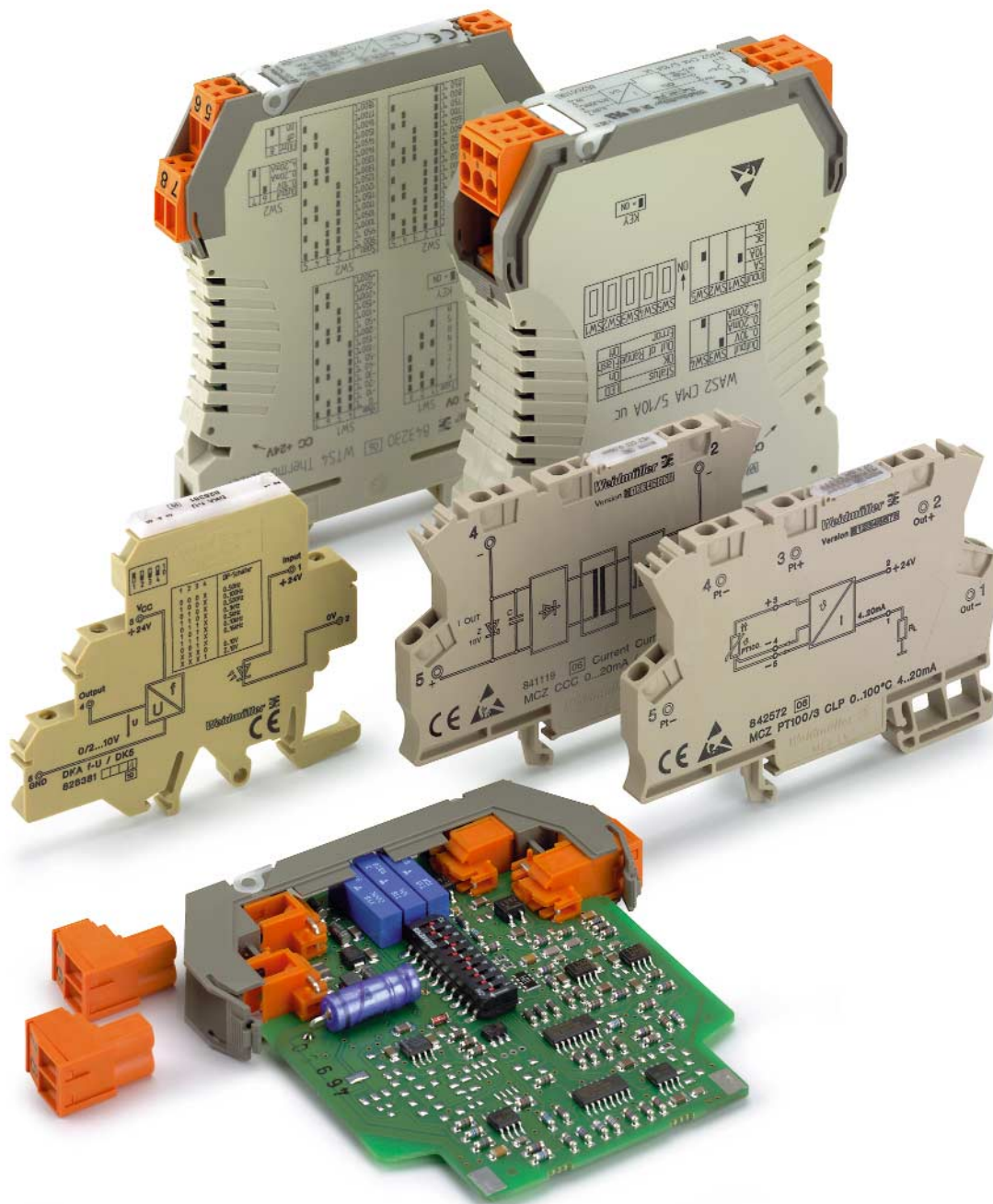




### The problem

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

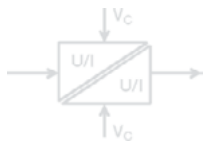
contains the following functions:

- 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

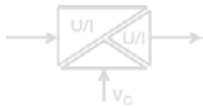
These products are categorised according to functionality as pure signal conversion, 2-way-isolation, 3-way-isolation and as passive separation.



## Analogue Signal Processing



**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.



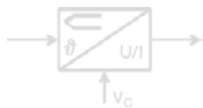
**3-way-isolation** also decouples the supply voltage from the input and output circuits, and enables the function with only one operating voltage.



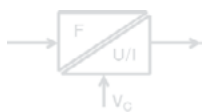
The **passive isolator** offers a further elementary advantage; it needs no additional voltage supply. The supply to the modules ensues via the input circuit and is the transferred to the output. This current loop supply is distinguished by very low power consumption.



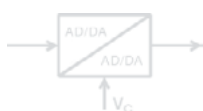
There are a large number of products available for measuring temperatures. RTD **PT100** signals, in 2-, 3- and 4-wire technology, are converted to standardised 0 – 20 mA, 4 – 20 mA and 0 – 10 V signals.



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.



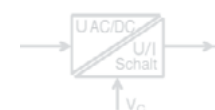
**Frequency converters** convert frequencies to standard analogue signals. This enables controllers connected in series to directly process impulse trains when making speed or rotational speed measurements.



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.

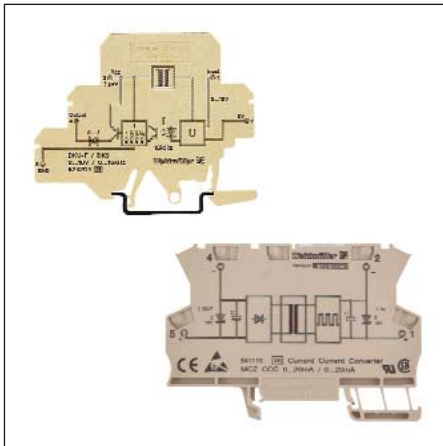


Modules for **monitoring of revolutions and torque** enable the control of cyclic movements on conveyor belts, ventilators and pumps. The output responds after a set amount of time, should the expected impulse not be received. The reliable potential-free relay contact, signals the interference to the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



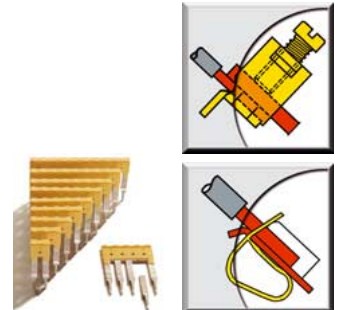
## Design Overview

### Mini Coupler / Mini Conditioner

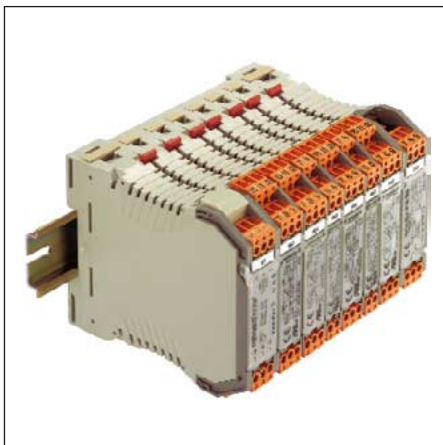


#### DK Mini Coupler / MCZ Mini Conditioner

- 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

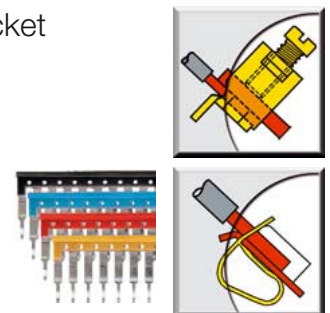


### WAVESERIES

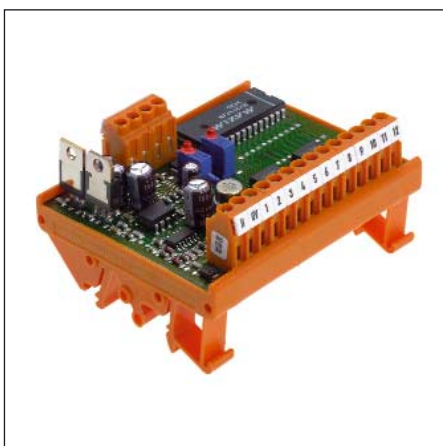


#### WAVEANALOG / WAVEANALOG PRO / WAVECONTROL

- 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

## Selection Table of Functions

| Function                                      | Areas of application                                                                                                                                                                 | Description                                                           | Versions                            | Page                      |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------|---------------------------|
| <b>DC signal conditioners</b>                 | Signal conditioning, signal isolation, suppression of mass loops                                                                                                                     | DC input/fixed functions and configurable inputs and outputs          | MCZ<br>WAVEANALOG<br>WAVEANALOG PRO | 164<br>174-184<br>185     |
|                                               | Motor current limitation, pressure alarm, direct disconnection of connected modules, safety function                                                                                 | DC input/limit value monitoring                                       | DK<br>MCZ                           | 172<br>173                |
| <b>PT100 signal conditioners</b>              | Temperature monitoring, noise rejection, electrical decoupling of visualization devices, suppression of mass loops, heating and cooling monitoring, overheating protection of motors | RTD input/fixed functions and configurable inputs and outputs         | MCZ<br>WAVEANALOG<br>WAVEANALOG PRO | 165<br>186-188<br>189     |
| <b>Thermocouple conditioners</b>              | Temperature monitoring, noise rejection, electrical decoupling of visualization devices, suppression of mass loops, heating and cooling monitoring, overheating protection of motors | Thermo input/fixed functions and configurable inputs and outputs      | WAVEANALOG<br>WAVEANALOG PRO        | 190<br>191                |
| <b>Frequency signal conditioners</b>          | Flow rate measurements, frequency converter monitoring, speed measurements, pulse processing                                                                                         | Input/fixed functions and configurable inputs and outputs             | DK<br>MCZ                           | 167-168<br>166            |
| <b>AD/DA converters</b>                       | Conditioning of voltage and current signals in 8-bit/12-bit digital form                                                                                                             | 8-bit AD/DA converter<br>12-bit AD/DA converter                       | RS                                  | 210-213                   |
| <b>Current monitoring</b>                     | Motor current monitoring, emergency lighting monitoring                                                                                                                              | AC input/measuring of sinusoidal and non sinusoidal signals up to 60A | DKI<br>WAVECONTROL<br>SMSI          | 172<br>196-199<br>200-203 |
| <b>Voltage monitoring</b>                     | Under and overvoltage monitoring, operating status indication                                                                                                                        | One and three-phase overvoltage                                       | SMSU                                | 204-205                   |
| <b>Motion and rotational speed monitoring</b> | Downtime monitoring, conveyor-drive monitoring, monitoring of fans, pumps or pistons                                                                                                 | PNP/NPN or NAMUR input/switching output                               | DKLW<br>SMS                         | 169<br>206                |
| <b>Namur switching amplifier</b>              | Switching amplifier                                                                                                                                                                  | Namur input/switching output                                          | EGV                                 | 207                       |
| <b>Setpoint device</b>                        | Testing measuring distances, defined input of analogue values                                                                                                                        | 1 control input/+/-set value/ analogue output                         | EMA/SW24                            | 208                       |

## Selection Table

| Function | Input    | Output   | Galvanic isolation | Voltage supply                                        | Setting      | Module width/mm | Connection type    | Cat. No.                                 | Page |
|----------|----------|----------|--------------------|-------------------------------------------------------|--------------|-----------------|--------------------|------------------------------------------|------|
| DC/DC    | 0...20mA | 0...20mA | yes                | Without auxiliary pwr. current loop supply from input | Fixed        | 6               | Tens. clamp        | 8411190000                               | 164  |
|          | 0...20mA | 0...20mA | yes                | Without auxiliary pwr. current loop supply from input | Fixed        | 17.5            | Screw/ tens. clamp | 8444950000/<br>8444960000<br>(1-channel) | 174  |
|          | 0...20mA | 0...20mA | yes                | Without auxiliary pwr. current loop supply from input | Fixed        | 17.5            | Screw/ tens. clamp | 8463580000/<br>8463590000<br>(2-channel) | 174  |
|          | 0...20mA | 0...20mA | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of both sides       | Fixed        | 12.5            | Screw/ tens. clamp | 8445070000/<br>8445080000                | 176  |
|          | 0...20mA | 0...20mA | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540180000/<br>8540190000                | 178  |
|          | 0...20mA | 0...20mA | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447160000/<br>8447170000                | 181  |
|          | 0...20mA | 4...20mA | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of both sides       | Fixed        | 12.5            | Screw/ tens. clamp | 8446970000/<br>8446990000                | 176  |
|          | 0...20mA | 4...20mA | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540250000/<br>8540260000                | 181  |
|          | 0...20mA | 4...20mA | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447190000/<br>8447200000                | 181  |
|          | 0...20mA | 0...10V  | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of both sides       | Fixed        | 12.5            | Screw/ tens. clamp | 8447020000/<br>8447030000                | 176  |
|          | 0...20mA | 0...10V  | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540270000/<br>8540280000                | 178  |
|          | 0...20mA | 0...10V  | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447220000/<br>8447230000                | 181  |
|          | 4...20mA | 0...20mA | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of output side      | Fixed        | 12.5            | Screw/ tens. clamp | 8444980000/<br>8444990000                | 175  |
|          | 4...20mA | 0...20mA | yes                | 18...30Vdc                                            | Fixed/10 kHz | 17.5            | Screw/ tens. clamp | 8540200000/<br>8540210000                | 179  |
|          | 4...20mA | 0...20mA | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447250000/<br>8447260000                | 182  |
|          | 4...20mA | 4...20mA | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of output side      | Fixed        | 12.5            | Screw/ tens. clamp | 8445010000/<br>8445020000                | 175  |
|          | 4...20mA | 4...20mA | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540180000/<br>8540190000                | 178  |
|          | 4...20mA | 4...20mA | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447160000/<br>8447170000                | 182  |
|          | 4...20mA | 0...10V  | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of output side      | Fixed        | 12.5            | Screw/ tens. clamp | 8445040000/<br>8445050000                | 175  |
|          | 4...20mA | 0...10V  | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540230000/<br>8540240000                | 179  |
|          | 4...20mA | 0...10V  | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447280000/<br>8447290000                | 182  |
|          | 0...10V  | 0...20mA | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of both sides       | Fixed        | 12.5            | Screw/ tens. clamp | 8447050000/<br>8447080000                | 177  |
|          | 0...10V  | 0...20mA | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540310000/<br>8540320000                | 180  |
|          | 0...10V  | 0...20mA | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447310000/<br>8447320000                | 183  |
|          | 0...10V  | 4...20mA | 2-way              | 19.2...28.8V/<br>Voltage supply of both sides         | Fixed        | 12.5            | Screw/ tens. clamp | 8447100000/<br>8447110000                | 177  |
|          | 0...10V  | 4...20mA | yes                | 18...30Vdc                                            | Fixed/10 Hz  | 17.5            | Screw/ tens. clamp | 8540290000/<br>8540300000                | 180  |
|          | 0...10V  | 4...20mA | 3-way              | 18...30Vdc                                            | Fixed/20 kHz | 17.5            | Screw/ tens. clamp | 8447340000/<br>8447350000                | 183  |
|          | 0...10V  | 0...10V  | 2-way              | 19.2...28.8Vdc/<br>Voltage supply of both sides       | Fixed        | 12.5            | Screw/ tens. clamp | 8447130000/<br>8447140000                | 177  |

## Selection Table

| Function                  | Input                                                                                                   | Output                                                          | Galvanic isolation | Voltage supply                   | Setting                     | Module width/mm | Connection type       | Cat. No.                  | Page        |
|---------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------|----------------------------------|-----------------------------|-----------------|-----------------------|---------------------------|-------------|
|                           | 0...10V                                                                                                 | 0...10V                                                         | yes                | 18...30Vdc                       | Fixed/10 Hz                 | 17.5            | Screw/<br>tens. clamp | 8540330000/<br>8540340000 | 180         |
|                           | 0...10V                                                                                                 | 0...10V                                                         | 3-way              | 18...30Vdc                       | Fixed/20 kHz                | 17.5            | Screw/<br>tens. clamp | 8447370000/<br>8447380000 | 184         |
|                           | Variable voltage and current<br>(+/-20mV...+/-200V,<br>+/-0.1mA...+/-100mA)                             | Variable voltage and current<br>(-10V...+10V,<br>-20mA...+20mA) | yes                | 20...253Vdc                      | DIP switch<br>Potentiometer | 12.5            | Screw/<br>tens. clamp | 8560740000/<br>8560750000 | 185         |
|                           | PT100/                                                                                                  | (4)...20mA                                                      | no                 | 19.2...28.8Vdc                   | DIP switch                  | 12.5            | Screw/<br>tens. clamp | 8432210000/<br>8432220000 | 186         |
| RTD/DC                    | PT100/<br>2-wire                                                                                        | 0...10V                                                         | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 12.5            | Screw/<br>tens. clamp | 8432180000/<br>8432190000 | 186         |
|                           | PT100/<br>2-wire                                                                                        | 4...20mA                                                        | no                 | current loop supply<br>in output | Fixed                       | 6               | Tens. clamp           | 8425720000                | 165         |
|                           | PT100/<br>3-wire                                                                                        | 0(4)...20mA                                                     | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 12.5            | Screw/<br>tens. clamp | 8432150000/<br>8432160000 | 187         |
|                           | PT100/<br>3-wire                                                                                        | 0...10V                                                         | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 12.5            | Screw/<br>tens. clamp | 8432090000/<br>8432130000 | 187         |
|                           | PT100/0<br>4-wire                                                                                       | (4)...20mA                                                      | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 12.5            | Screw/<br>tens. clamp | 8432270000/<br>8432280000 | 188         |
|                           | PT100/<br>4-wire                                                                                        | 0...10V                                                         | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 12.5            | Screw/<br>tens. clamp | 8432240000/<br>8432250000 | 188         |
|                           | PT100/<br>2-/3-/4-conduct.<br>Ni100<br>Potentiometer:<br>min. 0...100Ω<br>max. 0...100kΩ<br>R: 0...450Ω | 0...10V<br>0...20mA<br>4...20mA                                 | yes                | 18...30Vdc                       | DIP switch<br>Potentiometer | 17.5            | Screw/<br>tens. clamp | 8560700000/<br>8560710000 | 189         |
|                           | K, J, T, E, N,<br>R, S, B                                                                               |                                                                 |                    |                                  |                             |                 |                       |                           |             |
|                           | Thermo<br>K, J, T, E, N,<br>R, S, B                                                                     | 0...10V<br>0...20mA<br>4...20mA                                 | no                 | 19.2...28.8Vdc                   | DIP switch                  | 12.5            | Screw/<br>tens. clamp | 8432300000/<br>8432310000 | 190         |
| Thermo/DC                 | Thermocouples<br>K, J, T, E, N,<br>R, S, B                                                              | 0...10V<br>0...20mA<br>4...20mA                                 | yes                | 18...30Vdc                       | DIP switch<br>Potentiometer | 17.5            | Screw/<br>tens. clamp | 8560720000/<br>8560730000 | 191         |
|                           |                                                                                                         |                                                                 |                    |                                  |                             |                 |                       |                           |             |
| Frequency/DC              | 0...50/100/500Hz<br>0...1/5/10/16kHz                                                                    | 0(4)...20mA                                                     | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Screw                 | 8311870001                | 168         |
|                           | 0...50/100/500Hz<br>0...1/5/10/16kHz                                                                    | 0(4)...20mA                                                     | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Screw                 | 8311870001                | 168         |
|                           | 0...50/100/500Hz<br>0...1/5/10/16kHz                                                                    | 0...10V                                                         | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Screw                 | 8283810000                | 168         |
|                           | 0...20mA                                                                                                | 0...1/5/10/16kHz                                                | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Screw                 | 8258870000                | 167         |
|                           | 0...20mA                                                                                                | 0...1/5/10/16kHz                                                | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Tens. clamp           | 8461480000                | 166         |
|                           | 4...20mA                                                                                                | 0...1/5/10/16kHz                                                | no                 | current loop supply<br>in input  | DIP switch                  | 6               | Screw                 | 8081330000                | 167         |
|                           | 4...20mA                                                                                                | 0...1/5/10/16kHz                                                | no                 | current loop supply<br>in input  | DIP switch                  | 6               | Tens. clamp           | 8461490000                | 166         |
|                           | 0...10V                                                                                                 | 0...1/5/10/16kHz                                                | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Screw                 | 8242040000                | 167         |
|                           | 0...10V                                                                                                 | 0...1/5/10/16kHz                                                | no                 | 21.6...26.4Vdc                   | DIP switch                  | 6               | Tens. clamp           | 8461470000                | 166         |
|                           | Variable,<br>programmable                                                                               | Switching output<br>PNP                                         | no                 | 19.2...28.8Vdc                   | Fixed                       | 12              | Screw                 | 8248340000                | 170-<br>171 |
| Limit value<br>monitoring | 0...20mA                                                                                                | Switching output<br>PNP 2-channel                               | no                 | 19.2...28.8Vdc                   | Potentiometer               | 6               | Screw                 | 8031320000                | 172         |
|                           | 0...20mA                                                                                                | Switching output<br>PNP 2-channel                               | no                 | 19.2...28.8Vdc                   | Potentiometer               | 6               | Tens. clamp           | 8227350000                | 173         |
|                           | 0...10V                                                                                                 | Switching output<br>PNP 2-channel                               | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 6               | Screw                 | 8019640000                | 172         |
|                           | 0...10V                                                                                                 | Switching output<br>PNP 2-channel                               | no                 | 19.2...28.8Vdc                   | DIP switch<br>Potentiometer | 6               | Tens. clamp           | 8260280000                | 173         |
| AD convert.               | 0...20mA                                                                                                | 8-bit                                                           | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1160561001                | 210         |
|                           | 4...20mA                                                                                                | 8-bit                                                           | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1168561001                | 210         |
|                           | 0...10V                                                                                                 | 8-bit                                                           | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1160361001                | 210         |
|                           |                                                                                                         | 8-bit                                                           | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1122361001                | 210         |
|                           | 0...20mA                                                                                                | 12-bit                                                          | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1168461001                | 212         |
|                           | 4...20mA                                                                                                | 12-bit                                                          | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1169161001                | 212         |
|                           | 0...10V                                                                                                 | 12-bit                                                          | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1168361001                | 212         |
|                           |                                                                                                         | 12-bit                                                          | no                 | 19.2...28.8Vdc                   | Fixed                       | 70              | Screw                 | 1168261001                | 212         |

## Selection Table

| Function                                       | Input                  | Output               | Galvanic isolation | Voltage supply   | Setting       | Module width/mm | Connection type | Cat. No.          | Page |
|------------------------------------------------|------------------------|----------------------|--------------------|------------------|---------------|-----------------|-----------------|-------------------|------|
| <b>DA convert.</b>                             | 8-bit                  | 0...20mA             | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1165860000</b> | 211  |
|                                                | 8-bit                  | 4...20mA             | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1169260000</b> | 211  |
|                                                | 8-bit                  | 0...10V              | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1160760000</b> | 211  |
|                                                | 8-bit                  |                      | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1123360000</b> | 211  |
|                                                | 12-bit                 | 0...20mA             | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1166060000</b> | 213  |
|                                                | 12-bit                 | 4...20mA             | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1165960000</b> | 213  |
|                                                | 12-bit                 | 0...10V              | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1166160000</b> | 213  |
|                                                | 12-bit                 |                      | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1160860000</b> | 213  |
|                                                | 12-bit                 |                      | no                 | 19.2...28.8Vdc   | Fixed         | 70              | Screw           | <b>1160860000</b> | 213  |
| <b>Current monitoring</b>                      | 0...1/5/10 Aac         | 1)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Screw           | <b>8516560000</b> | 196  |
|                                                | 0...1/5/10 Aac         | 1)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8516570000</b> | 196  |
|                                                | 0...20/40/60 Aac       | 1)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Screw           | <b>8513340000</b> | 196  |
|                                                | 0...20/40/60 Aac       | 1)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8526600000</b> | 196  |
|                                                | 0...1/5/10 Aac         | 2)                   | 2-way              | 21.6...26.4Vdc   | DIP switch    | 22.5            | Screw           | <b>8523400000</b> | 197  |
|                                                | 0...1/5/10 Aac         | 2)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8523410000</b> | 197  |
|                                                | 0...1/5/10 Aac         | 3)                   | 2-way              | 12...30Vdc       | DIP sw./P*    | 22.5            | Screw           | <b>8528650000</b> | 197  |
|                                                | 0...1/5/10 Aac         | 3)                   | 2-way              | 12...30Vdc       | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8528660000</b> | 197  |
|                                                | 0...5/10 Aac           | 4)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Screw           | <b>8526610000</b> | 198  |
|                                                | 0...5/10 Aac           | 4)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8526620000</b> | 198  |
|                                                | 0...20/25/30 Aac       | 4)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Screw           | <b>8545830000</b> | 198  |
|                                                | 0...20/25/30 Aac       | 4)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8545840000</b> | 198  |
|                                                | 0...20/40/60 Aac       | 4)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Screw           | <b>8513330000</b> | 199  |
|                                                | 0...20/40/60 Aac       | 4)                   | 2-way              | 21.6...26.4Vdc   | DIP sw./P*    | 22.5            | Tens. clamp     | <b>8526590000</b> | 199  |
|                                                | 0.1...2A               | Switching output PNP | no                 | 18...30Vdc       | Fixed         | 6               | Screw           |                   |      |
|                                                | 1...50mAdc             | Opto-coupler         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1157160000</b> | 200  |
|                                                | 40...250mAdc           | Opto-coupler         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1156360000</b> | 200  |
|                                                | 40...250mAdc           | Opto-coupler         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1156460000</b> | 201  |
|                                                | 0.2...2.2Aac           | Opto-coupler         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1157360000</b> | 201  |
|                                                | 1...5Aac               | 21.6...26.4Vdc       | yes                | 10...250Vdc      | Fixed         | 22.5            | Screw           | <b>1112160000</b> | 201  |
|                                                | 1...5Aac               | 5...48Vdc            | yes                | 10...250Vdc      | Fixed         | 22.5            | Screw           | <b>8026930000</b> | 201  |
|                                                | 1...5Aac               | LED                  | yes                | 10...250Vdc      | Fixed         | 22.5            | Screw           | <b>1112060000</b> | 201  |
|                                                | 40...250mAdc           | NO 1-channel         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1156660000</b> | 202  |
|                                                | 40...250mAdc           | NO 1-channel         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1159960000</b> | 202  |
|                                                | 0.2...2.2Aac           | NO 1-channel         | yes                | 10...250Vdc      | Op. point     | 22.5            | Screw           | <b>1156960000</b> | 203  |
|                                                | 1...5Aac               | NO 1-channel         | yes                | 10...250Vdc      | Fixed         | 22.5            | Screw           | <b>1112260000</b> | 203  |
| <b>Voltage monitoring</b>                      | 1-24Vdc                | CO 1-channel         | yes                | 21.6...26.4Vdc   | Op. point     | 22.5            | Screw           | <b>0555060000</b> | 205  |
|                                                | 1-230Vdc               | CO 1-channel         | yes                | 207...253Vac     | Op. point     | 22.5            | Screw           | <b>0555160000</b> | 205  |
|                                                | 18...24Vac             | CO 1-channel         | yes                | 18...27Vac       | Op. point     | 22.5            | Screw           | <b>1156760000</b> | 204  |
|                                                | 36...48Vac             | CO 1-channel         | yes                | 36...53Vac       | Op. point     | 22.5            | Screw           | <b>1157660000</b> | 204  |
|                                                | 83...110Vac            | CO 1-channel         | yes                | 83...121Vac      | Op. point     | 22.5            | Screw           | <b>1157760000</b> | 205  |
|                                                | 165...220Vac           | CO 1-channel         | yes                | 165...253Vac     | Op. point     | 22.5            | Screw           | <b>1157860000</b> | 205  |
|                                                | 200...260Vac           | NO 1-channel         | yes                | 200...299Vac     | Op. point     | 22.5            | Screw           | <b>1160160000</b> | 205  |
|                                                | 3 phase 165...230Vac   | NO 2-channel         | yes                | 165...230Vac     | Op. point     | 22.5            | Screw           | <b>1156560000</b> | 205  |
|                                                | 3 phase 165...230Vac   | NO/NC                | yes                | 165...230Vac     | Op. point     | 22.5            | Screw           | <b>1178760000</b> | 205  |
| <b>Rotational-motion and r.p.m. monitoring</b> | P / N. switching 24Vdc | CO 1-channel         | no                 | 195.5...241.5Vac | Potentiometer | 22.5            | Screw           | <b>1110560000</b> | 206  |
| <b>Namur switch amplifier Setpoint device</b>  | Namur                  | NO 1-channel         | no                 | 21.6...26.4Vdc   | no            | 22.5            | Screw           | <b>1120360000</b> | 207  |
|                                                | Namur                  | PNP/NPN              | no                 | 21.6...26.4Vdc   | no            | 22.5            | Screw           | <b>1122460000</b> | 207  |
|                                                | 0...24V                | 10.5...+10.5V        | yes                | 21.6...26.4Vdc   | Potentiometer | 22.5            | Screw           | <b>1172660000</b> | 208  |

- 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

DIP switch./P\* = DIP switch / Potentiometer

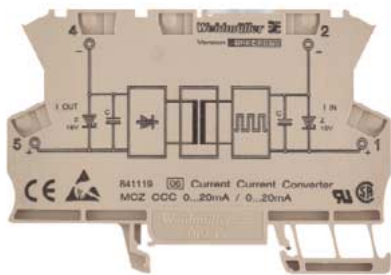


# Passive Isolator

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

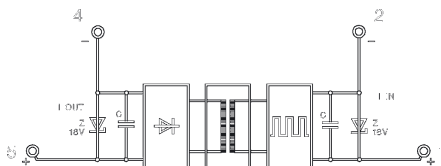
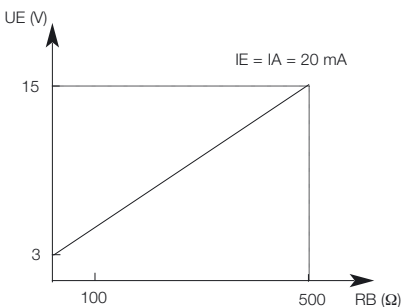


This module is a reasonably priced passive separator for galvanically separating standard 0.4...20 mA signals. It draws its power from the measurement signal and requires no further auxiliary power. The measurement signal is transmitted 1:1. The module is distinguished by its low power consumption as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



### Block diagram

Working resistance diagram



### Ordering data

for TS 35

| Type                                                | Cat. No.   |
|-----------------------------------------------------|------------|
| MCZ CCC 0...20 mA/0...20 mA<br>without power supply | 8411190000 |

### Technical data

#### Input

Response current  
Voltage drop  
Max. overload capacity at input

#### 0...20 mA (max. 15 V)

< 100 µA  
2.5...3 V (at 20 mA)  
50 mA, 15 V

#### Output

Set time (T99)  
Residual ripple

#### 0...20 mA (max. 10 V)

approx. 5 ms at 500 Ω working resistance impedance  
< 10 mV<sub>eff</sub>

Chopper frequency  
Transmission error  
Temperature effect

approx. 200 kHz  
< 0.1 % from end value, + 0.05 % from mean/100 Ω working resistance  
< 50 ppm/K from measurement value for working resistance 0 Ω

### Voltage strength

Input/output

510 V<sub>eff</sub>

### EMC

EMVG  
EN 50081-1  
EN 50082-2  
CE, UL, CSA

### Approvals

Ambient temperature  
- assembled without spacing  
- assembled with 20 mm spacing  
Storage temperature  
Conductor  
Conductor cross-section  
Overall width

-25 °C...+40 °C  
-25 °C...+50 °C  
-40 °C...+85 °C  
AWG 22...12  
1.5 mm<sup>2</sup>  
6 mm

Dimensions and accessories see

Page 305

# RTD Thermocouple Conditioners

- for 2 and 3 wire sensors



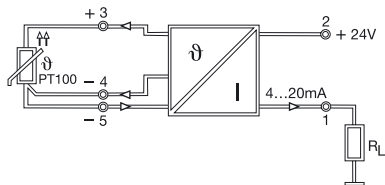
The temperature module converts measurement values from a PT 100 into analogue measurement signals. The module supplies the sensor with power. The module is distinguished by its accuracy and linearity.

