

Analogue Signal Processing

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

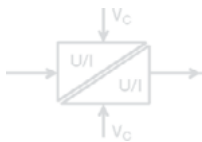
contains the following functions:

- 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

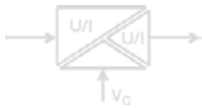
These products are categorised according to functionality as pure signal conversion, 2-way-isolation, 3-way-isolation and as passive separation.



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.



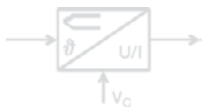
3-way-isolation also decouples the supply voltage from the input and output circuits, and enables the function with only one operating voltage.



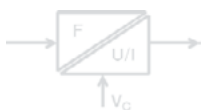
The **passive isolator** offers a further elementary advantage; it needs no additional voltage supply. The supply to the modules ensues via the input circuit and is transferred to the output. This current loop supply is distinguished by very low power consumption.



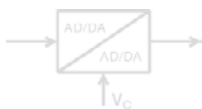
There are a large number of products available for measuring temperatures. RTD **PT100** signals, in 2-, 3- and 4-wire technology, are converted to standardised 0 – 20 mA, 4 – 20 mA and 0 – 10 V signals.



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.



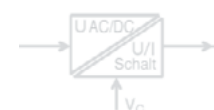
Frequency converters convert frequencies to standard analogue signals. This enables controllers connected in series to directly process impulse trains when making speed or rotational speed measurements.



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.



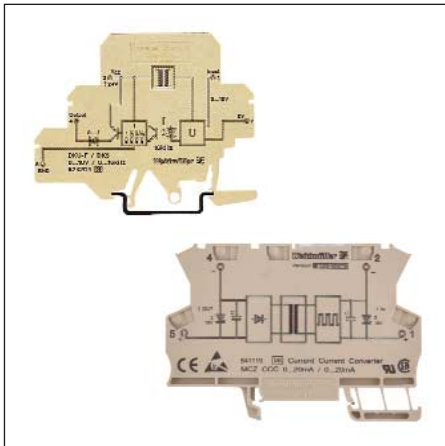
Voltage monitoring modules can be used to monitor direct and alternating voltages. Voltage fluctuations, resulting from switching operations or network overloads, can be reliably recognised and reported via the adjustable threshold function.



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.

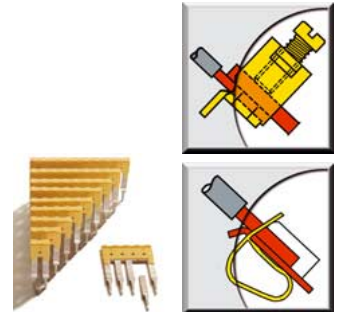
Design Overview

Mini Coupler / Mini Conditioner

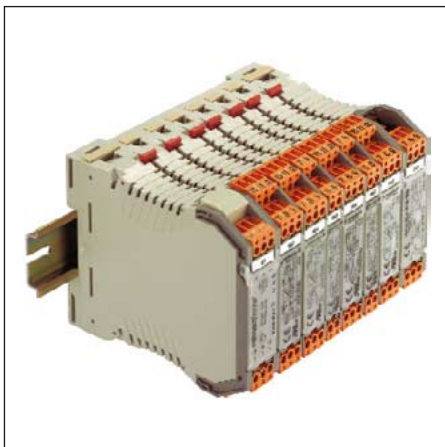


DK Mini Coupler / MCZ Mini Conditioner

- 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

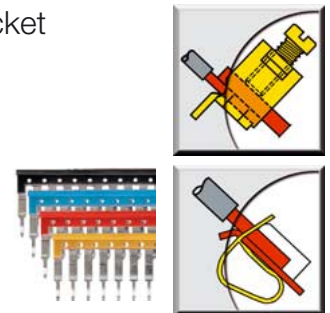


WAVESERIES

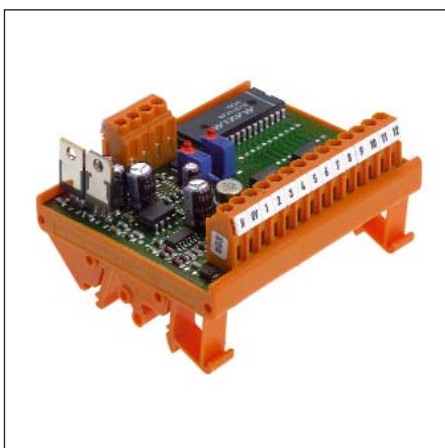


WAVEANALOG / WAVEANALOG PRO / WAVECONTROL

- 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 |
|---|--|---|-------------------------------------|---------------------------|
| DC signal conditioners | Signal conditioning, signal isolation, suppression of mass loops | DC input/fixed functions and configurable inputs and outputs | MCZ WAVEANALOG WAVEANALOG PRO | 164 174-184 185 |
| | Motor current limitation, pressure alarm, direct disconnection of connected modules, safety function | DC input/limit value monitoring | DK MCZ | 172 173 |
| PT100 signal conditioners | 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 WAVEANALOG WAVEANALOG PRO | 165 186-188 189 |
| Thermocouple conditioners | 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 WAVEANALOG PRO | 190 191 |
| Frequency signal conditioners | Flow rate measurements, frequency converter monitoring, speed measurements, pulse processing | Input/fixed functions and configurable inputs and outputs | DK MCZ | 167-168 166 |
| AD/DA converters | Conditioning of voltage and current signals in 8-bit/12-bit digital form | 8-bit AD/DA converter 12-bit AD/DA converter | RS | 210-213 |
| Current monitoring | Motor current monitoring, emergency lighting monitoring | AC input/measuring of sinusoidal and non sinusoidal signals up to 60A | DKI WAVECONTROL SMSI | 172 196-199 200-203 |
| Voltage monitoring | Under and overvoltage monitoring, operating status indication | One and three-phase overvoltage | SMSU | 204-205 |
| Motion and rotational speed monitoring | Downtime monitoring, conveyor-drive monitoring, monitoring of fans, pumps or pistons | PNP/NPN or NAMUR input/switching output | DKLW SMS | 169 206 |
| Namur switching amplifier | Switching amplifier | Namur input/switching output | EGV | 207 |
| Setpoint device | 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/ 8444960000 (1-channel) | 174 |
| | 0...20mA | 0...20mA | yes | Without auxiliary pwr. current loop supply from input | Fixed | 17.5 | Screw/ tens. clamp | 8463580000/ 8463590000 (2-channel) | 174 |
| | 0...20mA | 0...20mA | 2-way | 19.2...28.8Vdc/ Voltage supply of both sides | Fixed | 12.5 | Screw/ tens. clamp | 8445070000/ 8445080000 | 176 |
| | 0...20mA | 0...20mA | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540180000/ 8540190000 | 178 |
| | 0...20mA | 0...20mA | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447160000/ 8447170000 | 181 |
| | 0...20mA | 4...20mA | 2-way | 19.2...28.8Vdc/ Voltage supply of both sides | Fixed | 12.5 | Screw/ tens. clamp | 8446970000/ 8446990000 | 176 |
| | 0...20mA | 4...20mA | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540250000/ 8540260000 | 181 |
| | 0...20mA | 4...20mA | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447190000/ 8447200000 | 181 |
| | 0...20mA | 0...10V | 2-way | 19.2...28.8Vdc/ Voltage supply of both sides | Fixed | 12.5 | Screw/ tens. clamp | 8447020000/ 8447030000 | 176 |
| | 0...20mA | 0...10V | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540270000/ 8540280000 | 178 |
| | 0...20mA | 0...10V | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447220000/ 8447230000 | 181 |
| | 4...20mA | 0...20mA | 2-way | 19.2...28.8Vdc/ Voltage supply of output side | Fixed | 12.5 | Screw/ tens. clamp | 8444980000/ 8444990000 | 175 |
| | 4...20mA | 0...20mA | yes | 18...30Vdc | Fixed/10 kHz | 17.5 | Screw/ tens. clamp | 8540200000/ 8540210000 | 179 |
| | 4...20mA | 0...20mA | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447250000/ 8447260000 | 182 |
| | 4...20mA | 4...20mA | 2-way | 19.2...28.8Vdc/ Voltage supply of output side | Fixed | 12.5 | Screw/ tens. clamp | 8445010000/ 8445020000 | 175 |
| | 4...20mA | 4...20mA | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540180000/ 8540190000 | 178 |
| | 4...20mA | 4...20mA | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447160000/ 8447170000 | 182 |
| | 4...20mA | 0...10V | 2-way | 19.2...28.8Vdc/ Voltage supply of output side | Fixed | 12.5 | Screw/ tens. clamp | 8445040000/ 8445050000 | 175 |
| | 4...20mA | 0...10V | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540230000/ 8540240000 | 179 |
| | 4...20mA | 0...10V | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447280000/ 8447290000 | 182 |
| | 0...10V | 0...20mA | 2-way | 19.2...28.8Vdc/ Voltage supply of both sides | Fixed | 12.5 | Screw/ tens. clamp | 8447050000/ 8447080000 | 177 |
| | 0...10V | 0...20mA | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540310000/ 8540320000 | 180 |
| | 0...10V | 0...20mA | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447310000/ 8447320000 | 183 |
| | 0...10V | 4...20mA | 2-way | 19.2...28.8V/ Voltage supply of both sides | Fixed | 12.5 | Screw/ tens. clamp | 8447100000/ 8447110000 | 177 |
| | 0...10V | 4...20mA | yes | 18...30Vdc | Fixed/10 Hz | 17.5 | Screw/ tens. clamp | 8540290000/ 8540300000 | 180 |
| | 0...10V | 4...20mA | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447340000/ 8447350000 | 183 |
| | 0...10V | 0...10V | 2-way | 19.2...28.8Vdc/ Voltage supply of both sides | Fixed | 12.5 | Screw/ tens. clamp | 8447130000/ 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/ tens. clamp | 8540330000/ 8540340000 | 180 |
| | 0...10V | 0...10V | 3-way | 18...30Vdc | Fixed/20 kHz | 17.5 | Screw/ tens. clamp | 8447370000/ 8447380000 | 184 |
| | Variable voltage and current (+/-20mV...+/-200V, +/-0.1mA...+/-100mA) | Variable voltage and current (-10V...+10V, -20mA...+20mA) | yes | 20...253Vdc | DIP switch Potentiometer | 12.5 | Screw/ tens. clamp | 8560740000/ 8560750000 | 185 |
| | PT100/ | (4)...20mA | no | 19.2...28.8Vdc | DIP switch | 12.5 | Screw/ tens. clamp | 8432210000/ 8432220000 | 186 |
| RTD/DC | PT100/ 2-wire | 0...10V | no | 19.2...28.8Vdc | DIP switch Potentiometer | 12.5 | Screw/ tens. clamp | 8432180000/ 8432190000 | 186 |
| | PT100/ 2-wire | 4...20mA | no | current loop supply in output | Fixed | 6 | Tens. clamp | 8425720000 | 165 |
| | PT100/ 3-wire | 0(4)...20mA | no | 19.2...28.8Vdc | DIP switch Potentiometer | 12.5 | Screw/ tens. clamp | 8432150000/ 8432160000 | 187 |
| | PT100/ 3-wire | 0...10V | no | 19.2...28.8Vdc | DIP switch Potentiometer | 12.5 | Screw/ tens. clamp | 8432090000/ 8432130000 | 187 |
| | PT100/0 4-wire | (4)...20mA | no | 19.2...28.8Vdc | DIP switch Potentiometer | 12.5 | Screw/ tens. clamp | 8432270000/ 8432280000 | 188 |
| | PT100/ 4-wire | 0...10V | no | 19.2...28.8Vdc | DIP switch Potentiometer | 12.5 | Screw/ tens. clamp | 8432240000/ 8432250000 | 188 |
| | PT100/ 2-/3-/4-conduct. Ni100 Potentiometer: min. 0...100Ω max. 0...100kΩ R: 0...450Ω | 0...10V 0...20mA 4...20mA | yes | 18...30Vdc | DIP switch Potentiometer | 17.5 | Screw/ tens. clamp | 8560700000/ 8560710000 | 189 |
| | Thermo/DC | K, J, T, E, N, R, S, B | | | | | | | |
| | Thermo K, J, T, E, N, R, S, B | 0...10V 0...20mA 4...20mA | no | 19.2...28.8Vdc | DIP switch | 12.5 | Screw/ tens. clamp | 8432300000/ 8432310000 | 190 |
| | Thermocouples K, J, T, E, N, R, S, B | 0...10V 0...20mA 4...20mA | yes | 18...30Vdc | DIP switch Potentiometer | 17.5 | Screw/ tens. clamp | 8560720000/ 8560730000 | 191 |
| Frequency/DC | 0...50/100/500Hz 0...1/5/10/16kHz | 0(4)...20mA | no | 21.6...26.4Vdc | DIP switch | 6 | Screw | 8311870001 | 168 |
| | 0...50/100/500Hz 0...1/5/10/16kHz | 0(4)...20mA | no | 21.6...26.4Vdc | DIP switch | 6 | Screw | 8311870001 | 168 |
| | 0...50/100/500Hz 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 in input | DIP switch | 6 | Screw | 8081330000 | 167 |
| | 4...20mA | 0...1/5/10/16kHz | no | current loop supply 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, programmable | Switching output PNP | no | 19.2...28.8Vdc | Fixed | 12 | Screw | 8248340000 | 170- 171 |
| | Limit value monitoring | 0...20mA | Switching output PNP 2-channel | no | 19.2...28.8Vdc | Potentiometer | 6 | Screw | 8031320000 |
| | 0...20mA | Switching output PNP 2-channel | no | 19.2...28.8Vdc | Potentiometer | 6 | Tens. clamp | 8227350000 | 173 |
| | 0...10V | Switching output PNP 2-channel | no | 19.2...28.8Vdc | DIP switch Potentiometer | 6 | Screw | 8019640000 | 172 |
| | 0...10V | Switching output PNP 2-channel | no | 19.2...28.8Vdc | DIP switch Potentiometer | 6 | Tens. clamp | 8260280000 | 173 |
| | AD convert. | 0...20mA | 8-bit | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1160561001 |
| | 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 |
| | | 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 |
|--|---------------------------|----------------------|--------------------|------------------|----------------|-----------------|-----------------|------------|------------|
| DA convert. | 8-bit | 0...20mA | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1165860000 | 211 |
| | 8-bit | 4...20mA | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1169260000 | 211 |
| | 8-bit | 0...10V | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1160760000 | 211 |
| | 8-bit | | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1123360000 | 211 |
| | 12-bit | 0...20mA | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1166060000 | 213 |
| | 12-bit | 4...20mA | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1165960000 | 213 |
| | 12-bit | 0...10V | no | 19.2...28.8Vdc | Fixed | 70 | Screw | 1166160000 | 213 |
| Current monitoring | 0...1/5/10 Aac | 1) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Screw | 8516560000 | 196 |
| | 0...1/5/10 Aac | 1) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8516570000 | 196 |
| | 0...20/40/60 Aac | 1) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Screw | 8513340000 | 196 |
| | 0...20/40/60 Aac | 1) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8526600000 | 196 |
| | 0...1/5/10 Aac | 2) | 2-way | 21.6...26.4Vdc | DIP switch | 22.5 | Screw | 8523400000 | 197 |
| | 0...1/5/10 Aac | 2) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8523410000 | 197 |
| | 0...1/5/10 Aac | 3) | 2-way | 12...30Vdc | DIP sw./P* | 22.5 | Screw | 8528650000 | 197 |
| | 0...1/5/10 Aac | 3) | 2-way | 12...30Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8528660000 | 197 |
| | 0...5/10 Aac | 4) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Screw | 8526610000 | 198 |
| | 0...5/10 Aac | 4) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8526620000 | 198 |
| | 0...20/25/30 Aac | 4) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Screw | 8545830000 | 198 |
| | 0...20/25/30 Aac | 4) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8545840000 | 198 |
| | 0...20/40/60 Aac | 4) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Screw | 8513330000 | 199 |
| | 0...20/40/60 Aac | 4) | 2-way | 21.6...26.4Vdc | DIP sw./P* | 22.5 | Tens. clamp | 8526590000 | 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 | 1157160000 | 200 |
| | 40...250mAdc | Opto-coupler | yes | 10...250Vdc | Op. point | 22.5 | Screw | 1156360000 | 200 |
| | 40...250mAdc | Opto-coupler | yes | 10...250Vdc | Op. point | 22.5 | Screw | 1156460000 | 201 |
| | 0.2...2.2Aac | Opto-coupler | yes | 10...250Vdc | Op. point | 22.5 | Screw | 1157360000 | 201 |
| | 1...5Aac | 21.6...26.4Vdc | yes | 10...250Vdc | Fixed | 22.5 | Screw | 1112160000 | 201 |
| | 1...5Aac | 5...48Vdc | yes | 10...250Vdc | Fixed | 22.5 | Screw | 8026930000 | 201 |
| | 1...5Aac | LED | yes | 10...250Vdc | Fixed | 22.5 | Screw | 1112060000 | 201 |
| | 40...250mAdc | NO 1-channel | yes | 10...250Vdc | Op. point | 22.5 | Screw | 1156660000 | 202 |
| | 40...250mAdc | NO 1-channel | yes | 10...250Vdc | Op. point | 22.5 | Screw | 1159960000 | 202 |
| | 0.2...2.2Aac | NO 1-channel | yes | 10...250Vdc | Op. point | 22.5 | Screw | 1156960000 | 203 |
| | 1...5Aac | NO 1-channel | yes | 10...250Vdc | Fixed | 22.5 | Screw | 1112260000 | 203 |
| | Voltage monitoring | 1-24Vdc | CO 1-channel | yes | 21.6...26.4Vdc | Op. point | 22.5 | Screw | 0555060000 |
| 1-230Vdc | | CO 1-channel | yes | 207...253Vac | Op. point | 22.5 | Screw | 0555160000 | 205 |
| 18...24Vac | | CO 1-channel | yes | 18...27Vac | Op. point | 22.5 | Screw | 1156760000 | 204 |
| 36...48Vac | | CO 1-channel | yes | 36...53Vac | Op. point | 22.5 | Screw | 1157660000 | 204 |
| 83...110Vac | | CO 1-channel | yes | 83...121Vac | Op. point | 22.5 | Screw | 1157760000 | 205 |
| 165...220Vac | | CO 1-channel | yes | 165...253Vac | Op. point | 22.5 | Screw | 1157860000 | 205 |
| 200...260Vac | | NO 1-channel | yes | 200...299Vac | Op. point | 22.5 | Screw | 1160160000 | 205 |
| 3 phase 165...230Vac | | NO 2-channel | yes | 165...230Vac | Op. point | 22.5 | Screw | 1156560000 | 205 |
| 3 phase 165...230Vac | NO/NC | yes | 165...230Vac | Op. point | 22.5 | Screw | 1178760000 | 205 | |
| Rotational-motion and r.p.m. monitoring | P / N. switching 24Vdc | CO 1-channel | no | 195.5...241.5Vac | Potentiometer | 22.5 | Screw | 1110560000 | 206 |
| Namur switch amplifier Setpoint device | Namur | NO 1-channel | no | 21.6...26.4Vdc | no | 22.5 | Screw | 1120360000 | 207 |
| | Namur | PNP/NPN | no | 21.6...26.4Vdc | no | 22.5 | Screw | 1122460000 | 207 |
| | 0...24V | 10.5...+10.5V | yes | 21.6...26.4Vdc | Potentiometer | 22.5 | Screw | 1172660000 | 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

