact
AgCdO, gold-flashed
106 switching operations
100 mA
Movement and Rotational Speed Monitoring

SMS
SIZA
Rotational speed monitoring

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS/SIZA</td>
<td>1110560000</td>
</tr>
</tbody>
</table>

Description

Power supply with delayed turn-off relay output for three-conductor DC initiators (NPN or PNP). The transformer supplies the initiator with 24 V DC. The initiator signal activates the relay, at which time the adjustable turn-off delay becomes effective. This module is particularly suitable for monitoring cyclic movements, e.g., down-times monitoring of conveyor drives, ventilators and pumps or stroke monitoring of valves, die cutters and drilling heads.

A contact element actuates the initiator at regular intervals. If these pulses cease, i.e., the proximity switch is continuously actuated (t₄–t₆) or deactivated (t₁–t₃), the relay transmits a signal after the set time has elapsed. During normal operation, the time function bridges the gaps between regular pulses (tₐ–t₉).

Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>230 Vdc +5 –15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiator type/initiator voltage</td>
<td>P or N switched/24 Vdc</td>
</tr>
<tr>
<td>Output voltage</td>
<td>250 V</td>
</tr>
<tr>
<td>Continuous current</td>
<td>4 A</td>
</tr>
<tr>
<td>Max. switching capacity</td>
<td>2000 VA</td>
</tr>
<tr>
<td>Resistor load</td>
<td>1 changeover contact</td>
</tr>
<tr>
<td>Contact material</td>
<td>AgNi 0.15 gold-flashed</td>
</tr>
<tr>
<td>Mechanical service life</td>
<td>&gt; 10⁷ switching operations</td>
</tr>
<tr>
<td>Time range</td>
<td>0.5...5 s</td>
</tr>
</tbody>
</table>

Coordination of insulation to VDE DIN 0160, draft11/94

<table>
<thead>
<tr>
<th>Type</th>
<th>300 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>2 kV</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>Ⅱ</td>
</tr>
<tr>
<td>Contamination class</td>
<td>≥ 3 mm</td>
</tr>
<tr>
<td>Clearance and creepage distance</td>
<td>EN 50 081-1/50 082-2</td>
</tr>
<tr>
<td>EMC</td>
<td></td>
</tr>
</tbody>
</table>

Accessories and dimensions see page 307

Fig. VI
### Namur Switch Amplifiers

**EGV-Namur**

- **Type**: Cat. No. 1120360000
- **Input voltage**: 24 Vdc ±10%
- **Initiator type/initiator voltage**: approx. 8 Vdc
- **Output voltage, -current**: 250 Vac/dc, 3 A
- **Max. switching capacity (resistive load)**: 2000 VA
- **Contact**: 1 NO
- **Contact material**: AgNi 0.15 gold-flashed
- **Mechanical service life**: > 10^7 switching operations
- **Ambient temperature**: 40 °C mounted
- **Coordination of insulation to VDE DIN 0160, draft11/94**: Rated voltage 300 V, Rated surge voltage 4 kV, Overvoltage category II, Contamination class A, Clearance and creepage distance ≥ 3 mm, EMC EN 50081, EN 50082, EN 50011
- **Accessories and dimensions see page 307**

**Description**

Switching amplifier for 2-wire Namur initiators with relay output. Enables the use of economic Namur initiators with short design lengths. This is particularly valid for areas where initiators are subjected to heavy mechanical stresses, and often need to be replaced. A potential-free NO contact is available on the output side for switching larger ratings (2000 VA). The Namur initiator can be directly connected to the module. LED function indicators indicate switching statuses.