## MCZ PT100/3 CLP

0...100 °C / 0...120 °C / 0...150 °C / 0...200 °C / 0...300 °C  
-50...+150 °C / -40...100 °C



Block diagram



### Ordering data

for TS 35

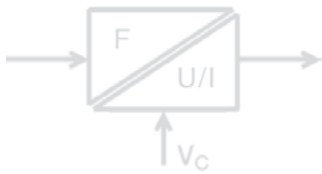
| Type            |               | Cat. No.   |
|-----------------|---------------|------------|
| MCZ PT100/3 CLP | 0...100 °C    | 8425720000 |
| MCZ PT100/3 CLP | 0...120 °C    | 8483680000 |
| MCZ PT100/3 CLP | 0...150 °C    | 8604420000 |
| MCZ PT100/3 CLP | 0...200 °C    | 8473010000 |
| MCZ PT100/3 CLP | 0...300 °C    | 8473020000 |
| MCZ PT100/3 CLP | -50...+150 °C | 8473000000 |
| MCZ PT100/3 CLP | -40...100 °C  | 8604430000 |

### Technical data

|                                         |                                      |
|-----------------------------------------|--------------------------------------|
| <b>Input</b>                            | <b>PT 100 (according to IEC 751)</b> |
| Connection                              | 3-wire / 2-wire*                     |
| Max. wire resistance                    | each 50 Ω                            |
| Leadwire resistance effect              | max. 0.006 °C/Ω                      |
| Supply current                          | 0.8 mA                               |
| <b>Output</b>                           | <b>4...20 mA**</b>                   |
| Load                                    | 750 Ω at 24 V                        |
| Supply voltage                          | max: 30V / min: 9V+20mA x RL         |
| Residual ripple of supply voltage       | max: 1.5 V at 100 Hz                 |
| Set time                                | 10 ms                                |
| Accuracy                                | Type: 0.2 % max. 0.5 % v. FSR        |
| Linearity                               | <0.1 % v. FSR                        |
| Temperature coefficient                 | max. ±250 ppm/°C                     |
| Open circuit recognition                | yes                                  |
| <b>EMC</b>                              | EMVG                                 |
|                                         | EN 50081-1                           |
|                                         | EN 50082-2                           |
| Approvals                               | CE, UL, CSA                          |
| Ambient temperature                     | 0 °C...+50 °C                        |
| Storage temperature                     | -20 °C...+85 °C                      |
| Conductor                               | AWG 22...12                          |
| Conductor cross-section                 | 1.5 mm²                              |
| Overall width                           | 6 mm                                 |
| * Putting a bridge between Pins 4 and 5 | ** current loop supplied             |
| Dimensions and accessories see          | Page 305                             |

## 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 in to frequencies. It is recommended that twisted and shielded 2-wire cables are used.

### MCZ VFC

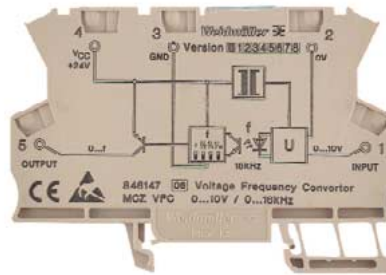
0...10 V

### MCZ CFC

0...20 mA

### MCZ CFC

4...20 mA CLP



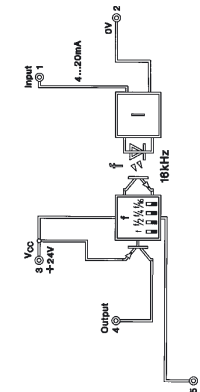
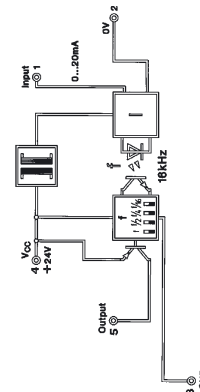
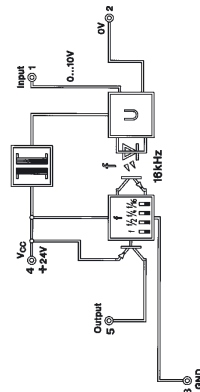
#### Block diagram/settings

##### MCZ VFZ 0...10 V and MCZ CFC 0...20 mA

| 1 | 2 | 3 | 4 | DIP switch |
|---|---|---|---|------------|
| 1 | 0 | 0 | 0 | 0...16 kHz |
| 0 | 1 | 0 | 0 | 0...8 kHz  |
| 0 | 0 | 1 | 0 | 0...4 kHz  |
| 0 | 0 | 0 | 1 | 0...1 kHz  |

##### MCZ CFC 4...20 mA CLP

| 1 | 2 | 3 | 4 | DIP switch   |
|---|---|---|---|--------------|
| 1 | 0 | 0 | 0 | 3.2...16 kHz |
| 0 | 1 | 0 | 0 | 1.6...8 kHz  |
| 0 | 0 | 1 | 0 | 0.8...4 kHz  |
| 0 | 0 | 0 | 1 | 0.2...1 kHz  |



#### Ordering data

for TS 35 W

Type Cat. No.  
MCZ VFC 8461470000

Type Cat. No.  
MCZ CFC 8461480000

Type Cat. No.  
MCZ CFC 8461490000

#### Technical data

|                                                         |                             |                             |                             |
|---------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|
| Input ranges                                            | 0...10 V                    | 0...20 mA                   | 4...20 mA LP*               |
| Overload limits, input                                  | 30 V                        | 50 mA                       | 50 mA                       |
| Input resistance                                        | 100 kΩ                      | 50 Ω                        |                             |
| Voltage drop, input                                     |                             | 1 V at 20 mA                | 5.8...6.4 at 20 mA          |
| Output                                                  |                             |                             |                             |
| Output frequency, end value                             | 1 kHz, 4 kHz, 8 kHz, 16 kHz | 1 kHz, 4 kHz, 8 kHz, 16 kHz | 1 kHz, 4 kHz, 8 kHz, 16 kHz |
| Frequency adjustment                                    | DIL switch                  | DIL switch                  | DIL switch                  |
| Readjustment range                                      | ±10 %, internal             | ±10 %, internal             | ±10 %, internal             |
| Output level                                            | PNP, Ub- 0.7 V              | PNP, Ub- 0.7 V              | PNP, Ub- 0.7 V              |
| Output current                                          | max. 20 mA                  | max. 20 mA                  | max. 20 mA                  |
| Display                                                 | LED, pulsing                | LED, pulsing                | LED, pulsing                |
| Supply voltage                                          | 24 Vdc ±10 %                | 24 Vdc ±10 %                | 24 Vdc ±20 %                |
| Power consumption                                       | 14 mA, w/o load             | 14 mA w/o load              | 14 mA w/o load              |
| Making current limit                                    | 200 mA                      | 200 mA                      |                             |
| Polarisation protection                                 | yes                         | yes                         | yes                         |
| Accuracy                                                | 0.2 % v. FSR                | 0.2 % v. FSR                | 0.15 % v. FSR               |
| Temperature coefficient                                 | < 250 ppm/°C                | < 250 ppm/°C                | < 250 ppm/°C                |
| <b>Coordination of insulation according to EN 50178</b> |                             |                             |                             |
| Voltage strength input/output                           | 1 kVdc                      | 1 kVdc                      |                             |
| Rated voltage                                           | 100 V                       | 100 V                       | 150 V                       |
| Rated surge voltage                                     | 1.5 kV                      | 1.5 kV                      | 2.5 kV                      |
| Overvoltage category                                    | III                         | III                         | III                         |
| Voltage strength I/O to mounting rail                   | 4 kVeff/ 1 min              | 4 kVeff/ 1 min              | 4 kVeff/ 1 min              |
| Operating temperature                                   | 0 °C...+50 °C               | 0 °C...+50 °C               | 0 °C...+50 °C               |
| Storage temperature                                     | -25 °C...+85 °C             | -25 °C...+85 °C             | -25 °C...+85 °C             |
| Overall width                                           | 6 mm                        | 6 mm                        | 6 mm                        |
| Conductor cross-section                                 | 1.5 mm²                     | 1.5 mm²                     | 1.5 mm²                     |

Dimensions and accessories see

Page 305

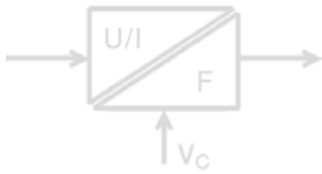
Page 305

Page 305

\* 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

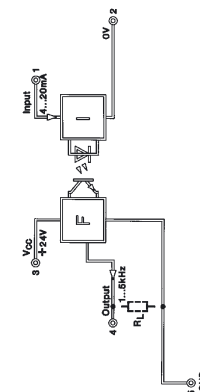
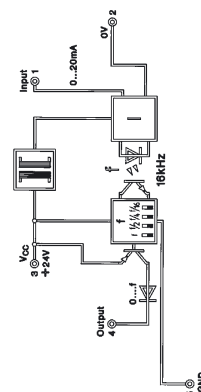
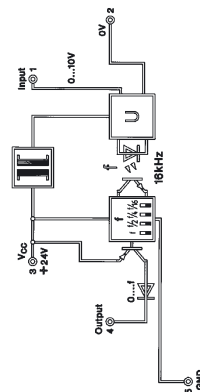
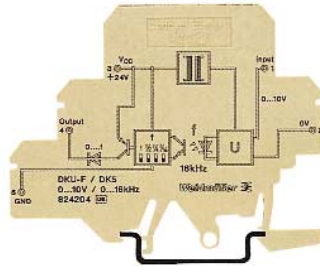
#### DKA U/f and DKA I/f

| 1 | 2 | 3 | 4 | DIP switch |
|---|---|---|---|------------|
| 1 | 0 | 0 | 0 | 0...16 kHz |
| 0 | 1 | 0 | 0 | 0...8 kHz  |
| 0 | 0 | 1 | 0 | 0...4 kHz  |
| 0 | 0 | 0 | 1 | 0...1 kHz  |

### DKA U/f

### DKA I/f

### DKA I/f\*



### Ordering data

|                             |   |
|-----------------------------|---|
| for TS 32                   | Y |
| for TS 35                   | W |
| with combi foot TS 32/TS 35 |   |

### Technical data

|                             |                             |
|-----------------------------|-----------------------------|
| Input ranges                | 0...10 V                    |
| Overload limits, input      | 100 V                       |
| Input resistance            | 100 kΩ                      |
| Voltage drop, input         |                             |
| Output                      |                             |
| Output frequency, end value | 1 kHz, 4 kHz, 8 kHz, 16 kHz |
| Frequency adjustment        | DIL switch                  |
| Readjustment range          | ±10 %, internal             |
| Output level                | PNP, Ub- 0.7 V              |
| Output current              | max. 20 mA                  |
| Display                     | LED, pulsing                |
| Decoupling diode            | present                     |
| Supply voltage              | 24 Vdc ±10 %                |
| Power consumption           | 14 mA, w/o load             |
| Making current limit        | 200 mA                      |
| Polarisation protection     | yes                         |

|          |              |
|----------|--------------|
| Accuracy | 0.2 % v. FSR |
|          | <250 ppm/°C  |

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

|                                   |                 |
|-----------------------------------|-----------------|
| Voltage strength input/output     | 1 kVdc          |
| Rated voltage                     |                 |
| Rated surge voltage               |                 |
| Overvoltage category              |                 |
| Voltage strength to mounting rail | 4 kVeff         |
| Operating temperature             | 0 °C...+50 °C   |
| Storage temperature               | -25 °C...+60 °C |
| Overall width                     | 6 mm            |
| Conductor cross-section           | 0.5...4 mm²     |

### Accessories

|                                |          |
|--------------------------------|----------|
| End plate                      | AP DK5   |
| Dimensions and accessories see | Page 305 |

### Type Cat. No.

DKA U/f 8242040000

0...10 V

100 V

100 kΩ

1 kHz, 4 kHz, 8 kHz, 16 kHz

DIL switch

±10 %, internal

PNP, Ub- 0.7 V

max. 20 mA

LED, pulsing

present

24 Vdc ±10 %

14 mA, w/o load

200 mA

yes

0.2 % v. FSR

<250 ppm/°C

1 kVdc

4 kVeff

0 °C...+50 °C

-25 °C...+60 °C

6 mm

0.5...4 mm²

Type Cat. No.

AP DK5 8268870000

Page 305

### Type Cat. No.

DKA I/f 8258870000

0...20 mA

50 mA

50 Ω

1 V at 20 mA

1 kHz, 4 kHz, 8 kHz, 16 kHz

DIL switch

±10 %, internal

PNP, Ub- 0.8 V

max. 20 mA

LED, pulsing

present

24 Vdc ±10 %

14 mA w/o load

200 mA

yes

0.2 % v. FSR

<250 ppm/°C

1 kVdc

4 kVeff

0 °C...+50 °C

-25 °C...+60 °C

6 mm

0.5...4 mm²

Type Cat. No.

AP DK5 8268870000

Page 305

### Type Cat. No.

DKA I/f \* 8081330000

4...20 mA

50 mA

max. 320 Ω at 20 mA

max. 6.4 V at 20 mA

5 kHz (1...5 kHz)

Ub- 3 V

max. 20 mA

present

19.2...28.8 Vdc

<13 mA w/o load

yes

0.15 % v. FSR

<250 ppm/°C 2

4 kVeff

150 V

2.5 kV

III

4 kVeff

0 °C...+50 °C

-25 °C...+60 °C

6 mm

0.5...4 mm²

Type Cat. No.

AP DK5 8268870000

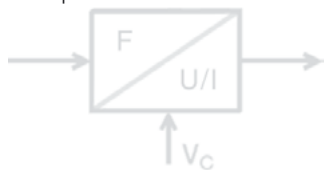
Page 305

\* without DC/DC converter  
Input current loop supplied



## Frequency Signal Conditioners

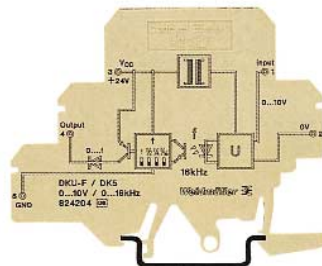
- Screw connection
- LED-Display
- Adjustable frequency output
- multiplex capable



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.

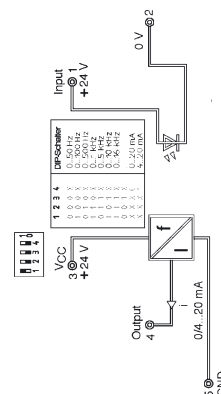
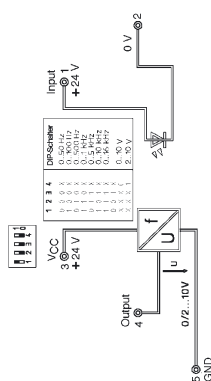
### DKA f/U

### DKA f/I



#### Block diagram/settings

| 1 | 2 | 3 | 4 | DIP switch           |
|---|---|---|---|----------------------|
| 0 | 0 | 0 | X | 0...50 Hz            |
| 1 | 0 | 0 | X | 0...100 Hz           |
| 0 | 1 | 0 | X | 0...500 Hz           |
| 1 | 1 | 0 | X | 0...1 kHz            |
| 0 | 1 | 1 | X | 0...5 kHz            |
| 1 | 0 | 1 | X | 0...10 kHz           |
| 1 | 1 | 1 | X | 0...16 kHz           |
| 0 | 0 | 1 | X | Customer specific    |
| X | X | X | 0 | 0...20 mA / 0...10 V |
| X | X | X | 1 | 4...20 mA / 2...10 V |



#### Ordering data

|                             |   |
|-----------------------------|---|
| for TS 32                   | Y |
| for TS 35                   | W |
| 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                |  |
| Output current              |  |
| Display                     |  |
| Decoupling diode            |  |

|                         |                           |
|-------------------------|---------------------------|
| Supply voltage          | 24 Vdc ±10 %              |
| Power consumption       | 32 mA + I <sub>Load</sub> |
| Making current limit    |                           |
| Polarisation protection | yes                       |

#### Accuracy

|                          |  |
|--------------------------|--|
| 0.5 % (8-bit resolution) |  |
|--------------------------|--|

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

|                                   |                         |
|-----------------------------------|-------------------------|
| Voltage strength input/output     | 2.5 kV                  |
| Rated voltage                     |                         |
| Rated surge voltage               |                         |
| Overvoltage category              |                         |
| Voltage strength to mounting rail | 4 kV <sub>eff</sub>     |
| Operating temperature             | 0 °C...+50 °C           |
| Storage temperature               | -25 °C...+60 °C         |
| Overall width                     | 6 mm                    |
| Conductor cross-section           | 0.5...4 mm <sup>2</sup> |

Dimensions and accessories see

#### Type Cat. No.

DKA f/U **8283810001**

0...50/100/500 Hz  
0...1/5/10/16 kHz

10 kΩ

0/2...10 V

DIL switch

24 Vdc ±10 %

32 mA + I<sub>Load</sub>

yes

0.5 % (8-bit resolution)

2.5 kV

4 kV<sub>eff</sub>

0 °C...+50 °C

-25 °C...+60 °C

6 mm

0.5...4 mm<sup>2</sup>

Page 305

#### Type Cat. No.

DKA f/I **8311870001**

0...50/100/500 Hz  
0...1/5/10/16 kHz

10 kΩ

0/4...20 mA

DIL switch

24 Vdc ±10 %

32 mA + I<sub>Load</sub>

yes

0.5 % (8-bit resolution)

2.5 kV

4 kV<sub>eff</sub>

0 °C...+50 °C

-25 °C...+60 °C

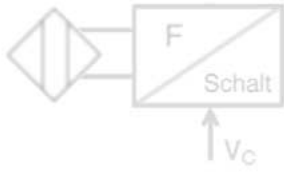
6 mm

0.5...4 mm<sup>2</sup>

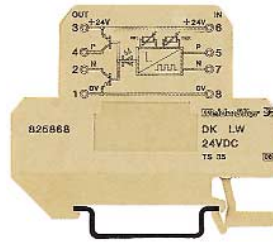
Page 305

## Monitoring Revolutions

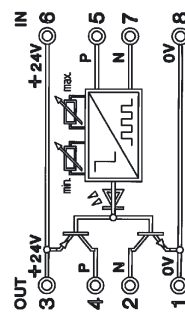
### DK LW



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



#### Block diagram/settings



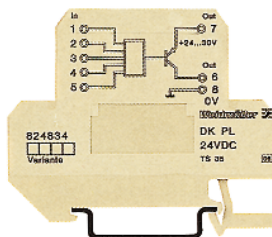
| Ordering data                     | Type                                                                | Cat. No.   |
|-----------------------------------|---------------------------------------------------------------------|------------|
| for TS 32                         | Y                                                                   |            |
| for TS 35                         | W                                                                   |            |
|                                   | DK LW                                                               | 8258680000 |
| Technical data                    |                                                                     |            |
| Input                             | Initiators, NPN or PNP                                              |            |
| Number of inputs                  | 1                                                                   |            |
| Input frequency                   | 10 - 6250 U/min.                                                    |            |
| Range selection                   | 3 switchable revolutions ranges: 10-130, 100-1300, 1000-7800 r.p.m. |            |
| Fine adjustment                   | 2 potentiometers for upper/lower revs limit                         |            |
| Input nominal level               | 24 Vdc = High, 0 V = Low                                            |            |
| Overload limits                   | 30 Vdc                                                              |            |
| Switching threshold               | High >18 V, Low <7 V                                                |            |
| Pulse duration                    | >0.5 ms                                                             |            |
| Input current                     | approx. 3.5 mA (24 V)                                               |            |
| Reverse polarity protection       | yes                                                                 |            |
| Output                            | Optional PNP or NPN                                                 |            |
| Function                          | Output active, if f within set revs limit                           |            |
| Output level                      | Ub- 1.8 V                                                           |            |
| Output current                    | 20 mA max.                                                          |            |
| Decoupling diode                  | yes                                                                 |            |
| Status LED                        | green LED                                                           |            |
| Short-circuit proof               | no                                                                  |            |
| Operating voltage                 | 24 V -10 % + 20 %                                                   |            |
| Power consumption                 | <10 mA, w/o load, without initiator                                 |            |
| Reverse polarity protection       | yes                                                                 |            |
| Galvanic isolation                | no                                                                  |            |
| Voltage strength to mounting rail | 4 kV <sub>eff</sub>                                                 |            |
| Operating temperature             | 0...+50 °C                                                          |            |
| Storage temperature               | -40...+60 °C                                                        |            |
| Overall width                     | 12 mm                                                               |            |
| Conductor cross-section           | 0.5...4 mm <sup>2</sup>                                             |            |
| Insulation stripping length       | 7 mm                                                                |            |
| Others                            | Initiator power supply via module possible                          |            |
| Accessories                       | Type                                                                | Cat. No.   |
| End plate                         | AP DKT4                                                             | 0687560000 |
| Dimensions and accessories see    | Page 278                                                            |            |

## Preprocessing Logic

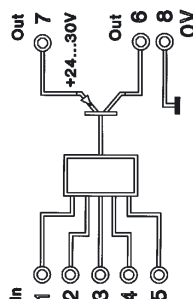
- Screw connection
- logic function and time function combined
- individually programmable (further functions on request)



### DK PL



### Block diagram



| Ordering data | Type       | Cat. No.           |
|---------------|------------|--------------------|
| for TS 32     | on request |                    |
| for TS 35     | DK PL      | <b>8248340000*</b> |

| Technical data                    |                                 |
|-----------------------------------|---------------------------------|
| Logical function                  | Programmable, see note          |
| Number of inputs                  | 5                               |
| Input nominal level               | 24 Vdc = High, 0 V = Low        |
| Overload limits                   | 30 Vdc                          |
| Switching threshold               | High >18 V, Low <7 V            |
| Pulse duration                    | >1 ms                           |
| Input current                     | approx. 1.5 mA per input (24 V) |
| Output                            | PNP                             |
| Output level                      | Ub- 1 V                         |
| Output current                    | 20 mA max.                      |
| Decoupling diode                  | no                              |
| Status LED                        | green LED                       |
| Short-circuit proof               | no                              |
| Operating voltage                 | 24 V ±20 %                      |
| Power consumption                 | <10 mA                          |
| Reverse polarity protection       | yes                             |
| Galvanic isolation                | no                              |
| Voltage strength to mounting rail | 4 kV <sub>eff</sub>             |
| Operating temperature             | 0 °C...+50 °C                   |
| Storage temperature               | -40 °C...+60 °C                 |
| Overall width                     | 12 mm                           |
| Conductor cross-section           | 0.5...4 mm <sup>2</sup>         |
| Insulation stripping length       | 7 mm                            |

| Accessories                    | Type     | Cat. No.          |
|--------------------------------|----------|-------------------|
| End plate                      | AD DKT4  | <b>0687560000</b> |
| Ordering example: RS FLIP-FLOP |          | <b>8248340002</b> |
| Dimensions see                 | Page 278 |                   |

\* (not programmed - function next page)

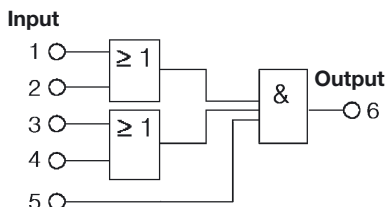
### Remark:

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

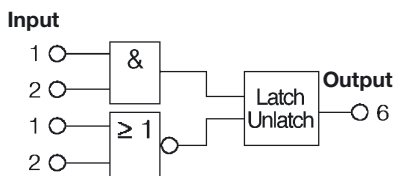
| State | Input |   |   |   |   | Output |
|-------|-------|---|---|---|---|--------|
|       | 5     | 4 | 3 | 2 | 1 | 6      |
| 1     | 0     | 0 | 0 | 0 | 0 | 0      |
| 2     | 0     | 0 | 0 | 0 | 1 | 0      |
| 3     | 0     | 0 | 0 | 1 | 0 | 0      |
| 4     | 0     | 0 | 0 | 1 | 1 | 0      |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



#### 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                    |
|-------------------------------|---|---------------------------|
| 2                             | 1 | 6                         |
| 0                             | 0 | 0 (is stored)             |
| 0                             | 1 | No change of stored state |
| 1                             | 0 | No change of stored state |
| 1                             | 1 | 1 (is stored)             |
| Inputs 3, 4 and 5 no function |   | No change of stored state |

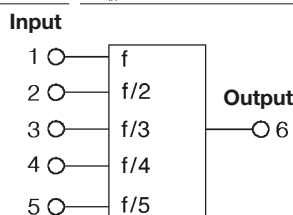


#### 824834 0003 DKPL - Frequency divider

Inputs 1 - 5 determine the divider factor  
Input 1 = divider factor 1:  $F_{OUT} = F_{IN}$   
Input 2 = divider factor 2:  $F_{OUT} = F_{IN} / 2$   
Input 5 = divider factor 5:  $F_{OUT} = F_{IN} / 5$ ;  $F_{IN}$  max. = 12 kHz

| Input | Output                 |
|-------|------------------------|
|       | 6                      |
| 1     | $f_{out} = f_{in}$     |
| 2     | $f_{out} = f_{in} / 2$ |
| 3     | $f_{out} = f_{in} / 3$ |
| 4     | $f_{out} = f_{in} / 4$ |
| 5     | $f_{out} = f_{in} / 5$ |

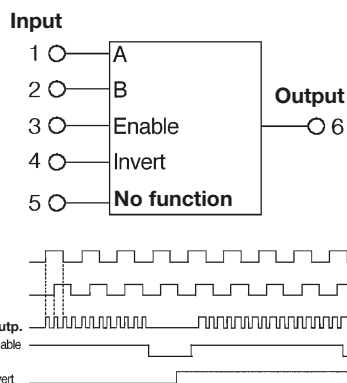
Note: An new divider factor can only be used if operating voltage is switched off.  
 $f_{in}$  max. = 12 kHz



#### 824834 0004 DKPL

Input 1: Signal A of an incremental generator  
Input 2: Signal B 90° is 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 Us.  
(I.e.:  $F_{OUT} = 4 \times F_{IN}$ )  
 $F_{IN}$  max. 1 kHz

| Connection | Description                                |
|------------|--------------------------------------------|
| 1          | A Signal A 90° leading $F_{max} = 1$ kHz   |
| 2          | B Signal B 90° following $F_{max} = 1$ kHz |
| 3          | Enable Output is released                  |
| 4          | Invert Output signal invert                |
| 5          | No function                                |
| 6          | $f_{out} = 4 \times f_{A/B}$ (max. 4 kHz)  |



#### 824834 0005 DKPL

Length of input signal between 80 and 100 ms.  
Length of output signal 100 ms, only 2 pulses,  
Relation pulse-interruption 1:1.  
The positive slope of the input signal has to be analysed. Only input E1 is used.

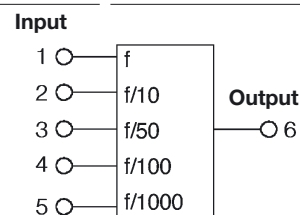
| Connect. 2 Logic | Factor | Inp. frequency | Outp. frequency |
|------------------|--------|----------------|-----------------|
|                  |        | Connection 1   | Connection 2    |
| 0 V or open      | L      | 75             | 0...30 kHz      |
| 24 Vdc           | H      | 27             | 0...10.8 kHz    |

#### 824834 0006 DKPL

Input 1:  $F_{OUT} = F_{IN}$   
Input 2:  $F_{OUT} = F_{IN} / 10$

| Input | Output                    |
|-------|---------------------------|
|       | 6                         |
| 1     | $f_{out} = f_{in}$        |
| 2     | $f_{out} = f_{in} / 10$   |
| 3     | $f_{out} = f_{in} / 50$   |
| 4     | $f_{out} = f_{in} / 100$  |
| 5     | $f_{out} = f_{in} / 1000$ |

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



#### 824834 0007 DKPL

| Input |   |   |   |   | Output      |
|-------|---|---|---|---|-------------|
| 1     | 2 | 3 | 4 | 5 | Out         |
| L     | L | X | X | X | No function |
| H     | L | X | X | X | f = 1 Hz    |
| L     | H | X | X | X | f = 10 Hz   |
| H     | H | X | X | X | f = 1 Hz    |

L -> 0 V or connection open  
H -> +24 ...30 Vdc  
X -> no effect on output function, L or H

#### 824834 0008 DKPL

| Input |   | Output |
|-------|---|--------|
| 1     | 2 |        |
| H     | H | H      |
| L     | H | L      |

#### 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 | Output                   | Logic |
|--------------------|--------------------|--------------------------|-------|
| R-Input            | S-Input            | Output                   |       |
| 0 V or open        | L                  | 0 V or open              | L     |
| 0 V or open        | L                  | previous state is stored |       |
| +24 Vdc            | H                  | 0 V                      | L     |
| 0 V or open        | L                  | +24 Vdc                  | H     |
| +24 Vdc            | H                  | +24 Vdc                  | H     |

#### 824834 0501 DKPL

The module allows the input frequency at connection 1 (0...max. 50 kHz) to be divided with 2 fixed divider factors.  
Depending on connection 2, the output frequency is transmitted from output connection 6.