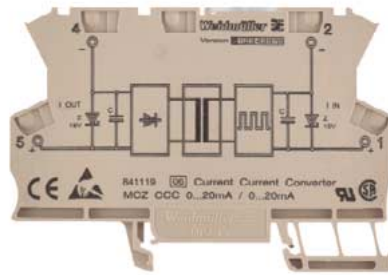
DIP switch./P* = DIP switch / Potentiometer

Passive Isolator

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

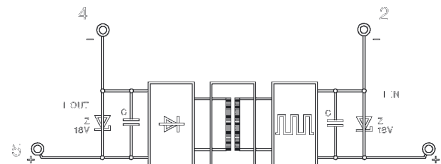
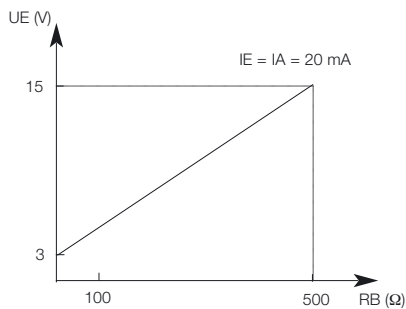


This module is a reasonably priced passive separator for galvanically separating standard 0.4...20 mA signals. It draws its power from the measurement signal and requires no further auxiliary power. The measurement signal is transmitted 1:1. The module is distinguished by its low power consumption as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



Block diagram

Working resistance diagram



Ordering data

for TS 35

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

Technical data

| Input | 0...20 mA (max. 15 V) |
|---------------------------------|--|
| Response current | <math>< 100 \mu\text{A}</math> |
| Voltage drop | 2.5...3 V (at 20 mA) |
| Max. overload capacity at input | 50 mA, 15 V |
| Output | 0...20 mA (max. 10 V) |
| Set time (T99) | approx. 5 ms at 500 Ω working resistance impedance |
| Residual ripple | <math>< 10 \text{ mV}_{\text{eff}}</math> |
| Chopper frequency | approx. 200 kHz |
| Transmission error | <math>< 0.1\%</math> from end value, + 0.05 % from mean/100 Ω working resistance |
| Temperature effect | <math>< 50 \text{ ppm/K}</math> from measurement value for working resistance 0 Ω |
| Voltage strength | |
| Input/output | 510 V_{eff} |
| EMC | |
| | EMVG |
| | EN 50081-1 |
| | EN 50082-2 |
| Approvals | CE, UL, CSA |
| Ambient temperature | |
| - assembled without spacing | -25 °C...+40 °C |
| - assembled with 20 mm spacing | -25 °C...+50 °C |
| Storage temperature | -40 °C...+85 °C |
| Conductor | AWG 22...12 |
| Conductor cross-section | 1.5 mm^2 |
| Overall width | 6 mm |
| Dimensions and accessories see | Page 305 |

RTD Thermocouple Conditioners

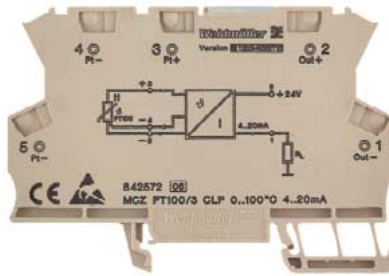
- for 2 and 3 wire sensors



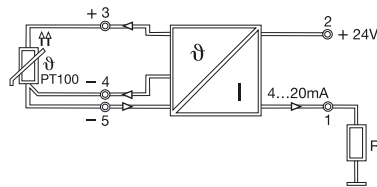
The temperature module converts measurement values from a PT 100 into analogue measurement signals. The module supplies the sensor with power. The module is distinguished by its accuracy and linearity.