**EGV-Inverter**

- **Type**: Cat. No. 1124600000
- **Input voltage**: 24 Vdc ± 10% (closed circuit current < 10 mA)
- **Initiator type/initiator voltage**: 24 Vdc ± 10% (switching threshold approx. 15 V)
- **Output voltage, -current**: 200 mA
- **Continuous current**: 0.2 A
- **Max. switching capacity (resistive load)**: EN 50081, EN 50082, EN 50011

**Description**

This module inverts the switching function of electronic outputs. A PNP output is changed into an NPN output with the load connected unilaterally against the positive potential (the negative potential is switched through). An NPN output is changed into a PNP output with the load connected unilaterally to the frame potential (the positive potential is switched through). The module reduces the inventory of sensors and electronic switches with PNP/NPN outputs to a single type.

**Technical data**

<table>
<thead>
<tr>
<th>Input voltage</th>
<th>24 Vdc ± 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiator type/initiator voltage</td>
<td>approx. 8 Vdc</td>
</tr>
<tr>
<td>Output voltage, -current</td>
<td>250 Vac/dc, 3 A</td>
</tr>
<tr>
<td>Max. switching capacity (resistive load)</td>
<td>2000 VA</td>
</tr>
<tr>
<td>Contact</td>
<td>1 NO</td>
</tr>
<tr>
<td>Contact material</td>
<td>AgNi 0.15 gold-flashed</td>
</tr>
<tr>
<td>Mechanical service life</td>
<td>&gt; 10^7 switching operations</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>40 °C mounted</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>300 V</td>
</tr>
<tr>
<td>Rated surge voltage</td>
<td>4 kV</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
</tr>
<tr>
<td>Contamination class</td>
<td>A</td>
</tr>
<tr>
<td>Clearance and creepage distance</td>
<td>≥ 3 mm</td>
</tr>
<tr>
<td>EMC</td>
<td>EN 50081, EN 50082, EN 50011</td>
</tr>
</tbody>
</table>

**Ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGV-Namur</td>
<td>1120360000</td>
</tr>
<tr>
<td>EGV-Inverter</td>
<td>1124600000</td>
</tr>
</tbody>
</table>

**Figures**

- **Fig. V**: Description of EGV-Inverter
- **Fig. VI**: Description of EGV-Namur
Set Point Generator

EMA/SW 24
- Set point generator
- switchable \(-10.5\, V/+10.5\, V\)

Set point 1 or set point 2 can be switched to the module’s output as required. The changeover is performed safely separated via the control input E1. The output voltage values \((0...10.5\, V)\) can be set using the spindle operated potentiometers SW1 and SW2. The control input E2 determines the polarity safely separated \((-10.5\, V...0\, V...+10\, V)\).

Control input E1: 0 V = set point 1, 24 V = set point 2,
Control input E2: 0 V = positive set point, 24 V = negative set point

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMA/SW</td>
<td>11726060000</td>
</tr>
</tbody>
</table>

Technical data

Input signal/measurement range

<table>
<thead>
<tr>
<th>Control voltage</th>
<th>Max. input current</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V ± 20 %</td>
<td>≤ 7 mA at 24 V</td>
</tr>
</tbody>
</table>

Display

- each control input: red LED
- via trimming potentiometer
- 25 rotations nom.

Setting

Output signal

Output

- Voltage output selection by E1/E2
- adjustable from \(-10.5\, V...+10.5\, V\)

Output current

- max. \(\pm 25\, mA\) at \(U_{\text{rated}}=24\, V\)
- min. \(400\, \Omega\) at \(U_{\text{rated}}=24\, V\)

Load resistance

- \(0.168\, V/\mu s\)
- \(30\, mV/106\, kHz\) (at \(U_{\text{max}}\))
- rising 50 \(\mu s\)
- decreasing 80 \(\mu s\)

Slew-Rate

Supply voltage UB:

- \(24\, V\) ± 20 %, 30 mA (\(R_L = \infty\))

Residual ripple

- 30 mV/106 kHz (at \(U_{\text{max}}\))
- rising 50 \(\mu s\)
- decreasing 80 \(\mu s\)

Reaction time

Isolation voltage, voltage strength

<table>
<thead>
<tr>
<th>Input/output/supply</th>
<th>Input-Output/TS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1, kV)</td>
<td>(4, kV)</td>
</tr>
</tbody>
</table>