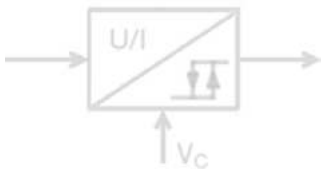
Connections 3, 4 and 5 have no function.

| Connect. 2 Logic | Factor | Inp. frequency | Outp. frequency |            |
|------------------|--------|----------------|-----------------|------------|
|                  |        | Connection 1   | Connection 2    |            |
| 0 V or open      | L      | 75             | 0...30 kHz      | 0...400 Hz |
| 24 Vdc           | H      | 27             | 0...10.8 kHz    | 0...400 Hz |

## Threshold Monitoring

### Current sensor

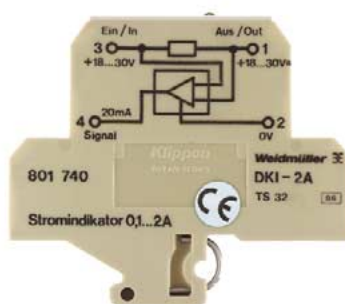
- Screw connection
- Mounts onto on mounting rail
- Wide spectrum of functions
- In part, individually adjustable



#### DKSC 0-10 V

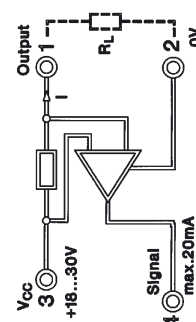
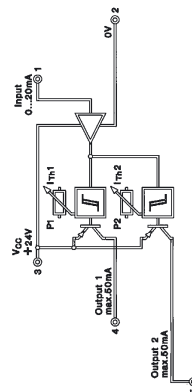
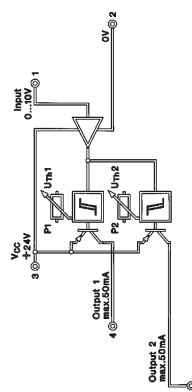
#### DKSC 0-20 mA

#### DKI 2A



#### Block diagram/settings

| S1  | S2  | DIP switch    |
|-----|-----|---------------|
| on  | on  | 10...100 mV   |
| on  | off | 30 mV...1 V   |
| off | X   | 300 mV...10 V |



#### Ordering data

|                             |   |
|-----------------------------|---|
| for TS 32                   | Y |
| for TS 35                   | W |
| with combi foot TS 32/TS 35 |   |

#### Technical data

|                                   |                                                                  |
|-----------------------------------|------------------------------------------------------------------|
| Input signal                      | 0...10 V                                                         |
| Input resistance                  | 60 kΩ                                                            |
| Voltage drop, input               |                                                                  |
| Cut-off frequency                 | 100 Hz                                                           |
| Switchable input range            | DIL switch for 3 ranges                                          |
| Switching point settings          | 2 threshold Uth 1 and Uth 2 with 2 front potentiometers each 1 % |
| Hysteresis                        |                                                                  |
| Output                            | double switch output                                             |
| Output level                      | per PNP, Ub- 1.2 V                                               |
| Output current                    | 50 mA                                                            |
| Function                          | Uin < Uth1: output 1 active<br>Uin > Uth2: output 2 active       |
| Status LED                        | no                                                               |
| Operating voltage                 | 24 Vdc ±20 %                                                     |
| Power consumption                 | approx. 15 mA                                                    |
| Galvanic isolation                | no                                                               |
| Voltage strength to mounting rail | 4 kVeff                                                          |
| Operating temperature             | 0 °C...+50 °C                                                    |
| Storage temperature               | -25 °C...+60 °C                                                  |
| Overall width                     | 6 mm                                                             |
| Conductor cross-section           | 0.5...4 mm <sup>2</sup>                                          |

#### EMC resistance

|                            |                   |                                 |
|----------------------------|-------------------|---------------------------------|
| Burst acc. to EN 61000-4-4 | Input/outputs     | Test severity 4, self restoring |
|                            | Power supply      | Test severity 4, self restoring |
| ESD acc. to EN 61000-4-2   | Contact discharge | Test severity 4                 |
|                            | Air discharge     | Test severity 3                 |

#### Accessories

|                |          |            |
|----------------|----------|------------|
| End plate      | AP DK5   | 8268870000 |
| Dimensions see | Page 278 |            |

#### Type Cat. No.

DKSC 0-10 V 8019640000

#### Type Cat. No.

DKSC 0-20 mA 8031320000

#### Type Cat. No.

DKI 2A 8017400000  
DKI 2A 8017410000

|                                   |                                                                  |
|-----------------------------------|------------------------------------------------------------------|
| Input signal                      | 0(4)...20 mA                                                     |
| Input resistance                  | 50 Ω                                                             |
| Voltage drop, input               | 1 V                                                              |
| Cut-off frequency                 | 100 Hz                                                           |
| Switchable input range            |                                                                  |
| Switching point settings          | 2 threshold Uth 1 and Uth 2 with 2 front potentiometers each 1 % |
| Hysteresis                        |                                                                  |
| Output                            | double switch output                                             |
| Output level                      | per PNP, Ub- 1.2 V                                               |
| Output current                    | 50 mA                                                            |
| Function                          | lin < Uth1: output 1 active<br>lin > Uth2: output 2 active       |
| Status LED                        | no                                                               |
| Operating voltage                 | 24 Vdc ±20 %                                                     |
| Power consumption                 | approx. 15 mA                                                    |
| Galvanic isolation                | no                                                               |
| Voltage strength to mounting rail | 4 kVeff                                                          |
| Operating temperature             | 0 °C...+50 °C                                                    |
| Storage temperature               | -25 °C...+60 °C                                                  |
| Overall width                     | 6 mm                                                             |
| Conductor cross-section           | 0.5...4 mm <sup>2</sup>                                          |

#### Type Cat. No.

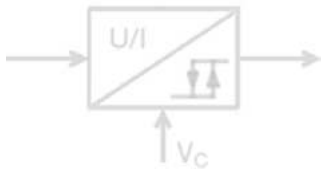
|        |            |
|--------|------------|
| DKI 2A | 8017400000 |
| DKI 2A | 8017410000 |

#### Type Cat. No.

|        |            |
|--------|------------|
| DKI 2A | 8017400000 |
| DKI 2A | 8017410000 |



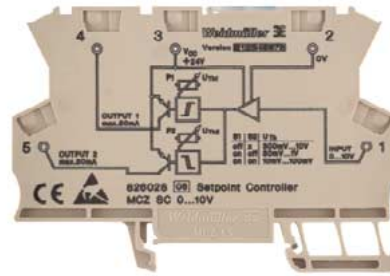
## Threshold Monitoring



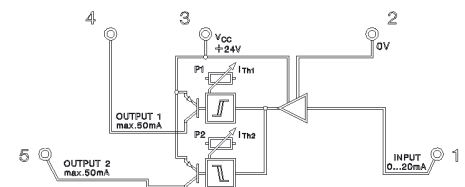
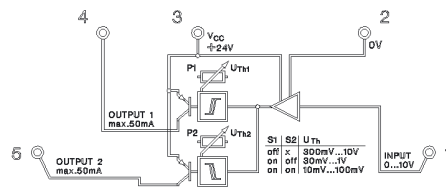
The Setpoint Controller allows cost effective units to be built for monitoring analogue signals. An upper and lower limit value, which covers the entire signal range, can be set by the user via 2 potentiometers. The respective statuses of the upper and lower limit value are indicated at the 2 digital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

### MCZ SC 0...10 Vdc

### MCZ SC 0...20 mA



#### Block diagram



| Ordering data                                       | Type                                                                                  | Cat. No.   | Type                                                                                  | Cat. No.   |
|-----------------------------------------------------|---------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------|------------|
| for TS 35                                           | MCZ SC 24 V/0...10V                                                                   | 8260280000 | MCZ SC 24 V/0...20 mA                                                                 | 8227350000 |
| Technical data                                      |                                                                                       |            |                                                                                       |            |
| Voltage supply                                      |                                                                                       |            |                                                                                       |            |
| Supply voltage                                      | 24 Vdc ± 20 %                                                                         |            | 24 Vdc ± 20 %                                                                         |            |
| Supply current                                      | 15 mA                                                                                 |            | 15 mA                                                                                 |            |
| Input                                               |                                                                                       |            |                                                                                       |            |
| Input voltage                                       | 0...10 V                                                                              |            | 0.5...20 mA                                                                           |            |
| Input resistance                                    | 60 kΩ                                                                                 |            | 50 Ω                                                                                  |            |
| Voltage drop at full scale                          |                                                                                       |            | 1 V                                                                                   |            |
| Max. input current                                  |                                                                                       |            | 40 mA                                                                                 |            |
| Cut-off frequency                                   | 100 Hz                                                                                |            | 100 Hz                                                                                |            |
| Transmission behaviour                              |                                                                                       |            |                                                                                       |            |
| Threshold voltage ranges of U <sub>th</sub>         | S1 S2 Temperature coefficient T <sub>k</sub>                                          |            | Temperature coefficient T <sub>k</sub> 250 ppm max.                                   |            |
|                                                     | 10...100 mV on on 500 ppm max.                                                        |            |                                                                                       |            |
|                                                     | 0.03...1 V on off 250 ppm max.                                                        |            |                                                                                       |            |
|                                                     | 0.3...10 V off x 250 ppm max.                                                         |            |                                                                                       |            |
| Setting of switching threshold                      | via 2 potentiometers (12 turns)                                                       |            | via 2 potentiometers (12 turns)                                                       |            |
| Hysteresis of switching threshold                   | 1 % of the end value                                                                  |            | 1 % of the end value                                                                  |            |
| Function of output 1                                | active High for U <sub>input</sub> < U <sub>th1</sub> (set via P1)                    |            | active High for I <sub>input</sub> < I <sub>th1</sub> (set via P1)                    |            |
| Function of output 2                                | active High for U <sub>input</sub> > U <sub>th2</sub> (set via P2)                    |            | active High for I <sub>input</sub> > I <sub>th2</sub> (set via P2)                    |            |
| Response time                                       | < 250 μs (switch threshold at 90% of the max. input signal;<br>R <sub>L</sub> ≤ 1 kΩ) |            | < 250 μs (switch threshold at 90% of the max. input signal;<br>R <sub>L</sub> ≤ 1 kΩ) |            |
| Output                                              |                                                                                       |            |                                                                                       |            |
| Output current per output                           | 2 channel switching PNP<br>max. 50 mA                                                 |            | 2 channel switching PNP<br>max. 50 mA                                                 |            |
| Voltage drop at output transistor                   | < 1.2 V at 50 mA                                                                      |            | < 1.2 V at 50 mA                                                                      |            |
| Insulation coordination/safe separation to EN 50178 |                                                                                       |            |                                                                                       |            |
| Separation input / output                           | none                                                                                  |            | none                                                                                  |            |
| Dielectric strength I/O to mounting rail            | 4 kVeff / 1 min                                                                       |            | 4 kVeff / 1 min                                                                       |            |
| Ambient temperature                                 | 0 °C...+50 °C                                                                         |            | 0 °C...+50 °C                                                                         |            |
| Storage temperature                                 | -25 °C...+60 °C                                                                       |            | -25 °C...+60 °C                                                                       |            |
| Conductor                                           | AWG 22...12                                                                           |            | AWG 22...12                                                                           |            |
| Conductor cross-section                             | 1.5 mm <sup>2</sup>                                                                   |            | 1.5 mm <sup>2</sup>                                                                   |            |
| Approvals                                           | CE, UL, CSA                                                                           |            | CE, UL, CSA                                                                           |            |
| Overall width                                       | 6 mm                                                                                  |            | 6 mm                                                                                  |            |
| Dimensions and accessories see                      | Page 305                                                                              |            | Page 305                                                                              |            |

# Passive Isolator DC/DC

## WAVEANALOG DC/DC

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

## Approvals:

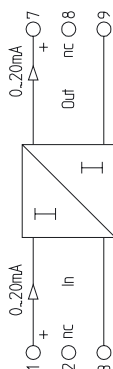


### Block diagram



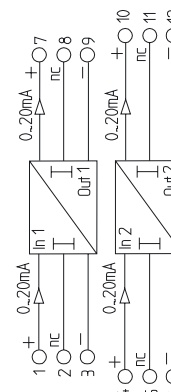
## CCC LP (1 channel)

0(4) ... 20 mA / 0(4) ... 20 mA



## CCC LP (2 channel)

0(4) ... 20 mA / 0(4) ... 20 mA



### Ordering data

|                                    |
|------------------------------------|
| Screw connection 1 channel         |
| Tension clamp connection 1 channel |
| Screw connection 2 channel         |
| Tension clamp connection 2 channel |
| Input/output                       |

| Type        | Cat. No.          |
|-------------|-------------------|
| WAS5 CCC LP | <b>8444950000</b> |
| WAZ5 CCC LP | <b>8444960000</b> |

0(4) ... 20 mA / 0(4) ... 20 mA

### Technical data\* (per channel)

#### Input signal

|                    |
|--------------------|
| Input voltage max. |
| Input current max  |
| Operating current  |
| Voltage drop       |

|                                    |
|------------------------------------|
| 0 ... 20 mA (4 ... 20 mA)          |
| 18 V                               |
| 50 mA                              |
| < 100 $\mu$ A                      |
| approx. 3 V at $R_L = 0 \Omega$    |
| $I_{in} = 20$ mA                   |
| approx. 13 V at $R_L = 500 \Omega$ |
| at $I_{in} = 20$ mA                |

#### Output signal

|                                      |
|--------------------------------------|
| Load resistance                      |
| Accuracy at $T_U = 23^\circ\text{C}$ |
| Influence of load resistance         |

|                                           |
|-------------------------------------------|
| 0 ... 20 mA (4 ... 20 mA)                 |
| $\leq 500 \Omega$                         |
| < 0.1% of FS                              |
| < 0.1% from measurement value             |
| per 100 $\Omega$ load resistance          |
| 50 ppm / K of FS                          |
| 4.5 ms at 500 $\Omega$ working resistance |
| < 20 mV <sub>eff</sub>                    |
| approx. 170 kHz                           |

### General

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

|                                               |
|-----------------------------------------------|
| -25 $^\circ\text{C}$ ... +70 $^\circ\text{C}$ |
| -40 $^\circ\text{C}$ ... +80 $^\circ\text{C}$ |
| 92.4 / 112.5 / 17.5                           |
| CE, UL, CSA, GL                               |

### Coordination of insulation according to EN 50178, 04/98 (safe separation)

|                                     |
|-------------------------------------|
| Rated voltage                       |
| Rated surge voltage                 |
| Overtoltage category                |
| Contamination class                 |
| Clearance and creepage distance     |
| Isolation voltage, voltage strength |
| Input/output, channel / channel     |
| Input/output to mounting rail       |
| Standards/specifications            |
| EMC standards                       |

|                              |
|------------------------------|
| 300 V                        |
| 6 kV                         |
| III                          |
| 2                            |
| $\geq 5.5$ mm                |
| 4 kV <sub>eff</sub> / 1 s    |
| 4 kV <sub>eff</sub> / 1 min  |
| EN 50178 (safe separation)   |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308               |

Dimensions and accessories see  
\* $T_U = 23^\circ\text{C}$  single module

### Ordering data

|                                 |                   |
|---------------------------------|-------------------|
| WAS5 CCC LP                     | <b>8463580000</b> |
| WAZ5 CCC LP                     | <b>8463590000</b> |
| 0(4) ... 20 mA / 0(4) ... 20 mA |                   |

0 ... 20 mA (4 ... 20 mA)

|                                    |
|------------------------------------|
| 18 V                               |
| 50 mA                              |
| < 100 $\mu$ A                      |
| approx. 3 V at $R_L = 0 \Omega$    |
| $I_{in} = 20$ mA                   |
| approx. 13 V at $R_L = 500 \Omega$ |
| at $I_{in} = 20$ mA                |

0 ... 20 mA (4 ... 20 mA)

|                                           |
|-------------------------------------------|
| $\leq 500 \Omega$                         |
| < 0.1% of FS                              |
| < 0.1% from measurement value             |
| per 100 $\Omega$ load resistance          |
| 50 ppm / K of FS                          |
| 4.5 ms at 500 $\Omega$ working resistance |
| < 20 mV <sub>eff</sub>                    |
| approx. 170 kHz                           |

|                                               |
|-----------------------------------------------|
| -25 $^\circ\text{C}$ ... +70 $^\circ\text{C}$ |
| -40 $^\circ\text{C}$ ... +80 $^\circ\text{C}$ |
| 92.4 / 112.5 / 17.5                           |
| CE, UL, CSA, GL                               |

300 V

|                              |
|------------------------------|
| 6 kV                         |
| III                          |
| 2                            |
| $\geq 5.5$ mm                |
| 4 kV <sub>eff</sub> / 1 s    |
| 4 kV <sub>eff</sub> / 1 min  |
| EN 50178 (safe separation)   |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308               |

## DC/DC-Signal Conditioners

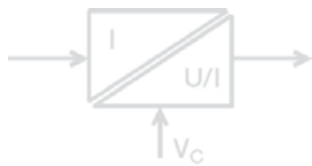
### WAVEANALOG DC/DC

- 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

#### Approvals:



#### Block diagram



### CCC DC

4 ... 20 mA / 4 ... 20 mA



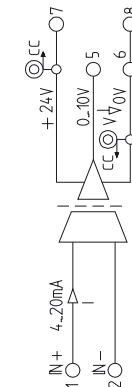
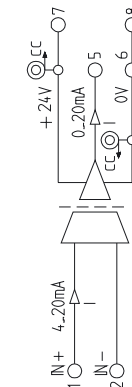
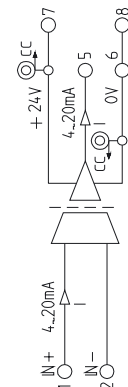
### CCC DC

4 ... 20 mA / 0 ... 20 mA



### CVC DC

4 ... 20 mA / 0 ... 10 V



#### Ordering data

Screw connection

Tension clamp connection

Input/output

| Type                      | Cat. No.          |
|---------------------------|-------------------|
| WAS4 CCC DC               | <b>8444980000</b> |
| WAZ4 CCC DC               | <b>8444990000</b> |
| 4 ... 20 mA / 4 ... 20 mA |                   |

| Type                      | Cat. No.          |
|---------------------------|-------------------|
| WAS4 CCC DC               | <b>8445010000</b> |
| WAZ4 CCC DC               | <b>8445020000</b> |
| 4 ... 20 mA / 0 ... 20 mA |                   |

| Type                    | Cat. No.          |
|-------------------------|-------------------|
| WAS4 CVC DC             | <b>8445040000</b> |
| WAZ4 CVC DC             | <b>8445050000</b> |
| 4 ... 20 mA / 0 ... 10V |                   |

#### Technical data\*

##### Input signal

Input voltage max.

Input current max

##### Output signal

Load resistance

Accuracy at  $T_u=23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

|                                         |
|-----------------------------------------|
| 4 ... 20 mA                             |
| 7 V                                     |
| 25 mA                                   |
| 4 ... 20 mA                             |
| $\leq 500 \Omega$                       |
| $\pm 0.2\%$ of FS                       |
| $\leq 250 \text{ ppm} / \text{K}$ of FS |
| $\leq 30 \text{ ms}$ (typ. 20 ms)       |
| $\geq 15 \text{ Hz}$ (typ. 20 Hz)       |

|                                         |
|-----------------------------------------|
| 4 ... 20 mA                             |
| 7 V                                     |
| 25 mA                                   |
| 0 ... 20 mA                             |
| $\leq 500 \Omega$                       |
| $\pm 0.2\%$ of FS                       |
| $\leq 250 \text{ ppm} / \text{K}$ of FS |
| $\leq 30 \text{ ms}$ (typ. 20 ms)       |
| $\geq 15 \text{ Hz}$ (typ. 20 Hz)       |

|                                         |
|-----------------------------------------|
| 4 ... 20 mA                             |
| 7 V                                     |
| 25 mA                                   |
| 0 ... 10 V                              |
| $\geq 1 \text{ k}\Omega$                |
| $\pm 0.2\%$ of FS                       |
| $\leq 250 \text{ ppm} / \text{K}$ of FS |
| $\leq 30 \text{ ms}$ (typ. 20 ms)       |
| $\geq 15 \text{ Hz}$ (typ. 20 Hz)       |

#### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

|                                                       |
|-------------------------------------------------------|
| 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)              |
| $< 32 \text{ mA}$ at $I_{\text{out}} = 20 \text{ mA}$ |
| $\leq 2 \text{ A}$                                    |
| $0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted)   |
| $-20^\circ\text{C} \dots +85^\circ\text{C}$           |
| 92.4 / 112.5 / 12.5                                   |
| CE, UL, CSA                                           |

|                                                       |
|-------------------------------------------------------|
| 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)              |
| $< 32 \text{ mA}$ at $I_{\text{out}} = 20 \text{ mA}$ |
| $\leq 2 \text{ A}$                                    |
| $0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted)   |
| $-20^\circ\text{C} \dots +85^\circ\text{C}$           |
| 92.4 / 112.5 / 12.5                                   |
| CE, UL, CSA                                           |

|                                                       |
|-------------------------------------------------------|
| 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)              |
| $< 20 \text{ mA}$ at $I_{\text{out}} = 10 \text{ mA}$ |
| $\leq 2 \text{ A}$                                    |
| $0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted)   |
| $-20^\circ\text{C} \dots +85^\circ\text{C}$           |
| 92.4 / 112.5 / 12.5                                   |
| CE, UL, CSA                                           |

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Isolation voltage, voltage strength

Input/output to mounting rail

|                             |
|-----------------------------|
| 300 V                       |
| 4 kV                        |
| III                         |
| 2                           |
| $\geq 3 \text{ mm}$         |
| 4 kV <sub>eff</sub> / 1 min |

|                             |
|-----------------------------|
| 300 V                       |
| 4 kV                        |
| III                         |
| 2                           |
| $\geq 3 \text{ mm}$         |
| 4 kV <sub>eff</sub> / 1 min |

|                             |
|-----------------------------|
| 300 V                       |
| 4 kV                        |
| III                         |
| 2                           |
| $\geq 3 \text{ mm}$         |
| 4 kV <sub>eff</sub> / 1 min |

Standards/specifications

EMC standards

|                                 |
|---------------------------------|
| EN 50178                        |
| EN 50081, EN 50082,<br>EN 55011 |

|                                 |
|---------------------------------|
| EN 50178                        |
| EN 50081, EN 50082,<br>EN 55011 |

|                                 |
|---------------------------------|
| EN 50178                        |
| EN 50081, EN 50082,<br>EN 55011 |

Dimensions and accessories see

\* $T_U = 23^\circ\text{C}$  single module

Page 298 + 308

Page 298 + 308

Page 298 + 308

## DC/DC-Signal Conditioners

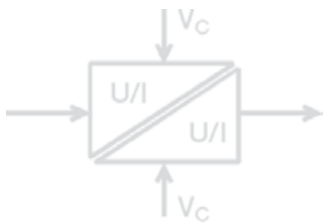
### WAVEANALOG DC/DC

- voltage supply on both sides
- 2-way-isolation
- analogue signal conditioning
- galvanic isolation between input/output signal
- cross-connectable voltage supply via cross-connectorss

### Approvals:



### Block diagram



### CCC DC

0 ... 20 mA / 0 ... 20 mA



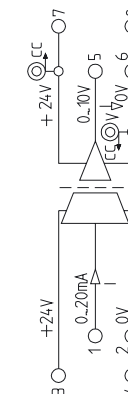
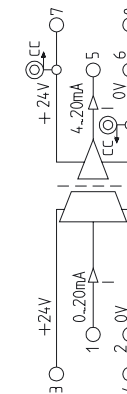
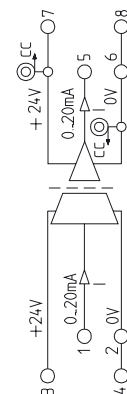
### CCC DC

0 ... 20 mA / 4 ... 20 mA



### CVC DC

0 ... 20 mA / 0 ... 10 V



### Ordering data

Screw connection

Tension clamp connection

Input/output

| Type                      | Cat. No.          |
|---------------------------|-------------------|
| WAS4 CCC DC               | <b>8445070000</b> |
| WAZ4 CCC DC               | <b>8445080000</b> |
| 0 ... 20 mA / 0 ... 20 mA |                   |

| Type                      | Cat. No.          |
|---------------------------|-------------------|
| WAS4 CCC DC               | <b>8446970000</b> |
| WAZ4 CCC DC               | <b>8446990000</b> |
| 0 ... 20 mA / 4 ... 20 mA |                   |

| Type                     | Cat. No.          |
|--------------------------|-------------------|
| WAS4 CVC DC              | <b>8447020000</b> |
| WAZ4 CVC DC              | <b>8447030000</b> |
| 0 ... 20 mA / 0 ... 10 V |                   |

### Technical data\*

#### Input signal

Input current max

Input resistance

Output signal

Load resistance

Accuracy at  $T_U = 23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

0 ... 20 mA

25 mA

50  $\Omega$

0 ... 20 mA

$\leq 500 \Omega$

$\pm 0.2\%$  of FS

$\leq 250 \text{ ppm} / \text{K}$  of FS

$\leq 30 \text{ ms}$  (typ. 16 ms)

$\geq 15 \text{ Hz}$  (typ. 25 Hz)

0 ... 20 mA

25 mA

50  $\Omega$

4 ... 20 mA

$\leq 500 \Omega$

$\pm 0.2\%$  of FS

$\leq 250 \text{ ppm} / \text{K}$  of FS

$\leq 30 \text{ ms}$  (typ. 16 ms)

$\geq 15 \text{ Hz}$  (typ. 25 Hz)

0 ... 20 mA

25 mA

50  $\Omega$

0 ... 10 V

$\geq 1 \text{ k}\Omega$

$\pm 0.2\%$  of FS

$\leq 250 \text{ ppm} / \text{K}$  of FS

$\leq 30 \text{ ms}$  (typ. 16 ms)

$\geq 15 \text{ Hz}$  (typ. 25 Hz)

### General

Voltage supply

Power consumption input

Power consumption output

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc  $\pm 20\%$

(19.2 ... 28.8 Vdc)

$< 11 \text{ mA}$  at  $I_{in} = 20 \text{ mA}$

$< 32 \text{ mA}$  at  $I_{out} = 20 \text{ mA}$

$\leq 2 \text{ A}$

$0^\circ\text{C} \dots +55^\circ\text{C}$  (mounted)

$-20^\circ\text{C} \dots +85^\circ\text{C}$

92.4 / 112.5 / 12.5

CE, UL, CSA

24 Vdc  $\pm 20\%$

(19.2 ... 28.8 Vdc)

$< 11 \text{ mA}$  at  $I_{in} = 20 \text{ mA}$

$< 32 \text{ mA}$  at  $I_{out} = 20 \text{ mA}$

$\leq 2 \text{ A}$

$0^\circ\text{C} \dots +55^\circ\text{C}$  (mounted)

$-20^\circ\text{C} \dots +85^\circ\text{C}$

92.4 / 112.5 / 12.5

CE, UL, CSA

24 Vdc  $\pm 20\%$

(19.2 ... 28.8 Vdc)

$< 11 \text{ mA}$  at  $I_{in} = 20 \text{ mA}$

$< 20 \text{ mA}$  at  $I_{out} = 10 \text{ V}$

$\leq 2 \text{ A}$

$0^\circ\text{C} \dots +55^\circ\text{C}$  (mounted)

$-20^\circ\text{C} \dots +85^\circ\text{C}$

92.4 / 112.5 / 12.5

CE, UL, CSA

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Isolation voltage, voltage strength

Input/output to mounting rail

300 V

4 kV

III

2

$\geq 3 \text{ mm}$

4 kV<sub>eff</sub> / 1 min

Standards/specifications

EMC standards

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

300 V

4 kV

III

2

$\geq 3 \text{ mm}$

4 kV<sub>eff</sub> / 1 min

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

300 V

4 kV

III

2

$\geq 3 \text{ mm}$

4 kV<sub>eff</sub> / 1 min

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

\* $T_U = 23^\circ\text{C}$  single module

## DC/DC Signal Conditioners

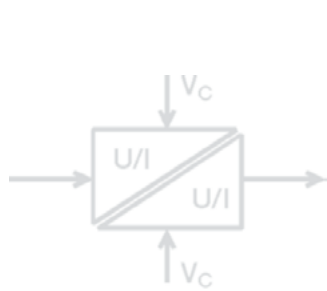
### WAVEANALOG DC/DC

- 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:

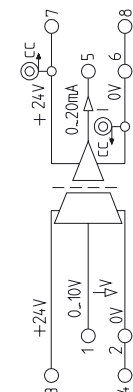


### Block diagram



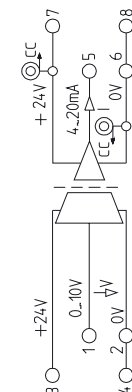
### VCC DC

0 ... 10 V / 0 ... 20 mA



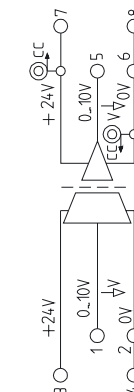
### VCC DC

0 ... 10 V / 4 ... 20 mA



### VVC DC

0 ... 10 V / 0 ... 10 V



### Ordering data

Screw connection

Tension clamp connection

Input/output

| Type                     | Cat. No.          |
|--------------------------|-------------------|
| WAS4 VCC DC              | <b>8447050000</b> |
| WAZ4 VCC DC              | <b>8447080000</b> |
| 0 ... 10 V / 0 ... 20 mA |                   |

| Type                     | Cat. No.          |
|--------------------------|-------------------|
| WAS4 VCC DC              | <b>8447100000</b> |
| WAZ4 VCC DC              | <b>8447110000</b> |
| 0 ... 10 V / 4 ... 20 mA |                   |

| Type                    | Cat. No.          |
|-------------------------|-------------------|
| WAS4 VVC DC             | <b>8447130000</b> |
| WAZ4 VVC DC             | <b>8447140000</b> |
| 0 ... 10 V / 0 ... 10 V |                   |

### Technical data\*

#### Input signal

Input voltage max.

Input resistance

#### Output signal

Load resistance

Accuracy at  $T_U = 23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| 0 ... 10 V                        | 0 ... 10 V                        |
| 15 V                              | 15 V                              |
| 500 k $\Omega$                    | 500 k $\Omega$                    |
| 0 ... 20 mA                       | 4 ... 20 mA                       |
| $\leq 500 \Omega$                 | $\leq 500 \Omega$                 |
| $\pm 0.2\%$ of FS                 | $\pm 0.2\%$ of FS                 |
| $\leq 250 \text{ ppm / K of FS}$  | $\leq 250 \text{ ppm / K of FS}$  |
| $\leq 30 \text{ ms (typ. 25 ms)}$ | $\leq 30 \text{ ms (typ. 25 ms)}$ |
| $\geq 13 \text{ Hz (typ. 17 Hz)}$ | $\geq 13 \text{ Hz (typ. 17 Hz)}$ |

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| 0 ... 10 V                        | 0 ... 10 V                        |
| 15 V                              | 15 V                              |
| 500 k $\Omega$                    | 500 k $\Omega$                    |
| 4 ... 20 mA                       | 4 ... 20 mA                       |
| $\leq 500 \Omega$                 | $\leq 500 \Omega$                 |
| $\pm 0.2\%$ of FS                 | $\pm 0.2\%$ of FS                 |
| $\leq 250 \text{ ppm / K of FS}$  | $\leq 250 \text{ ppm / K of FS}$  |
| $\leq 30 \text{ ms (typ. 25 ms)}$ | $\leq 30 \text{ ms (typ. 25 ms)}$ |
| $\geq 13 \text{ Hz (typ. 17 Hz)}$ | $\geq 13 \text{ Hz (typ. 17 Hz)}$ |

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| 0 ... 10 V                        | 0 ... 10 V                        |
| 15 V                              | 15 V                              |
| 500 k $\Omega$                    | 500 k $\Omega$                    |
| 0 ... 10 V                        | 0 ... 10 V                        |
| $\geq 1 \text{ k}\Omega$          | $\geq 1 \text{ k}\Omega$          |
| $\pm 0.2\%$ of FS                 | $\pm 0.2\%$ of FS                 |
| $\leq 250 \text{ ppm / K of FS}$  | $\leq 250 \text{ ppm / K of FS}$  |
| $\leq 30 \text{ ms (typ. 25 ms)}$ | $\leq 30 \text{ ms (typ. 25 ms)}$ |
| $\geq 13 \text{ Hz (typ. 17 Hz)}$ | $\geq 13 \text{ Hz (typ. 17 Hz)}$ |

### General

Voltage supply

Power consumption input

Power consumption output

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

|                                               |                                               |
|-----------------------------------------------|-----------------------------------------------|
| 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)      | 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)      |
| $< 11 \text{ mA at } U_{in} = 10 \text{ V}$   | $< 11 \text{ mA at } U_{in} = 10 \text{ V}$   |
| $< 32 \text{ mA at } I_{out} = 20 \text{ mA}$ | $< 32 \text{ mA at } I_{out} = 20 \text{ mA}$ |
| $\leq 2 \text{ A}$                            | $\leq 2 \text{ A}$                            |
| 0 °C ... +55 °C (mounted)                     | 0 °C ... +55 °C (mounted)                     |
| -20 °C ... +85 °C                             | -20 °C ... +85 °C                             |
| 92.4 / 112.5 / 12.5                           | 92.4 / 112.5 / 12.5                           |
| CE, UL, CSA                                   | CE, UL, CSA                                   |

|                                               |                                               |
|-----------------------------------------------|-----------------------------------------------|
| 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)      | 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)      |
| $< 11 \text{ mA at } U_{in} = 10 \text{ V}$   | $< 11 \text{ mA at } U_{in} = 10 \text{ V}$   |
| $< 32 \text{ mA at } I_{out} = 20 \text{ mA}$ | $< 32 \text{ mA at } I_{out} = 20 \text{ mA}$ |
| $\leq 2 \text{ A}$                            | $\leq 2 \text{ A}$                            |
| 0 °C ... +55 °C (mounted)                     | 0 °C ... +55 °C (mounted)                     |
| -20 °C ... +85 °C                             | -20 °C ... +85 °C                             |
| 92.4 / 112.5 / 12.5                           | 92.4 / 112.5 / 12.5                           |
| CE, UL, CSA                                   | CE, UL, CSA                                   |

|                                               |                                               |
|-----------------------------------------------|-----------------------------------------------|
| 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)      | 24 Vdc $\pm 20\%$<br>(19.2 ... 28.8 Vdc)      |
| $< 11 \text{ mA at } U_{in} = 10 \text{ V}$   | $< 11 \text{ mA at } U_{in} = 10 \text{ V}$   |
| $< 20 \text{ mA at } I_{out} = 10 \text{ mA}$ | $< 20 \text{ mA at } I_{out} = 10 \text{ mA}$ |
| $\leq 2 \text{ A}$                            | $\leq 2 \text{ A}$                            |
| 0 °C ... +55 °C (mounted)                     | 0 °C ... +55 °C (mounted)                     |
| -20 °C ... +85 °C                             | -20 °C ... +85 °C                             |
| 92.4 / 112.5 / 12.5                           | 92.4 / 112.5 / 12.5                           |
| CE, UL, CSA                                   | CE, UL, CSA                                   |

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Isolation voltage, voltage strength

Input/output to mounting rail

|                             |                             |
|-----------------------------|-----------------------------|
| 300 V                       | 300 V                       |
| 4 kV                        | 4 kV                        |
| III                         | III                         |
| 2                           | 2                           |
| $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         |
| 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min |

|                             |                             |
|-----------------------------|-----------------------------|
| 300 V                       | 300 V                       |
| 4 kV                        | 4 kV                        |
| III                         | III                         |
| 2                           | 2                           |
| $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         |
| 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min |

|                             |                             |
|-----------------------------|-----------------------------|
| 300 V                       | 300 V                       |
| 4 kV                        | 4 kV                        |
| III                         | III                         |
| 2                           | 2                           |
| $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         |
| 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min |

Standards/specifications

EMC standards

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

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

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

Dimensions and accessories see

Page 298 + 308

Page 298 + 308

Page 298 + 308

\* $T_U = 23^\circ\text{C}$  single module

## DC/DC Signal Conditioners

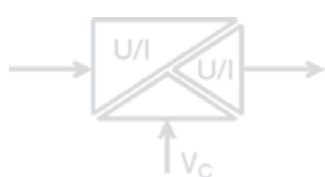
### WAVEANALOG DC/DC

- 3-way-isolation
- analogue signal conditioning
- indication LED
- cross-connectable voltage supply via cross-connectors