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

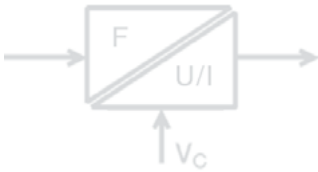
| Type | | Cat. No. |
|-----------------|---------------|-------------------|
| MCZ PT100/3 CLP | 0...100 °C | 8425720000 |
| MCZ PT100/3 CLP | 0...120 °C | 8483680000 |
| MCZ PT100/3 CLP | 0...150 °C | 8604420000 |
| MCZ PT100/3 CLP | 0...200 °C | 8473010000 |
| MCZ PT100/3 CLP | 0...300 °C | 8473020000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

Technical data

| | |
|---|--------------------------------------|
| Input | PT 100 (according to IEC 751) |
| Connection | 3-wire / 2-wire* |
| Max. wire resistance | each 50 Ω |
| Leadwire resistance effect | max. 0.006 °C/Ω |
| Supply current | 0.8 mA |
| Output | 4...20 mA** |
| 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 |
| EMC | 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 mm ² |
| 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

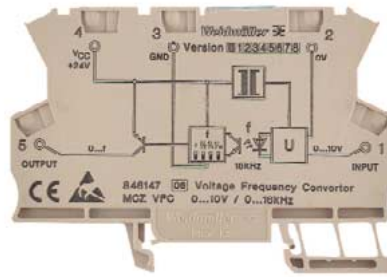
0...10 V

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

Technical data

| | |
|-----------------------------|-----------------------------|
| Input ranges | 0...10 V |
| Overload limits, input | 30 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 |
| 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
Temperature coefficient < 250 ppm/°C

Coordination of insulation according to EN 50178

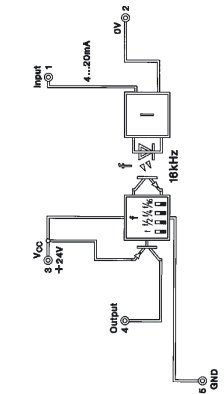
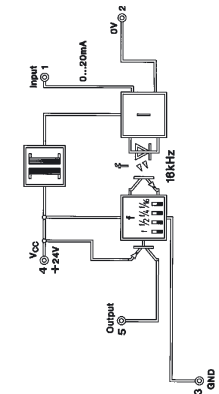
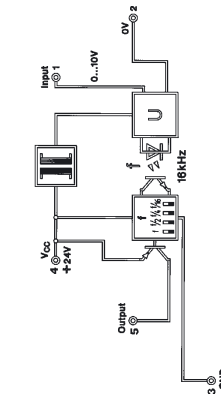
| | |
|---------------------------------------|-----------------------------|
| Voltage strength input/output | 1 kVdc |
| Rated voltage | 100 V |
| Rated surge voltage | 1.5 kV |
| Overvoltage category | III |
| Voltage strength I/O to mounting rail | 4 kV _{eff} / 1 min |
| Operating temperature | 0 °C...+50 °C |
| Storage temperature | -25 °C...+85 °C |
| Overall width | 6 mm |
| Conductor cross-section | 1.5 mm ² |

Dimensions and accessories see

Type MCZ VFC Cat. No. **8461470000**

Type MCZ CFC Cat. No. **8461480000**

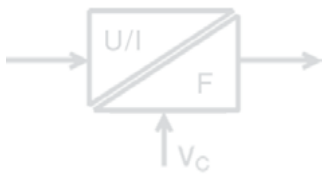
Type MCZ CFC Cat. No. **8461490000**



* without DC/DC converter input supply via current loop

Frequency Signal Conditioners

- Screw connection
- LED-Display
- Adjustable frequency output

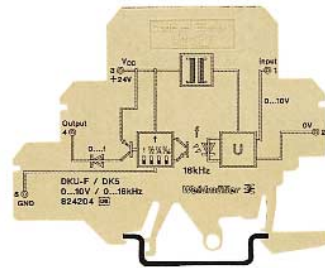


For EMC reasons, frequency processing modules must be used in conjunction with shielded cables. This measure prevents interference of analogue and frequency signals by other signal cables and vice versa.

DKA U/f

DKA I/f

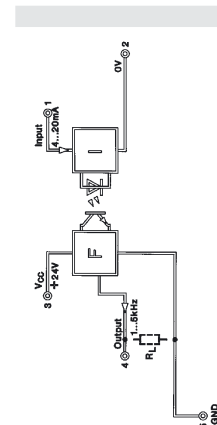
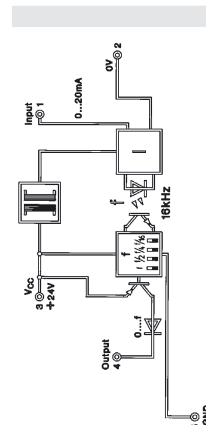
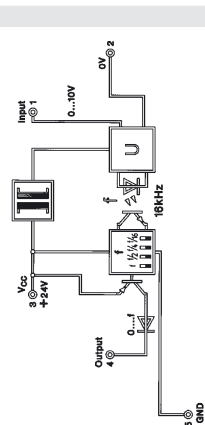
DKA I/f*



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 |



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 mm ² |

Accessories

| | | |
|--------------------------------|----------|------------|
| End plate | AP DK5 | 8268870000 |
| Dimensions and accessories see | Page 305 | |

| Type | Cat. No. |
|---------|------------|
| DKA U/f | 8242040000 |

| | |
|-----------------------------|-----------------------------|
| 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 |

| | |
|-----------------------------------|-------------------------|
| 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 mm ² |

| | |
|----------|------------|
| Type | Cat. No. |
| AP DK5 | 8268870000 |
| Page 305 | |

| Type | Cat. No. |
|---------|------------|
| DKA I/f | 8258870000 |

| | |
|-----------------------------|-----------------------------|
| Input ranges | 0...20 mA |
| Overload limits, input | 50 mA |
| Input resistance | 50 Ω |
| Voltage drop, input | 1 V at 20 mA |
| 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- 0.8 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 |

| | |
|-----------------------------------|-------------------------|
| 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 mm ² |

| | |
|----------|------------|
| Type | Cat. No. |
| AP DK5 | 8268870000 |
| Page 305 | |

| Type | Cat. No. |
|-----------|------------|
| DKA I/f * | 8081330000 |

| | |
|-----------------------------|---------------------|
| Input ranges | 4...20 mA |
| Overload limits, input | 50 mA |
| Input resistance | max. 320 Ω at 20 mA |
| Voltage drop, input | max. 6.4 V at 20 mA |
| Output | |
| Output frequency, end value | 5 kHz (1...5 kHz) |
| Frequency adjustment | |
| Readjustment range | |
| Output level | Ub- 3 V |
| Output current | max. 20 mA |
| Display | |
| Decoupling diode | present |
| Supply voltage | 19.2...28.8 Vdc |
| Power consumption | <13 mA w/o load |
| Making current limit | |
| Polarisation protection | yes |
| Accuracy | 0.15 % v. FSR |
| | <250 ppm/°C 2 |

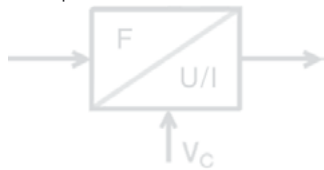
| | |
|-----------------------------------|-------------------------|
| Voltage strength input/output | 4 kVeff |
| Rated voltage | 150 V |
| Rated surge voltage | 2.5 kV |
| Overvoltage category | III |
| Voltage strength to mounting rail | 4 kVeff |
| Operating temperature | 0 °C...+50 °C |
| Storage temperature | -25 °C...+60 °C |
| Overall width | 6 mm |
| Conductor cross-section | 0.5...4 mm ² |

| | |
|----------|------------|
| Type | Cat. No. |
| AP DK5 | 8268870000 |
| Page 305 | |

* without DC/DC converter
Input current loop supplied

Frequency Signal Conditioners

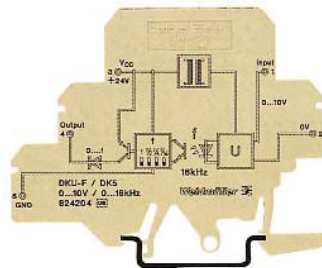
- Screw connection
- LED-Display
- Adjustable frequency output
- multiplex capable



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.

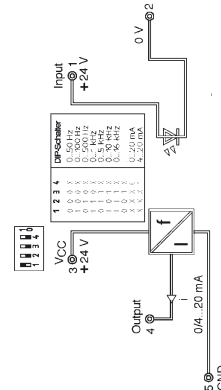
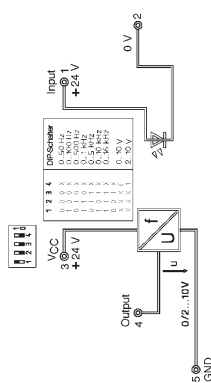
DKA f/U

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 _{Load} |
| 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 _{eff} |
| Operating temperature | 0 °C...+50 °C |
| Storage temperature | -25 °C...+60 °C |
| Overall width | 6 mm |
| Conductor cross-section | 0.5...4 mm ² |

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_{Load}

yes

0.5 % (8-bit resolution)

2.5 kV

4 kV_{eff}

0 °C...+50 °C

-25 °C...+60 °C

6 mm

0.5...4 mm²

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_{Load}

yes

0.5 % (8-bit resolution)

2.5 kV

4 kV_{eff}

0 °C...+50 °C

-25 °C...+60 °C

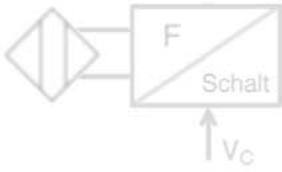
6 mm

0.5...4 mm²

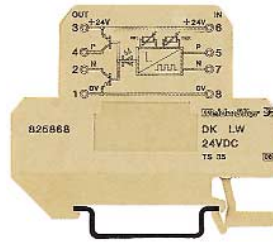
Page 305

Monitoring Revolutions

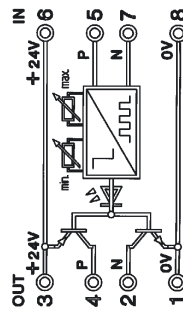
DK LW



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.



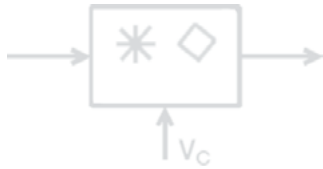
Block diagram/settings



| Ordering data | Type | Cat. No. |
|-----------------------------------|---|------------|
| for TS 32 | | Y |
| for TS 35 | | W |
| 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 _{eff} | |
| Operating temperature | 0...+50 °C | |
| Storage temperature | -40...+60 °C | |
| Overall width | 12 mm | |
| Conductor cross-section | 0.5...4 mm ² | |
| Insulation stripping length | 7 mm | |
| Others | Initiator power supply via module possible | |
| Accessories | | |
| End plate | AP DKT4 | 0687560000 |
| Dimensions and accessories see | Page 278 | |

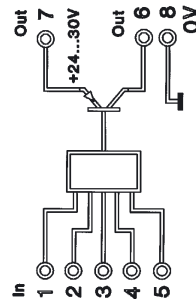
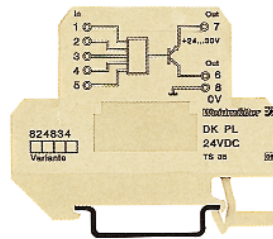
Preprocessing Logic

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



Block diagram

DK PL



Ordering data

| | |
|-----------|---|
| for TS 32 | Y |
| for TS 35 | W |

| Type | Cat. No. |
|------------|-------------------|
| on request | |
| DK PL | 824834000* |

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 | U _b - 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 _{eff} |
| Operating temperature | 0 °C...+50 °C |
| Storage temperature | -40 °C...+60 °C |
| Overall width | 12 mm |
| Conductor cross-section | 0.5...4 mm ² |
| Insulation stripping length | 7 mm |

Accessories

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

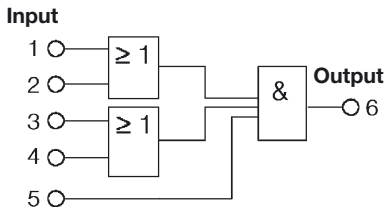
* (not programmed - function next page)

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.