Operating temperature

- \(-20\, ^\circ\, C...+70\, ^\circ\, C\)
- \(0\, ^\circ\, C...+50\, ^\circ\, C\)

Insulation coordination according to EN 50 178

Overvoltage category

- III

Contamination class

- 2

Fig. V

Electronic changeover switch

Accessories, dimensions and connection data see page 307
8-Bit Analogue/Digital Converters

RS/U-D8

Hold function (H):
The converter can, for example, by means of the hold function (H) be matched to the cycle time of a PLC. Holding and release of the conversion. The Hold input (H) is internally connected to 0 V via a resistor. In order to store the last signal, the Hold input (H) must be supplied with 24 V.

Enable function (E):
The Enable circuit (E) allows several converters, e.g. on an input card of a PLC, to be switched on. The Enable input (E) is connected internally to 0 V via a resistor. In order to make the connection to the PLC, one converter must be disconnected. The other converters are supplied with 24 V (at least 12 V). This causes the converters at the output to be highly resistive.

Functions table (example)

<table>
<thead>
<tr>
<th>Terminal PIN</th>
<th>Digital value/digital value</th>
<th>Analog voltage</th>
<th>Analog voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSB</td>
<td>L8</td>
<td>E7</td>
<td>E6</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Ordering data

Type Cat. No.
RS/U-D 8 1122361001
RS/I-D 8 1160561001

Technical data

Input signal
Max. input voltage
Max. input current
Input resistance
Max. limit frequency
Resolution

Output signal
Output current
Output level
Prefix
Transmission error
Conversion time
Supply
Connection arrangement

Storage temperature
Operating temperature
EMC EN 50 081-1/50 082-2

1) 1 LSB-Accuracy 2) Enable: 24 V = tristate

Digital volante/digital value
Analogue voltage

Enable function (E):
The Enable circuit (E) allows several converters, e.g. on an input card of a PLC, to be switched on. The Enable input (E) is connected internally to 0 V via a resistor. In order to make the connection to the PLC, one converter must be disconnected. The other converters are supplied with 24 V (at least 12 V). This causes the converters at the output to be highly resistive.

Enable function (E):
The Enable circuit (E) allows several converters, e.g. on an input card of a PLC, to be switched on. The Enable input (E) is connected internally to 0 V via a resistor. In order to make the connection to the PLC, one converter must be disconnected. The other converters are supplied with 24 V (at least 12 V). This causes the converters at the output to be highly resistive.

Ordering data

Type Cat. No.
RS/U-D 8 1122361001
RS/I-D 8 1160561001

Technical data

Input signal
Max. input voltage
Max. input current
Input resistance
Max. limit frequency
Resolution

Output signal
Output current
Output level
Prefix
Transmission error
Conversion time
Supply
Connection arrangement

Storage temperature
Operating temperature
EMC EN 50 081-1/50 082-2

1) 1 LSB-Accuracy 2) Enable: 24 V = tristate

Digital volante/digital value
Analogue voltage

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Ordering data

Type Cat. No.
RS/U-D 8 1122361001
RS/I-D 8 1160561001

Technical data

Input signal
Max. input voltage
Max. input current
Input resistance
Max. limit frequency
Resolution

Output signal
Output current
Output level
Prefix
Transmission error
Conversion time
Supply
Connection arrangement

Storage temperature
Operating temperature
EMC EN 50 081-1/50 082-2

1) 1 LSB-Accuracy 2) Enable: 24 V = tristate

Digital volante/digital value
Analogue voltage

Enable function (E):
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Enable function (E):
The Enable circuit (E) allows several converters, e.g. on an input card of a PLC, to be switched on. The Enable input (E) is connected internally to 0 V via a resistor. In order to make the connection to the PLC, one converter must be disconnected. The other converters are supplied with 24 V (at least 12 V). This causes the converters at the output to be highly resistive.
## 8-Bit Digital/Analogue Converters