### Approvals:



Block diagram



### CCC

0 ... 20 mA / 0 ... 20 mA



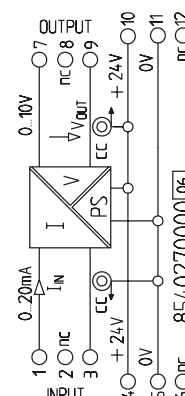
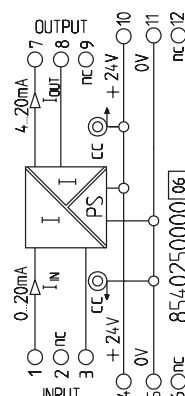
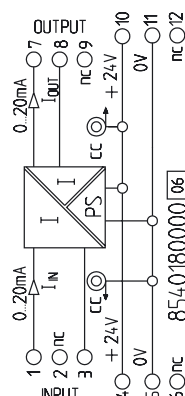
### CCC

0 ... 20 mA / 4 ... 20 mA



### CVC

0 ... 20 mA / 0 ... 10 V



### Ordering data

Screw connection  
Tension clamp connection  
Input/output

| Type                      | Cat. No.    |
|---------------------------|-------------|
| WAS5 CCC                  | 8540180000* |
| WAZ5 CCC                  | 8540190000* |
| 0 ... 20 mA / 0 ... 20 mA |             |

| Type                      | Cat. No.   |
|---------------------------|------------|
| WAS5 CCC                  | 8540250000 |
| WAZ5 CCC                  | 8540260000 |
| 0 ... 20 mA / 4 ... 20 mA |            |

| Type                     | Cat. No.   |
|--------------------------|------------|
| WAS5 CVC                 | 8540270000 |
| WAZ5 CVC                 | 8540280000 |
| 0 ... 20 mA / 0 ... 10 V |            |

### Technical data\*\*

#### Input signal

Input current max  
Input resistance

0 ... 20 mA

25 mA

≤ 110 Ω

#### Output signal

Load resistance

Accuracy at  $T_u=23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

0 ... 20 mA

25 mA

≤ 110 Ω

0 ... 20 mA

≤ 600 Ω

0.2%

± 250 ppm / K

≤ 45 ms

10 Hz

0 ... 20 mA

25 mA

≤ 110 Ω

4 ... 20 mA

≤ 600 Ω

0.2%

± 250 ppm / K

≤ 45 ms

10 Hz

0 ... 20 mA

25 mA

≤ 110 Ω

0 ... 10 V

≥ 1 kΩ

0.2%

± 250 ppm / K

≤ 45 ms

10 Hz

### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc ±25%

(18 Vdc ... 24 Vdc ... 30 Vdc)

< 1.5 W at  $I_{out} = 20\text{ mA}$

≤ 2 A

0 °C ... +55 °C

when mounted horizontally

-20 °C ... +85 °C

92.4 / 112.5 / 17.5

CE, cUL

24 Vdc ±25%

(18 Vdc ... 24 Vdc ... 30 Vdc)

< 1.5 W at  $I_{out} = 20\text{ mA}$

≤ 2 A

0 °C ... +55 °C

when mounted horizontally

-20 °C ... +85 °C

92.4 / 112.5 / 17.5

CE, cUL

24 Vdc ±25%

(18 Vdc ... 24 Vdc ... 30 Vdc)

< 1.3 W at  $I_{out} = 5\text{ mA}$

≤ 2 A

0 °C ... +55 °C

when mounted horizontally

-20 °C ... +85 °C

92.4 / 112.5 / 17.5

CE, cUL

### 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

300 V

4 kV

III

2

≥ 3 mm

1 nF

4 kV<sub>eff</sub> / 1 min

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

300 V

4 kV

III

2

≥ 3 mm

1 nF

4 kV<sub>eff</sub> / 1 min

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

300 V

4 kV

III

2

≥ 3 mm

1 nF

4 kV<sub>eff</sub> / 1 min

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

\*\*  $T_u = 23^\circ\text{C}$  single module

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



# DC/DC Signal Conditioners

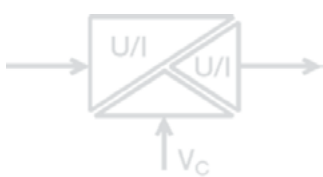
## WAVEANALOG DC/DC

- 3-way-isolation
- analogue signal conditioning
- indication LED
- cross-connectable voltage supply via cross-connectors

### Approvals:

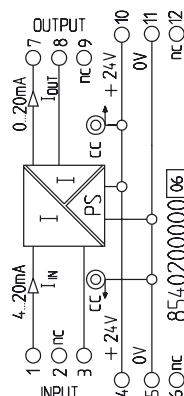


#### Block diagram



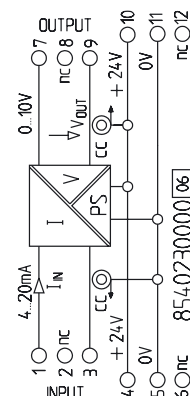
## CCC

4 ... 20 mA / 0 ... 20 mA



## CVC

4 ... 20 mA / 0 ... 10 V



#### Ordering data

Screw connection

Tension clamp connection

Input/output

#### Type

WAS5 CCC

WAZ5 CCC

4 ... 20 mA / 0 ... 20 mA

#### Cat. No.

8540200000

8540210000

#### Type

WAS5 CVC

WAZ5 CVC

4 ... 20 mA / 0 ... 10 V

#### Cat. No.

8540230000

8540240000

#### Technical data

##### Input signal

Input current max

Input resistance

Output signal

Load resistance

Accuracy at  $T_U=23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

4 ... 20 mA

25 mA

$\leq 110\ \Omega$

0 ... 20 mA

$\leq 600\ \Omega$

0.2%

$\pm 250\ \text{ppm} / \text{K}$

$\leq 45\ \text{ms}$

10 Hz

4 ... 20 mA

25 mA

$\leq 110\ \Omega$

0 ... 10 V

$\geq 1\ \text{k}\Omega$

0.2%

$\pm 250\ \text{ppm} / \text{K}$

$\leq 45\ \text{ms}$

10 Hz

#### General\*

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc  $\pm 25\%$

(18 Vdc ... **24 Vdc** ... 30 Vdc)

$< 1.5\ \text{W}$  at  $I_{\text{out}} = 20\ \text{mA}$

$\leq 2\ \text{A}$

0 °C ... +55 °C

when mounted horizontally

-20 °C ... +85 °C

92.4 / 112.5 / 17.5

CE, cUL

24 Vdc  $\pm 25\%$

(18 Vdc ... **24 Vdc** ... 30 Vdc)

$< 1.3\ \text{W}$  at  $I_{\text{out}} = 5\ \text{mA}$

$\leq 2\ \text{A}$

0 °C ... +55 °C

when mounted horizontally

-20 °C ... +85 °C

92.4 / 112.5 / 17.5

CE, cUL

#### 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

300 V

4 kV

III

2

$\geq 3\ \text{mm}$

1 nF

4 kV<sub>eff</sub> / 1 min

300 V

4 kV

III

2

$\geq 3\ \text{mm}$

1 nF

4 kV<sub>eff</sub> / 1 min

Standards/specifications

EMC standards

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082,

EN 55011

Dimensions and accessories see

Page 298 + 308

Page 298 + 308

\* $T_U = 23^\circ\text{C}$  single module

# DC/DC Signal Conditioners

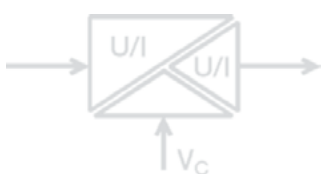
## WAVEANALOG DC/DC

- 3-way-isolation
- analogue signal conditioning
- indication LED
- cross-connectable voltage supply via cross-connectors

### Approvals:



#### Block diagram



### VCC

0 ... 10 V / 0 ... 20 mA



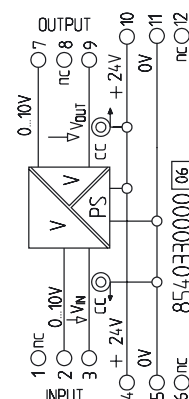
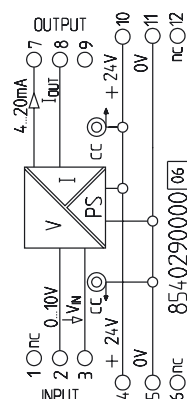
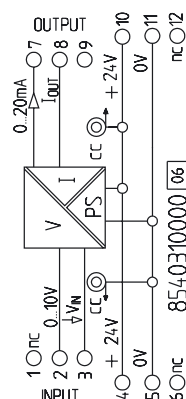
### VCC

0 ... 10 V / 4 ... 20 mA



### VVC

0 ... 10 V / 0 ... 10 V



#### Ordering data

Screw connection

Tension clamp connection

Input/output

| Type                     | Cat. No.          |
|--------------------------|-------------------|
| WAS5 VCC                 | <b>8540310000</b> |
| WAZ5 VCC                 | <b>8540320000</b> |
| 0 ... 10 V / 0 ... 20 mA |                   |

| Type                     | Cat. No.          |
|--------------------------|-------------------|
| WAS5 VCC                 | <b>8540290000</b> |
| WAZ5 VCC                 | <b>8540300000</b> |
| 0 ... 10 V / 4 ... 20 mA |                   |

| Type                    | Cat. No.          |
|-------------------------|-------------------|
| WAS5 VVC                | <b>8540330000</b> |
| WAZ5 VVC                | <b>8540340000</b> |
| 0 ... 10 V / 0 ... 10 V |                   |

#### Technical data\*

##### Input signal

Input voltage max.

Input resistance

Output signal

Load resistance

Accuracy at  $T_U=23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

|                           |                           |                           |
|---------------------------|---------------------------|---------------------------|
| 0 ... 10 V                | 0 ... 10 V                | 0 ... 10 V                |
| 15 V                      | 15 V                      | 15 V                      |
| typ. 100 k $\Omega$       | typ. 100 k $\Omega$       | typ. 100 k $\Omega$       |
| 0 ... 20 mA               | 4 ... 20 mA               | 0 ... 10 V                |
| $\leq 600 \Omega$         | $\leq 600 \Omega$         | $\geq 1 \text{ k}\Omega$  |
| 0.2%                      | 0.2%                      | 0.2%                      |
| $\pm 250 \text{ ppm / K}$ | $\pm 250 \text{ ppm / K}$ | $\pm 250 \text{ ppm / K}$ |
| $\leq 45 \text{ ms}$      | $\leq 45 \text{ ms}$      | $\leq 45 \text{ ms}$      |
| 10 Hz                     | 10 Hz                     | 10 Hz                     |

|                           |                           |                           |
|---------------------------|---------------------------|---------------------------|
| 0 ... 10 V                | 0 ... 10 V                | 0 ... 10 V                |
| 15 V                      | 15 V                      | 15 V                      |
| typ. 100 k $\Omega$       | typ. 100 k $\Omega$       | typ. 100 k $\Omega$       |
| 4 ... 20 mA               | 4 ... 20 mA               | 0 ... 10 V                |
| $\leq 600 \Omega$         | $\leq 600 \Omega$         | $\geq 1 \text{ k}\Omega$  |
| 0.2%                      | 0.2%                      | 0.2%                      |
| $\pm 250 \text{ ppm / K}$ | $\pm 250 \text{ ppm / K}$ | $\pm 250 \text{ ppm / K}$ |
| $\leq 45 \text{ ms}$      | $\leq 45 \text{ ms}$      | $\leq 45 \text{ ms}$      |
| 10 Hz                     | 10 Hz                     | 10 Hz                     |

|                           |                           |                           |
|---------------------------|---------------------------|---------------------------|
| 0 ... 10 V                | 0 ... 10 V                | 0 ... 10 V                |
| 15 V                      | 15 V                      | 15 V                      |
| typ. 100 k $\Omega$       | typ. 100 k $\Omega$       | typ. 100 k $\Omega$       |
| 0 ... 10 V                | 0 ... 10 V                | 0 ... 10 V                |
| $\geq 1 \text{ k}\Omega$  | $\geq 1 \text{ k}\Omega$  | $\geq 1 \text{ k}\Omega$  |
| 0.2%                      | 0.2%                      | 0.2%                      |
| $\pm 250 \text{ ppm / K}$ | $\pm 250 \text{ ppm / K}$ | $\pm 250 \text{ ppm / K}$ |
| $\leq 45 \text{ ms}$      | $\leq 45 \text{ ms}$      | $\leq 45 \text{ ms}$      |
| 10 Hz                     | 10 Hz                     | 10 Hz                     |

#### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

|                                                            |                                                            |                                                            |
|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|
| 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) | 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) | 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) |
| $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$             | $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$             | $< 1.3 \text{ W}$ at $I_{out} = 5 \text{ mA}$              |
| $\leq 2 \text{ A}$                                         | $\leq 2 \text{ A}$                                         | $\leq 2 \text{ A}$                                         |
| 0 °C ... +55 °C<br>when mounted horizontally               | 0 °C ... +55 °C<br>when mounted horizontally               | 0 °C ... +55 °C<br>when mounted horizontally               |
| -20 °C ... +85 °C                                          | -20 °C ... +85 °C                                          | -20 °C ... +85 °C                                          |
| 92.4 / 112.5 / 17.5                                        | 92.4 / 112.5 / 17.5                                        | 92.4 / 112.5 / 17.5                                        |
| CE, cUL                                                    | CE, cUL                                                    | CE, cUL                                                    |

|                                                            |                                                            |                                                            |
|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|
| 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) | 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) | 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) |
| $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$             | $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$             | $< 1.3 \text{ W}$ at $I_{out} = 5 \text{ mA}$              |
| $\leq 2 \text{ A}$                                         | $\leq 2 \text{ A}$                                         | $\leq 2 \text{ A}$                                         |
| 0 °C ... +55 °C<br>when mounted horizontally               | 0 °C ... +55 °C<br>when mounted horizontally               | 0 °C ... +55 °C<br>when mounted horizontally               |
| -20 °C ... +85 °C                                          | -20 °C ... +85 °C                                          | -20 °C ... +85 °C                                          |
| 92.4 / 112.5 / 17.5                                        | 92.4 / 112.5 / 17.5                                        | 92.4 / 112.5 / 17.5                                        |
| CE, cUL                                                    | CE, cUL                                                    | CE, cUL                                                    |

|                                                            |                                                            |                                                            |
|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|
| 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) | 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) | 24 Vdc $\pm 25\%$<br>(18 Vdc ... <b>24 Vdc</b> ... 30 Vdc) |
| $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$             | $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$             | $< 1.3 \text{ W}$ at $I_{out} = 5 \text{ mA}$              |
| $\leq 2 \text{ A}$                                         | $\leq 2 \text{ A}$                                         | $\leq 2 \text{ A}$                                         |
| 0 °C ... +55 °C<br>when mounted horizontally               | 0 °C ... +55 °C<br>when mounted horizontally               | 0 °C ... +55 °C<br>when mounted horizontally               |
| -20 °C ... +85 °C                                          | -20 °C ... +85 °C                                          | -20 °C ... +85 °C                                          |
| 92.4 / 112.5 / 17.5                                        | 92.4 / 112.5 / 17.5                                        | 92.4 / 112.5 / 17.5                                        |
| CE, cUL                                                    | CE, cUL                                                    | CE, cUL                                                    |

#### 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

|                             |                             |                             |
|-----------------------------|-----------------------------|-----------------------------|
| 300 V                       | 300 V                       | 300 V                       |
| 4 kV                        | 4 kV                        | 4 kV                        |
| III                         | III                         | III                         |
| 2                           | 2                           | 2                           |
| $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         |
| 1 nF                        | 1 nF                        | 1 nF                        |
| 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min |

|                             |                             |                             |
|-----------------------------|-----------------------------|-----------------------------|
| 300 V                       | 300 V                       | 300 V                       |
| 4 kV                        | 4 kV                        | 4 kV                        |
| III                         | III                         | III                         |
| 2                           | 2                           | 2                           |
| $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         |
| 1 nF                        | 1 nF                        | 1 nF                        |
| 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min |

|                             |                             |                             |
|-----------------------------|-----------------------------|-----------------------------|
| 300 V                       | 300 V                       | 300 V                       |
| 4 kV                        | 4 kV                        | 4 kV                        |
| III                         | III                         | III                         |
| 2                           | 2                           | 2                           |
| $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         | $\geq 3 \text{ mm}$         |
| 1 nF                        | 1 nF                        | 1 nF                        |
| 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min | 4 kV <sub>eff</sub> / 1 min |

Standards/specifications

EMC standards

|                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|
| EN 50178                        | EN 50178                        | EN 50178                        |
| EN 50081, EN 50082,<br>EN 55011 | EN 50081, EN 50082,<br>EN 55011 | EN 50081, EN 50082,<br>EN 55011 |

|                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|
| EN 50178                        | EN 50178                        | EN 50178                        |
| EN 50081, EN 50082,<br>EN 55011 | EN 50081, EN 50082,<br>EN 55011 | EN 50081, EN 50082,<br>EN 55011 |

|                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|
| EN 50178                        | EN 50178                        | EN 50178                        |
| EN 50081, EN 50082,<br>EN 55011 | EN 50081, EN 50082,<br>EN 55011 | EN 50081, EN 50082,<br>EN 55011 |

Dimensions and accessories see

Page 298 + 308

Page 298 + 308

Page 298 + 308

\* $T_U = 23^\circ\text{C}$  single module

## DC/DC Signal Conditioners

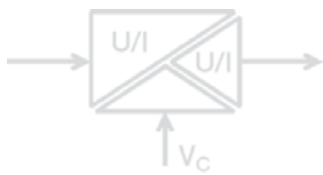
### WAVEANALOG DC/DC 20 kHz

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

#### Approvals:

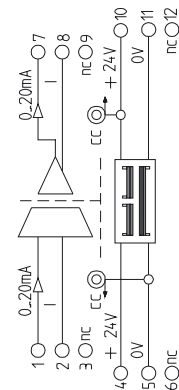


#### Block diagram



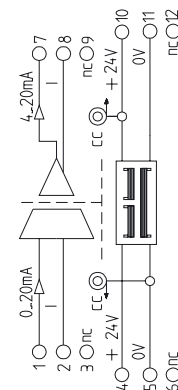
### CCC HF

0 ... 20 mA / 0 ... 20 mA



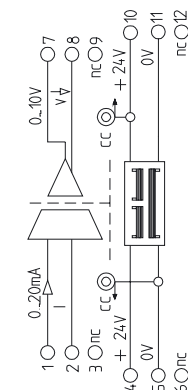
### CCC HF

0 ... 20 mA / 4 ... 20 mA



### CVC HF

0 ... 20 mA / 0 ... 10 V



#### Ordering data

Screw connection

Tension clamp connection

Input/output

Type Cat. No.

WAS5 CCC HF **8447160000\***

WAZ5 CCC HF **8447170000\***

0 ... 20 mA / 0 ... 20 mA

Type Cat. No.

WAS5 CCC HF **8447190000**

WAZ5 CCC HF **8447200000**

0 ... 20 mA / 4 ... 20 mA

Type Cat. No.

WAS5 CVC HF **8447220000**

WAZ5 CVC HF **8447230000**

0 ... 20 mA / 0 ... 10 V

#### Technical data\*\*

##### Input signal

Input current max

Input resistance

Output signal

Load resistance

Accuracy at  $T_u=23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

0 ... 20 mA

50 mA

50  $\Omega$

0 ... 20 mA

$\leq 500 \Omega$

$< 0.2\%$  of FS

$\leq 250$  ppm / K of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15$  kHz (typ. 20 kHz)

0 ... 20 mA

50 mA

50  $\Omega$

4 ... 20 mA

$\leq 500 \Omega$

$< 0.2\%$  of FS

$\leq 250$  ppm / K of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15$  kHz (typ. 20 kHz)

0 ... 20 mA

50 mA

50  $\Omega$

0 ... 10 V

$\geq 2$  k $\Omega$

$< 0.2\%$  of FS

$\leq 250$  ppm / K of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15$  kHz (typ. 20 kHz)

#### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.5$  W at  $I_{out} = 20$  mA

$\leq 2$  A

0  $^\circ\text{C}$  ... +55  $^\circ\text{C}$

-20  $^\circ\text{C}$  ... +85  $^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.5$  W at  $I_{out} = 20$  mA

$\leq 2$  A

0  $^\circ\text{C}$  ... +55  $^\circ\text{C}$

-20  $^\circ\text{C}$  ... +85  $^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.3$  W at  $I_{out} = 5$  mA

$\leq 2$  A

0  $^\circ\text{C}$  ... +55  $^\circ\text{C}$

-20  $^\circ\text{C}$  ... +85  $^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

#### 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

300 V

4 kV

III

2

$\geq 3$  mm

1 nF

4 kV<sub>eff</sub> / 1 min

300 V

4 kV

III

2

$\geq 3$  mm

1 nF

4 kV<sub>eff</sub> / 1 min

300 V

4 kV

III

2

$\geq 3$  mm

1 nF

4 kV<sub>eff</sub> / 1 min

Standards/specifications

EMC standards

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082,

EN 55011

Dimensions and accessories see

Page 298 + 308

Page 298 + 308

Page 298 + 308

\*\* $T_U = 23^\circ\text{C}$  single module

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

## DC/DC Signal Conditioners

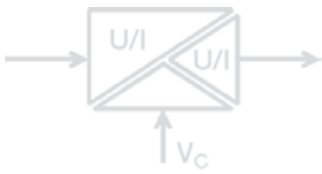
### WAVEANALOG DC/DC 20 kHz

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

#### Approvals:

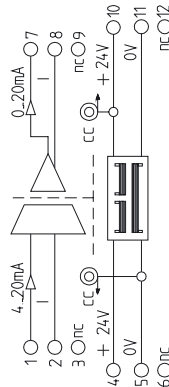


#### Block diagram



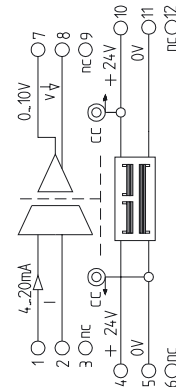
### CCC HF

4 ... 20 mA / 0 ... 20 mA



### CVC HF

4 ... 20 mA / 0 ... 10 V



#### Ordering data

Screw connection

Tension clamp connection

Input/output

#### Type

WAS5 CCC HF

WAZ5 CCC HF

4 ... 20 mA / 0 ... 20 mA

#### Cat. No.

8447250000

8447260000

#### Type

WAS5 CVC HF

WAZ5 CVC HF

4 ... 20 mA / 0 ... 10 V

#### Cat. No.

8447280000

8447290000

#### Technical data\*

##### Input signal

Input current max

Input resistance

##### Output signal

Load resistance

Accuracy at  $T_U = 23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

4 ... 20 mA

50 mA

50  $\Omega$

0 ... 20 mA

$\leq 500 \Omega$

$< 0.2\%$  of FS

$\leq 250 \text{ ppm} / \text{K}$  of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15 \text{ kHz}$  (typ. 20 kHz)

4 ... 20 mA

50 mA

50  $\Omega$

0 ... 10 V

$\geq 2 \text{ k}\Omega$

$< 0.2\%$  of FS

$\leq 250 \text{ ppm} / \text{K}$  of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15 \text{ kHz}$  (typ. 20 kHz)

#### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.5 \text{ W}$  at  $I_{\text{out}} = 20 \text{ mA}$

$\leq 2 \text{ A}$

$0^\circ\text{C} \dots +55^\circ\text{C}$

$-20^\circ\text{C} \dots +85^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.3 \text{ W}$  at  $I_{\text{out}} = 5 \text{ mA}$

$\leq 2 \text{ A}$

$0^\circ\text{C} \dots +55^\circ\text{C}$

$-20^\circ\text{C} \dots +85^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

#### 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

300 V

4 kV

III

2

$\geq 3 \text{ mm}$

1 nF

4 kVeff / 1 min

300 V

4 kV

III

2

$\geq 3 \text{ mm}$

1 nF

4 kVeff / 1 min

Standards/specifications

EMC standards

EN 50178

EN 50081, EN 50082,

EN 55011

EN 50178

EN 50081, EN 50082

EN 55011

Dimensions and accessories see

Page 298 + 308

Page 298 + 308

\* $T_U = 23^\circ\text{C}$  single module

## DC/DC Signal Conditioners

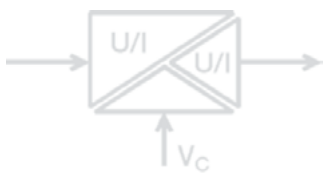
### WAVEANALOG DC/DC 20 kHz

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

#### Approvals:

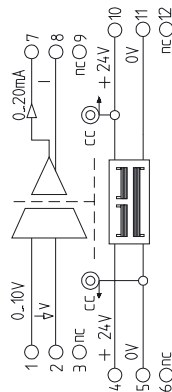


#### Block diagram



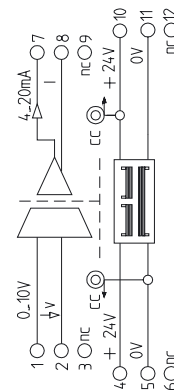
### VCC HF

0 ... 10 V / 0 ... 20 mA



### VCC HF

0 ... 10 V / 4 ... 20 mA



#### Ordering data

Screw connection

Tension clamp connection

Input/output

#### Type

WAS5 VCC HF

WAZ5 VCC HF

0 ... 10 V / 0 ... 20 mA

#### Cat. No.

8447310000

8447320000

#### Type

WAS5 VCC HF

WAZ5 VCC HF

0 ... 10 V / 4 ... 20 mA

#### Cat. No.

8447340000

8447350000

#### Technical data\*

##### Input signal

Input voltage max.

Input resistance

##### Output signal

Load resistance

Accuracy at  $T_U = 23^\circ\text{C}$

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

0 ... 10 V

15 V

500 k $\Omega$

0 ... 20 mA

$\leq 500 \Omega$

$\pm 0.2\%$  of FS

$\leq 250$  ppm / K of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15$  kHz (typ. 20 kHz)

0 ... 10 V

15 V

500 k $\Omega$

4 ... 20 mA

$\leq 500 \Omega$

$\pm 0.2\%$  of FS

$\leq 250$  ppm / K of FS

$\leq 40 \mu\text{s}$  (typ. 30  $\mu\text{s}$ )

$\geq 15$  kHz (typ. 20 kHz)

#### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.5$  W at  $I_{out} = 20$  mA

$\leq 2$  A

0  $^\circ\text{C}$  ...  $+55^\circ\text{C}$

$-20^\circ\text{C}$  ...  $+85^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc)

$< 1.5$  W at  $I_{out} = 20$  mA

$\leq 2$  A

0  $^\circ\text{C}$  ...  $+55^\circ\text{C}$

$-20^\circ\text{C}$  ...  $+85^\circ\text{C}$

92.4 / 112.5 / 17.5

CE, UL, CSA

#### 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

300 V

4 kV

III

2

$\geq 3$  mm

1 nF

4 kVeff / 1 min

EN 50178

EMC standards

EN 50081, EN 50082,

EN 55011

Dimensions and accessories see

Page 298 + 308

300 V

4 kV

III

2

$\geq 3$  mm

1 nF

4 kVeff / 1 min

EN 50178

EN 50081, EN 50082

EN 55011

Page 298 + 308

\* $T_U = 23^\circ\text{C}$  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

## VVC HF

0 ... 10 V / 0 ... 10 V



## Approvals:



## VVC HF

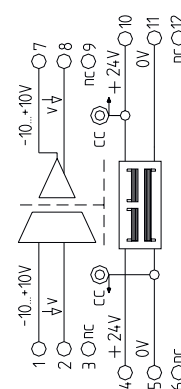
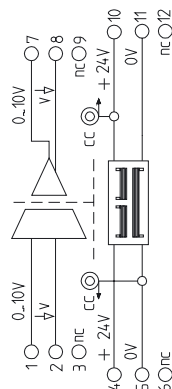
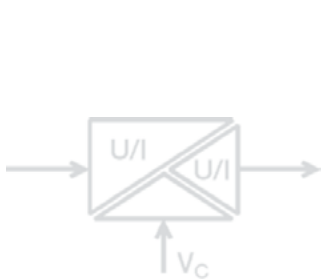
-10 ... +10 V / -10 ... +10 V



## Approvals:



## Block diagram



## Ordering data

Screw connection

Tension clamp connection

Input/output

## Type

WAS5 VVC HF

## Cat. No.

8447370000

WAZ5 VVC HF

8447380000

0 ... 10 V / 0 ... 10 V

## Type

WAS5 VVC HF

## Cat. No.

8561610000

WAZ5 VVC HF

8587000000

±10 V / ±10 V

## Technical data\*

## Input signal

Input voltage max.

Input resistance

## Output signal

Load resistance

Accuracy at  $T_U=23\text{ }^{\circ}\text{C}$ 

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

0 ... 10 V

15 V

500 k $\Omega$ 

0 ... 10 V

 $\geq 2\text{ k}\Omega$  $\pm 0.2\%$  of FS $\leq 250\text{ ppm / K}$  of FS $\leq 40\text{ }\mu\text{s}$  (typ. 30  $\mu\text{s}$ ) $\geq 15\text{ kHz}$  (typ. 20 kHz)

## General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L / H / W mm

Approvals

24 Vdc  $\pm 25\%$  (18 ... 30 Vdc) $< 1.3\text{ W}$  at  $I_{out} = 5\text{ mA}$  $\leq 2\text{ A}$ 0  $^{\circ}\text{C}$  ... +55  $^{\circ}\text{C}$ -20  $^{\circ}\text{C}$  ... +85  $^{\circ}\text{C}$ 

92.4 / 112.5 / 17.5

CE, UL, CSA

## 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

300 V

4 kV

III

2

 $\geq 3\text{ mm}$ 

1 nF

4 kVeff / 1 min

Standards/specifications

EMC standards

Dimensions and accessories see

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

300 V

4 kV

III

2

 $\geq 3\text{ mm}$ 

1 nF

4 kVeff / 1 min

EN 50178

EN 50081, EN 50082,

EN 55011

Page 298 + 308

\* $T_U = 23\text{ }^{\circ}\text{C}$  single module



# DC/DC Signal Conditioners (Configurable)

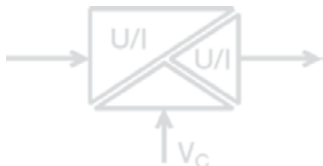
## WAVEANALOG PRO DC/DC

- 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

### Approvals:



#### Block diagram



#### Ordering data

Screw connection

Tension clamp connection

Input/output

#### Technical data\*

##### Input (adjustable)

Voltage uni-/bipolar adjustable

Voltage calibrated ranges

Current uni-/bipolar adjustable

Current calibrated ranges

Input resistance

at current input range &lt; 5 mA / &gt; 5 mA

at voltage input

Input capacity

at current input

Voltage input range &lt; 500 mV / &gt; 500 mV

Overload capacity

at current input range &lt; 5 mA / &gt; 5 mA

Voltage input range &lt; 500 mV / &gt; 500 mV

##### Output (adjustable)

Voltage uni-/bipolar adjustable

Voltage calibrated ranges

Current uni-/bipolar adjustable

Current calibrated ranges

Offset

Load

at output current

at output voltage

Offset

Residual ripple

Adjustment zero pot.

Adjustment span pot.