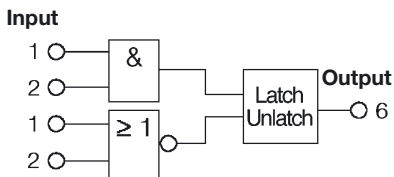
824834 0001 DKPL
A = (E1 OR E2) AND (E3 OR E4) AND E5

| State | 5 | 4 | 3 | 2 | 1 | Output |
|-------|---|---|---|---|---|--------|
| 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

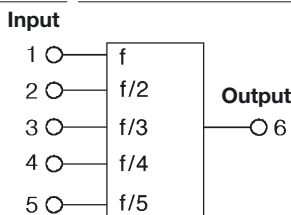
| Input | Output |
|-------------------------------|---------------------------|
| 2 1 | 6 |
| 0 0 | 0 (is stored) |
| 0 1 | No change of stored state |
| 1 0 | No change of stored state |
| 1 1 | 1 (is stored) |
| Inputs 3, 4 and 5 no function | No change of stored state |



824834 0003 DKPL - Frequency divider
Inputs 1 - 5 determine the divider factor
Input 1 = divider factor 1: $F_{OUT} = F_{IN} \cdot 1$
Input 2 = divider factor 2: $F_{OUT} = F_{IN} \cdot 2$
Input 5 = divider factor 5: $F_{OUT} = F_{IN} \cdot 5$; $F_{IN} \text{ max.} = 12 \text{ kHz}$

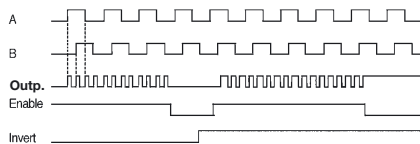
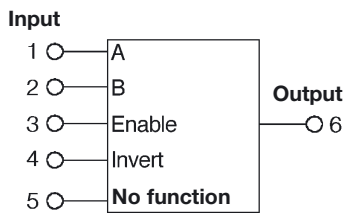
| Input | Output |
|-------|------------------------|
| 1 | $f_{out} = f_{in}$ |
| 2 | $f_{out} = f_{in} / 2$ |
| 3 | $f_{out} = f_{in} / 3$ |
| 4 | $f_{out} = f_{in} / 4$ |
| 5 | $f_{out} = f_{in} / 5$ |

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



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.: $F_{out} = 4 \times F_{in}$)
 $F_{in} \text{ max.} = 1 \text{ kHz}$

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



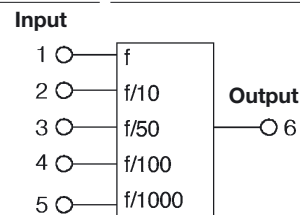
824834 0005 DKPL
Length of input signal between 80 and 100 ms.
Length of output signal 100 ms, only 2 pulses,
Relation pulse-interruption 1:1.
The positive slope of the input signal has to be analysed. Only input E1 is used.

| Connect. 2 Logic | Factor | Inp. frequency | Outp. frequency |
|------------------|--------|----------------|-----------------|
| 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: $F_{OUT} = F_{IN} \cdot 10$

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

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



824834 0007 DKPL

| Input | Output |
|-----------|---------------------|
| 1 2 3 4 5 | Out |
| L L X X X | No function |
| H L X X X | $f = 1 \text{ Hz}$ |
| L H X X X | $f = 10 \text{ Hz}$ |
| H H X X X | $f = 1 \text{ Hz}$ |

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 | 6 |
| 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 S-Input | Logic | Connection 6 Output |
|--------------------|----------------------|-------------|---------------------|
| 0 V or open | L | 0 V or open | L |
| +24 Vdc | H | 0 V or open | L |
| 0 V or open | L | +24 Vdc | H |
| +24 Vdc | H | +24 Vdc | H |

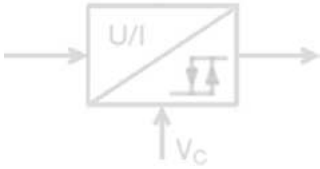
824834 0501 DKPL
The module allows the input frequency at connection 1 (0...max. 50 kHz) to be divided with 2 fixed divider factors. Depending on connection 2, the output frequency is transmitted from output connection 6.
Connections 3, 4 and 5 have no function.

| Connect. 2 Logic | Factor | Inp. frequency | Outp. frequency |
|------------------|--------|----------------|-----------------|
| 0 V or open | L | 75 | 0...30 kHz |
| 24 Vdc | H | 27 | 0...10,8 kHz |

Threshold Monitoring

Current sensor

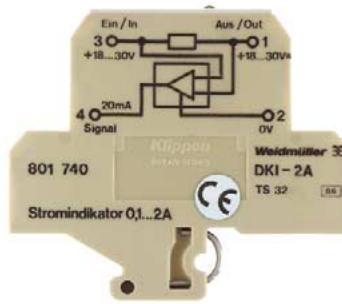
- Screw connection
- Mounts onto on mounting rail
- Wide spectrum of functions
- In part, individually adjustable



DKSC 0-10 V

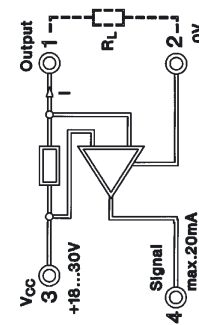
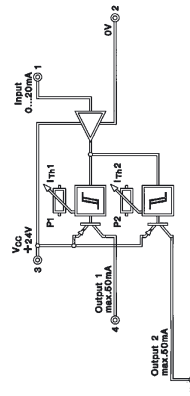
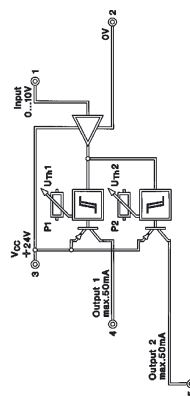
DKSC 0-20 mA

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 | 1 V |
| 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 | each 1 % |
| Output | double switch output |
| Output level | per PNP, Ub- 1.2 V |
| Output current | 50 mA |
| Function | lin <Uth1: output 1 active 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 ² |

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**

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.

AP DK5 **8268870000**

Page 278

Type Cat. No.

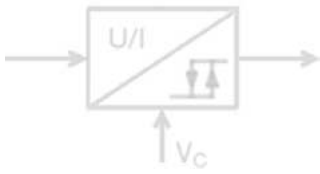
AP DKT4 **0687560000**

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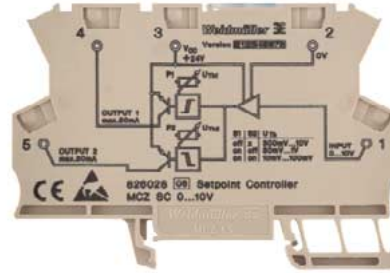
Threshold Monitoring

MCZ SC 0...10 Vdc

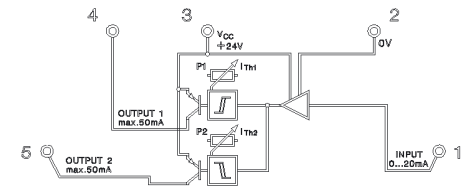
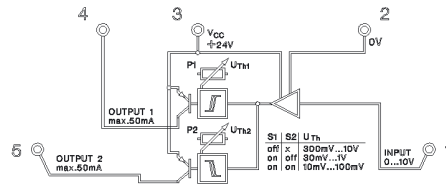
MCZ SC 0...20 mA



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



Block diagram



| 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_{th} | | S1 S2 Temperature coefficient T_k | | Temperature coefficient T_k 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 $U_{input} < U_{th1}$ (set via P1) | | active High for $I_{input} < I_{th1}$ (set via P1) | |
| Function of output 2 | active High for $U_{input} > U_{th2}$ (set via P2) | | active High for $I_{input} > I_{th2}$ (set via P2) | |
| Response time | < 250 μs (switch threshold at 90% of the max. input signal; $R_L \leq 1$ kΩ) | | < 250 μs (switch threshold at 90% of the max. input signal; $R_L \leq 1$ kΩ) | |
| Output | | | | |
| Output current per output | 2 channel switching PNP max. 50 mA | | 2 channel switching PNP 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 ² | | 1.5 mm ² | |
| 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:

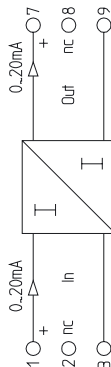


Block diagram



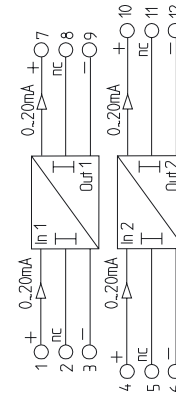
CCC LP (1 channel)

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 | 8444950000 |
| WAZ5 CCC LP | 8444960000 |
| | |
| | |
| 0(4) ... 20 mA / 0(4) ... 20 mA | |

| Type | Cat. No. |
|---------------------------------|-------------------|
| WAS5 CCC LP | 8463580000 |
| WAZ5 CCC LP | 8463590000 |
| | |
| | |
| 0(4) ... 20 mA / 0(4) ... 20 mA | |

Technical data* (per channel)

| Input signal | |
|--------------------------------------|--|
| Input voltage max. | 18 V |
| Input current max | 50 mA |
| Operating current | < 100 μ A |
| Voltage drop | 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 | 0 ... 20 mA (4 ... 20 mA) $\leq 500 \Omega$ |
| Accuracy at $T_U = 23^\circ\text{C}$ | < 0.1% of FS |
| Influence of load resistance | < 0.1% from measurement value per 100 Ω load resistance |
| Temperature coefficient | 50 ppm / K of FS |
| Set time | 4.5 ms at 500 Ω working resistance |
| Residual ripple | < 20 mV _{eff} |
| Chopper frequency | approx. 170 kHz |

| | |
|--|--|
| 0 ... 20 mA (4 ... 20 mA) | |
| 18 V | |
| 50 mA | |
| < 100 μ 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 Ω load resistance | |
| 50 ppm / K of FS | |
| 4.5 ms at 500 Ω working resistance | |
| < 20 mV _{eff} | |
| approx. 170 kHz | |

| | |
|--|--|
| 0 ... 20 mA (4 ... 20 mA) | |
| 18 V | |
| 50 mA | |
| < 100 μ 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 Ω load resistance | |
| 50 ppm / K of FS | |
| 4.5 ms at 500 Ω working resistance | |
| < 20 mV _{eff} | |
| approx. 170 kHz | |

General

| | |
|-------------------------|---|
| Operating temperature | -25 $^\circ\text{C}$... +70 $^\circ\text{C}$ |
| Storage temperature | -40 $^\circ\text{C}$... +80 $^\circ\text{C}$ |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, UL, CSA, GL |

| | |
|---|--|
| -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 | |

| | |
|---|--|
| -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 | 300 V |
| Rated surge voltage | 6 kV |
| Overtoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 5.5 mm |
| Isolation voltage, voltage strength | |
| Input/output, channel / channel | 4 kV _{eff} / 1 s |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 (safe separation) |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|---------------------------------|--|
| 300 V | |
| 6 kV | |
| III | |
| 2 | |
| ≥ 5.5 mm | |
| | |
| 4 kV _{eff} / 1 s | |
| 4 kV _{eff} / 1 min | |
| EN 50178 (safe separation) | |
| EN 50081, EN 50082, EN 55011 | |
| Page 298 + 308 | |

| | |
|---------------------------------|--|
| 300 V | |
| 6 kV | |
| III | |
| 2 | |
| ≥ 5.5 mm | |
| | |
| 4 kV _{eff} / 1 s | |
| 4 kV _{eff} / 1 min | |
| EN 50178 (safe separation) | |
| EN 50081, EN 50082, EN 55011 | |
| Page 298 + 308 | |

DC/DC-Signal Conditioners

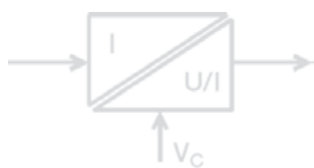
WAVEANALOG DC/DC

- 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



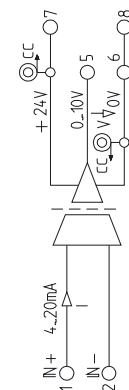
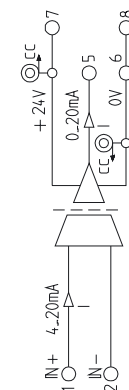
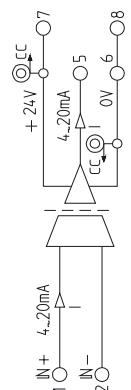
CCC DC

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 | 8444980000 |
| WAZ4 CCC DC | 8444990000 |

| Type | Cat. No. |
|-------------|-------------------|
| WAS4 CCC DC | 8445010000 |
| WAZ4 CCC DC | 8445020000 |

| Type | Cat. No. |
|-------------|-------------------|
| WAS4 CVC DC | 8445040000 |
| WAZ4 CVC DC | 8445050000 |

Technical data*

Input signal

Input voltage max.

Input current max.