<table>
<thead>
<tr>
<th>Ordering data</th>
<th>Type</th>
<th>Cat. No.</th>
<th>Technical data</th>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input signal</strong></td>
<td></td>
<td></td>
<td><strong>Output signal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. input voltage</td>
<td>5...24 V (typ. 24 V)</td>
<td></td>
<td>Max. input current</td>
<td>2.5 mA</td>
<td></td>
</tr>
<tr>
<td>Max. input current</td>
<td>2.5 mA</td>
<td></td>
<td>Input resistance</td>
<td>50 kΩ per input</td>
<td></td>
</tr>
<tr>
<td>Prefix</td>
<td>MSB, H = positive, L = negative</td>
<td></td>
<td>Resolution</td>
<td>78 mV ± 1 LSB</td>
<td></td>
</tr>
<tr>
<td><strong>Output signal</strong></td>
<td>8 Bit (1 Bit prefix)</td>
<td></td>
<td>Offset</td>
<td>± 10 mA</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>± 10 mA, max. current</td>
<td></td>
<td>Load resistance</td>
<td>± 20 mA</td>
<td></td>
</tr>
<tr>
<td>Max. input voltage</td>
<td>± 1 kΩ</td>
<td></td>
<td>Transmission error</td>
<td>± 1 kΩ</td>
<td></td>
</tr>
<tr>
<td>Conversion time</td>
<td>± 20 µs</td>
<td></td>
<td>Supply</td>
<td>± 100 µs</td>
<td></td>
</tr>
<tr>
<td><strong>Connection arrangement</strong></td>
<td></td>
<td></td>
<td>Connection arrangement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RS/D 8-U
- **Cat. No.:** RS/D 8-U 112361001
- **Input signal:**
  - Max. input voltage: 5...24 V (typ. 24 V)
  - Max. input current: 2.5 mA
  - Input resistance: 50 kΩ per input
  - Resolution: 78 mV ± 1 LSB
- **Output signal:**
  - Output current: ± 10 mA
  - Offset: ± 10 mA, max. current
- **Connection arrangement:**
  - Terminal 1 LSB
  - Terminal 2 MSB
  - Terminal 3 Hold
- **Storage temperature:**
  - -40 °C...+85 °C
  - 0 °C...+50 °C

### RS/D 8-I
- **Cat. No.:** RS/D 8-I 1165861001
- **Input signal:**
  - Max. input voltage: 5...24 V (typ. 30 V)
  - Max. input current: 2.5 mA
  - Input resistance: 50 kΩ per input
  - Resolution: 78 mV ± 1 LSB
- **Output signal:**
  - Output current: ± 10 mA
  - Offset: ± 10 mA, max. current
- **Connection arrangement:**
  - Terminal 1 LSB
  - Terminal 2 MSB
  - Terminal 3 Hold
- **Storage temperature:**
  - -40 °C...+85 °C
  - 0 °C...+50 °C

---

### RS/D 8-U
- **Cat. No.:** RS/D 8-U 1169261001
- **Input signal:**
  - Max. input voltage: 5...24 V (typ. 24 V)
  - Max. input current: 2.5 mA
  - Input resistance: 50 kΩ per input
  - Resolution: 50 kΩ ± 1 LSB
- **Output signal:**
  - Output current: ± 10 mA
  - Offset: ± 10 mA, max. current
- **Connection arrangement:**
  - Terminal 1 LSB
  - Terminal 2 MSB
  - Terminal 3 Hold
- **Storage temperature:**
  - -40 °C...+85 °C
  - 0 °C...+50 °C