Gain error

Temperature coefficient

Cut-off frequency

#### General

Voltage supply

Power consumption

Frequency range

Operating temperature

Storage temperature

Factory setting

Dimensions L/H/B mm

Weight

Approvals

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

Rated voltage

Rated surge voltage

Overvoltage category

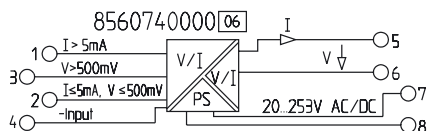
Contamination class

Test voltage

Standards/specifications

EMC standards

## PRO DC/DC



| Type           | Cat. No.   |
|----------------|------------|
| WAS4 PRO DC/DC | 8560740000 |
| WAZ4 PRO DC/DC | 8560750000 |
| configurable   |            |

|                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------|
| 20 mV ... 200 V                                                                                                              |
| 0 ... ±60 mV, 0 ... ±100 mV, 0 ... ±150 mV, 0 ... ±300 mV,<br>0 ... ±500 mV, 0 ... ±1V, 0 ... ±5V, 0 ... ±10 V, 0 ... ±100 V |
| 0,1 mA ... 100 mA                                                                                                            |
| 0 ... ±0,3 mA, 0 ... ±1 mA, 0 ... ±5 mA, 0 ... ±16 mA,<br>0 ... 20 mA, 0 ... 50 mA                                           |
| approx. 100 Ω / approx. 5 Ω                                                                                                  |
| approx. 1 MΩ                                                                                                                 |
| approx. 1 nF                                                                                                                 |
| approx. 1 nF / approx. 500 pF                                                                                                |
| < 75 mA / < 300 mA                                                                                                           |
| max. < 20 mA / < 3 mA continuous current                                                                                     |

|                                                                            |
|----------------------------------------------------------------------------|
| 0 ... 10 V                                                                 |
| 0 ... ±10 V, 2 ... 10 V, 0 ... ±5 V, 1 ... 5 V                             |
| 0 ... 20 mV                                                                |
| 0 ... ±20 mA, 4 ... 20 mA                                                  |
| -100%, -50%, 0%, 50%, 100% of measuring span of the<br>chosen output range |
| < 12 V (600 Ω at 20 mA)                                                    |
| < 10 mA (1 KΩ at 10 V)                                                     |
| 20 µA and. 10 mV                                                           |
| < 10 mVeff                                                                 |
| +25% measuring span of the chosen output range                             |
| 0.33 ... 3.30 x end value of chosen input range                            |
| < 0.1% of FS                                                               |
| < 60 ppm/K of FS                                                           |
| > 10 kHz, < 10 Hz switch                                                   |

|                               |
|-------------------------------|
| 20 ... 230 V ac/dc +10%       |
| approx. 1 W                   |
| 48 ... 62 Hz                  |
| -10 °C ... +70 °C             |
| -40 °C ... +85 °C             |
| 0 ... 10 V / 0 ... 10 V 10 Hz |
| 92.4 / 112.5 / 12.5           |
| approx. 100 g                 |
| CE, cUL, GL                   |

|                                                      |
|------------------------------------------------------|
| 600 V                                                |
| 5 kV, 1.2/50 us, acc. to IEC 255-4                   |
| III                                                  |
| 2                                                    |
| 4 KVeff input against output against auxiliary power |

|                                                     |
|-----------------------------------------------------|
| EN 50178                                            |
| DIN EN 61326, EN 61326/A1, EN 50081-2, EN 61000-6-2 |

### Adjustment help WAVEtool

The service tool enables quick and uncomplicated configuration of WAVEANALOG PRO.

Download from Internet:

<http://www.weidmueller.de>

→ Products → Downloads (see page 192)

### Switch position/setting options

| Input<br>Input range | Switch |   |   |   |    |   |   |   |
|----------------------|--------|---|---|---|----|---|---|---|
|                      | S1     |   |   |   | S2 |   |   |   |
|                      | 1      | 2 | 3 | 4 | 1  | 2 | 3 | 4 |
| 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         |        |   | ■ |   |    |   | ■ | ■ |
| 0 ... ± ~0.3 mA      | ■      |   | ■ |   |    |   |   | ■ |
| 0 ... ±1 mA          |        | ■ | ■ |   |    | ■ |   | ■ |
| 0 ... ±5 mA          | ■      | ■ | ■ |   |    | ■ |   | ■ |
| 0 ... ±10 mA         |        |   | ■ | ■ |    | ■ |   | ■ |
| 0 ... ±20 mA         | ■      | ■ | ■ | ■ |    | ■ |   | ■ |
| 0 ... ±50 mA         |        | ■ | ■ | ■ |    | ■ |   | ■ |
| 0 ... ±20 mA*        | ■      | ■ | ■ | ■ |    | ■ |   | ■ |

\*Offset conversion not calibrated

| Switch S2                                          |  | 4 |
|----------------------------------------------------|--|---|
| calibrated ranges                                  |  | ■ |
| Span pot. activated: input range x 0.33 ... x 3.30 |  |   |

| Output<br>Output range | Switch |   |   |    |   |   |
|------------------------|--------|---|---|----|---|---|
|                        | S1     |   |   | S3 |   |   |
|                        | 5      | 6 | 7 | 1  | 2 |   |
| 0 ... ±10 V            |        |   |   | ■  | ■ |   |
| 2 ... 10 V             |        | ■ |   |    |   | ■ |
| 0 ... ±5 V             |        |   | ■ | ■  | ■ |   |
| 1 ... 5 V              |        | ■ | ■ |    |   | ■ |
| 0 ... ±20 mA           |        |   |   | ■  |   |   |
| 4 ... 20 mA            |        | ■ | ■ |    |   |   |

| Offset<br>(in % of output voltage) | S1 |   |    |  | S2 |
|------------------------------------|----|---|----|--|----|
|                                    | 8  | 9 | 10 |  | 5  |
| 0 %                                |    |   |    |  | ■  |
| -100 %                             | ■  |   |    |  | ■  |
| -50 %                              |    | ■ |    |  | ■  |
| +50 %                              |    | ■ | ■  |  | ■  |
| +100 %                             |    |   | ■  |  | ■  |

Zero pot. activated: additional ±25 %

| Switch S3        |  | 3 |
|------------------|--|---|
| Bandwidth 10 kHz |  |   |
| Bandwidth 10 Hz  |  | ■ |

Set range can be documented on side of housing.

■ = on  
= off

Dimensions and accessories see page 298 + 308

\*T<sub>U</sub> = 23 °C single module

# RTD Signal Conditioners

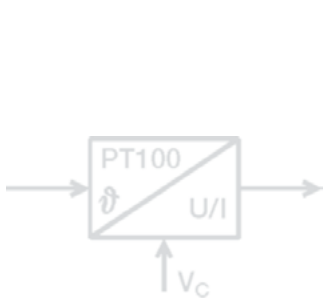
## WAVEANALOG RTD

- 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

## Approvals:



## Block diagram



## PT100/2

0(4) ... 20 mA



## PT100/2

0 ... 10 V



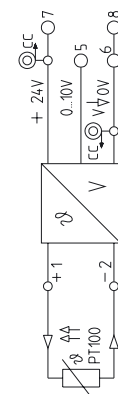
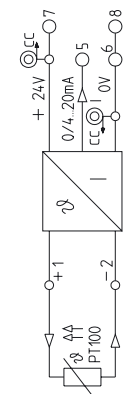
## Switch position/setting options

| Tmin    | 1 | 2 | 3 | Span           | 4 | 5 | 6 |
|---------|---|---|---|----------------|---|---|---|
| 0 °C    | ■ | ■ | ■ | 40 ... 50 °C   | ■ | ■ | ■ |
| -10 °C  | ■ | ■ |   | 50 ... 75 °C   | ■ | ■ |   |
| -20 °C  | ■ |   | ■ | 75 ... 110 °C  | ■ | ■ |   |
| -40 °C  | ■ |   |   | 110 ... 165 °C | ■ | ■ |   |
| -60 °C  |   | ■ | ■ | 165 ... 245 °C |   | ■ | ■ |
| -80 °C  |   | ■ |   | 245 ... 360 °C |   | ■ |   |
| -100 °C |   |   | ■ | 360 ... 540 °C |   |   | ■ |
| -200 °C |   |   |   | 540 ... 800 °C |   |   |   |

| Output <sup>1)</sup> | 7 |
|----------------------|---|
| Range                |   |
| 0 ... 20 mA          |   |
| 4 ... 20 mA          | ■ |

<sup>1)</sup> only modules with current output

■ = on  
= off



## Ordering data

Screw connection

Tension clamp connection

Input/output

Type Cat. No.

WTS4 PT100/2 C **8432210000\***

WTZ4 PT100/2 C **8432220000\***

PT100/2 / 0(4) ... 20 mA

Type Cat. No.

WTS4 PT100/2 V **8432180000\***

WTZ4 PT100/2 V **8432190000\***

PT100/2 / 0 ... 10 V

## Technical data\*\*\*

### Input signal

Temperature range

Supply current

Conductor resistance

### Output signal

Load resistance

Accuracy at T<sub>U</sub>=23 °C

Temperature coefficient

Measurement range ≥ 200 K

100 K ≤ measurement range < 200 K

40 K ≤ measurement range < 100 K

## General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Standards/specifications

EMC standards

Dimensions L / H / W mm

Approvals

Dimensions and accessories see

\* without balancing

\*\*\* T<sub>U</sub> = 23 °C single module

### PT100/2-wire

-200 ... +800 °C

1.45 mA

0(4) ... 20 mA

≤ 500 Ω

± 0.5% of measurement range

≤ 200 ppm / °C

(typ. 80 ppm / °C)

≤ 250 ppm / °C

(typ. 100 ppm / °C)

≤ 500 ppm / °C

24 Vdc ±20%

(19.2 ... 28.8 Vdc)

< 48 mA at I<sub>out</sub> = 20 mA

≤ 2 A

0 °C ... +55 °C

-20 °C ... +85 °C

EN 50178, IEC 751

EN 50081, EN 50082,

EN 55011

92.4 / 112.5 / 12.5

CE, UL, CSA

Page 298 + 308

### PT100/2-wire

-200 ... +800 °C

1.45 mA

0 ... 10 V

≥ 1 kΩ

± 0.5% of measurement range

≤ 200 ppm / °C

(typ. 80 ppm / °C)

≤ 250 ppm / °C

(typ. 100 ppm / °C)

≤ 500 ppm / °C

24 Vdc ±20%

(19.2 ... 28.8 Vdc)

< 38 mA at I<sub>out</sub> = 10 mA

≤ 2 A

0 °C ... +55 °C

-20 °C ... +85 °C

EN 50178, IEC 751

EN 50081, EN 50082,

EN 55011

92.4 / 112.5 / 12.5

CE, UL, CSA

Page 298 + 308

## Preconfigured modules

|                                 | Input             | Output              |                     |                     |
|---------------------------------|-------------------|---------------------|---------------------|---------------------|
|                                 |                   | 0 ... 20 mA         | 4 ... 20 mA         | 0 ... 10 V          |
| <b>Screw connection</b>         | 0 ... 100 °C      | <b>8432210001</b>   | <b>8432210011</b>   | <b>8432180001</b>   |
|                                 | special balancing | <b>8432219999**</b> | <b>8432219999**</b> | <b>8432189999**</b> |
| <b>Tension clamp connection</b> | 0 ... 100 °C      | <b>8432220001</b>   | <b>8432220011</b>   | <b>8432190001</b>   |
|                                 | special balancing | <b>8432229999**</b> | <b>8432229999**</b> | <b>8432199999**</b> |

\*\*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

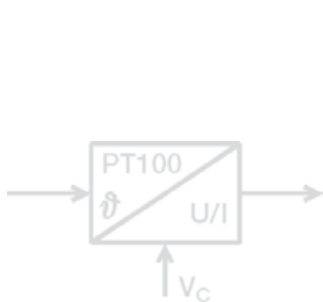
## WAVEANALOG RTD

- 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

## Approvals:



## Block diagram



## PT100/3

0(4) ... 20 mA



## PT100/3

0 ... 10 V



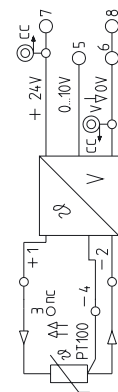
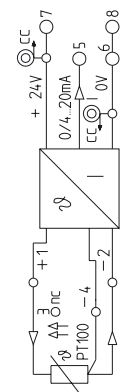
## Switch position/setting options

| Tmin    | 1 | 2 | 3 | Span           | 4 | 5 | 6 |
|---------|---|---|---|----------------|---|---|---|
| 0 °C    | ■ | ■ | ■ | 40 ... 50 °C   | ■ | ■ | ■ |
| -10 °C  | ■ | ■ |   | 50 ... 75 °C   | ■ | ■ |   |
| -20 °C  | ■ |   | ■ | 75 ... 110 °C  | ■ |   | ■ |
| -40 °C  | ■ |   |   | 110 ... 165 °C | ■ |   |   |
| -60 °C  |   | ■ | ■ | 165 ... 245 °C |   | ■ | ■ |
| -80 °C  |   | ■ |   | 245 ... 360 °C |   | ■ |   |
| -100 °C |   |   | ■ | 360 ... 540 °C |   |   | ■ |
| -200 °C |   |   |   | 540 ... 800 °C |   |   |   |

| Output <sup>1)</sup> | 7 |
|----------------------|---|
| Range                |   |
| 0 ... 20 mA          |   |
| 4 ... 20 mA          | ■ |

<sup>1)</sup> only modules with current output

■ = on  
□ = off



## Ordering data

Screw connection

Tension clamp connection

Input/output

Type Cat. No.

WTS4 PT100/3 C **8432150000\***

WTZ4 PT100/3 C **8432160000\***

PT100/3 / 0(4) ... 20 mA

Type Cat. No.

WTS4 PT100/3 V **8432090000\***

WTZ4 PT100/3 V **8432130000\***

PT100/3 / 0 ... 10 V

## Technical data\*\*\*

### Input signal

Temperature range

-200 ... +800 °C

Supply current

1.45 mA

Conductor resistance

≤ 50 Ω

### Output signal

Load resistance

≤ 500 Ω

Accuracy at Tu=23 °C

± 0.5% of measurement range

Temperature coefficient

± 200 ppm / °C (typ. 80 ppm / °C)

± 250 ppm / °C (typ. 100 ppm / °C)

± 500 ppm / °C (typ. 200 ppm / °C)

100 K ≤ measurement range < 200 K

40 K ≤ measurement range < 100 K

24 Vdc ±20% (19.2 ... 28.8 Vdc)

< 48 mA at I<sub>out</sub> = 20 mA

≤ 2 A

0 °C ... +55 °C

-20 °C ... +85 °C

EN 50178, IEC 751

EN 50081, EN 50082, EN 55011

92.4 / 112.5 / 12.5

CE, UL, CSA

Page 298 + 308

\* without balancing

\*\*\* T<sub>U</sub> = 23 °C single module

## Preconfigured modules

|                                 | Input             | Output              |                     |                     |
|---------------------------------|-------------------|---------------------|---------------------|---------------------|
|                                 |                   | 0 ... 20 mA         | 4 ... 20 mA         | 0 ... 10 V          |
| <b>Screw connection</b>         | 0 ... 100 °C      | <b>8432150001</b>   | <b>8432150011</b>   | <b>8432090001</b>   |
|                                 | special balancing | <b>8432159999**</b> | <b>8432159999**</b> | <b>8432099999**</b> |
| <b>Tension clamp connection</b> | 0 ... 100 °C      | <b>8432160001</b>   | <b>8432160011</b>   | <b>8432130001</b>   |
|                                 | special balancing | <b>8432169999**</b> | <b>8432169999**</b> | <b>8432139999**</b> |

\*\* 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

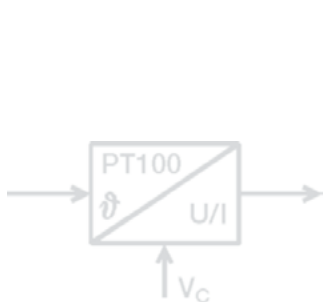
## WAVEANALOG RTD

- 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:

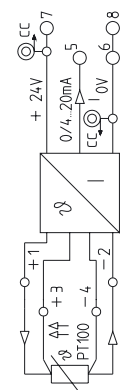


## Block diagram



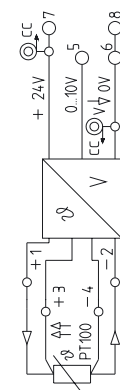
## PT100/4

0(4) ... 20 mA



## PT100/4

0 ... 10 V



## Switch position/setting options

| Tmin    | 1 | 2 | 3 | Span           | 4 | 5 | 6 |
|---------|---|---|---|----------------|---|---|---|
| 0 °C    | ■ | ■ | ■ | 40 ... 50 °C   | ■ | ■ | ■ |
| -10 °C  | ■ | ■ |   | 50 ... 75 °C   | ■ | ■ |   |
| -20 °C  | ■ |   | ■ | 75 ... 110 °C  |   | ■ | ■ |
| -40 °C  | ■ |   |   | 110 ... 165 °C | ■ |   |   |
| -60 °C  |   | ■ | ■ | 165 ... 245 °C |   | ■ | ■ |
| -80 °C  |   | ■ |   | 245 ... 360 °C |   | ■ |   |
| -100 °C |   |   | ■ | 360 ... 540 °C |   |   | ■ |
| -200 °C |   |   |   | 540 ... 800 °C |   |   |   |

| Output 1)   |   | PT 100   |   |    |
|-------------|---|----------|---|----|
| Range       | 7 | 8        | 9 | 10 |
| 0 ... 20 mA |   | 2 - wire | ■ | ■  |
| 4 ... 20 mA | ■ | 3 - wire | ■ | ■  |
|             |   | 4 - wire |   | ■  |

1) only modules with current output ■ = on  
= off

| Ordering data                                 | Type                                | Cat. No.    | Type                                | Cat. No.   |
|-----------------------------------------------|-------------------------------------|-------------|-------------------------------------|------------|
| Screw connection                              | WTS4 PT100/4 C                      | 8432270000* | WTS4 PT100/4 V                      | 432240000* |
| Tension clamp connection                      | WTZ4 PT100/4 C                      | 8432280000* | WTZ4 PT100/4 V                      | 432250000* |
| Input/output                                  | PT100/4 / 0(4) ... 20 mA            |             | PT100/4 / 0 ... 10 V                |            |
| Technical data***                             |                                     |             |                                     |            |
| Input signal                                  | PT100/4-wire                        |             | PT100/4-wire                        |            |
| Temperature range                             | -200 ... +800 °C                    |             | -200 ... +800 °C                    |            |
| Supply current                                | 1.45 mA                             |             | 1.45 mA                             |            |
| Conductor resistance                          | ≤ 50 Ω (3- & 4-wire)                |             | ≤ 50 Ω (3- & 4-wire)                |            |
| Output signal                                 | 0(4) ... 20 mA                      |             | 0 ... 10 V                          |            |
| Load resistance                               | ≤ 500 Ω                             |             | ≥ 1 kΩ                              |            |
| Accuracy at Tu=23 °C                          |                                     |             |                                     |            |
| 100 K ≤ measurement range < 600 K             | ± 0.1% of measurement range         |             | ± 0.1% of measurement range         |            |
| Measurement range ≤ 100 K                     | ± 0.1 K                             |             | ± 0.1 K                             |            |
| Measurement range ≥ 600 K                     | ± 0.2% of measurement range         |             | ± 0.2% of measurement range         |            |
| Temperature coefficient                       |                                     |             |                                     |            |
| Measurement range ≥ 200 K                     | ≤ 200 ppm / °C                      |             | ≤ 200 ppm / °C                      |            |
|                                               | (typ. 80 ppm / °C)                  |             | (typ. 80 ppm / °C)                  |            |
| 100 K ≤ measurement range < 200 K             | ≤ 225 ppm / °C                      |             | ≤ 225 ppm / °C                      |            |
|                                               | (typ. 90 ppm / °C)                  |             | (typ. 90 ppm / °C)                  |            |
| 40 K ≤ measurement range < 100 K              | ≤ 450 ppm / °C                      |             | ≤ 450 ppm / °C                      |            |
|                                               | (typ. 180 ppm / °C)                 |             | (typ. 180 ppm / °C)                 |            |
| General                                       |                                     |             |                                     |            |
| Voltage supply                                | 24 Vdc ±20%                         |             | 24 Vdc ±20%                         |            |
|                                               | (19.2 ... 28.8 Vdc)                 |             | (19.2 ... 28.8 Vdc)                 |            |
| Power consumption                             | < 48 mA at I <sub>out</sub> = 20 mA |             | < 38 mA at I <sub>out</sub> = 10 mA |            |
| Current carrying capacity of cross-connection | ≤ 2 A                               |             | ≤ 2 A                               |            |
| Operating temperature                         | 0 °C ... +55 °C                     |             | 0 °C ... +55 °C                     |            |
| Storage temperature                           | -20 °C ... +85 °C                   |             | -20 °C ... +85 °C                   |            |
| Standards/specifications                      | EN 50178, IEC 751                   |             | EN 50178, IEC 751                   |            |
| EMC standards                                 | EN 50081, EN 50082, EN 55011        |             | EN 50081, EN 50082, EN 55011        |            |
| Dimensions L / H / W mm                       | 92.4 / 112.5 / 12.5                 |             | 92.4 / 112.5 / 12.5                 |            |
| Approvals                                     | CE, UL, CSA                         |             | CE, UL, CSA                         |            |
| Dimensions and accessories see                | Page 298 + 308                      |             | Page 298 + 308                      |            |

\* without balancing

\*\*\* Tu = 23 °C single module

## Preconfigured modules

|                          | Input             | Output       |             |              |
|--------------------------|-------------------|--------------|-------------|--------------|
|                          |                   | 0 ... 20 mA  | 4 ... 20 mA | 0 ... 10 V   |
| Screw connection         | 0 ... 100 °C      | 8432270001   | 8432270011  | 8432240001   |
|                          | special balancing | 8432279999** |             | 8432249999** |
| Tension clamp connection | 0 ... 100 °C      | 8432280001   | 8432280011  | 8432250001   |
|                          | special balancing | 8432289999** |             | 8432259999** |

\*\* Please indicate the temperature range and the sensor type (2-, 3- or 4-wire).

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 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

### Approvals:



#### Block diagram



#### Ordering data

Screw connection  
Tension clamp connection  
Input/output

#### Technical data\*

##### Input (adjustable)

##### Output (adjustable)

Output voltage  
Offset voltage  
Load resistance  
Output current  
Offset current  
Load resistance  
Accuracy, slow/fast step response

Step response (switchable via DIP switch)

RTD, R

Potentiometer

Temperature coefficient measurement range  $\geq 200$  K  
100 K  $\leq$  measurement range  $< 200$  K  
40 K  $\leq$  measurement range  $< 100$  K

Max. wire resistance:

Influence of wire resistances:

Open circuit recognition:

Range of man. fine adjustment

Status LED:

#### General

Supply 18 Vdc ... 24 Vdc ... 30 Vdc  
Power consumption 830 mW ... 880 mW ... 980mW @  $I_{out} = 20$  mA  
Current carrying capacity of cross-connection  $\leq 2$  A  
Operating temperature 0...55°C  
Storage temperature -20...85°C  
Factory setting PT 100/3 0 ... 100 °C / 4 ... 20 mA  
No manual fine adjustment; slow step response  
92.4 / 112.5 / 17.5  
Weight approx. 100 g  
Approvals CE, cUL, GL

#### Coordination of insulation according to DIN EN 50178, 04/91

Rated voltage 300 V  
Surge voltage 4 kV  
Overvoltage category III  
Contamination class 2  
Clearance and creepage distance 3 mm  
Test voltage 2 kV<sub>eff</sub>

Standards/specifications

EMC standards

Dimensions and accessories see

\*  $T_U = 23$  °C single module

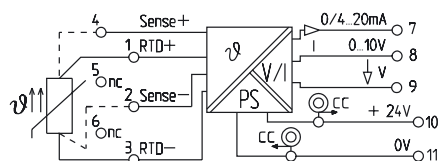
## PRO RTD



### Adjustment help

#### WAVEtool

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



| Type         | Cat. No.   |
|--------------|------------|
| WAS5 PRO RTD | 8560700000 |
| WAZ5 PRO RTD | 8560710000 |
| configurable |            |

PT100/2-/3-/4-wire: -200°C to 850°C  
Ni100 : -60°C to +250°C  
Potentiometer: min: 0...100Ω / max: 0...100kΩ  
Resistance: 0 ... 450Ω /

|                                                                                                |
|------------------------------------------------------------------------------------------------|
| 0...10 V                                                                                       |
| max. 0.05 V                                                                                    |
| $\geq 1$ kΩ                                                                                    |
| 0/4 ... 20 mA                                                                                  |
| max. 100 μA                                                                                    |
| $\leq 600$ Ω                                                                                   |
| PT 100, Ni 100: 0.3% of measurement range 0.8%,<br>Measurement range $< 100$ K / 0.3 K / 0.8 K |
| Potentiometer: 0.2% of FS / 0.3%                                                               |
| Resistance: 0.2% of FS / 0.3%                                                                  |
| typ. fast slow                                                                                 |
| $< 1.2$ s $< 2.2$ s                                                                            |
| $< 500$ ms $< 1.1$ s                                                                           |

$\leq 200$  ppm / °C  
 $\leq 250$  ppm / °C  
 $\leq 400$  ppm / °C  
50 Ω for 3- and 4-wire  
max. + 0.25°C at 50 Ω wire resistance  
Output signal  $> 10$  V or  $> 20$  mA, LED blinks  
 $\geq \pm 5\%$ , from ver. 1:  $\geq 12.5\%$ , potentiometer  $\geq 12.5\% \dots 25\%$   
Module active: LED lit / open circuit: LED blinks  
Error: LED off

18 Vdc ... 24 Vdc ... 30 Vdc  
830 mW ... 880 mW ... 980mW @  $I_{out} = 20$  mA  
 $\leq 2$  A  
0...55°C  
-20...85°C  
PT 100/3 0 ... 100 °C / 4 ... 20 mA  
No manual fine adjustment; slow step response  
92.4 / 112.5 / 17.5  
approx. 100 g  
CE, cUL, GL

300 V  
4 kV  
III  
2  
3 mm  
2 kV<sub>eff</sub>

EN 50178, IEC751  
EN 50081, EN50082, EN55011  
Page 298 + 308

| Input         | Switch 1 |   |   |
|---------------|----------|---|---|
|               | 1        | 2 | 3 |
| PT100 2-wire  | ■        | ■ | ■ |
| PT100 3-wire  | ■        | ■ |   |
| PT100 4-wire  | ■        | ■ |   |
| R 2-wire      |          | ■ |   |
| Ni100 2-wire  | ■        | ■ |   |
| Ni100 3-wire  |          | ■ |   |
| Ni100 4-wire  | ■        |   |   |
| Potentiometer |          |   |   |

■ = on  
□ = off

| Selection of minimum input values |           |         |  | Switch 1 |   |   |   |
|-----------------------------------|-----------|---------|--|----------|---|---|---|
| $\vartheta_{min}$                 | $R_{min}$ | Pot.min |  | 4        | 5 | 6 | 7 |
| 0°C                               | 0 Ω       | 0%      |  | ■        | ■ | ■ | ■ |
| -10°C                             | 10 Ω      | 10%     |  | ■        | ■ | ■ |   |
| -20°C                             | 20 Ω      | 20%     |  | ■        | ■ | ■ |   |
| -25°C                             | 20 Ω      | 25%     |  | ■        | ■ |   |   |
| -30°C                             | 30 Ω      | 30%     |  | ■        |   | ■ | ■ |
| -40°C                             | 40 Ω      | 40%     |  | ■        |   | ■ |   |
| -50°C                             | 50 Ω      | 50%     |  | ■        |   | ■ |   |
| -60°C                             | 60 Ω      | 60%     |  | ■        |   |   |   |
| -70°C                             | 70 Ω      | 70%     |  |          | ■ | ■ | ■ |
| -80°C                             | 80 Ω      | 80%     |  |          | ■ | ■ |   |
| -90°C                             | 90 Ω      |         |  |          | ■ | ■ |   |
| -100°C                            | 100 Ω     |         |  |          | ■ |   |   |
| -150°C                            | 150 Ω     |         |  |          |   | ■ | ■ |
| -200°C                            | 200 Ω     |         |  |          |   | ■ |   |
| Special range                     |           |         |  |          |   |   | ■ |

| Selection of the measurement range |       |       |  | Switch 2 |   |   |   |   |
|------------------------------------|-------|-------|--|----------|---|---|---|---|
| T                                  | R     | pot.  |  | 1        | 2 | 3 | 4 | 5 |
| 40K                                | 20Ω   | 20%   |  | ■        | ■ | ■ | ■ | ■ |
| 50K                                | 25Ω   | 25%   |  | ■        | ■ | ■ | ■ |   |
| 60K                                | 30Ω   | 30%   |  | ■        | ■ | ■ | ■ |   |
| 70K                                | 35Ω   | 35%   |  | ■        | ■ | ■ |   |   |
| 80K                                | 40Ω   | 40%   |  | ■        | ■ | ■ | ■ |   |
| 90K                                | 45Ω   | 45%   |  | ■        | ■ | ■ |   |   |
| 100K                               | 50Ω   | 50%   |  | ■        | ■ |   |   |   |
| 110K                               | 55Ω   | 55%   |  | ■        | ■ |   |   |   |
| 120K                               | 60Ω   | 60%   |  | ■        |   | ■ | ■ | ■ |
| 125K                               | 62.5Ω | 62.5% |  | ■        | ■ | ■ |   |   |
| 130K                               | 65Ω   | 65%   |  | ■        | ■ | ■ | ■ |   |
| 140K                               | 70Ω   | 70%   |  | ■        | ■ |   |   |   |
| 150K                               | 75Ω   | 75%   |  | ■        |   | ■ | ■ |   |
| 160K                               | 80Ω   | 80%   |  | ■        |   | ■ |   |   |
| 170K                               | 85Ω   | 85%   |  | ■        |   | ■ | ■ |   |
| 180K                               | 90Ω   | 90%   |  | ■        |   |   |   |   |
| 190K                               | 95Ω   | 95%   |  |          | ■ | ■ | ■ | ■ |
| 200K                               | 100Ω  | 100%  |  |          | ■ | ■ | ■ |   |
| 250K                               | 125Ω  | ---   |  |          | ■ | ■ | ■ |   |
| 300K                               | 150Ω  | ---   |  |          | ■ | ■ |   |   |
| 350K                               | 175Ω  | ---   |  |          | ■ |   | ■ | ■ |
| 400K                               | 200Ω  | ---   |  |          | ■ |   | ■ |   |
| 450K                               | 225Ω  | ---   |  |          | ■ |   | ■ |   |
| 500K                               | 250Ω  | ---   |  |          | ■ |   |   |   |
| 550K                               | 275Ω  | ---   |  |          |   | ■ | ■ | ■ |
| 600K                               | 300Ω  | ---   |  |          |   | ■ | ■ |   |
| 650K                               | 325Ω  | ---   |  |          |   | ■ | ■ |   |
| 700K                               | 350Ω  | ---   |  |          |   | ■ |   |   |
| 750K                               | 375Ω  | ---   |  |          |   |   | ■ | ■ |
| 800K                               | 400Ω  | ---   |  |          |   |   | ■ |   |
| 850K                               | 425Ω  | ---   |  |          |   |   |   | ■ |
| 900K                               | 450Ω  | ---   |  |          |   |   |   |   |

| Output   | Switch 2 |   |
|----------|----------|---|
|          | 6        | 7 |
| 0...10V  | ■        |   |
| 0...20mA |          |   |
| 4...20mA |          | ■ |

| Switching on the manual fine adjustment |  | S.1 |
|-----------------------------------------|--|-----|
| man. adj..                              |  | 8   |
| off                                     |  |     |
| on                                      |  | ■   |

| Selection of step set time |     |
|----------------------------|-----|
| Time of step response      | S.2 |
| slow                       | ■   |
| fast                       |     |

# Thermo-Signal Conditioners

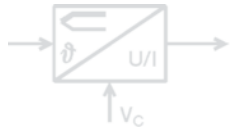
## WAVEANALOG Thermo

- 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

Screw connection  
Tension clamp connection  
Input/output

### Technical data\*

#### Input signal

Types

#### Output signal

Load resistance

#### Output signal

Load resistance

#### Output signal

Load resistance

Accuracy at  $T_U = 23\text{ °C}$

Temperature coefficient

Response time without filter

Response time with filter

### General

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Open circuit recognition

Operating temperature

Storage temperature

Standards/specifications

EMC standards

Dimensions L / H / W mm

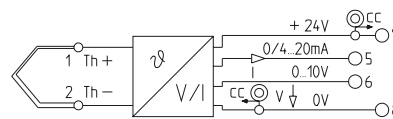
Approvals

Dimensions and accessories see

\*  $T_U = 23\text{ °C}$  single module

## Thermo Select

°C / 0 ... 20 mA,  
4 ... 20 mA, 0 ... 10 V



| Type               | Cat. No.   |
|--------------------|------------|
| WTS4 Thermo Select | 8432300000 |
| WTZ4 Thermo Select | 8432310000 |
| °C / 0 ... 20 mA   |            |
| °C / 4 ... 20 mA   |            |
| °C / 0 ... 10 V    |            |

Thermocoupler acc. to IEC584 (fully insulated)

K -200 ... +1372 °C

J -200 ... +1200 °C

T -200 ... +400 °C

E -200 ... +1000 °C

N -200 ... +1300 °C

R -50 ... +1760 °C

S -50 ... +1760 °C

B +50 ... +1820 °C

0 ... 20 mA

≤ 500 Ω

4 ... 20 mA

≤ 500 Ω

0 ... 10 V

≥ 1 kΩ

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

-150°C ... 1200°C ± (3K + 0.1% of set range)

1200°C ... 1372°C ± (4K + 0.1% of set range)

Type J -200°C ... -150°C ± (4K + 0.1% of set range)

-150°C ... 1200°C ± (3K + 0.1% of set range)

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

-150°C ... 400°C ± (3K + 0.1% of set range)

Type E -200°C ... -150°C ± (4K + 0.1% of set range)

-150°C ... 1000°C ± (3K + 0.1% of set range)

Type N -200°C ... -150°C ± (6K + 0.1% of set range)

-150°C ... 1300°C ± (3K + 0.1% of set range)