Output signal

Load resistance

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

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 $\pm 20\%$

(19.2 ... 28.8 Vdc)

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

$\leq 2\ \text{A}$

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

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

92.4 / 112.5 / 12.5

CE, UL, CSA

24 Vdc $\pm 20\%$

(19.2 ... 28.8 Vdc)

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

$\leq 2\ \text{A}$

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

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

92.4 / 112.5 / 12.5

CE, UL, CSA

24 Vdc $\pm 20\%$

(19.2 ... 28.8 Vdc)

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

$\leq 2\ \text{A}$

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

-20 $^\circ\text{C}$... +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_{eff} / 1 min

300 V

4 kV

III

2

$\geq 3\ \text{mm}$

4 kV_{eff} / 1 min

300 V

4 kV

III

2

$\geq 3\ \text{mm}$

4 kV_{eff} / 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

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

Page 298 + 308

Page 298 + 308

Page 298 + 308

DC/DC-Signal Conditioners

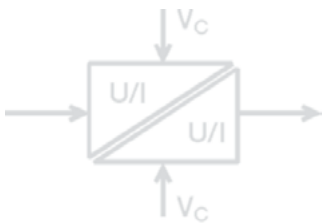
WAVEANALOG DC/DC

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

Approvals:



Block diagram



CCC DC

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



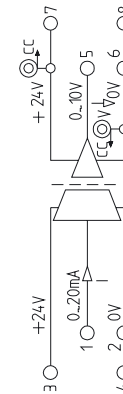
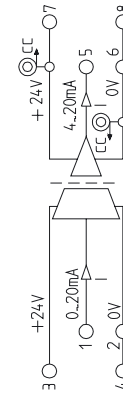
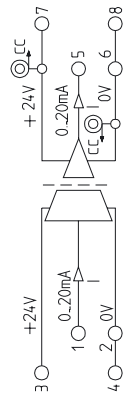
CCC DC

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



CVC DC

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



Ordering data

| | | |
|--------------------------|-------------|-------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WAS4 CCC DC | 8445070000 |
| Input/output | WAZ4 CCC DC | 8445080000 |

| | |
|-------------|-------------------|
| Type | Cat. No. |
| WAS4 CCC DC | 8445070000 |
| WAZ4 CCC DC | 8445080000 |

| | |
|-------------|-------------------|
| Type | Cat. No. |
| WAS4 CCC DC | 8446970000 |
| WAZ4 CCC DC | 8446990000 |

| | |
|-------------|-------------------|
| Type | Cat. No. |
| WAS4 CVC DC | 8447020000 |
| WAZ4 CVC DC | 8447030000 |

Technical data*

| | |
|---------------------------|----------------------|
| Input signal | 0 ... 20 mA |
| Input current max | 25 mA |
| Input resistance | 50 Ω |
| Output signal | 0 ... 20 mA |
| Load resistance | ≤ 500 Ω |
| Accuracy at Tu=23 °C | ± 0.2% of FS |
| Temperature coefficient | ≤ 250 ppm / K of FS |
| Response time | ≤ 30 ms (typ. 16 ms) |
| Cut-off frequency (-3 dB) | ≥ 15 Hz (typ. 25 Hz) |

| |
|----------------------|
| 0 ... 20 mA |
| 25 mA |
| 50 Ω |
| 4 ... 20 mA |
| ≤ 500 Ω |
| ± 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 30 ms (typ. 16 ms) |
| ≥ 15 Hz (typ. 25 Hz) |

| |
|----------------------|
| 0 ... 20 mA |
| 25 mA |
| 50 Ω |
| 4 ... 20 mA |
| ≤ 500 Ω |
| ± 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 30 ms (typ. 16 ms) |
| ≥ 15 Hz (typ. 25 Hz) |

| |
|----------------------|
| 0 ... 20 mA |
| 25 mA |
| 50 Ω |
| 0 ... 10 V |
| ≥ 1 kΩ |
| ± 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 30 ms (typ. 16 ms) |
| ≥ 15 Hz (typ. 25 Hz) |

General

| | |
|---|-------------------------------------|
| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Power consumption input | < 11 mA at I _{in} = 20 mA |
| Power consumption output | < 32 mA at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C (mounted) |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA |

| |
|-------------------------------------|
| 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| < 11 mA at I _{in} = 20 mA |
| < 32 mA at I _{out} = 20 mA |
| ≤ 2 A |
| 0 °C ... +55 °C (mounted) |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 12.5 |
| CE, UL, CSA |

| |
|-------------------------------------|
| 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| < 11 mA at I _{in} = 20 mA |
| < 32 mA at I _{out} = 20 mA |
| ≤ 2 A |
| 0 °C ... +55 °C (mounted) |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 12.5 |
| CE, UL, CSA |

| |
|------------------------------------|
| 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| < 11 mA at I _{in} = 20 mA |
| < 20 mA at I _{out} = 10 V |
| ≤ 2 A |
| 0 °C ... +55 °C (mounted) |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 12.5 |
| CE, UL, CSA |

Coordination of insulation according to EN 50178, 04/98

| | |
|-------------------------------------|------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Isolation voltage, voltage strength | ≥ 3 mm |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| ≥ 3 mm |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| ≥ 3 mm |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| ≥ 3 mm |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

*T_U = 23 °C single module

DC/DC Signal Conditioners

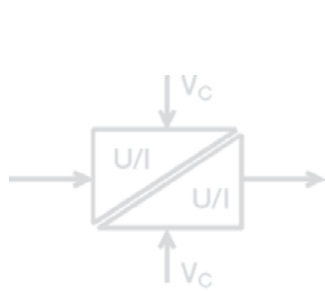
WAVEANALOG DC/DC

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

Approvals:

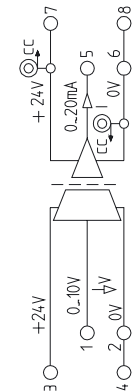


Block diagram



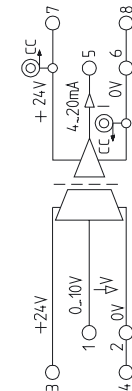
VCC DC

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



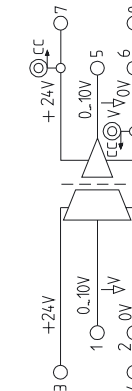
VCC DC

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



VCC DC

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



Ordering data

| | | |
|--------------------------|--------------------------|-------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WAS4 VCC DC | 8447050000 |
| Input/output | WAZ4 VCC DC | 8447080000 |
| | 0 ... 10 V / 0 ... 20 mA | |

Technical data*

| | |
|---------------------------|----------------------|
| Input signal | 0 ... 10 V |
| Input voltage max. | 15 V |
| Input resistance | 500 kΩ |
| Output signal | 0 ... 20 mA |
| Load resistance | ≤ 500 Ω |
| Accuracy at Tu=23°C | ± 0.2% of FS |
| Temperature coefficient | ≤ 250 ppm / K of FS |
| Response time | ≤ 30 ms (typ. 25 ms) |
| Cut-off frequency (-3 dB) | ≥ 13 Hz (typ. 17 Hz) |

General

| | |
|---|-------------------------------------|
| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Power consumption input | < 11 mA at U _{in} = 10 V |
| Power consumption output | < 32 mA at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C (mounted) |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA |

Coordination of insulation according to EN 50178, 04/98

| | |
|-------------------------------------|------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Isolation voltage, voltage strength | |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

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

| | | | | | | | | |
|------------|------|--------|-------------|---------|--------------|---------------------|----------------------|----------------------|
| 0 ... 10 V | 15 V | 500 kΩ | 0 ... 20 mA | ≤ 500 Ω | ± 0.2% of FS | ≤ 250 ppm / K of FS | ≤ 30 ms (typ. 25 ms) | ≥ 13 Hz (typ. 17 Hz) |
|------------|------|--------|-------------|---------|--------------|---------------------|----------------------|----------------------|

| | | | | | | | |
|------------------------------------|-----------------------------------|-------------------------------------|-------|---------------------------|-------------------|---------------------|-------------|
| 24 Vdc ±20% (19.2 ... 28.8 Vdc) | < 11 mA at U _{in} = 10 V | < 32 mA at I _{out} = 20 mA | ≤ 2 A | 0 °C ... +55 °C (mounted) | -20 °C ... +85 °C | 92.4 / 112.5 / 12.5 | CE, UL, CSA |
|------------------------------------|-----------------------------------|-------------------------------------|-------|---------------------------|-------------------|---------------------|-------------|

| | | | | | | | | |
|-------|------|-----|---|--------|-----------------------------|----------|------------------------------|----------------|
| 300 V | 4 kV | III | 2 | ≥ 3 mm | 4 kV _{eff} / 1 min | EN 50178 | EN 50081, EN 50082, EN 55011 | Page 298 + 308 |
|-------|------|-----|---|--------|-----------------------------|----------|------------------------------|----------------|

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

| | | | | | | | | |
|------------|------|--------|-------------|---------|--------------|---------------------|----------------------|----------------------|
| 0 ... 10 V | 15 V | 500 kΩ | 4 ... 20 mA | ≤ 500 Ω | ± 0.2% of FS | ≤ 250 ppm / K of FS | ≤ 30 ms (typ. 25 ms) | ≥ 13 Hz (typ. 17 Hz) |
|------------|------|--------|-------------|---------|--------------|---------------------|----------------------|----------------------|

| | | | | | | | |
|------------------------------------|-----------------------------------|-------------------------------------|-------|---------------------------|-------------------|---------------------|-------------|
| 24 Vdc ±20% (19.2 ... 28.8 Vdc) | < 11 mA at U _{in} = 10 V | < 32 mA at I _{out} = 20 mA | ≤ 2 A | 0 °C ... +55 °C (mounted) | -20 °C ... +85 °C | 92.4 / 112.5 / 12.5 | CE, UL, CSA |
|------------------------------------|-----------------------------------|-------------------------------------|-------|---------------------------|-------------------|---------------------|-------------|

| | | | | | | | | |
|-------|------|-----|---|--------|-----------------------------|----------|------------------------------|----------------|
| 300 V | 4 kV | III | 2 | ≥ 3 mm | 4 kV _{eff} / 1 min | EN 50178 | EN 50081, EN 50082, EN 55011 | Page 298 + 308 |
|-------|------|-----|---|--------|-----------------------------|----------|------------------------------|----------------|

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

| | | | | | | | | |
|------------|------|--------|------------|--------|--------------|---------------------|----------------------|----------------------|
| 0 ... 10 V | 15 V | 500 kΩ | 0 ... 10 V | ≥ 1 kΩ | ± 0.2% of FS | ≤ 250 ppm / K of FS | ≤ 30 ms (typ. 25 ms) | ≥ 13 Hz (typ. 17 Hz) |
|------------|------|--------|------------|--------|--------------|---------------------|----------------------|----------------------|

| | | | | | | | |
|------------------------------------|-----------------------------------|-------------------------------------|-------|---------------------------|-------------------|---------------------|-------------|
| 24 Vdc ±20% (19.2 ... 28.8 Vdc) | < 11 mA at U _{in} = 10 V | < 20 mA at I _{out} = 10 mA | ≤ 2 A | 0 °C ... +55 °C (mounted) | -20 °C ... +85 °C | 92.4 / 112.5 / 12.5 | CE, UL, CSA |
|------------------------------------|-----------------------------------|-------------------------------------|-------|---------------------------|-------------------|---------------------|-------------|

| | | | | | | | | |
|-------|------|-----|---|--------|-----------------------------|----------|------------------------------|----------------|
| 300 V | 4 kV | III | 2 | ≥ 3 mm | 4 kV _{eff} / 1 min | EN 50178 | EN 50081, EN 50082, EN 55011 | Page 298 + 308 |
|-------|------|-----|---|--------|-----------------------------|----------|------------------------------|----------------|

*T_U = 23 °C single module

DC/DC Signal Conditioners

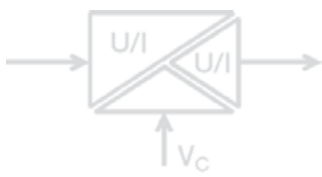
WAVEANALOG DC/DC

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

Approvals:



Block diagram



CCC

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



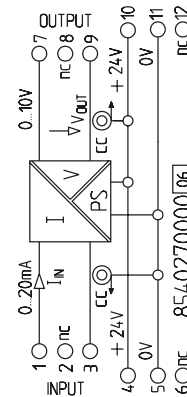
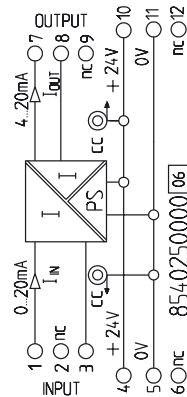
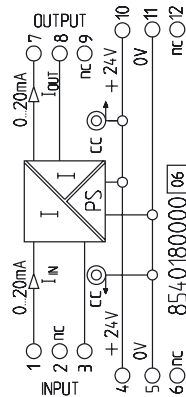
CCC

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* |
| Input/output | 0 ... 20 mA / 0 ... 20 mA |