### RS/D 8-I
- **Cat. No.:** RS/D 8-I 1169261001
- **Input signal:**
  - Max. input voltage: 5...24 V (typ. 30 V)
  - Max. input current: 2.5 mA
  - Input resistance: 50 kΩ per input
  - Resolution: 78 µA ± 1 LSB
- **Output signal:**
  - Output current: ± 10 mA
  - Offset: ± 10 mA, max. current
- **Connection arrangement:**
  - Terminal 1 LSB
  - Terminal 2 MSB
  - Terminal 3 Hold
- **Storage temperature:**
  - -40 °C...+85 °C
  - 0 °C...+50 °C
Hold function (H):
The converter can, for example, by means of the hold function (H) be matched to the cycle time of a PLC. Holding and release of the conversion. The Hold input (H) is internally connected to 0 V via a resistor. In order to store the last signal, the hold input (H) must be supplied with 24 V.

<table>
<thead>
<tr>
<th>Digital value/digital value</th>
<th>Terminal</th>
<th>PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSB</td>
<td>LSB</td>
<td>12</td>
</tr>
<tr>
<td>4 mA</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20 mA</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS/U-D 12</td>
<td>1168261001</td>
</tr>
<tr>
<td>RS/U-D 12</td>
<td>1168361001</td>
</tr>
<tr>
<td>RS/I-D 12</td>
<td>1168461001</td>
</tr>
<tr>
<td>RS/I-D 12</td>
<td>1169161001</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Input signal/measurement range</th>
<th>Max. input voltage</th>
<th>Max. input current</th>
<th>Input resistance</th>
<th>Prefix</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...10 V</td>
<td>±15 V</td>
<td>±25 mA (as source)</td>
<td>100 kΩ</td>
<td>MSB: H positive, L negative</td>
<td>4.88 mV ± 1 LSB</td>
</tr>
<tr>
<td>0...20 mA</td>
<td>±10 V</td>
<td>±25 mA (as source)</td>
<td>100 kΩ</td>
<td>2.44 mV ± 1 LSB</td>
<td></td>
</tr>
<tr>
<td>4...20 mA</td>
<td>±10 V</td>
<td>±25 mA (as source)</td>
<td>4.9 µA ± 1 LSB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Output signal

<table>
<thead>
<tr>
<th>Output current</th>
<th>Output level</th>
<th>Load resistance</th>
<th>Transmission error</th>
<th>Conversion time</th>
<th>Temperature coefficient</th>
<th>Supply</th>
<th>Max. power loss</th>
<th>Connection arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mA</td>
<td>24 V±, ±20 %</td>
<td>4 W</td>
<td>±1 LSB</td>
<td>±50 µs</td>
<td>24 °C ±5 °C</td>
<td>±20 %</td>
<td>24 V–, ±20 %</td>
<td>Terminal 1 LSB</td>
</tr>
<tr>
<td>20 mA</td>
<td>24 V±, 0 V</td>
<td>4 W</td>
<td>±1 LSB</td>
<td>±50 µs</td>
<td>24 °C ±10 °C</td>
<td>±20 %</td>
<td>24 V–, ±20 %</td>
<td>Terminal 1 LSB</td>
</tr>
</tbody>
</table>

Storage temperature

| 40 °C → +80 °C |
| 0 °C → +50 °C |

Temperature coefficient

| 24 °C ±5 °C |
| 24 °C ±10 °C |

Supply

| ±20 % |
| ±20 % |

Connection arrangement

<table>
<thead>
<tr>
<th>Terminal 1 LSB</th>
<th>Terminal 1 LSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold function:</td>
<td>Hold function:</td>
</tr>
<tr>
<td>High e +24 V e storage of digital signal</td>
<td>High e +24 V e storage of digital signal</td>
</tr>
<tr>
<td>Low e 0 V e enabling the conversion cycle</td>
<td>Low e 0 V e enabling the conversion cycle</td>
</tr>
</tbody>
</table>
12-Bit Digital/Analogue Converters

Ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS/D 12-U</td>
<td>1160610001</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Input signal/measurement range</th>
<th>12 Bit (1 Bit as prefix)</th>
<th>12 Bit</th>
<th>12 Bit</th>
<th>12 Bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input voltage</td>
<td>24 V, ±20 %</td>
<td>24 V, ±20 %</td>
<td>24 V, ±20 %</td>
<td>24 V, ±20 %</td>
</tr>
<tr>
<td>Input current, I_{inom}</td>
<td>4.2 mA</td>
<td>4.2 mA</td>
<td>4.2 mA</td>
<td>4.2 mA</td>
</tr>
<tr>
<td>Input resistance</td>
<td>5.7 kΩ</td>
<td>5.7 kΩ</td>
<td>5.7 kΩ</td>
<td>5.7 kΩ</td>
</tr>
<tr>
<td>Prefix</td>
<td>MSB: H \text{ positive, } L \text{ negative}</td>
<td>MSB: H \text{ positive, } L \text{ negative}</td>
<td>MSB: H \text{ positive, } L \text{ negative}</td>
<td>MSB: H \text{ positive, } L \text{ negative}</td>
</tr>
<tr>
<td>Resolution</td>
<td>4.88 mV \text{ LSB}</td>
<td>2.44 mV \text{ LSB}</td>
<td>4.9 µA \text{ LSB}</td>
<td>4 µA \text{ LSB}</td>
</tr>
<tr>
<td>Output signal</td>
<td>–10 V...+10 V</td>
<td>0 V...10 V</td>
<td>0...20 mA</td>
<td>0...20 mA</td>
</tr>
<tr>
<td>Load resistance</td>
<td>± 1 kΩ</td>
<td>± 1 kΩ</td>
<td>± 1 kΩ</td>
<td>± 1 kΩ</td>
</tr>
<tr>
<td>Transmission error</td>
<td>± 4 µA</td>
<td>± 4 µA</td>
<td>± 4 µA</td>
<td>± 4 µA</td>
</tr>
<tr>
<td>Conversion time</td>
<td>± 200 ppm from FSR/°C</td>
<td>± 200 ppm from FSR/°C</td>
<td>± 200 ppm from FSR/°C</td>
<td>± 200 ppm from FSR/°C</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>40 °C...+85 °C</td>
<td>0 °C...+50 °C</td>
<td>40 °C...+85 °C</td>
<td>0 °C...+50 °C</td>
</tr>
</tbody>
</table>

| Output current                | I_{out}                  | I_{out}     | I_{out}  | I_{out}  |
| Load resistance               | ≤ 500 Ω                  | ≤ 500 Ω     | ≤ 500 Ω  | ≤ 500 Ω  |
| Transmission error            | ± 500 µA                 | ± 500 µA    | ± 500 µA | ± 500 µA |
| Conversion time               | ± 200 ppm from FSR/°C    | ± 200 ppm from FSR/°C | ± 200 ppm from FSR/°C | ± 200 ppm from FSR/°C |
| Temperature coefficient       | 40 °C...+85 °C            | 0 °C...+50 °C | 40 °C...+85 °C | 0 °C...+50 °C |

| Max. power loss               |                          |            |          |          |
| Connection arrangement        | Terminal 1 LSB           | Terminal 1 LSB | Terminal 1 LSB | Terminal 1 LSB |
| Hold function:                | Terminal 12 MSB          | Terminal 12 MSB | Terminal 12 MSB | Terminal 12 MSB |
|                              | Hold function:           | Hold function: | Hold function: | Hold function: |
|                              | High e +24 V e storage of | High e +24 V e storage of | High e +24 V e storage of | High e +24 V e storage of |
|                              | analogue signal          | analogue signal | analogue signal | analogue signal |
|                              | Low e 0 V e enabling the | Low e 0 V e enabling the | Low e 0 V e enabling the | Low e 0 V e enabling the |
|                              | conversion cycle         | conversion cycle | conversion cycle | conversion cycle |

Storage temperature

| 40 °C...+85 °C | 0 °C...+50 °C |

Operating temperature

| 40 °C...+85 °C | 0 °C...+50 °C |

EMC EN 50 081-1/50 082-2