Type R -50°C ... 200°C ± (10K + 0.1% of set range)

200°C ... 1760°C ± (6K + 0.1% of set range)

Type S -50°C ... 200°C ± (10K + 0.1% of set range)

200°C ... 1760°C ± (6K + 0.1% of set range)

Type B 50°C ... 250°C ± (25K + 0.1% of set range)

250°C ... 500°C ± (10K + 0.1% of set range)

500°C ... 1820°C ± (6K + 0.1% of set range)

± (200 ppm v. Span

+ 0.075 K) /K

1.1 s

6 s

24 Vdc ±20% (19.2 ... 28.8 Vdc)

< 38 mA at  $I_{out} = 20\text{ mA}$

≤ 2 A

LED blinks (output value: > 20 mA and. > 10 V)

0 °C ... +55 °C

-20 °C ... +85 °C

EN 50178, IEC584

EN 50081, EN 50082, EN 55011

92.4 / 112.5 / 12.5

CE, UL, CSA

Page 298 + 308

## Switch position/setting options

| SW 1      |   |   |   | SW 2    |         |   |   |   |   |
|-----------|---|---|---|---------|---------|---|---|---|---|
| Type      | 1 | 2 | 3 | Span    | 1       | 2 | 3 | 4 | 5 |
| K         | ■ | ■ | ■ | 100 °C  | ■       | ■ | ■ | ■ | ■ |
| J         | ■ | ■ | ■ | 150 °C  | ■       | ■ | ■ | ■ | ■ |
| T         | ■ | ■ | ■ | 200 °C  | ■       | ■ | ■ | ■ | ■ |
| E         | ■ | ■ | ■ | 250 °C  | ■       | ■ | ■ | ■ | ■ |
| N         | ■ | ■ | ■ | 300 °C  | ■       | ■ | ■ | ■ | ■ |
| R         | ■ | ■ | ■ | 350 °C  | ■       | ■ | ■ | ■ | ■ |
| S         | ■ | ■ | ■ | 400 °C  | ■       | ■ | ■ | ■ | ■ |
| B         | ■ | ■ | ■ | 450 °C  | ■       | ■ | ■ | ■ | ■ |
| SW 1      |   |   |   | 500 °C  | ■       | ■ | ■ | ■ | ■ |
| Tmin      | 4 | 5 | 6 | 7       | 550 °C  | ■ | ■ | ■ | ■ |
| 0 °C      | ■ | ■ | ■ | ■       | 600 °C  | ■ | ■ | ■ | ■ |
| -10 °C    | ■ | ■ | ■ | ■       | 650 °C  | ■ | ■ | ■ | ■ |
| -20 °C    | ■ | ■ | ■ | ■       | 700 °C  | ■ | ■ | ■ | ■ |
| -30 °C    | ■ | ■ | ■ | ■       | 750 °C  | ■ | ■ | ■ | ■ |
| -40 °C    | ■ | ■ | ■ | ■       | 800 °C  | ■ | ■ | ■ | ■ |
| -50 °C    | ■ | ■ | ■ | ■       | 850 °C  | ■ | ■ | ■ | ■ |
| -100 °C   | ■ | ■ | ■ | ■       | 900 °C  | ■ | ■ | ■ | ■ |
| -150 °C   | ■ | ■ | ■ | ■       | 950 °C  | ■ | ■ | ■ | ■ |
| -200 °C   | ■ | ■ | ■ | ■       | 1000 °C | ■ | ■ | ■ | ■ |
| +50 °C    | ■ | ■ | ■ | ■       | 1050 °C | ■ | ■ | ■ | ■ |
| +100 °C   | ■ | ■ | ■ | ■       | 1100 °C | ■ | ■ | ■ | ■ |
| +150 °C   | ■ | ■ | ■ | ■       | 1150 °C | ■ | ■ | ■ | ■ |
| +200 °C   | ■ | ■ | ■ | ■       | 1200 °C | ■ | ■ | ■ | ■ |
| +250 °C   | ■ | ■ | ■ | ■       | 1250 °C | ■ | ■ | ■ | ■ |
| +500 °C   | ■ | ■ | ■ | ■       | 1300 °C | ■ | ■ | ■ | ■ |
| SW 2      |   |   |   | 1350 °C | ■       | ■ | ■ | ■ | ■ |
| Output    | 6 | 7 |   |         |         |   |   |   |   |
| 0 - 10 V  | ■ |   |   |         |         |   |   |   |   |
| 0 - 20 mA |   |   |   |         |         |   |   |   |   |
| 4 - 20 mA | ■ |   |   |         |         |   |   |   |   |
| Filter    |   |   |   | 8       |         |   |   |   |   |
| off       |   |   |   |         |         |   |   |   |   |
| on        |   |   |   | ■       |         |   |   |   |   |
|           |   |   |   |         |         |   |   |   |   |

■ = on

= off

■ = on  
□ = off



# 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:



### Block diagram



### Ordering data

Screw connection  
Tension clamp connection  
Input/output

### Technical data\*

#### Input (adjustable)

Accuracy at  $T_u = 23\text{ °C}$

#### Output (adjustable)

Output voltage  
Offset voltage  
Load resistance  
Output current  
Offset current  
Load resistance  
Step response  
at connected filter function  
Max. wire resistance  
Open circuit recognition  
Range of man. fine adjustment  
Status LED:

### General

Supply voltage:  
Power consumption:  
Current carrying capacity of cross-connection

Operating temperature  
Storage temperature

Standards/specifications  
EMC standards

### Factory setting

Dimensions L/H/W mm

Weight

Approvals

Dimensions and accessories see

\*  $T_u = 23\text{ °C}$  single module

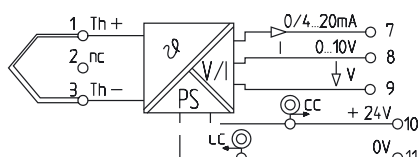
## PRO Thermo



## Adjustment help

### WAVEtool

This service tool enables quick and uncomplicated configuration of WAVEANALOG PRO. Download from the Internet:  
<http://www.weidmueller.de>  
→ Products → Downloads  
(see page 192)



| Type            | Cat. No.   |
|-----------------|------------|
| WAS5 PRO Thermo | 8560720000 |
| WAZ5 PRO Thermo | 8560730000 |

Thermocouples acc. to EN 60584-1

Type K, J, E, N, R, S, B via DIP switch selectable

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

-150°C ... 1200°C ± (3K + 0.1% of set range)

1200°C ... 1372°C ± (4K + 0.1% of set range)

Type J -200°C ... -150°C ± (4K + 0.1% of set range)

-150°C ... 1200°C ± (3K + 0.1% of set range)

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

-150°C ... 400°C ± (3K + 0.1% of set range)

Type E -200°C ... -150°C ± (4K + 0.1% of set range)

-150°C ... 1000°C ± (3K + 0.1% of set range)

Type N -200°C ... -150°C ± (6K + 0.1% of set range)

-150°C ... 1300°C ± (3K + 0.1% of set range)

Type R -50°C ... 200°C ± (10K + 0.1% of set range)

200°C ... 1760°C ± (6K + 0.1% of set range)

Type S -50°C ... 200°C ± (10K + 0.1% of set range)

200°C ... 1760°C ± (6K + 0.1% of set range)

Type B 50°C ... 250°C ± (25K + 0.1% of set range)

250°C ... 500°C ± (10K + 0.1% of set range)

500°C ... 1820°C ± (6K + 0.1% of set range)

0...10 V

Max. 0.05 V

≥ 1 KΩ

0/4 ... 20 mA

max. 100 μA

≤ 600 Ω

max. 1.4 s

max. 7.5 s

50 Ω for 3- and 4-wire

Output signal > 10 V or > 20 mA, LED blinks

≥ ±5%

Module active: LED lights up / open circuit: LED blinks

Error: LED off

18 Vdc ... 24 Vdc ... 30 Vdc

800 mW ... 850 mW ... 950 mW @ I output = 20 mA

≤ 2 A

0 °C ... +55 °C

-20 ... +85 °C

EN 50178, IEC751

EN 50081, EN50082, EN55011

Type K 0 ... 1000 °C / 4 ... 20 mA; no filter;

No manual fine adjustment

92.4 / 112.5 / 17.5

100 g

CE, cUL, GL

Page 298 + 308

| Selection the thermocoupler |     |   |   |
|-----------------------------|-----|---|---|
| Type                        | SW1 |   |   |
| K                           | ■   | ■ | ■ |
| J                           | ■   | ■ | ■ |
| T                           | ■   | ■ | ■ |
| E                           | ■   | ■ | ■ |
| N                           | ■   | ■ | ■ |
| R                           | ■   | ■ | ■ |
| S                           | ■   | ■ | ■ |
| B                           | ■   | ■ | ■ |

| Selection of minimum temperature |     |   |   |   |   |   |
|----------------------------------|-----|---|---|---|---|---|
| θ <sub>min</sub>                 | SW1 |   |   |   |   |   |
| 0°C                              | ■   | ■ | ■ | ■ | ■ | ■ |
| -10°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| -20°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| -30°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| -40°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| -50°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| -100°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| -150°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| -200°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| +50°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| +100°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| +150°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| +200°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| +250°C                           | ■   | ■ | ■ | ■ | ■ | ■ |
| 500°C                            | ■   | ■ | ■ | ■ | ■ | ■ |
| Special range                    | ■   | ■ | ■ | ■ | ■ | ■ |

| Selection of temperature span |     |   |   |   |   |
|-------------------------------|-----|---|---|---|---|
| Span                          | SW2 |   |   |   |   |
| 100°C                         | ■   | ■ | ■ | ■ | ■ |
| 150°C                         | ■   | ■ | ■ | ■ | ■ |
| 200°C                         | ■   | ■ | ■ | ■ | ■ |
| 250°C                         | ■   | ■ | ■ | ■ | ■ |
| 300°C                         | ■   | ■ | ■ | ■ | ■ |
| 350°C                         | ■   | ■ | ■ | ■ | ■ |
| 400°C                         | ■   | ■ | ■ | ■ | ■ |
| 450°C                         | ■   | ■ | ■ | ■ | ■ |
| 500°C                         | ■   | ■ | ■ | ■ | ■ |
| 550°C                         | ■   | ■ | ■ | ■ | ■ |
| 600°C                         | ■   | ■ | ■ | ■ | ■ |
| 650°C                         | ■   | ■ | ■ | ■ | ■ |
| 700°C                         | ■   | ■ | ■ | ■ | ■ |
| 750°C                         | ■   | ■ | ■ | ■ | ■ |
| 800°C                         | ■   | ■ | ■ | ■ | ■ |
| 850°C                         | ■   | ■ | ■ | ■ | ■ |
| 900°C                         | ■   | ■ | ■ | ■ | ■ |
| 950°C                         | ■   | ■ | ■ | ■ | ■ |
| 1000°C                        | ■   | ■ | ■ | ■ | ■ |
| 1050°C                        | ■   | ■ | ■ | ■ | ■ |
| 1100°C                        | ■   | ■ | ■ | ■ | ■ |
| 1150°C                        | ■   | ■ | ■ | ■ | ■ |
| 1200°C                        | ■   | ■ | ■ | ■ | ■ |
| 1250°C                        | ■   | ■ | ■ | ■ | ■ |
| 1300°C                        | ■   | ■ | ■ | ■ | ■ |
| 1350°C                        | ■   | ■ | ■ | ■ | ■ |
| 1400°C                        | ■   | ■ | ■ | ■ | ■ |
| 1450°C                        | ■   | ■ | ■ | ■ | ■ |
| 1500°C                        | ■   | ■ | ■ | ■ | ■ |
| 1600°C                        | ■   | ■ | ■ | ■ | ■ |
| 1700°C                        | ■   | ■ | ■ | ■ | ■ |
| 1800°C                        | ■   | ■ | ■ | ■ | ■ |

■ = on  
□ = off

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

|                             |                     |
|-----------------------------|---------------------|
| Rated voltage               | 300 V               |
| Surge voltage               | 4 kV                |
| Overvoltage category        | III                 |
| Contamination class         | 2                   |
| Clearance & creep. distance | 3 mm                |
| Test voltage                | 2 kV <sub>eff</sub> |

| Selection of output |     |   |
|---------------------|-----|---|
| Output              | SW2 |   |
| 0...10V             | ■   | ■ |
| 0...20mA            | ■   | ■ |
| 4...20mA            | ■   | ■ |

### Switching on the manual fine adjustment

| SW1          |   |   |
|--------------|---|---|
| man. adjust. | 8 |   |
| off          | ■ | ■ |
| on           | ■ | ■ |

### Switching on the filter function

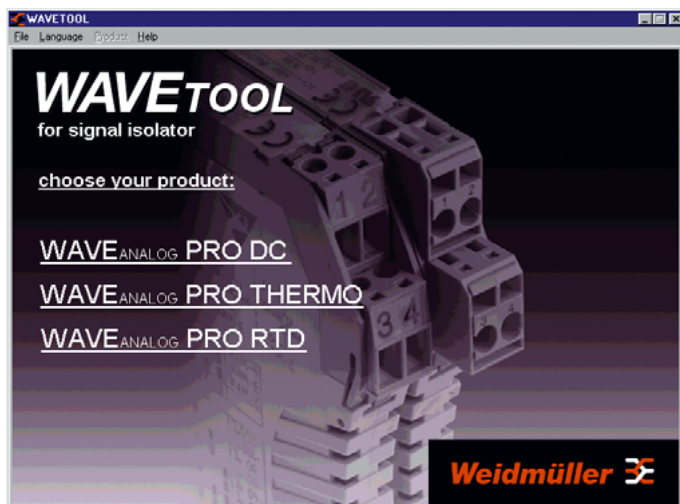
| Filter | SW2 |   |
|--------|-----|---|
| off    | ■   | ■ |
| on     | ■   | ■ |



# Adjustment Help WAVEtool

The adjustment help – **WAVEtool** – enables quick and uncomplicated configuration of **WAVEANALOG PRO DC**, **WAVEANALOG PRO RTD**, **WAVEANALOG PRO THERMO**.

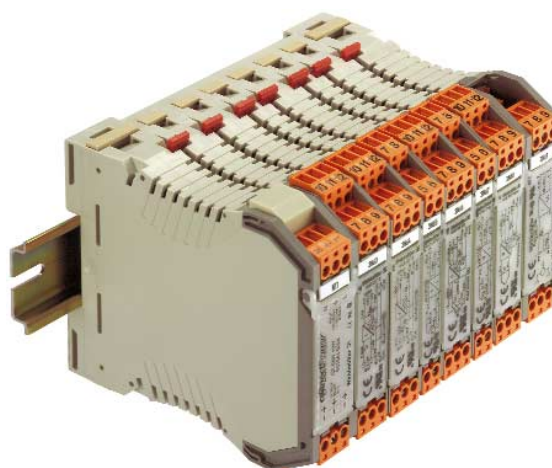
## Menu for selecting the functions



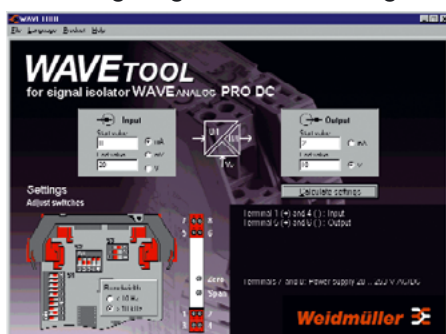
Once the required input and output parameters have been entered, the program determines the correct switch setting and gives instructions for the electrical connection of the module. Where necessary, it also determines and displays the required calibration values. The entire process can be printed out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

## Download from the Internet:

<http://www.weidmueller.de> ⇒ Products ⇒ Download



## For configuring the current/voltage isolating transformer



## Printout of protocol for the documentation

**WAVEtool**  
for signal isolator WAVEANALOG PRO RTD

**Note:** Weidmüller Interface GmbH

**Input:**  
Type: PT100 / 4-wire  
Start value: 0°C / 32°F  
End value: 100°C / 212°F

**Output:**  
Output voltage: 0 .. 10 V  
Response time: slow 2,2s  
Fine calibration: off

**Settings:** Adjust switches

**Weidmüller**

Weidmüller Interface GmbH & Co.  
P.O. Box 3030  
D-52720 Detmold  
T: +49-(0)5231-14-0  
F: +49-(0)5231-14-2083  
Date: 02.04.02

Terminal 1: RTD+ (Source+)

Terminal 2: Sense-

Terminal 3: RTD- (Source-)

Terminal 4: Sense+

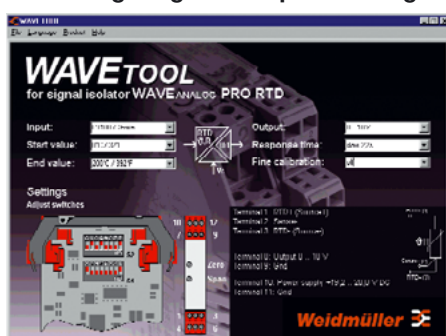
Terminal 8: Output 0 .. 10 V

Terminal 9: Gnd

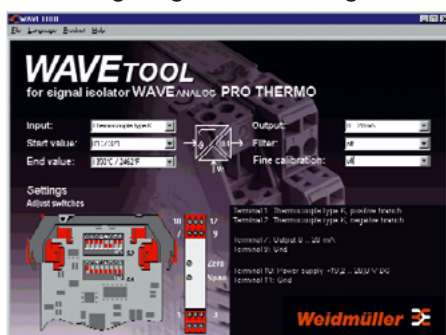
Terminal 10: Power supply +18 .. 30 V DC

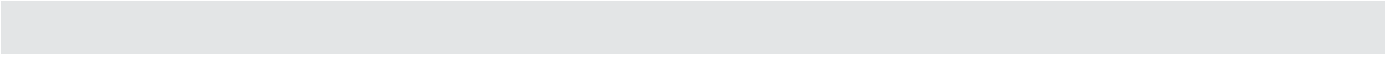
Terminal 11: Gnd

## For configuring the temperature signal isolating transformer



## For configuring the thermo signal isolating transformer





## 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.

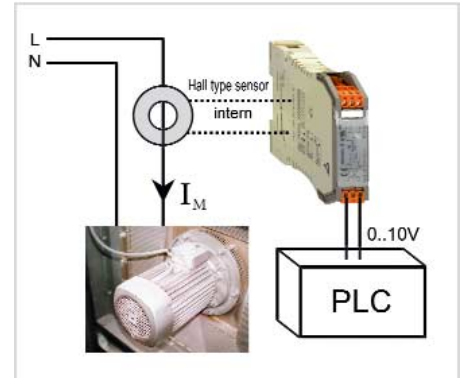
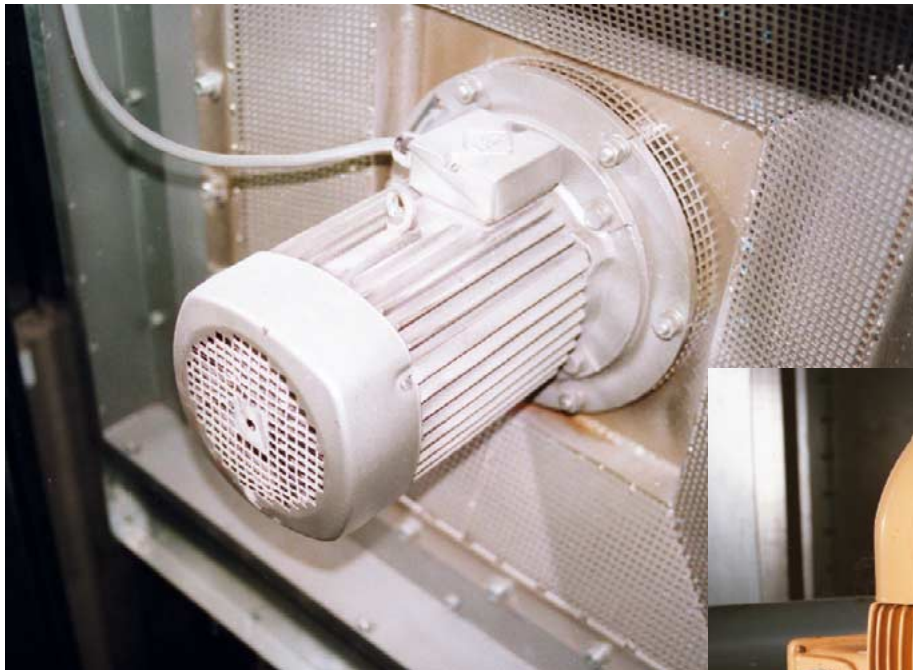


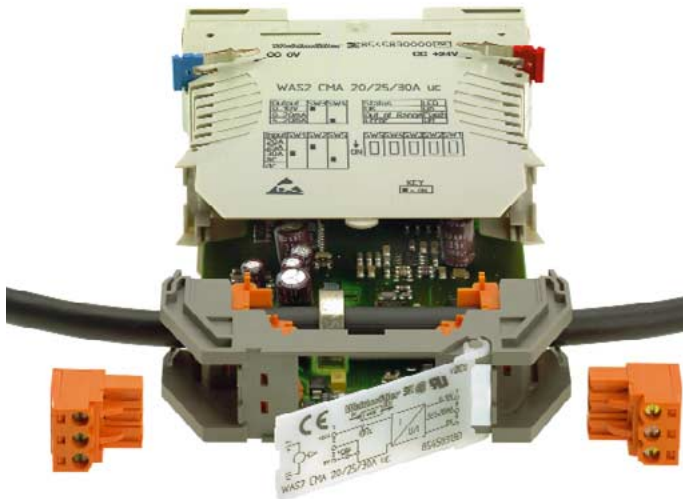
Fig.: Monitoring motor currents



Monitoring a motor in a cooling system



Monitoring a pump in a sewage treatment plant



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

Less wiring costs thanks to cross-connections

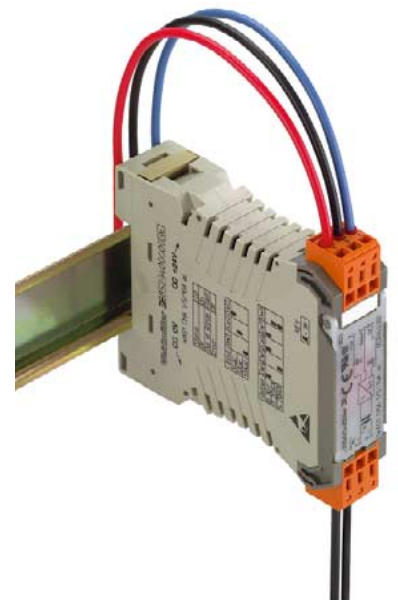
Very good marking options

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



Analogue Signal Processing



## Current Monitoring

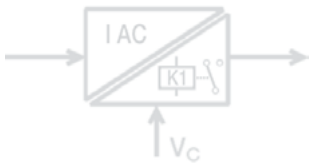
### WAVECONTROL

- 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



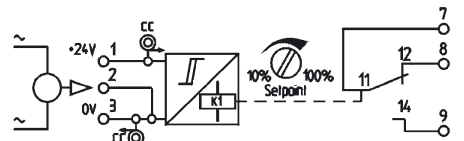
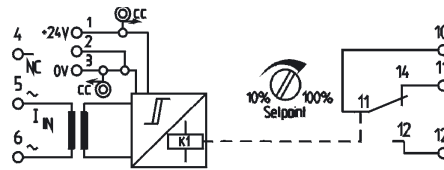
### WAS2 CMR WAZ2 CMR

1/5/10 A ac  
selectable with  
relay output



### WAS2 CMR WAZ2 CMR

20/40/60A ac  
selectable with  
relay output



#### Ordering data

Screw connection

Tension clamp connection

#### Technical data\*

|                                                        |                                                               |                                                                 |
|--------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|
| Input                                                  |                                                               |                                                                 |
| Input current                                          | 1A ac/5A ac/10A ac selectable (without additional adjustment) | 20A ac/40A ac/60A ac selectable (without additional adjustment) |
| Input frequency                                        | 50Hz/60Hz                                                     | 50Hz/60Hz                                                       |
| Pass through diameter                                  |                                                               | 8mm                                                             |
| Measuring principle                                    | transformer coupled                                           | Contact-free current monitoring using Hall sensor               |
| Connection type                                        | screw or tension clamp connection                             | Push-through connection                                         |
| Measurement circuit voltage                            | 250Vac                                                        | 400Vac, higher voltages dependent on wire insulation            |
| Max. measuring circuit                                 | 100A for 1s                                                   | dependent on wire cross-section                                 |
| Output                                                 |                                                               |                                                                 |
| Contact set                                            | 1 changeover contact                                          | 1 changeover contact                                            |
| Min. switching voltage                                 | 6Vdc/6Vac                                                     | 6Vdc/6Vac                                                       |
| Max. switching voltage                                 | 60Vdc/250Vac                                                  | 60Vdc/250Vac                                                    |
| Continuous current AC                                  | 3A                                                            | 3A                                                              |
| Continuous current DC                                  | 0.7A                                                          | 0.7A                                                            |
| Max. switching current                                 | 7A                                                            | 7A                                                              |
| Min. switching current                                 | 100mA                                                         | 100mA                                                           |
| Status LED                                             | green LED                                                     | green LED                                                       |
| Threshold                                              | 10% ... 100% adjustable via front potentiometer               | 10% ... 100% adjustable via front potentiometer                 |
| Hysteresis                                             | approx. 5% or approx. 10% selectable from set threshold       | approx. 5% or approx. 10% selectable from set threshold         |
| Temperature coefficient                                | ≤ 800 ppm/K                                                   | ≤ 250 ppm/K                                                     |
| Response time (10 ... 90%)                             | typ. 700 ms                                                   | typ. 700 ms                                                     |
| Working/closed-circuit current principle               | selectable                                                    | selectable                                                      |
| Coordination of insulation acc. to DIN EN 50178, 04/98 |                                                               |                                                                 |
| Rated voltage                                          | 300V                                                          | 300V                                                            |
| Surge voltage                                          | 4KV                                                           | 4KV                                                             |
| Overvoltage category                                   | III                                                           | III                                                             |
| Contamination class                                    | 2                                                             | 2                                                               |
| Clearance and creepage distance                        | ≥ 3 mm                                                        | ≥ 3 mm                                                          |
| Test voltage                                           | 4kV eff                                                       | 4kV eff                                                         |

#### General

|                                                   |                                                               |                                                               |
|---------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| Supply                                            | 21.6Vdc...24Vdc...26.4Vdc                                     | 21.6Vdc...24Vdc...26.4Vdc                                     |
| Supply voltage                                    | 8.3 mA (relay not switched)                                   | 23 mA (relay not switched)                                    |
| Power consumption at rated voltage                | 24 mA (relay switched)                                        | 47 mA (relay switched)                                        |
| Reverse polarity protection                       | yes                                                           | yes                                                           |
| Current carrying capacity of the cross-connection | ≤ 2 A                                                         | ≤ 2 A                                                         |
| Operating temperature range                       | 0 ... 50°C                                                    | 0 ... 50°C                                                    |
| Storage/transport                                 | -20 ... +70°C                                                 | -20 ... +70°C                                                 |
| Factory setting                                   | Input range: 5A ac; hysteresis 10%, working current principle | Input range: 40A ac; hysteresis 10% working current principle |
| Dimensions L/H/B (mm)                             | 92.4/112.4/22.5                                               | 92.4/112.4/22.5                                               |
| Weight                                            | 150g                                                          | 150g                                                          |
| Approvals                                         | CE, cUL                                                       | CE, cUL                                                       |
| Dimensions and accessories see                    | Page 298 + 308                                                | Page 298 + 308                                                |

\* T<sub>U</sub> = 23 °C single module

## Current Monitoring

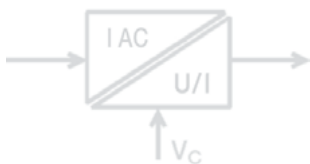
### WAVECONTROL

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

### Approvals:



#### Block diagram



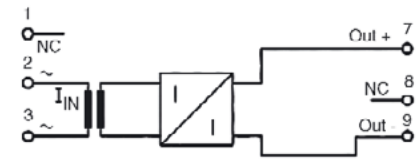
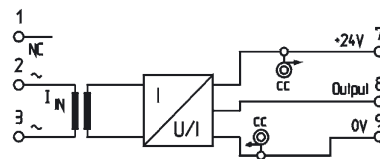
### WAS1 CMA WAZ1 CMA

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



### WAS1 LP CMA WAZ1 LP CMA

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



#### Ordering data

Screw connection

Tension clamp connection

#### Technical data\*

##### Input

Input current

Input frequency

Accuracy

Measuring principle

Connection type

Measurement circuit voltage

Max. measuring circuit

##### Output

Current/voltage selectable

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

(safe separation)

Rated voltage

Surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

#### General

Supply

Supply voltage

Power consumption at rated voltage

Reverse polarity protection

Operating temperature range

Storage/transport

Factory setting

Dimensions L/H/W (mm)

Weight

Approvals

Dimensions and accessories see

\* T<sub>U</sub> = 23 °C single module

| Type                | Cat. No.   | Qty. |
|---------------------|------------|------|
| WAS1 CMA 1/5/10A ac | 8523400000 | 1    |
| WAZ1 CMA 1/5/10A ac | 8523410000 | 1    |

| Type                   | Cat. No.   | Qty. |
|------------------------|------------|------|
| WAS1 LP CMA 1/5/10A ac | 8528650000 | 1    |
| WAZ1 LP CMA 1/5/10A ac | 8528660000 | 1    |

## Current Monitoring

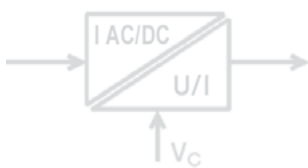
### WAVECONTROL

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

### Approvals:



#### Block diagram



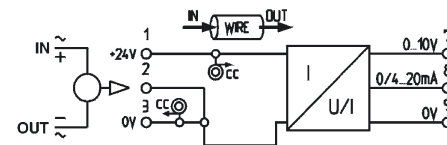
Input / Output configurable

| Ordering data                                                            |                                                                              |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Screw connection                                                         |                                                                              |
| Tension clamp connection                                                 |                                                                              |
| Technical data*                                                          |                                                                              |
| Input                                                                    |                                                                              |
| Input current                                                            | 5 A uc/10 A uc selectable (without additional adjustment)                    |
| Input frequency                                                          | 0 Hz - 2 kHz (True RMS to DC Converter)                                      |
| Accuracy                                                                 | 1% (0 Hz - 1 kHz) Crest factor 3 FSR<br>2% (0 Hz - 2 kHz) Crest factor 5 FSR |
| Measuring principle                                                      | Contact-free current monitoring using Hall sensor                            |
| Connection type                                                          | Push-through connection                                                      |
| Pass through diameter                                                    | 8 mm                                                                         |
| Measurement circuit voltage                                              | 400 Vac, higher voltages dependent on wire insulation                        |
| Max. measuring circuit                                                   | dependent on wire cross-section                                              |
| Output                                                                   |                                                                              |
| Current/voltage selectable                                               | 0 ... 10 V<br>0 ... 20 mA<br>4 ... 20 mA                                     |
| Output voltage                                                           | 0 ... 10 V                                                                   |
| Offset voltage                                                           | max. 0.08 V                                                                  |
| Load resistance                                                          | ≥ 1 KΩ                                                                       |
| Output signal limit                                                      | approx. 13 V and. 24 mA                                                      |
| Output current                                                           | 0/4 ... 20 mA                                                                |
| Offset current                                                           | max. 150 μA                                                                  |
| Load resistance                                                          | ≤ 600 Ω                                                                      |
| Status LED                                                               | green LED<br>ON → OK; blinks → signal out of range; OFF → Error              |
| Temperature coefficient                                                  | ≤ 650 ppm/K                                                                  |
| Response time (10 ... 90%)                                               | typ. 700 ms                                                                  |
| Coordination of insulation acc. to DIN EN 50178, 04/98 (safe separation) |                                                                              |
| Rated voltage                                                            | 300 V                                                                        |
| Surge voltage                                                            | 6 kV                                                                         |
| Overvoltage category                                                     | III                                                                          |
| Contamination class                                                      | 2                                                                            |
| Clearance and creepage distance                                          | ≥ 5.5 mm                                                                     |
| Test voltage                                                             | 4 kV eff                                                                     |
| General                                                                  |                                                                              |
| Supply                                                                   |                                                                              |
| Supply voltage                                                           | 21.6 Vdc...24 Vdc...26.4 Vdc                                                 |
| Power consumption at rated voltage                                       | 50 mA at I <sub>out</sub> = 20 mA                                            |
| Reverse polarity protection                                              | yes                                                                          |
| Operating temperature range                                              | 0 ... 50 °C                                                                  |
| Storage/transport                                                        | -20 ... +70 °C                                                               |
| Factory setting                                                          | 0 ... 5A uc; 4 ... 20 mA                                                     |
| Dimensions L/H/B (mm)                                                    | 92.4/112.4/22.5                                                              |
| Weight                                                                   | 150 g                                                                        |
| Approvals                                                                | CE, cUL                                                                      |
| Dimensions and accessories see                                           | Page 298 + 308                                                               |

\* T<sub>u</sub> = 23 °C single module

### WAS2 CMA WAZ2 CMA

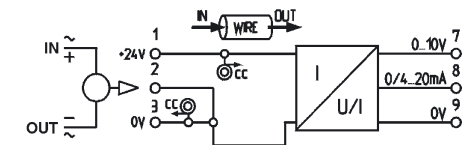
5/10A ac/dc selectable with analogue output  
0 ... 20 mA/  
4 ... 20 mA/  
0 ... 10 V



| Type                                                                     | Cat. No.                                                                     | Qty. |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------|------|
| WAS2 CMA 5/10A uc                                                        | 8526610000                                                                   | 1    |
| WAZ2 CMA 5/10A uc                                                        | 8526620000                                                                   | 1    |
| Technical data*                                                          |                                                                              |      |
| Input                                                                    |                                                                              |      |
| Input current                                                            | 5 A uc/10 A uc selectable (without additional adjustment)                    |      |
| Input frequency                                                          | 0 Hz - 2 kHz (True RMS to DC Converter)                                      |      |
| Accuracy                                                                 | 1% (0 Hz - 1 kHz) Crest factor 3 FSR<br>2% (0 Hz - 2 kHz) Crest factor 5 FSR |      |
| Measuring principle                                                      | Contact-free current monitoring using Hall sensor                            |      |
| Connection type                                                          | Push-through connection                                                      |      |
| Pass through diameter                                                    | 8 mm                                                                         |      |
| Measurement circuit voltage                                              | 400 Vac, higher voltages dependent on wire insulation                        |      |
| Max. measuring circuit                                                   | dependent on wire cross-section                                              |      |
| Output                                                                   |                                                                              |      |
| Current/voltage selectable                                               | 0 ... 10 V<br>0 ... 20 mA<br>4 ... 20 mA                                     |      |
| Output voltage                                                           | 0 ... 10 V                                                                   |      |
| Offset voltage                                                           | max. 0.08 V                                                                  |      |
| Load resistance                                                          | ≥ 1 KΩ                                                                       |      |
| Output signal limit                                                      | approx. 13 V and. 24 mA                                                      |      |
| Output current                                                           | 0/4 ... 20 mA                                                                |      |
| Offset current                                                           | max. 150 μA                                                                  |      |
| Load resistance                                                          | ≤ 600 Ω                                                                      |      |
| Status LED                                                               | green LED<br>ON → OK; blinks → signal out of range; OFF → Error              |      |
| Temperature coefficient                                                  | ≤ 650 ppm/K                                                                  |      |
| Response time (10 ... 90%)                                               | typ. 700 ms                                                                  |      |
| Coordination of insulation acc. to DIN EN 50178, 04/98 (safe separation) |                                                                              |      |
| Rated voltage                                                            | 300 V                                                                        |      |
| Surge voltage                                                            | 6 kV                                                                         |      |
| Overvoltage category                                                     | III                                                                          |      |
| Contamination class                                                      | 2                                                                            |      |
| Clearance and creepage distance                                          | ≥ 5.5 mm                                                                     |      |
| Test voltage                                                             | 4 kV eff                                                                     |      |
| General                                                                  |                                                                              |      |
| Supply                                                                   |                                                                              |      |
| Supply voltage                                                           | 21.6 Vdc...24 Vdc...26.4 Vdc                                                 |      |
| Power consumption at rated voltage                                       | 50 mA at I <sub>out</sub> = 20 mA                                            |      |
| Reverse polarity protection                                              | yes                                                                          |      |
| Operating temperature range                                              | 0 ... 50 °C                                                                  |      |
| Storage/transport                                                        | -20 ... +70 °C                                                               |      |
| Factory setting                                                          | 0 ... 5A uc; 4 ... 20 mA                                                     |      |
| Dimensions L/H/B (mm)                                                    | 92.4/112.4/22.5                                                              |      |
| Weight                                                                   | 150 g                                                                        |      |
| Approvals                                                                | CE, cUL                                                                      |      |
| Dimensions and accessories see                                           | Page 298 + 308                                                               |      |

### WAS2 CMA WAZ2 CMA

20/25/30A ac/dc selectable with analogue output  
0 ... 20 mA/  
4 ... 20 mA/  
0 ... 10 V



| Type                                                                     | Cat. No.                                                                     | Qty. |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------|------|
| WAS2 CMA 20/25/30A uc                                                    | 8545830000                                                                   | 1    |
| WAZ2 CMA 20/25/30A uc                                                    | 8545840000                                                                   | 1    |
| Technical data*                                                          |                                                                              |      |
| Input                                                                    |                                                                              |      |
| Input current                                                            | 20/25/30 A uc selectable (without additional adjustment)                     |      |
| Input frequency                                                          | 0 Hz - 2 kHz (True RMS to DC Converter)                                      |      |
| Accuracy                                                                 | 1% (0 Hz - 1 kHz) Crest factor 3 FSR<br>2% (0 Hz - 2 kHz) Crest factor 5 FSR |      |
| Measuring principle                                                      | Contact-free current monitoring using Hall sensor                            |      |
| Connection type                                                          | Push-through connection                                                      |      |
| Pass through diameter                                                    | 8 mm                                                                         |      |
| Measurement circuit voltage                                              | 400 Vac, higher voltages dependent on wire insulation                        |      |
| Max. measuring circuit                                                   | dependent on wire cross-section                                              |      |
| Output                                                                   |                                                                              |      |
| Current/voltage selectable                                               | 0 ... 10 V<br>0 ... 20 mA<br>4 ... 20 mA                                     |      |
| Output voltage                                                           | 0 ... 10 V                                                                   |      |
| Offset voltage                                                           | max. 0.08 V                                                                  |      |
| Load resistance                                                          | ≥ 1 KΩ                                                                       |      |
| Output signal limit                                                      | approx. 13 V and. 24 mA                                                      |      |
| Output current                                                           | 0/4 ... 20 mA                                                                |      |
| Offset current                                                           | max. 150 μA                                                                  |      |
| Load resistance                                                          | ≤ 600 Ω                                                                      |      |
| Status LED                                                               | green LED<br>ON → OK; blinks → signal out of range; OFF → Error              |      |
| Temperature coefficient                                                  | ≤ 650 ppm/K                                                                  |      |
| Response time (10 ... 90%)                                               | typ. 700 ms                                                                  |      |
| Coordination of insulation acc. to DIN EN 50178, 04/98 (safe separation) |                                                                              |      |
| Rated voltage                                                            | 300 V                                                                        |      |
| Surge voltage                                                            | 6 kV                                                                         |      |
| Overvoltage category                                                     | III                                                                          |      |
| Contamination class                                                      | 2                                                                            |      |
| Clearance and creepage distance                                          | ≥ 5.5 mm                                                                     |      |
| Test voltage                                                             | 4 kV eff                                                                     |      |
| General                                                                  |                                                                              |      |
| Supply                                                                   |                                                                              |      |
| Supply voltage                                                           | 21.6 Vdc...24 Vdc...26.4 Vdc                                                 |      |
| Power consumption at rated voltage                                       | 50 mA at I <sub>out</sub> = 20 mA                                            |      |
| Reverse polarity protection                                              | yes                                                                          |      |
| Operating temperature range                                              | 0 ... 50 °C                                                                  |      |
| Storage/transport                                                        | -20 ... +70 °C                                                               |      |
| Factory setting                                                          | 0 ... 25 A uc; 4 ... 20 mA                                                   |      |
| Dimensions L/H/B (mm)                                                    | 92.4/112.4/22.5                                                              |      |
| Weight                                                                   | 150g                                                                         |      |
| Approvals                                                                | CE, cUL                                                                      |      |
| Dimensions and accessories see                                           | Page 298 + 308                                                               |      |



## Current Monitoring

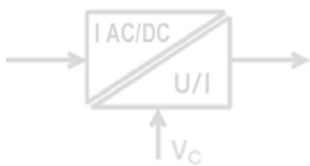
### WAVECONTROL

- 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:

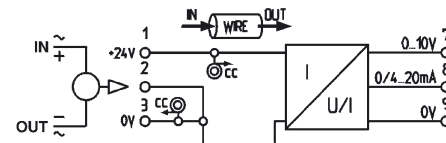


#### Block diagram



### WAS2 CMA WAZ2 CMA

40/50/60A ac/dc  
selectable with  
analogue output  
0 ... 20 mA/  
4 ... 20 mA/  
0 ... 10 V



#### Ordering data

Screw connection

Tension clamp connection

#### Technical data\*

##### Input

Input current

Input frequency

Accuracy

Measuring principle

Connection type

Pass through diameter

Measurement circuit voltage

Max. measuring circuit

##### Output

Current/voltage selectable

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

(safe separation)

Rated voltage

Surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

#### General

Supply

Supply voltage

Power consumption at rated voltage

Reverse polarity protection

Operating temperature range

Storage/transport

Factory setting

Dimensions L/H/W (mm)

Weight

Approvals

Dimensions and accessories see

\* T<sub>u</sub> = 23 °C single module

| Type                  | Cat. No.   | Qty. |
|-----------------------|------------|------|
| WAS2 CMA 40/50/60A uc | 8513330000 | 1    |
| WAZ2 CMA 40/50/60A uc | 8526590000 | 1    |

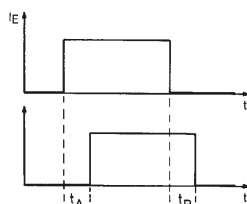
## Current Monitoring

- 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.

### Block diagram/ timing diagram

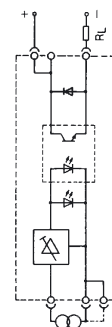


### SMSI DC O

With adjustable switching threshold

Up to 50 mA

Up to 250 mA



### Ordering data

### Technical data

Measurement circuit voltage

**Max. permissible current in measurement circuit**

Rated consumption – (W)

Rated consumption – (VA)

**Adjustable switching threshold**

Hysteresis between turn-on and turn-off point

Activation time  $t_A$

Reaction time  $t_R$

Voltage drop at input

Output voltage

Max. continuous output current

Saturation voltage

Auxiliary voltage

Auxiliary voltage rated consumption

Auxiliary voltage rated data

Storage temperature

Ambient temperature

–, assembled without spacing on TS

–, assembled with  $\geq 20$  mm spacing on TS

### Coordination of insulation according to VDE, Draft 11/94

Overvoltage category, input

Overvoltage category, output

Overvoltage category, input 1-input 2,

Output 1-output 2, input-output

Contamination class

### Dimensions and connection data

see page 306 + 307

Type Cat. No.  
SMSI 0.05 DC O **1157160000**

Type Cat. No.  
SMSI 0.25 DC O **1156360000**

10 V... 250 Vdc

**70 mA**

200 mW

–

**1 mA...50 mA**

0.5 % (50 mA)...5 % (1 mA)

< 10 ms

< 10 ms

< 4 V

5 V...50 Vdc

100 mA

$\leq 1.3$  V

–

–

–

–25 °C...+60 °C

–25 °C...+40 °C

–25 °C...+50 °C

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

10 V... 250 Vdc

**350 mA**

750 mW

–

**40 mA...250 mA**

2% (250 mA)...10% (40 mA)

< 3 ms

< 3 ms

< 3 V

5 V...50 V–

100 mA

$\leq 1.3$  V

–

–

–

–25 °C...+60 °C

–25 °C...+40 °C

–25 °C...+50 °C

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

–

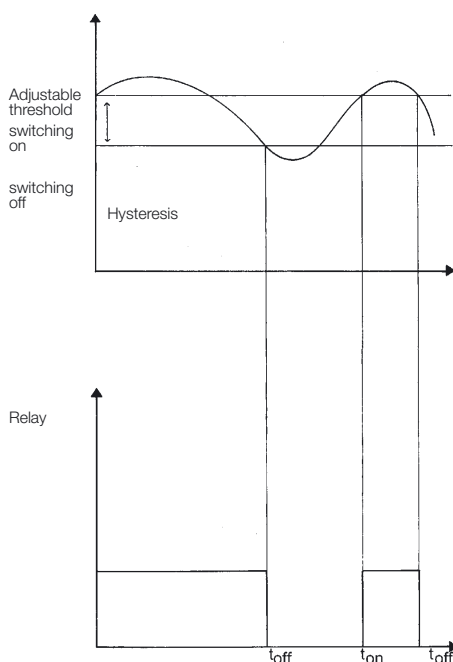
–

–

–

–

–



## SMSI AC O

With adjustable switching threshold  
up to 250 mA Up to 2.5 A



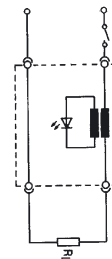
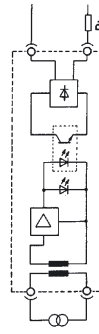
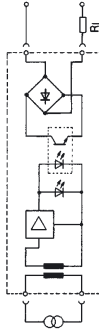
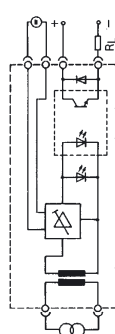
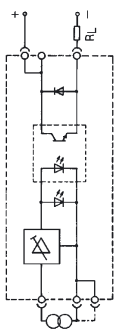
## SMSI AC O

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



## SMSI AC

Current monitoring with indicator up to 5 A  
without switching threshold



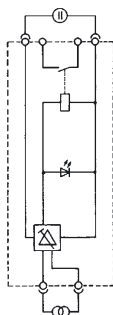
| Type                                | Cat. No.   | Type                               | Cat. No.   | Type             | Cat. No.   | Type             | Cat. No.   | Type             | Cat. No.   |
|-------------------------------------|------------|------------------------------------|------------|------------------|------------|------------------|------------|------------------|------------|
| SMSI 0.25 AC O                      | 1156460000 | SMSI 2.5 AC O                      | 1157360000 | SMSI 5 AC O      | 1112160000 | SMSI 5 AC O      | 8026930000 | SMSI 5 AC        | 1112060000 |
| 10 V...250 Vac                      |            | 10 V...250 Vac                     |            | 5...250 Vac      |            | 5...250 Vac      |            | 5...250 Vac      |            |
| <b>300 mA</b>                       |            | <b>2.8 A</b>                       |            | <b>1 A...5 A</b> |            | <b>1 A...5 A</b> |            | <b>1 A...5 A</b> |            |
| 1075 mVA                            |            | 250 mVA                            |            | -                |            | -                |            | -                |            |
| <b>40 mA...250 mA</b>               |            | <b>0.2 A...2.2 A</b>               |            | -                |            | -                |            | -                |            |
| ≤ 5%                                |            | ≤ approx. 35%                      |            | -                |            | -                |            | -                |            |
| ≤ 40 ms                             |            | ≤ 55 ms                            |            | ≤ 10 ms          |            | ≤ 10 ms          |            | -                |            |
| ≤ 15 ms                             |            | ≤ 20 ms                            |            | ≤ 20 ms          |            | ≤ 20 ms          |            | -                |            |
| < 4.3 V <sub>eff</sub> (I = 250 mA) |            | < 100 mV <sub>eff</sub> (I = 10 A) |            | < 200 mV         |            | < 200 mV         |            | < 200 mV         |            |
| 5 V...50 V-                         |            | 5 V...50 V-                        |            | 24 Vac ± 10%     |            | 5...48 Vdc       |            |                  |            |
| 100 mA                              |            | 100 mA                             |            | 100 mA           |            | 100 mA           |            |                  |            |
| ≤ 1.3 V                             |            | ≤ 1.3 V                            |            | < 3.2 V          |            | < 1.6 V          |            |                  |            |
|                                     |            | 24 Vac ± 10%                       |            |                  |            |                  |            |                  |            |
|                                     |            | 550 mW/-1150 mVA~                  |            |                  |            |                  |            |                  |            |
|                                     |            | 23 mA/-47 mA~                      |            |                  |            |                  |            |                  |            |
| -25 °C...+60 °C                     |            | -25 °C...+60 °C                    |            | -40 °C...+60 °C  |            | -40 °C...+60 °C  |            | -40 °C...+60 °C  |            |
| -25 °C...+40 °C                     |            | -25 °C...+40 °C                    |            | -25 °C...+40 °C  |            | -25 °C...+40 °C  |            | -25 °C...+40 °C  |            |
| -25 °C...+50 °C                     |            | -25 °C...+50 °C                    |            | -25 °C...+50 °C  |            | -25 °C...+50 °C  |            | -25 °C...+50 °C  |            |
| II                                  |            | II                                 |            | II               |            | II               |            | II               |            |
| I                                   |            | I                                  |            | I                |            | I                |            | I                |            |
| III                                 |            | III                                |            | III              |            | III              |            | III              |            |
| 2                                   |            | 2                                  |            | 2                |            | 2                |            | 2                |            |
| Fig. V                              |            | Fig. V                             |            | Fig. II          |            | Fig. II          |            | Fig. II          |            |

## Current Monitoring

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

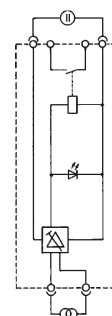
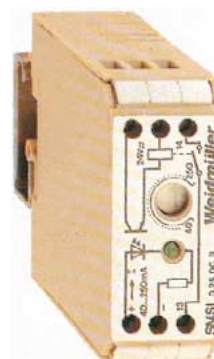
### SMSI DC R

With adjustable switching threshold  
up to 250 mA



### SMSI AC R

With adjustable switching threshold  
up to 250 mA



#### Ordering data

| Type           | Cat. No.   |
|----------------|------------|
| SMSI 0.25 DC R | 1156660000 |

| Type           | Cat. No.   |
|----------------|------------|
| SMSI 0.25 AC R | 1159960000 |

#### Technical data

|                                                        |                             |
|--------------------------------------------------------|-----------------------------|
| Measurement circuit voltage                            | 10 V...250 Vdc              |
| <b>Max. permissible current in measurement circuit</b> | <b>350 mA</b>               |
| Rated consumption ~ (VA)                               | 750 mVA (I = 250 mA)        |
| Voltage drop at input                                  | ≤ 3 V (I = 250 mA)          |
| <b>Adjustable switching threshold</b>                  | <b>40 mA...250 mA~</b>      |
| Hysteresis between turn-on and turn-off point          | 2% (250 mA)<IHY<10% (40 mA) |
| Activation time tA                                     | -                           |
| Reaction time tR                                       | ≤ 12 ms                     |
| Recovery                                               | -                           |
| Output voltage                                         | 250 V                       |
| Max. continuous output current                         | 3 A                         |
| Auxiliary voltage                                      | 24 V~ ±10%                  |
| Rated consumption auxiliary voltage                    | 250 mW/450 mVA              |
| Max. switching current                                 | 8 A                         |
| Contact                                                | 1 NO <sup>1)</sup>          |
| Contact material                                       | AgNi, gold-flashed          |
| Storage temperature                                    | -25 °C...+60 °C             |
| Ambient temperature                                    | -                           |
| - , assembled without spacing on TS                    | -25 °C...+40 °C             |
| - , assembled with ≥ 20 mm spacing on TS               | -25 °C...+50 °C             |

|                                                        |                        |
|--------------------------------------------------------|------------------------|
| Measurement circuit voltage                            | 10 V...250 Vac         |
| <b>Max. permissible current in measurement circuit</b> | <b>300 mA</b>          |
| Rated consumption ~ (VA)                               | 1075 mVA (I = 250 mA)  |
| Voltage drop at input                                  | ≤ 3 V (I = 250 mA)     |
| <b>Adjustable switching threshold</b>                  | <b>40 mA...250 mA~</b> |
| Hysteresis between turn-on and turn-off point          | ≤ 5%                   |
| Activation time tA                                     | ≤ 25 ms                |
| Reaction time tR                                       | ≤ 15 ms                |
| Recovery                                               | -                      |
| Output voltage                                         | 250 V                  |
| Max. continuous output current                         | 3 A                    |
| Auxiliary voltage                                      | 24 V~ ±10%             |
| Rated consumption auxiliary voltage                    | 250 mW/450 mVA         |
| Max. switching current                                 | 8 A                    |
| Contact                                                | 1 NO <sup>1)</sup>     |
| Contact material                                       | AgNi, gold-flashed     |
| Storage temperature                                    | -25 °C...+60 °C        |
| Ambient temperature                                    | -                      |
| - , assembled without spacing on TS                    | -25 °C...+40 °C        |
| - , assembled with ≥ 20 mm spacing on TS               | -25 °C...+50 °C        |

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

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| Overvoltage category, input, output                                    | II  |
| Overvoltage category, input1-input2,<br>Output1-output 2, input-output | III |
| Contamination class                                                    | 2   |

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| Overvoltage category, input, output                                    | II  |
| Overvoltage category, input1-input2,<br>Output1-output 2, input-output | III |
| Contamination class                                                    | 2   |

#### Dimensions and connection data

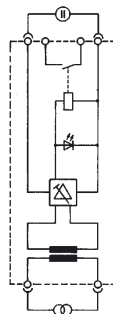
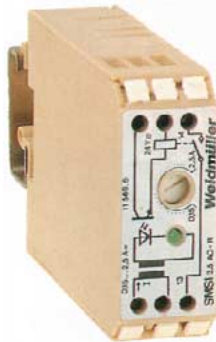
|              |                             |
|--------------|-----------------------------|
| see page 307 | Fig. V                      |
|              | <sup>1)</sup> NC on request |

Fig. V

# Current Monitoring

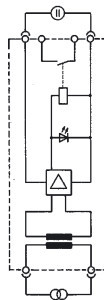
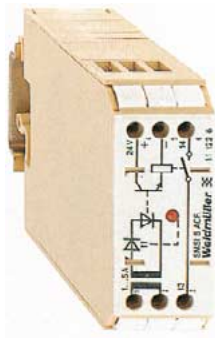
## SMSI AC R

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

|      |          |
|------|----------|
| Type | Cat. No. |
|------|----------|

|               |            |
|---------------|------------|
| Type          | Cat. No.   |
| SMSI 2.5 AC R | 1156960000 |

### Technical data

|                                                        |                        |
|--------------------------------------------------------|------------------------|
| Measurement circuit voltage                            | 10 V...250 Vac         |
| <b>Max. permissible current in measurement circuit</b> | <b>3 A</b>             |
| Rated consumption ~ (VA)                               | 250 mVA (I = 2.5 A)    |
| Voltage drop at input                                  | < 0.1 V (I = 2.5 A)    |
| <b>Adjustable switching threshold</b>                  | <b>0.2...2.2 A</b>     |
| Hysteresis between turn-on and turn-off point          | ≤ approx. 5%           |
| Activation time tA                                     | ≤ 45 ms                |
| Reaction time tR                                       | ≤ 30 ms                |
| Recovery                                               | < 75 ms                |
| Output voltage                                         | 250 V                  |
| Max. continuous output current                         | 3 A                    |
| Auxiliary voltage                                      | 24 Vdc ±10%            |
| Rated consumption auxiliary voltage                    | 1000 mW                |
| Max. switching current                                 | 5 A                    |
| Contact                                                | 1 NO <sup>1)</sup>     |
| Contact material                                       | AgNi, gold-plated 3 µm |
| Storage temperature                                    | -40 °C...+60 °C        |
| Ambient temperature                                    |                        |
| - , assembled without spacing on TS                    | -25 °C...+40 °C        |
| - , assembled with ≥ 20 mm spacing on TS               | -25 °C...+50 °C        |

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

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| Overvoltage category, input, output                                    | II  |
| Overvoltage category, input1-input2,<br>Output1-output 2, input-output | III |
| Contamination class                                                    | 2   |

### Dimensions and connection data

see page 307

Fig. V

|             |            |
|-------------|------------|
| Type        | Cat. No.   |
| SMSI 5 AC R | 1112260000 |

10 V...250 Vac

**1 A...5 A**

1 VA (I = 5 A)

< 1 VA (I = 5 A)

-

-

-

-

-

250 V

3 A

24 Vdc ±10%

-

8 A

1 NO<sup>1)</sup>

AgNi, gold-plated 3 µm

-40 °C...+60 °C

-25 °C...+40 °C

-25 °C...+50 °C

II

III

2

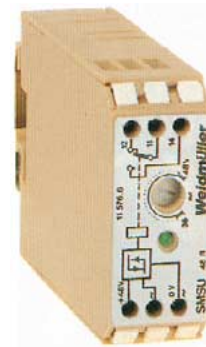
Fig. V

## Voltage Monitoring

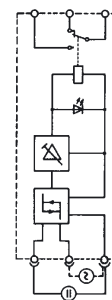
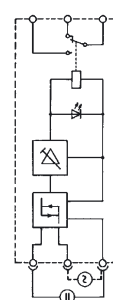
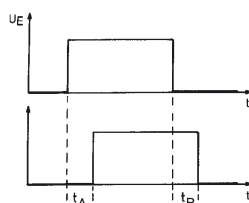
- Voltage monitoring from 18 to 299 V
- One and three phase version
- Adjustable switching threshold

### SMSU 24 R

### SMSU 48 R



Block diagram/ timing diagram



#### Ordering data

#### Technical data

##### Voltage monitoring range (also Supply voltage)

Rated consumption – (W)

Rated consumption – (VA)

##### Adjustable switch-off threshold

Hysteresis/factory setting

Switching points

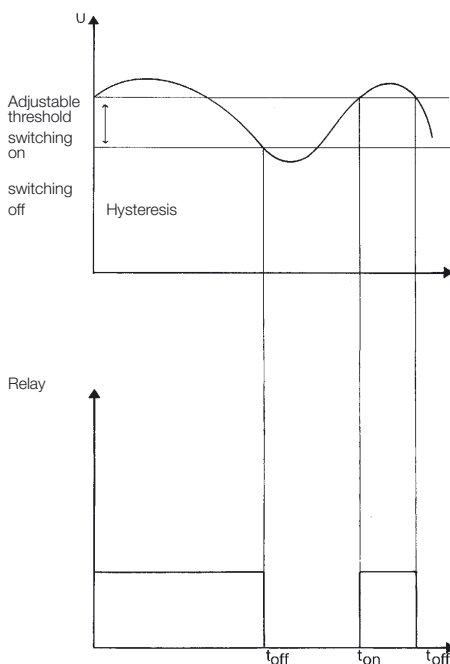
Activation time  $t_A$

Reaction time  $t_R$

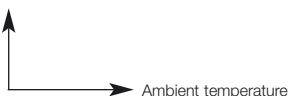
Derating curve

a = assembled without spacing on mounting rail

b = assembled with  $\geq 20$  mm spacing on mounting rail



Continuous current



Max. output voltage

Max. switching current

Max. continuous output current

Contact

Contact material

Switching capacity (resistive load)

Fuse

Storage temperature

Ambient temperature

–, assembled without spacing on TS

–, assembled with  $\geq 20$  mm spacing on TS

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

Overvoltage category, input, input 1-input 2, output

Overvoltage category, input-output, output 1-output 2

Contamination class

Dimensions and connection data see page 306

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

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

18 Vdc...27 Vdc or

18 Vac...27 Vac/50 Hz

< 0.8 W

< 0.9 VA

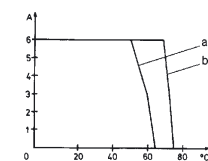
18 Vdc...24 Vdc

1%...10%/5%

–

< 4 s

< 300 ms



36 Vdc...53 Vdc or

36 Vac...53 Vac/50 Hz

< 1 W

< 1.5 VA

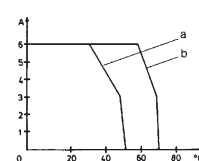
36 Vdc...48 Vdc

1%...10%/5%

–

< 2.5 s

< 300 ms



250 V~

8 A

3 A

1 changeover contact

AgNi 0.15 gold-flashed

2000 VA

–40 °C...+60 °C

–25 °C...+50 °C

–25 °C...+60 °C

250 V~

8 A

3 A

1 changeover contact

AgNi 0.15 gold-flashed

2000 VA

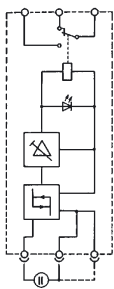
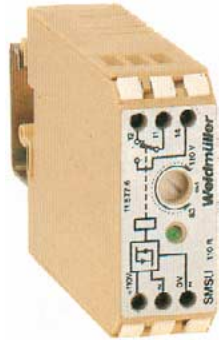
–40 °C...+60 °C

–25 °C...+50 °C

–25 °C...+60 °C

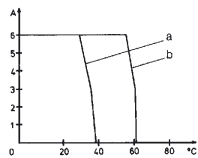


## SMSU 110 R



Type Cat. No.  
SMSU 110 R **1157760000**

**83 Vdc...121 Vdc or**  
**83 Vac...121 Vac/50 Hz**  
—  
—  
**83 Vuc...110 Vuc**  
1%...10%/5%  
—  
< 4 s  
< 300 ms

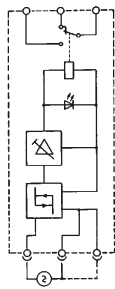
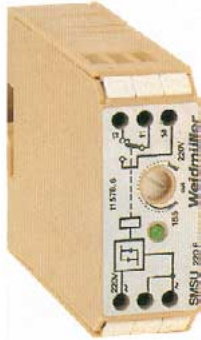


250 V~  
8 A  
3 A  
1 changeover contact

AgNi 0.15 gold-flashed  
2000 VA

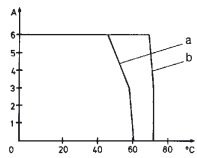
-40 °C...+60 °C  
-25 °C...+30 °C  
-25 °C...+55 °C

## SMSU 220 R



Type Cat. No.  
SMSU 220 R **1157860000**

**165 Vac...253 Vac/50 Hz**  
—  
—  
**165 Vac...220 Vac**  
1%...15%/5%  
—  
< 3 s  
< 2 s



250 V~  
8 A  
3 A  
1 changeover contact

AgNi 0.15 gold-flashed  
2000 VA

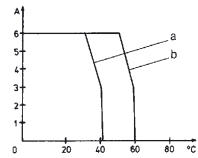
-40 °C...+60 °C  
-25 °C...+45 °C  
-25 °C...+60 °C

## SMSU 260 R



Type Cat. No.  
SMSU 260 R **1160160000**

**200 V...299 Vac/50 Hz**  
—  
—  
**200 V...260 V**  
1%...15%/5%  
—  
< 3 s  
< 2 s



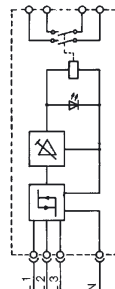
250 V~  
8 A  
3 A  
1 changeover contact

AgNi 0.15 gold-flashed  
2000 VA

-40 °C...+60 °C  
-25 °C...+45 °C  
-25 °C...+60 °C

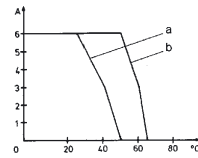
## SMSU 3x220 R

Three-phase with  
adjustable switching threshold



Type Cat. No.  
SMSU **1156560000**

3x220 R, 2 NO **1156560000**  
3x220 R, 1 NC/1 NO **1178760000**  
—  
**165 V...230 Vac 50 Hz**  
—  
9 VA (L3); 60 mA (L 1/L 2)  
150 V~...205 V~  
-7%  
—  
< 4 s  
< 80 ms



250 V~  
8 A  
3 A  
2 NO (115656)  
1 NO/1 NC (117876)

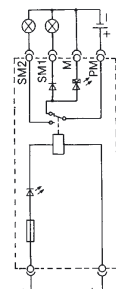
AgCdO, gold-flashed  
5x10<sup>7</sup> switching operations  
2x10<sup>5</sup> switching operations  
10<sup>5</sup> switching operations  
-40 °C...+60 °C

-5 °C...+40 °C  
-5 °C...+55 °C

II  
III  
2

## SMSU 1-24 DC

Single-phase without  
switching threshold



Type Cat. No.  
SMSU 24 DC **0555060000**

**24 Vdc ± 10%**  
**0.5 W**  
—  
—  
—  
On: 18.5 V, off: 5 V  
15 ms  
10 ms

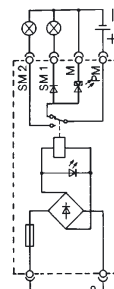
24 V- ± 10%  
1 A  
1 changeover contact

AgNi, gold-flashed  
10<sup>6</sup> switching operations  
100 mA

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

## SMSU 1-230 AC/DC

Single-phase without  
adjustable switching threshold



Type Cat. No.  
SMSU 230 AC/DC **0555160000**

**230 Vdc ±10%**  
**0.9 W**  
1.1 W  
—  
—  
On: 140 V-130 V-, off: 70 V-/80 V-  
—  
—

24 V- ± 10%  
1 A  
1 changeover contact

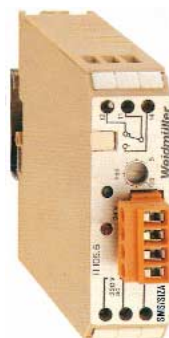
AgNi, gold-flashed  
10<sup>6</sup> switching operations  
100 mA

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

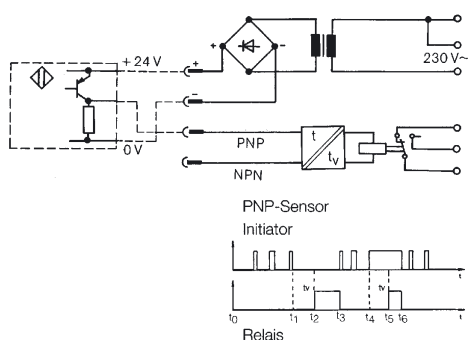
# Movement and Rotational Speed Monitoring

## SMS SZA

Rotational speed monitoring



### Block diagram



### Ordering data

| Type    | Cat. No.   |
|---------|------------|
| SMS/SZA | 1110560000 |

### 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 ( $t_4$ - $t_6$ ) or deactivated ( $t_1$ - $t_3$ ), the relay transmits a signal after the set time has elapsed. During normal operation, the time function bridges the gaps between regular pulses ( $t_0$ - $t_2$ ).

### Technical data

|                                          |                               |
|------------------------------------------|-------------------------------|
| Operating voltage                        | 230 Vdc $\pm 5$ -15%          |
| Initiator type/initiator voltage         | P or N switched/24 Vdc        |
| Output voltage                           | 250 V                         |
| Continuous current                       | 4 A                           |
| Max. switching capacity (resistive load) | 2000 VA                       |
| Contact                                  | 1 changeover contact          |
| Contact material                         | AgNi 0.15 gold-flashed        |
| Mechanical service life                  | $> 10^7$ switching operations |
| Time range                               | 0.5...5 s                     |

### Coordination of insulation to VDE DIN 0160, draft11/94

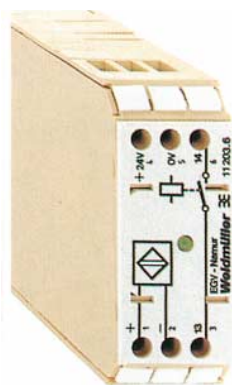
|                                 |                      |
|---------------------------------|----------------------|
| Rated voltage                   | 300 V                |
| Rated surge voltage             | 4 kV                 |
| Overvoltage category            | III                  |
| Contamination class             | 2                    |
| Clearance and creepage distance | $\geq 3$ mm          |
| EMC                             | EN 50 081-1/50 082-2 |

Accessories and dimensions see page 307

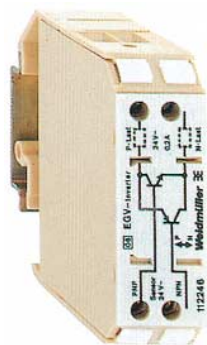
Fig. VI

Namur Switch Amplifiers

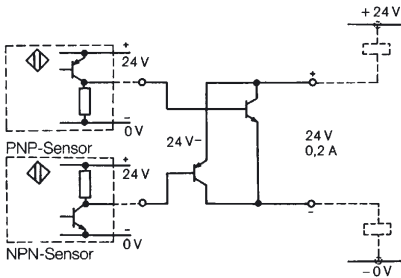
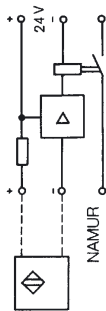
EGV-Namur



EGV-Inverter



Block diagram



Ordering data

| Type      | Cat. No.   |
|-----------|------------|
| EGV Namur | 1120360000 |

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.

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

|                                          |                               |
|------------------------------------------|-------------------------------|
| Input voltage                            | 24 Vdc $\pm 10\%$             |
| Initiator type/initiator voltage         | approx. 8 Vdc                 |
| Output voltage, -current                 | 250 Vac/dc                    |
| Continuous current                       | 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                 |

|                                                      |
|------------------------------------------------------|
| 24 Vdc $\pm 10\%$ (closed circuit current $< 10$ mA) |
| 24 Vdc $\pm 10\%$ (switching threshold approx. 15 V) |
| 200 mA                                               |

Coordination of insulation to VDE DIN 0160, draft11/94

|                                 |                                |
|---------------------------------|--------------------------------|
| Rated voltage                   | 300 V                          |
| Rated surge voltage             | 4 kV                           |
| Overvoltage category            | III                            |
| Contamination class             | 2                              |
| Clearance and creepage distance | $\geq 3$ mm                    |
| EMC                             | EN 50 081, EN 50 082, EN50 011 |

EN 50 081, EN 50 082, EN50 011

Accessories and dimensions see page 307

Fig. VI

Fig. V

# Set Point Generator

## EMA/SW 24

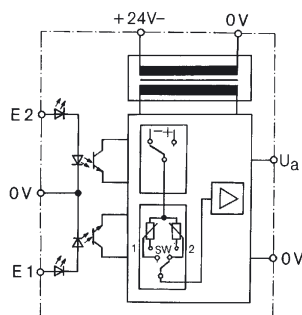
- Set point generator
- switchable  $-10.5\text{ V}/+10.5\text{ V}$



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 ( $0 \dots 10.5\text{ V}$ ) can be set using the spindle operated potentiometers SW1 and SW2. The control input E\* determines the polarity safely separated ( $-10.5\text{ V} \dots 0\text{ V} \dots +10\text{ V}$ ).

Control input E1:  $0\text{ V}$  = set point 1,  
 $24\text{ V}$  = set point 2,

Control input E2:  $0\text{ V}$  = positive set point,  
 $24\text{ V}$  = negative set point



electronic changeover switch

### Ordering data

| Type   | Cat. No.   |
|--------|------------|
| EMA/SW | 1172660000 |

### Technical data

#### Input signal/measurement range

**0=0 V, 1=+24 V**

Control voltage

$24\text{ V} \pm 20\%$

Max. input current

$\leq 7\text{ mA}$  at  $24\text{ V}$

Display

each control input: red LED

Setting

via trimming potentiometer

25 rotations nom.

#### Output signal

**adjustable from  $-10.5\text{ V} \dots +10.5\text{ V}$**

Output

Voltage output selection by E1/E2

Output current

max.  $\pm 25\text{ mA}$  at  $U_{\text{rated}} = 24\text{ V}$

Load resistance

min.  $400\ \Omega$  at  $U_{\text{rated}} = 24\text{ V}$

Slew-Rate

$0.168\text{ V}/\mu\text{s}$

Supply voltage  $U_B$

$24\text{ V} \pm 20\%$ ,  $30\text{ mA}$  ( $R_L = \infty$ )

Residual ripple

$30\text{ mV}/106\text{ kHz}$  (at  $U_{\text{max}}$ )

Reaction time

rising  $50\ \mu\text{s}$

decreasing  $80\ \mu\text{s}$

Isolation voltage, voltage strength

Input/output/supply

$1\text{ kV}$ -

Input-Output/TS

$4\text{ kV}_{\text{eff}}$

Storage temperature

$-20\text{ }^\circ\text{C} \dots +70\text{ }^\circ\text{C}$

Operating temperature

$0\text{ }^\circ\text{C} \dots +50\text{ }^\circ\text{C}$

#### Insulation coordination according to EN 50 178

Overvoltage category

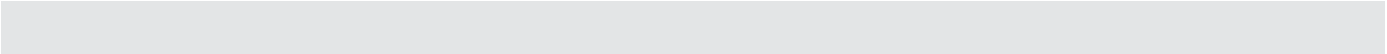
III

Contamination class

2

Accessories, dimensions and connection data see page 307

Fig. V



## 8-Bit Analogue/Digital Converters

### 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.

RS/U-D8



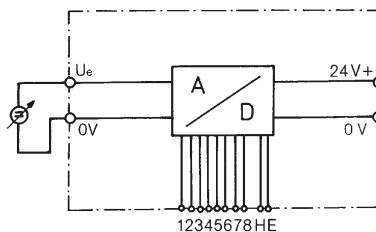
RS/I-D 8



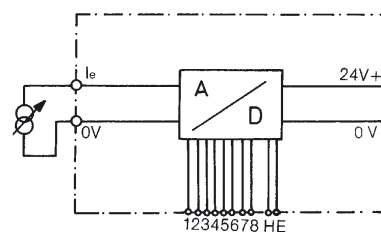
Functions table (example)

| Terminal PIN |    |    |    |    |    |    |     | Digital value/<br>digital value | Analog voltage<br>Analog voltage |
|--------------|----|----|----|----|----|----|-----|---------------------------------|----------------------------------|
| MSB          | E8 | E7 | E6 | E5 | E4 | E3 | LSB |                                 |                                  |
| 0            | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0                               | 0 V                              |
| 0            | 0  | 0  | 0  | 0  | 0  | 0  | 1   |                                 |                                  |
| 0            | 0  | 0  | 0  | 0  | 0  | 1  | 0   |                                 |                                  |
| 0            | 0  | 0  | 0  | 0  | 0  | 1  | 1   |                                 |                                  |
| -            | -  | -  | -  | -  | -  | -  | -   |                                 |                                  |
| 1            | 1  | 1  | 1  | 1  | 1  | 0  | 1   |                                 |                                  |
| 1            | 1  | 1  | 1  | 1  | 1  | 1  | 0   |                                 |                                  |
| 1            | 1  | 1  | 1  | 1  | 1  | 1  | 1   |                                 | +10 V                            |

Block diagram



Block diagram



### Ordering data

| Type     | Cat. No.   | Type     | Cat. No.   | Type     | Cat. No.   | Type     | Cat. No.   |
|----------|------------|----------|------------|----------|------------|----------|------------|
| RS/U-D 8 | 1122361001 | RS/U-D 8 | 1160361001 | RS/I-D 8 | 1160561001 | RS/I-D 8 | 1168561001 |

### Technical data

| Input signal                       | -10 V...+10 V                                  | 0...10 V                                       | 0...20 mA                                      | 4...20 mA                                      |
|------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| Max. input voltage                 |                                                |                                                | 3.5 V                                          | 3.5 V                                          |
| Max. input current                 | ≤ 55 µA                                        | ≤ 25 µA                                        | 25 mA                                          | 25 mA                                          |
| Input resistance                   | ≥ 200 kΩ                                       | ≥ 400 kΩ                                       | ≥ 51 Ω                                         | ≥ 51 Ω                                         |
| Max. limit frequency <sup>1)</sup> | 5 kHz at Full-Scale (Sinus) <sup>1)</sup>      | 5 kHz at Full-Scale (Sinus) <sup>1)</sup>      | 5 kHz at Full-Scale (Sinus) <sup>1)</sup>      | 5 kHz at Full-Scale (Sinus) <sup>1)</sup>      |
| Resolution                         | 78 mV c 1 LSB                                  | 39 mV c 1 LSB                                  | 78 µA c 1 LSB                                  | 62.5 µA c 1 LSB                                |
| Output signal                      | 8 Bit (1 Bit prefix)                           | 8 Bit                                          | 8 Bit                                          | 8 Bit                                          |
| Output current                     | ≤ 25 mA (as source)                            | ≤ 25 mA (as source)                            | ≤ 25 mA (as source)                            | ≤ 25 mA (as source)                            |
| Output level                       | approx. 17 V c H, 0 V c L                      | approx. 17 V c H, 0 V c L                      | approx. 17 V c H, 0 V c L                      | approx. 17 V c H, 0 V c L                      |
| Prefix                             | MSB: H c positive, L c negative                |                                                |                                                |                                                |
| Transmission error                 | ±1 LSB                                         | ±1 LSB                                         | ±1 LSB                                         | ±1 LSB                                         |
| Conversion time                    | ≤ 4 µs                                         | ≤ 4 µs                                         | ≤ 4 µs                                         | ≤ 4 µs                                         |
| Supply                             | 24 V-, ±20 %, 35 mA<br>(plus output current)   | 24 V-, ±20 %, 35 mA<br>(plus output current)   | 24 V-, ±20 %, 35 mA<br>(plus output current)   | 24 V-, ±20 %, 35 mA<br>(plus output current)   |
| Connection arrangement             | Terminal 1 LSB                                 | Terminal 1 LSB                                 | Terminal 1 LSB                                 | Terminal 1 LSB                                 |
|                                    | :                                              | :                                              | :                                              | :                                              |
|                                    | :                                              | :                                              | :                                              | :                                              |
|                                    | Terminal 8 MSB                                 | Terminal 8 MSB                                 | Terminal 8 MSB                                 | Terminal 8 MSB                                 |
|                                    | Terminal 9 Enable <sup>2)</sup>                | Terminal 9 Enable <sup>2)</sup>                | Terminal 9 Enable <sup>2)</sup>                | Terminal 9 Enable <sup>2)</sup>                |
|                                    | Terminal 10 Hold                               | Terminal 10 Hold                               | Terminal 10 Hold                               | Terminal 10 Hold                               |
|                                    | Hold function:                                 | Hold function:                                 | Hold function:                                 | Hold function:                                 |
|                                    | High c +24 V c storage of last converted value | High c +24 V c storage of last converted value | High c +24 V c storage of last converted value | High c +24 V c storage of last converted value |
|                                    | Low c 0 V c free conversion                    | Low c 0 V c free conversion                    | Low c 0 V c free conversion                    | Low c 0 V c free conversion                    |
| Storage temperature                | -40 °C...+85 °C                                | -40 °C...+85 °C                                | -40 °C...+85 °C                                | -40 °C...+85 °C                                |
| Operating temperature              | 0 °C...+50 °C                                  | 0 °C...+50 °C                                  | 0 °C...+50 °C                                  | 0 °C...+50 °C                                  |
| EMC EN 50 081-1/50 082-2           |                                                |                                                |                                                |                                                |

<sup>1)</sup> 1 LSB-Accuracy

<sup>2)</sup> Enable: 24 V = tristate  
0 V = free conversion



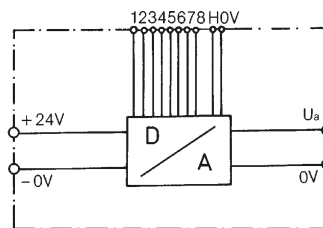
## 8-Bit Digital/Analogue Converters

RS/D 8-U



Block diagram

Pin assignment

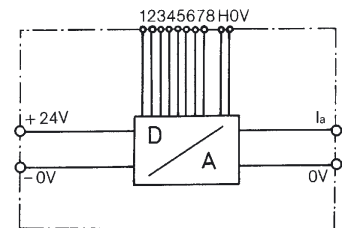


RS/D 8-I



Block diagram

Pin assignment

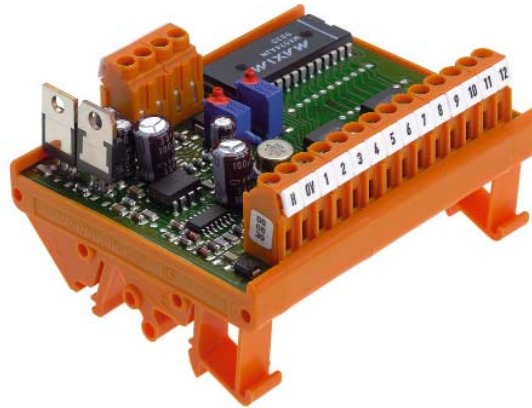


| Ordering data            | Type                                              | Cat. No.   | Type                                              | Cat. No.   | Type                                              | Cat. No.   | Type                                              | Cat. No.   |
|--------------------------|---------------------------------------------------|------------|---------------------------------------------------|------------|---------------------------------------------------|------------|---------------------------------------------------|------------|
|                          | RS/D 8-U                                          | 1123361001 | RS/D 8-U                                          | 1160761001 | RS/D 8-I                                          | 1165861001 | RS/D 8-I                                          | 1169261001 |
| Technical data           |                                                   |            |                                                   |            |                                                   |            |                                                   |            |
| Input signal             | 8 Bit (1 Bit prefix)                              |            | 8 Bit                                             |            | 8 Bit                                             |            | 8 Bit                                             |            |
| Max. input voltage       | 5...24 V (typ. 24 V)                              |            | 5...24 V (typ. 24 V)                              |            | 5...24 V (typ., max. 30 V) c H                    |            | 5...24 V (type., max. 30 V) c H                   |            |
| Max. input current       | 2.5 mA                                            |            | 2.5 mA                                            |            |                                                   |            |                                                   |            |
| Input resistance         | 50 kΩ per input                                   |            | 50 kΩ per input                                   |            | 50 kΩ per input                                   |            | 50 kΩ per input                                   |            |
| Prefix                   | MSB: H c positive, L c negative                   |            |                                                   |            |                                                   |            |                                                   |            |
| Resolution               | 78 mV c 1 LSB                                     |            | 39 mV c 1 LSB                                     |            | 78 μA c 1 LSB                                     |            | 62.5 μA c 1 LSB                                   |            |
| Output signal            | -10 V...+10 V                                     |            | 0...10 V                                          |            | 0...20 mA                                         |            | 4...20 mA                                         |            |
| Output current           | ≤ 10 mA max. current                              |            | ≤ 10 mA                                           |            | 0...20 mA (as source)                             |            | 4...20 mA (as source)                             |            |
| Offset                   | ≤ 20 mV                                           |            | ≤ 20 mV                                           |            | max. 0.08 mA                                      |            | 4 mA                                              |            |
| Load resistance          | ≥ 1 kΩ                                            |            | ≥ 1 kΩ                                            |            | ≤ 500 Ω                                           |            | ≤ 500 Ω                                           |            |
| Transmission error       | ±1 LSB                                            |            | ±1 LSB                                            |            | ±1 LSB                                            |            | ±1 LSB                                            |            |
| Conversion time          | ≤ 30 μs                                           |            | ≤ 30 μs                                           |            | ≤ 30 μs                                           |            | ≤ 30 μs                                           |            |
| Supply                   | 24 V-, ±20 %, 25 mA<br>(plus output current)      |            | 24 V-, ±20 %, 25 mA<br>(plus output current)      |            | 24 V-, ±20 %, 25 mA<br>(plus output current)      |            | 24 V-, ±20 %, 25 mA<br>(plus output current)      |            |
| Connection arrangement   |                                                   |            |                                                   |            |                                                   |            |                                                   |            |
|                          | Terminal 1 LSB                                    |            | Terminal 1 LSB                                    |            | Terminal 1 LSB                                    |            | Terminal 1 LSB                                    |            |
|                          | :                                                 |            | :                                                 |            | :                                                 |            | :                                                 |            |
|                          | Terminal 8 MSB                                    |            | Terminal 8 MSB                                    |            | Terminal 8 MSB                                    |            | Terminal 8 MSB                                    |            |
|                          | Terminal 9 Hold                                   |            | Terminal 9 Hold                                   |            | Terminal 9 Hold                                   |            | Terminal 9 Hold                                   |            |
|                          | Terminal 10 0 V                                   |            | Terminal 10 0 V                                   |            | Terminal 10 0 V                                   |            | Terminal 10 0 V                                   |            |
|                          | Hold function:                                    |            | Hold function:                                    |            | Hold function:                                    |            | Hold function:                                    |            |
|                          | High c +24 V c storage of<br>last converted value |            | High c +24 V c storage of<br>last converted value |            | High c +24 V c storage of<br>last converted value |            | High c +24 V c storage of<br>last converted value |            |
|                          | Low c 0 V c free conversion                       |            | Low c 0 V c free conversion                       |            | Low c 0 V c free conversion                       |            | Low c 0 V c free conversion                       |            |
| Storage temperature      | -40 °C...+85 °C                                   |            | -40 °C...+85 °C                                   |            | -40 °C...+85 °C                                   |            | -40 °C...+85 °C                                   |            |
| Operating temperature    | 0 °C...+50 °C                                     |            | 0 °C...+50 °C                                     |            | 0 °C...+50 °C                                     |            | 0 °C...+50 °C                                     |            |
| EMC EN 50 081-1/50 082-2 |                                                   |            |                                                   |            |                                                   |            |                                                   |            |

## 12-Bit Analogue/Digital Converters

**Hold function (H):**

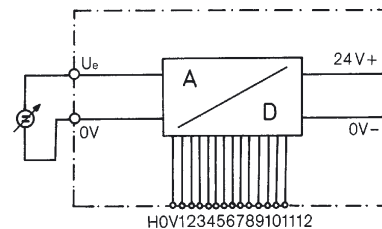
The converter can, for example, by means of the hold function (H) be matched to the cycle time of a PLC. Holding and release of the conversion. The Hold input (H) is internally connected to 0 V via a resistor. In order to store the last signal, the hold input (H) must be supplied with 24 V.



### Functions table (example)

| Analog current<br>Analog current | Digital value/<br>digital value | Terminal |    |    |   |   |   |   |   |     |   |   |   |   |   |   |   |
|----------------------------------|---------------------------------|----------|----|----|---|---|---|---|---|-----|---|---|---|---|---|---|---|
|                                  |                                 | PIN      |    |    |   |   |   |   |   |     |   |   |   |   |   |   |   |
|                                  |                                 | MSB      |    |    |   |   |   |   |   | LSB |   |   |   |   |   |   |   |
|                                  |                                 | 12       | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4   | 3 | 2 | 1 |   |   |   |   |
| 4 mA                             |                                 | 0        | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0   | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|                                  |                                 | 0        | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0   | 0 | 0 | 0 | 0 | 0 | 1 |   |
|                                  |                                 | 0        | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0   | 0 | 0 | 0 | 1 | 0 | 1 |   |
|                                  |                                 | 0        | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0   | 0 | 0 | 0 | 1 | 1 |   |   |
|                                  |                                 | -        | -  |    |   |   |   |   |   |     |   |   |   |   | - |   |   |
|                                  |                                 | -        | -  |    |   |   |   |   |   |     |   |   |   |   | - | - |   |
|                                  |                                 | 1        | 1  | 1  | 1 | 1 | 1 | 1 | 1 | 1   | 1 | 1 | 1 | 1 | 0 | 1 |   |
|                                  |                                 | 1        | 1  | 1  | 1 | 1 | 1 | 1 | 1 | 1   | 1 | 1 | 1 | 1 | 1 | 0 |   |
| 20 mA                            |                                 | 1        | 1  | 1  | 1 | 1 | 1 | 1 | 1 | 1   | 1 | 1 | 1 | 1 | 1 | 1 |   |

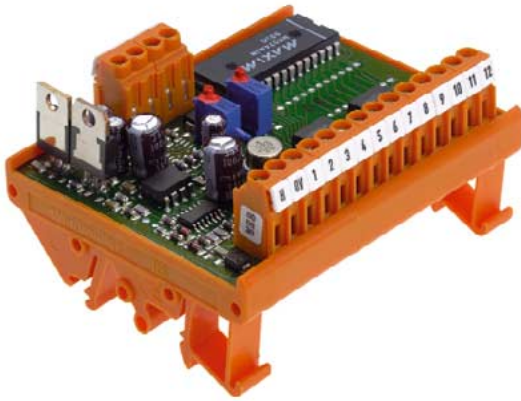
### Block diagram



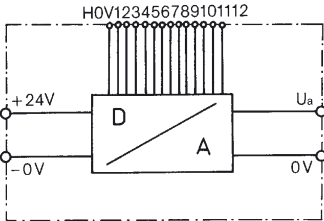
### Block diagram

| Ordering data                  | Type                                      | Cat. No.   | Type                                      | Cat. No.   | Type                                      | Cat. No.   | Type                                      | Cat. No.   |
|--------------------------------|-------------------------------------------|------------|-------------------------------------------|------------|-------------------------------------------|------------|-------------------------------------------|------------|
|                                | RS/U-D 12                                 | 1168261001 | RS/U-D 12                                 | 1168361001 | RS/I-D 12                                 | 1168461001 | RS/I-D 12                                 | 1169161001 |
|                                |                                           |            |                                           |            |                                           |            |                                           |            |
| <b>Technical data</b>          |                                           |            |                                           |            |                                           |            |                                           |            |
| Input signal/measurement range | -10...+10 V                               |            | 0...10 V                                  |            | 0...20 mA                                 |            | 4...20 mA                                 |            |
| Max. input voltage             | ±15 V                                     |            | 15 V                                      |            |                                           |            |                                           |            |
| Max. input current             |                                           |            |                                           |            | 30 mA                                     |            | 30 mA                                     |            |
| Input resistance               | 100 kΩ                                    |            | 100 kΩ                                    |            | 500 Ω                                     |            | 500 Ω                                     |            |
| Prefix                         | MSB: H c positive, L c negative           |            |                                           |            |                                           |            |                                           |            |
| Resolution                     | 4.88 mV c 1 LSB                           |            | 2.44 mV c 1 LSB                           |            | 4.9 µA c 1 LSB                            |            | 4 µA c 1 LSB                              |            |
|                                |                                           |            |                                           |            |                                           |            |                                           |            |
| <b>Output signal</b>           | <b>12 Bit</b> (1 Bit prefix)              |            | <b>12 Bit</b>                             |            | <b>12 Bit</b>                             |            | <b>12 Bit</b>                             |            |
| Output current                 | ≤ 25 mA (as source)                       |            | ≤ 25 mA (as source)                       |            | ≤ 25 mA (as source)                       |            | ≤ 25 mA (as source)                       |            |
| Output level                   | 24 V c H, 0 V c L                         |            | 24 V c H, 0 V c L                         |            | 24 V c H, 0 V c L                         |            | 24 V c H, 0 V c L                         |            |
| Load resistance                |                                           |            |                                           |            |                                           |            |                                           |            |
| Transmission error             | ±1 LSB                                    |            | ±1 LSB                                    |            | ±1 LSB                                    |            | ±1 LSB                                    |            |
| Conversion time                | ≤ 50 µs                                   |            | ≤ 50 µs                                   |            | ≤ 50 µs                                   |            | ≤ 50 µs                                   |            |
| Temperature coefficient        | 1 LSB *                                   |            | 1 LSB *                                   |            | 1 LSB *                                   |            | 1 LSB *                                   |            |
| Supply                         | 24 V-, ±20 %                              |            | 24 V-, ±20 %                              |            | 24 V-, ±20 %                              |            | 24 V-, ±20 %                              |            |
| Max. power loss                | 4 W                                       |            | 4 W                                       |            | 4 W                                       |            | 4 W                                       |            |
| Connection arrangement         | Terminal 1    LSB                         |            | Terminal 1    LSB                         |            | Terminal 1    LSB                         |            | Terminal 1    LSB                         |            |
|                                | ⋮                    ⋮                    |            | ⋮                    ⋮                    |            | ⋮                    ⋮                    |            | ⋮                    ⋮                    |            |
|                                | Terminal 12    MSB                        |            | Terminal 12    MSB                        |            | Terminal 12    MSB                        |            | Terminal 12    MSB                        |            |
|                                | Hold function:                            |            | Hold function:                            |            | Hold function:                            |            | Hold function:                            |            |
|                                | High c +24 V c storage of digital signal  |            | High c +24 V c storage of digital signal  |            | High c +24 V c storage of digital signal  |            | High c +24 V c storage of digital signal  |            |
|                                | Low c 0 V c enabling the conversion cycle |            | Low c 0 V c enabling the conversion cycle |            | Low c 0 V c enabling the conversion cycle |            | Low c 0 V c enabling the conversion cycle |            |
|                                |                                           |            |                                           |            |                                           |            |                                           |            |
|                                |                                           |            |                                           |            |                                           |            |                                           |            |
| Storage temperature            | -40 °C...+80 °C                           |            | -40 °C...+80 °C                           |            | -40 °C...+80 °C                           |            | -40 °C...+80 °C                           |            |
| Operating temperature          | 0 °C...+50 °C                             |            | 0 °C...+50 °C                             |            | 0 °C...+50 °C                             |            | 0 °C...+50 °C                             |            |
|                                |                                           |            |                                           |            |                                           |            |                                           |            |
| EMC EN 50 081-1/50 082-2       |                                           |            |                                           |            |                                           |            |                                           |            |

# 12-Bit Digital/Analogue Converters



Block diagram



Block diagram

| Ordering data                   | Type                                      | Cat. No.   | Type                                      | Cat. No.   | Type                                      | Cat. No.   | Type                                      | Cat. No.   |
|---------------------------------|-------------------------------------------|------------|-------------------------------------------|------------|-------------------------------------------|------------|-------------------------------------------|------------|
|                                 | RS/D 12-U                                 | 1160861001 | RS/D 12-U                                 | 1166161001 | RS/D 12-I                                 | 1166061001 | RS/D 12-I                                 | 1165961001 |
| Technical data                  |                                           |            |                                           |            |                                           |            |                                           |            |
| Input signal/measurement range  | 12 Bit (1 Bit as prefix)                  |            | 12 Bit                                    |            | 12 Bit                                    |            | 12 Bit                                    |            |
| Max. input voltage              | 24 V-, ±20 %                              |            | 24 V-, ±20 %                              |            | 24 V-, ±20 %                              |            | 24 V-, ±20 %                              |            |
| Input current, I <sub>nom</sub> | 4.2 mA                                    |            | 4.2 mA                                    |            | 4.2 mA                                    |            | 4.2 mA                                    |            |
| Input resistance                | 5.7 kΩ                                    |            | 5.7 kΩ                                    |            | 5.7 kΩ                                    |            | 5.7 kΩ                                    |            |
| Prefix                          | MSB: H c positive, L c negative           |            |                                           |            |                                           |            |                                           |            |
| Resolution                      | 4.88 mV c 1 LSB                           |            | 2.44 mV c 1 LSB                           |            | 4.9 µA c 1 LSB                            |            | 4 µA c 1 LSB                              |            |
| Output signal                   | -10 V...+10 V                             |            | 0 V...10 V                                |            | 0...20 mA                                 |            | 4...20 mA                                 |            |
| Output current                  | ≤ 10 mA                                   |            | ≤ 10 mA                                   |            | 0...20 mA (as source)                     |            | 4...20 mA (as source)                     |            |
| Output level                    |                                           |            |                                           |            |                                           |            |                                           |            |
| Load resistance                 | ≥ 1 kΩ                                    |            | ≥ 1 kΩ                                    |            | ≤ 500 Ω                                   |            | ≤ 500 Ω                                   |            |
| Transmission error              | ±1 LSB                                    |            | ±1 LSB                                    |            | ±1 LSB                                    |            | ±1 LSB                                    |            |
| Conversion time                 | ≤ 4 µs                                    |            | ≤ 4 µs                                    |            | ≤ 4 µs                                    |            | ≤ 4 µs                                    |            |
| Temperature coefficient         | ±100 ppm from FSR/°C                      |            | ±100 ppm from FSR/°C                      |            | ±100 ppm from FSR/°C                      |            | ±100 ppm from FSR/°C                      |            |
| Supply                          | 24 V-, ±20 %, 40 mA                       |            | 24 V-, ±20 %, 40 mA                       |            | 24 V-, ±20 %, 60 mA                       |            | 24 V-, ±20 %, 60 mA                       |            |
| Max. power loss                 |                                           |            |                                           |            |                                           |            |                                           |            |
| Connection arrangement          | Terminal 1 LSB                            |            | Terminal 1 LSB                            |            | Terminal 1 LSB                            |            | Terminal 1 LSB                            |            |
|                                 | ...                                       |            | ...                                       |            | ...                                       |            | ...                                       |            |
|                                 | Terminal 12 MSB                           |            | Terminal 12 MSB                           |            | Terminal 12 MSB                           |            | Terminal 12 MSB                           |            |
|                                 | Hold function:                            |            | Hold function:                            |            | Hold function:                            |            | Hold function:                            |            |
|                                 | High c +24 V c storage of analogue signal |            | High c +24 V c storage of analogue signal |            | High c +24 V c storage of analogue signal |            | High c +24 V c storage of analogue signal |            |
|                                 | Low c 0 V c enabling the conversion cycle |            | Low c 0 V c enabling the conversion cycle |            | Low c 0 V c enabling the conversion cycle |            | Low c 0 V c enabling the conversion cycle |            |
|                                 |                                           |            |                                           |            |                                           |            |                                           |            |
|                                 |                                           |            |                                           |            |                                           |            |                                           |            |
| Storage temperature             | -40 °C...+85 °C                           |            | -40 °C...+85 °C                           |            | -40 °C...+85 °C                           |            | -40 °C...+85 °C                           |            |
| Operating temperature           | 0 °C...+50 °C                             |            | 0 °C...+50 °C                             |            | 0 °C...+50 °C                             |            | 0 °C...+50 °C                             |            |
| EMC EN 50 081-1/50 082-2        |                                           |            |                                           |            |                                           |            |                                           |            |