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

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

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

| | |
|---------------------------|---------------|
| Input signal | 0 ... 20 mA |
| Input current max | 25 mA |
| Input resistance | ≤ 110 Ω |
| Output signal | 4 ... 20 mA |
| Load resistance | ≤ 600 Ω |
| Accuracy at Tu=23 °C | 0.2% |
| Temperature coefficient | ± 250 ppm / K |
| Response time | ≤ 45 ms |
| Cut-off frequency (-3 dB) | 10 Hz |

| | |
|---------------------------|---------------|
| Input signal | 0 ... 20 mA |
| Input current max | 25 mA |
| Input resistance | ≤ 110 Ω |
| Output signal | 0 ... 10 V |
| Load resistance | ≥ 1 kΩ |
| Accuracy at Tu=23 °C | 0.2% |
| Temperature coefficient | ± 250 ppm / K |
| Response time | ≤ 45 ms |
| Cut-off frequency (-3 dB) | 10 Hz |

| | |
|---------------------------|---------------|
| Input signal | 0 ... 20 mA |
| Input current max | 25 mA |
| Input resistance | ≤ 110 Ω |
| Output signal | 0 ... 10 V |
| Load resistance | ≥ 1 kΩ |
| Accuracy at Tu=23 °C | 0.2% |
| Temperature coefficient | ± 250 ppm / K |
| Response time | ≤ 45 ms |
| Cut-off frequency (-3 dB) | 10 Hz |

| General | |
|---|--|
| Voltage supply | 24 Vdc ±25% (18 Vdc ... 24 Vdc ... 30 Vdc) |
| Power consumption | < 1.5 W at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C when mounted horizontally |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, cUL |

| | |
|---|--|
| Voltage supply | 24 Vdc ±25% (18 Vdc ... 24 Vdc ... 30 Vdc) |
| Power consumption | < 1.5 W at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C when mounted horizontally |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, cUL |

| | |
|---|--|
| Voltage supply | 24 Vdc ±25% (18 Vdc ... 24 Vdc ... 30 Vdc) |
| Power consumption | < 1.3 W at I _{out} = 5 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C when mounted horizontally |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, cUL |

| | |
|---|--|
| Voltage supply | 24 Vdc ±25% (18 Vdc ... 24 Vdc ... 30 Vdc) |
| Power consumption | < 1.3 W at I _{out} = 5 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C when mounted horizontally |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, cUL |

| Coordination of insulation according to EN 50178, 04/98 | |
|---|---------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | 1 nF |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | 4 kV _{eff} / 1 min |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|-------------------------------------|---------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | 1 nF |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | 4 kV _{eff} / 1 min |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|-------------------------------------|---------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | 1 nF |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | 4 kV _{eff} / 1 min |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|-------------------------------------|---------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | 1 nF |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | 4 kV _{eff} / 1 min |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

** Tu = 23 °C single module

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

DC/DC Signal Conditioners

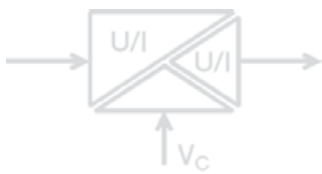
WAVEANALOG DC/DC

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

Approvals:

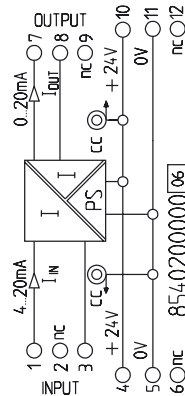


Block diagram



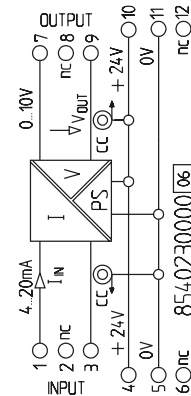
CCC

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



CVC

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



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

| Technical data |
|--|
| Input signal |
| Input signal 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) |

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

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

| |
|--------------------------------|
| Dimensions and accessories see |
|--------------------------------|

| Type | Cat. No. |
|----------|------------|
| WAS5 CCC | 8540200000 |
| WAZ5 CCC | 8540210000 |

| |
|----------------------------------|
| 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 |

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

| |
|---------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| $\geq 3\ \text{mm}$ |
| 1 nF |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |

| |
|----------------|
| Page 298 + 308 |
|----------------|

| Type | Cat. No. |
|----------|------------|
| WAS5 CVC | 8540230000 |
| WAZ5 CVC | 8540240000 |

| |
|----------------------------------|
| 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 |

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

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

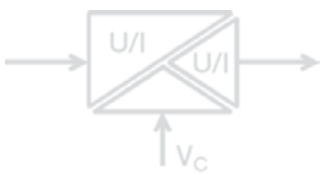
WAVEANALOG DC/DC

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

Approvals:



Block diagram



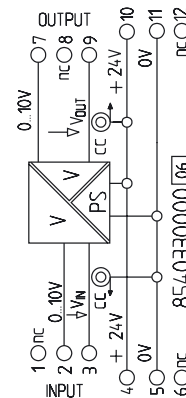
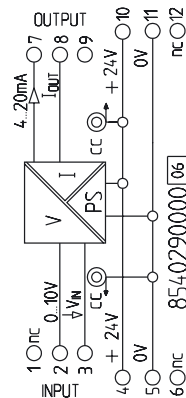
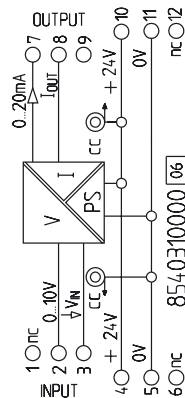
VCC
0 ... 10 V / 0 ... 20 mA



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



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



Ordering data

| | | |
|--------------------------|--------------------------|------------|
| Screw connection | WAS5 VCC | 8540310000 |
| Tension clamp connection | WAZ5 VCC | 8540320000 |
| Input/output | 0 ... 10 V / 0 ... 20 mA | |

| | |
|--------------|--------------------------|
| Type | Cat. No. |
| WAS5 VCC | 8540310000 |
| WAZ5 VCC | 8540320000 |
| Input/output | 0 ... 10 V / 0 ... 20 mA |

| | |
|--------------|--------------------------|
| Type | Cat. No. |
| WAS5 VCC | 8540290000 |
| WAZ5 VCC | 8540300000 |
| Input/output | 0 ... 10 V / 4 ... 20 mA |

| | |
|--------------|-------------------------|
| Type | Cat. No. |
| WAS5 VVC | 8540330000 |
| WAZ5 VVC | 8540340000 |
| Input/output | 0 ... 10 V / 0 ... 10 V |

Technical data*

| | |
|---------------------------|---------------|
| Input signal | 0 ... 10 V |
| Input voltage max. | 15 V |
| Input resistance | typ. 100 kΩ |
| Output signal | 0 ... 20 mA |
| Load resistance | ≤ 600 Ω |
| Accuracy at Tu=23 °C | 0.2% |
| Temperature coefficient | ± 250 ppm / K |
| Response time | ≤ 45 ms |
| Cut-off frequency (-3 dB) | 10 Hz |

| | | | | | | | | |
|------------|------|-------------|-------------|---------|------|---------------|---------|-------|
| 0 ... 10 V | 15 V | typ. 100 kΩ | 0 ... 20 mA | ≤ 600 Ω | 0.2% | ± 250 ppm / K | ≤ 45 ms | 10 Hz |
|------------|------|-------------|-------------|---------|------|---------------|---------|-------|

| | | | | | | | | |
|------------|------|-------------|-------------|---------|------|---------------|---------|-------|
| 0 ... 10 V | 15 V | typ. 100 kΩ | 4 ... 20 mA | ≤ 600 Ω | 0.2% | ± 250 ppm / K | ≤ 45 ms | 10 Hz |
|------------|------|-------------|-------------|---------|------|---------------|---------|-------|

| | | | | | | | | |
|------------|------|-------------|------------|--------|------|---------------|---------|-------|
| 0 ... 10 V | 15 V | typ. 100 kΩ | 0 ... 10 V | ≥ 1 kΩ | 0.2% | ± 250 ppm / K | ≤ 45 ms | 10 Hz |
|------------|------|-------------|------------|--------|------|---------------|---------|-------|

General

| | |
|---|--|
| Voltage supply | 24 Vdc ±25% (18 Vdc ... 24 Vdc ... 30 Vdc) |
| Power consumption | < 1.5 W at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C when mounted horizontally |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, cUL |

| | | | | | | |
|--|-------------------------------------|-------|--|-------------------|---------------------|---------|
| 24 Vdc ±25% (18 Vdc ... 24 Vdc ... 30 Vdc) | < 1.5 W at I _{out} = 20 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 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 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 | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | 1 nF |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | 4 kV _{eff} / 1 min |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |

| | | | | | | | | | | |
|-------|------|-----|---|--------|------|------|-----------------------------|-----------------------------|----------|---------------------------------|
| 300 V | 4 kV | III | 2 | ≥ 3 mm | 1 nF | 1 nF | 4 kV _{eff} / 1 min | 4 kV _{eff} / 1 min | EN 50178 | EN 50081, EN 50082, EN 55011 |
|-------|------|-----|---|--------|------|------|-----------------------------|-----------------------------|----------|---------------------------------|

| | | | | | | | | | | |
|-------|------|-----|---|--------|------|------|-----------------------------|-----------------------------|----------|---------------------------------|
| 300 V | 4 kV | III | 2 | ≥ 3 mm | 1 nF | 1 nF | 4 kV _{eff} / 1 min | 4 kV _{eff} / 1 min | EN 50178 | EN 50081, EN 50082, EN 55011 |
|-------|------|-----|---|--------|------|------|-----------------------------|-----------------------------|----------|---------------------------------|

| | | | | | | | | | | |
|-------|------|-----|---|--------|------|------|-----------------------------|-----------------------------|----------|---------------------------------|
| 300 V | 4 kV | III | 2 | ≥ 3 mm | 1 nF | 1 nF | 4 kV _{eff} / 1 min | 4 kV _{eff} / 1 min | EN 50178 | EN 50081, EN 50082, EN 55011 |
|-------|------|-----|---|--------|------|------|-----------------------------|-----------------------------|----------|---------------------------------|

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

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| Page 298 + 308 |
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| Page 298 + 308 |
|----------------|

*T_U = 23 °C single module

DC/DC Signal Conditioners

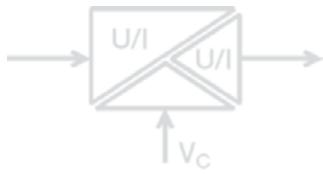
WAVEANALOG DC/DC 20 kHz

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

Approvals:



Block diagram



CCC HF

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



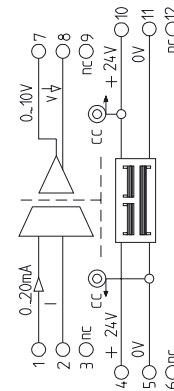
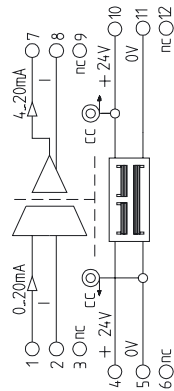
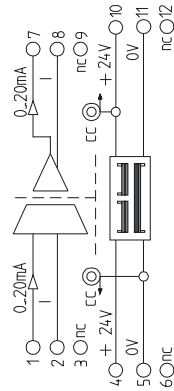
CCC HF

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



CVC HF

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



Ordering data

| | | |
|--------------------------|---------------------------|--------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WAS5 CCC HF | 8447160000* |
| Input/output | WAZ5 CCC HF | 8447170000* |
| | 0 ... 20 mA / 0 ... 20 mA | |

Technical data**

| | |
|---------------------------|------------------------|
| Input signal | 0 ... 20 mA |
| Input current max | 50 mA |
| Input resistance | 50 Ω |
| Output signal | 0 ... 20 mA |
| Load resistance | ≤ 500 Ω |
| Accuracy at Tu=23 °C | < 0.2% of FS |
| Temperature coefficient | ≤ 250 ppm / K of FS |
| Response time | ≤ 40 μs (typ. 30 μs) |
| Cut-off frequency (-3 dB) | ≥ 15 kHz (typ. 20 kHz) |

General

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

Coordination of insulation according to EN 50178, 04/98

| | |
|-------------------------------------|-----------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overtoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |

Standards/specifications

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

Dimensions and accessories see

| | |
|---------------------------|--------------------|
| 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 | |

| | |
|------------------------|------------------------|
| 0 ... 20 mA | 0 ... 20 mA |
| 50 mA | 50 mA |
| 50 Ω | 50 Ω |
| 4 ... 20 mA | 4 ... 20 mA |
| ≤ 500 Ω | ≤ 500 Ω |
| < 0.2% of FS | < 0.2% of FS |
| ≤ 250 ppm / K of FS | ≤ 250 ppm / K of FS |
| ≤ 40 μs (typ. 30 μs) | ≤ 40 μs (typ. 30 μs) |
| ≥ 15 kHz (typ. 20 kHz) | ≥ 15 kHz (typ. 20 kHz) |

| | |
|------------------------|------------------------|
| 0 ... 20 mA | 0 ... 20 mA |
| 50 mA | 50 mA |
| 50 Ω | 50 Ω |
| 0 ... 10 V | 0 ... 10 V |
| ≥ 2 kΩ | ≥ 2 kΩ |
| < 0.2% of FS | < 0.2% of FS |
| ≤ 250 ppm / K of FS | ≤ 250 ppm / K of FS |
| ≤ 40 μs (typ. 30 μs) | ≤ 40 μs (typ. 30 μs) |
| ≥ 15 kHz (typ. 20 kHz) | ≥ 15 kHz (typ. 20 kHz) |

| | |
|-------------------------------------|-------------------------------------|
| 24 Vdc ±25% (18 ... 30 Vdc) | 24 Vdc ±25% (18 ... 30 Vdc) |
| < 1.5 W at I _{out} = 20 mA | < 1.5 W at I _{out} = 20 mA |
| ≤ 2 A | ≤ 2 A |
| 0 °C ... +55 °C | 0 °C ... +55 °C |
| -20 °C ... +85 °C | -20 °C ... +85 °C |
| 92.4 / 112.5 / 17.5 | 92.4 / 112.5 / 17.5 |
| CE, UL, CSA | CE, UL, CSA |

| | |
|------------------------------------|------------------------------------|
| 24 Vdc ±25% (18 ... 30 Vdc) | 24 Vdc ±25% (18 ... 30 Vdc) |
| < 1.3 W at I _{out} = 5 mA | < 1.3 W at I _{out} = 5 mA |
| ≤ 2 A | ≤ 2 A |
| 0 °C ... +55 °C | 0 °C ... +55 °C |
| -20 °C ... +85 °C | -20 °C ... +85 °C |
| 92.4 / 112.5 / 17.5 | 92.4 / 112.5 / 17.5 |
| CE, UL, CSA | CE, UL, CSA |

| | |
|--------|--------|
| 300 V | 300 V |
| 4 kV | 4 kV |
| III | III |
| 2 | 2 |
| ≥ 3 mm | ≥ 3 mm |

| | |
|--------|--------|
| 300 V | 300 V |
| 4 kV | 4 kV |
| III | III |
| 2 | 2 |
| ≥ 3 mm | ≥ 3 mm |

| | |
|-----------------------------|-----------------------------|
| 1 nF | 1 nF |
| 4 kV _{eff} / 1 min | 4 kV _{eff} / 1 min |

| | |
|-----------------------------|-----------------------------|
| 1 nF | 1 nF |
| 4 kV _{eff} / 1 min | 4 kV _{eff} / 1 min |

| | |
|---------------------------------|---------------------------------|
| 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 |

Page 298 + 308

Page 298 + 308

**T_U = 23 °C single module

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

DC/DC Signal Conditioners

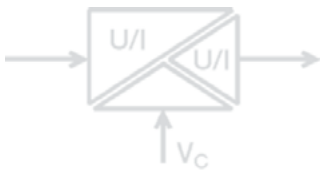
WAVEANALOG DC/DC 20 kHz

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

Approvals:

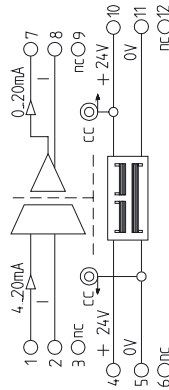


Block diagram



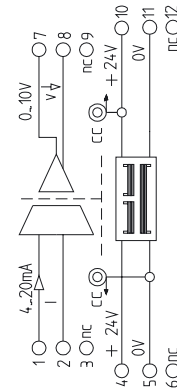
CCC HF

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



CVC HF

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



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

| Technical data* |
|---------------------------|
| Input signal |
| Input current max |
| Input resistance |
| Output signal |
| Load resistance |
| Accuracy at Tu=23 °C |
| Temperature coefficient |
| Response time |
| Cut-off frequency (-3 dB) |

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

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

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

| |
|------------------------|
| 4 ... 20 mA |
| 50 mA |
| 50 Ω |
| 0 ... 20 mA |
| ≤ 500 Ω |
| < 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 40 μs (typ. 30 μs) |
| ≥ 15 kHz (typ. 20 kHz) |

| |
|-------------------------------------|
| 24 Vdc ±25% (18 ... 30 Vdc) |
| < 1.5 W at I _{out} = 20 mA |
| ≤ 2 A |
| 0 °C ... +55 °C |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 17.5 |
| CE, UL, CSA |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| 1 nF |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

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

| |
|------------------------|
| 4 ... 20 mA |
| 50 mA |
| 50 Ω |
| 0 ... 10 V |
| ≥ 2 kΩ |
| < 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 40 μs (typ. 30 μs) |
| ≥ 15 kHz (typ. 20 kHz) |

| |
|------------------------------------|
| 24 Vdc ±25% (18 ... 30 Vdc) |
| < 1.3 W at I _{out} = 5 mA |
| ≤ 2 A |
| 0 °C ... +55 °C |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 17.5 |
| CE, UL, CSA |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| 1 nF |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

*T_U = 23 °C single module

DC/DC Signal Conditioners

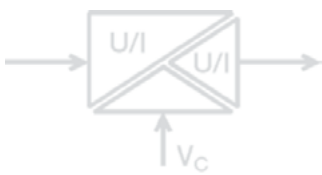
WAVEANALOG DC/DC 20 kHz

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

Approvals:

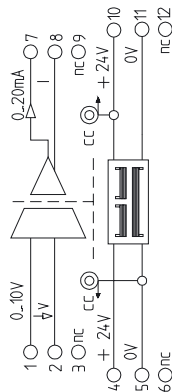


Block diagram



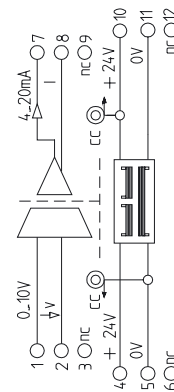
VCC HF

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



VCC HF

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



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

| Technical data* |
|---------------------------|
| Input signal |
| Input voltage max. |
| Input resistance |
| Output signal |
| Load resistance |
| Accuracy at Tu=23 °C |
| Temperature coefficient |
| Response time |
| Cut-off frequency (-3 dB) |

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

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

| Type | Cat. No. |
|-------------|-------------------|
| WAS5 VCC HF | 8447310000 |
| WAZ5 VCC HF | 8447320000 |

| |
|------------------------|
| 0 ... 10 V |
| 15 V |
| 500 kΩ |
| 0 ... 20 mA |
| ≤ 500 Ω |
| ± 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 40 μs (typ. 30 μs) |
| ≥ 15 kHz (typ. 20 kHz) |

| |
|-------------------------------------|
| 24 Vdc ±25% (18 ... 30 Vdc) |
| < 1.5 W at I _{out} = 20 mA |
| ≤ 2 A |
| 0 °C ... +55 °C |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 17.5 |
| CE, UL, CSA |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| 1 nF |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

| Type | Cat. No. |
|-------------|-------------------|
| WAS5 VCC HF | 8447340000 |
| WAZ5 VCC HF | 8447350000 |

| |
|------------------------|
| 0 ... 10 V |
| 15 V |
| 500 kΩ |
| 4 ... 20 mA |
| ≤ 500 Ω |
| ± 0.2% of FS |
| ≤ 250 ppm / K of FS |
| ≤ 40 μs (typ. 30 μs) |
| ≥ 15 kHz (typ. 20 kHz) |

| |
|-------------------------------------|
| 24 Vdc ±25% (18 ... 30 Vdc) |
| < 1.5 W at I _{out} = 20 mA |
| ≤ 2 A |
| 0 °C ... +55 °C |
| -20 °C ... +85 °C |
| 92.4 / 112.5 / 17.5 |
| CE, UL, CSA |

| |
|------------------------------|
| 300 V |
| 4 kV |
| III |
| 2 |
| ≥ 3 mm |
| 1 nF |
| 4 kV _{eff} / 1 min |
| EN 50178 |
| EN 50081, EN 50082, EN 55011 |
| Page 298 + 308 |

*T_U = 23 °C single module

DC/DC Signal Conditioners

WAVEANALOG DC/DC 20 kHz

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

VVC HF

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



Approvals:



VVC HF

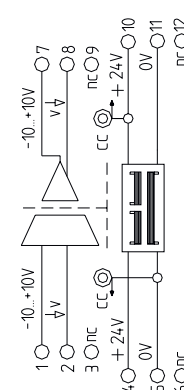
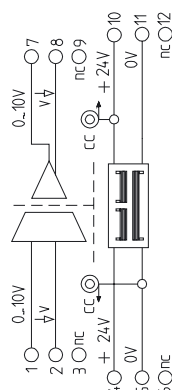
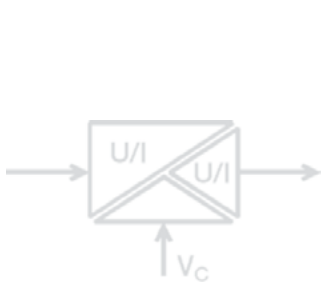
-10 ... +10 V / -10 ... +10 V



Approvals:



Block diagram



Ordering data

| | | |
|--------------------------|-------------------------|-------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WAS5 VVC HF | 8447370000 |
| Input/output | WAZ5 VVC HF | 8447380000 |
| | 0 ... 10 V / 0 ... 10 V | |

Ordering data

| | | |
|--------------------------|---------------|-------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WAS5 VVC HF | 8561610000 |
| Input/output | WAZ5 VVC HF | 8587000000 |
| | ±10 V / ±10 V | |

Technical data*

| | |
|---------------------------|------------------------|
| Input signal | 0 ... 10 V |
| Input voltage max. | 15 V |
| Input resistance | 500 kΩ |
| Output signal | 0 ... 10 V |
| Load resistance | ≥ 2 kΩ |
| Accuracy at Tu=23 °C | ± 0.2% of FS |
| Temperature coefficient | ≤ 250 ppm / K of FS |
| Response time | ≤ 40 μs (typ. 30 μs) |
| Cut-off frequency (-3 dB) | ≥ 15 kHz (typ. 20 kHz) |

| | |
|---------------------------|------------------------------------|
| Input signal | -10 ... +10 V |
| Input voltage max. | ± 15 V |
| Input resistance | 500 kΩ |
| Output signal | -10 ... +10 V |
| Load resistance | ≥ 2 kΩ |
| Accuracy at Tu=23 °C | ± 0.2% of measurement range |
| Temperature coefficient | ≤ 250 ppm / K of measurement range |
| Response time | ≤ 40 μs (typ. 30 μs) |
| Cut-off frequency (-3 dB) | ≥ 15 kHz (typ. 20 kHz) |

General

| | |
|---|------------------------------------|
| Voltage supply | 24 Vdc ±25% (18 ... 30 Vdc) |
| Power consumption | < 1.3 W at I _{out} = 5 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, UL, CSA |

| | |
|---|------------------------------------|
| Voltage supply | 24 Vdc ±25% (18 ... 30 Vdc) |
| Power consumption | < 1.3 W at I _{out} = 5 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |
| Dimensions L / H / W mm | 92.4 / 112.5 / 17.5 |
| Approvals | CE, cUL |

Coordination of insulation according to EN 50178, 04/98

| | |
|-------------------------------------|------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|-------------------------------------|------------------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Coupling capacity | |
| Input / output to supply | 1 nF |
| Isolation voltage, voltage strength | |
| Input/output to mounting rail | 4 kV _{eff} / 1 min |
| Standards/specifications | EN 50178 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions and accessories see | Page 298 + 308 |

*Tu = 23 °C single module

DC/DC Signal Conditioners (Configurable)

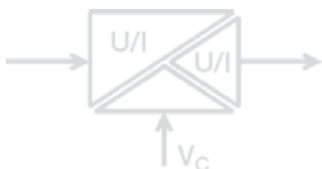
WAVEANALOG PRO DC/DC

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

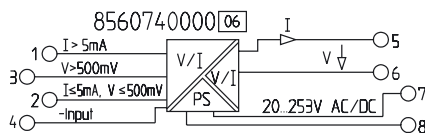
Approvals:



Block diagram



PRO DC/DC



Ordering data

| | | |
|--------------------------|----------------|-------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WAS4 PRO DC/DC | 8560740000 |
| Input/output | WAZ4 PRO DC/DC | 8560750000 |
| | configurable | |

Technical data*

Input (adjustable)

Voltage uni-/bipolar adjustable
Voltage calibrated ranges

Current uni-/bipolar adjustable
Current calibrated ranges

Input resistance
at current input range < 5 mA / > 5 mA
at voltage input

Input capacity
at current input

Voltage input range < 500 mV / > 500 mV
Overload capacity

at current input range < 5 mA / > 5 mA
Voltage input range < 500 mV / > 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

| | |
|---|--|
| 20 mV ... 200 V | approx. 100 Ω / approx. 5 Ω |
| 0 ... ±60 mV, 0 ... ±100 mV, 0 ... ±150 mV, 0 ... ±300 mV, 0 ... ±500 mV, 0 ... ±1V, 0 ... ±5V, 0 ... ±10 V, 0 ... ±100 V | approx. 1 MΩ |
| 0.1 mA ... 100 mA | approx. 1 nF |
| 0 ... ±0.3 mA, 0 ... ±1 mA, 0 ... ±5 mA, 0 ... ±16 mA, 0 ... 20 mA, 0 ... 50 mA | approx. 1 nF / approx. 500 pF |
| | < 75 mA / < 300 mA |
| | max. < 20 mA / < 3 mA continuous current |

20 mV ... 200 V

0 ... ±60 mV, 0 ... ±100 mV, 0 ... ±150 mV, 0 ... ±300 mV, 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, 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 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 | Switch | | | | | | | |
|----------------|--------|---|---|---|----|---|---|---|
| | S1 | | | | S2 | | | |
| Input range | 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 | Switch | | | | |
|--------------|--------|---|----|---|---|
| | S1 | | S3 | | |
| Output range | 5 | 6 | 7 | 1 | 2 |
| 0 ... ±10 V | | | | ■ | ■ |
| 2 ... 10 V | ■ | | | | |
| 0 ... ±5 V | | ■ | | ■ | ■ |
| 1 ... 5 V | ■ | ■ | | ■ | ■ |
| 0 ... ±20 mA | | | ■ | | |
| 4 ... 20 mA | | ■ | ■ | | |

| Offset | Switch | | | |
|--------------------------|--------|---|----|---|
| | S1 | | S2 | |
| (in % of output voltage) | 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_U = 23 °C single module

RTD Signal Conditioners

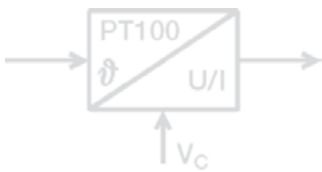
WAVEANALOG RTD

- 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



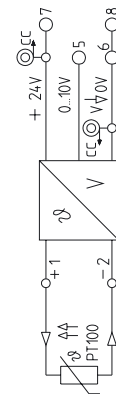
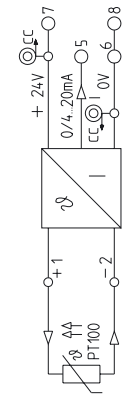
Switch position/setting options

| 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 ¹⁾ | 7 |
|----------------------|---|
| Range | 7 |
| 0 ... 20 mA | ■ |
| 4 ... 20 mA | ■ |

¹⁾ only modules with current output

■ = on
□ = off



Ordering data

| | | |
|--------------------------|--------------------------|-------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WTS4 PT100/2 C | 8432210000* |
| Input/output | WTZ4 PT100/2 C | 8432220000* |
| | PT100/2 / 0(4) ... 20 mA | |

| | |
|--------------------------|-------------|
| 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 | PT100/2-wire |
|-----------------------------------|---------------------------------------|
| Temperature range | -200 ... +800 °C |
| Supply current | 1.45 mA |
| Conductor resistance | |
| Output signal | PT100/2-wire |
| Load resistance | 0(4) ... 20 mA |
| Accuracy at Tu=23 °C | ≤ 500 Ω |
| Temperature coefficient | ± 0.5% of measurement range |
| Measurement range ≥ 200 K | ≤ 200 ppm / °C (typ. 80 ppm / °C) |
| 100 K ≤ measurement range < 200 K | ≤ 250 ppm / °C (typ. 100 ppm / °C) |
| 40 K ≤ measurement range < 100 K | ≤ 500 ppm / °C |

| Input signal | PT100/2-wire |
|-----------------------------------|---------------------------------------|
| Temperature range | -200 ... +800 °C |
| Supply current | 1.45 mA |
| Conductor resistance | |
| Output signal | PT100/2-wire |
| Load resistance | 0 ... 10 V |
| Accuracy at Tu=23 °C | ≥ 1 kΩ |
| Temperature coefficient | ± 0.5% of measurement range |
| Measurement range ≥ 200 K | ≤ 200 ppm / °C (typ. 80 ppm / °C) |
| 100 K ≤ measurement range < 200 K | ≤ 250 ppm / °C (typ. 100 ppm / °C) |
| 40 K ≤ measurement range < 100 K | ≤ 500 ppm / °C |

| Input signal | PT100/2-wire |
|-----------------------------------|---------------------------------------|
| Temperature range | -200 ... +800 °C |
| Supply current | 1.45 mA |
| Conductor resistance | |
| Output signal | PT100/2-wire |
| Load resistance | 0 ... 10 V |
| Accuracy at Tu=23 °C | ≥ 1 kΩ |
| Temperature coefficient | ± 0.5% of measurement range |
| Measurement range ≥ 200 K | ≤ 200 ppm / °C (typ. 80 ppm / °C) |
| 100 K ≤ measurement range < 200 K | ≤ 250 ppm / °C (typ. 100 ppm / °C) |
| 40 K ≤ measurement range < 100 K | ≤ 500 ppm / °C |

General

| | |
|---|-------------------------------------|
| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Power consumption | < 48 mA at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |
| Standards/specifications | EN 50178, IEC 751 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|---|-------------------------------------|
| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Power consumption | < 48 mA at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |
| Standards/specifications | EN 50178, IEC 751 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA |
| Dimensions and accessories see | Page 298 + 308 |

| | |
|---|-------------------------------------|
| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Power consumption | < 38 mA at I _{out} = 10 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |
| Standards/specifications | EN 50178, IEC 751 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA |
| Dimensions and accessories see | Page 298 + 308 |

* without balancing

*** T_U = 23 °C single module

Preconfigured modules

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

**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

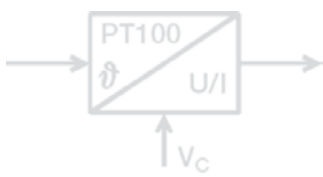
WAVEANALOG RTD

- 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



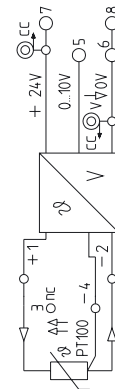
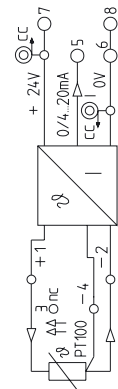
PT100/3

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 ¹⁾ | Range | 7 |
|----------------------|-------|---|
| 0 ... 20 mA | | |
| 4 ... 20 mA | | ■ |

¹⁾ only modules with current output

■ = on
= off

Ordering data

| | | |
|--------------------------|--------------------------|--------------------|
| Screw connection | Type | Cat. No. |
| Tension clamp connection | WTS4 PT100/3 C | 8432150000* |
| Input/output | WTZ4 PT100/3 C | 8432160000* |
| | PT100/3 / 0(4) ... 20 mA | |

Technical data***

| Input signal | PT100/3-wire |
|-----------------------------------|---------------------------------------|
| Temperature range | -200 ... +800 °C |
| Supply current | 1.45 mA |
| Conductor resistance | ≤ 50 Ω |
| Output signal | 0(4) ... 20 mA |
| Load resistance | ≤ 500 Ω |
| Accuracy at Tu=23 °C | ± 0.5% of measurement range |
| Temperature coefficient | |
| Measurement range ≥ 200 K | ≤ 200 ppm / °C (typ. 80 ppm / °C) |
| 100 K ≤ measurement range < 200 K | ≤ 250 ppm / °C (typ. 100 ppm / °C) |
| 40 K ≤ measurement range < 100 K | ≤ 500 ppm / °C (typ. 200 ppm / °C) |

General

| | |
|---|-------------------------------------|
| Voltage supply | 24 Vdc ±20% (19.2 ... 28.8 Vdc) |
| Power consumption | < 48 mA at I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0 °C ... +55 °C |
| Storage temperature | -20 °C ... +85 °C |
| Standards/specifications | EN 50178, IEC 751 |
| EMC standards | EN 50081, EN 50082, EN 55011 |
| Dimensions L / H / W mm | 92.4 / 112.5 / 12.5 |
| Approvals | CE, UL, CSA |
| Dimensions and accessories see | Page 298 + 308 |

* without balancing

*** T_U = 23 °C single module

Preconfigured modules

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

** 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

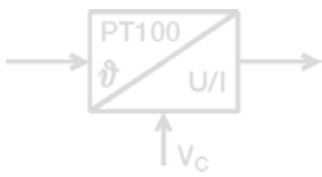
WAVEANALOG RTD

- 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:



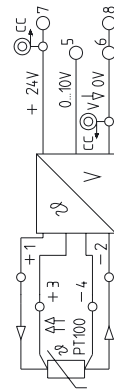
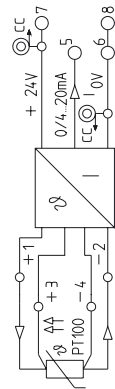
Block diagram



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 | ■ | ■ | ■ | ■ |
| 4 ... 20 mA | ■ | ■ | ■ | ■ |
| | | 2 - wire | ■ | ■ |
| | | 3 - wire | ■ | ■ |
| | | 4 - wire | ■ | ■ |

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

Ordering data

Screw connection
Tension clamp connection

Input/output

Technical data***

Input signal

Temperature range

Supply current

Conductor resistance

Output signal

Load resistance

Accuracy at Tu=23 °C

100 K ≤ measurement range < 600 K

Measurement range ≤ 100 K

Measurement range ≥ 600 K

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

*** Tu = 23 °C single module

| Type | Cat. No. | Type | Cat. No. |
|--------------------------|-------------|----------------------|------------|
| WTS4 PT100/4 C | 8432270000* | WTS4 PT100/4 V | 432240000* |
| WTZ4 PT100/4 C | 8432280000* | WTZ4 PT100/4 V | 432250000* |
| PT100/4 / 0(4) ... 20 mA | | PT100/4 / 0 ... 10 V | |

PT100/4-wire

-200 ... +800 °C

1.45 mA

≤ 50 Ω (3- & 4-wire)

0(4) ... 20 mA

≤ 500 Ω

± 0.1% of measurement range

± 0.1 K

± 0.2% of measurement range

≤ 200 ppm / °C

(typ. 80 ppm / °C)

≤ 225 ppm / °C

(typ. 90 ppm / °C)

≤ 450 ppm / °C

(typ. 180 ppm / °C)

24 Vdc ±20%

(19.2 ... 28.8 Vdc)

< 48 mA at I_{out} = 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

| Type | Cat. No. | Type | Cat. No. |
|----------------------|------------|----------------------|------------|
| WTS4 PT100/4 V | 432240000* | WTS4 PT100/4 V | 432240000* |
| WTZ4 PT100/4 V | 432250000* | WTZ4 PT100/4 V | 432250000* |
| PT100/4 / 0 ... 10 V | | PT100/4 / 0 ... 10 V | |

PT100/4-wire

-200 ... +800 °C

1.45 mA

≤ 50 Ω (3- & 4-wire)

0 ... 10 V

≥ 1 kΩ

± 0.1% of measurement range

± 0.1 K

± 0.2% of measurement range

≤ 200 ppm / °C

(typ. 80 ppm / °C)

≤ 225 ppm / °C

(typ. 90 ppm / °C)

≤ 450 ppm / °C

(typ. 180 ppm / °C)

24 Vdc ±20%

(19.2 ... 28.8 Vdc)

< 38 mA at I_{out} = 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 |
| 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)

| |
|--|
| 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 / |

Output (adjustable)

| | |
|-----------------------------------|---------------|
| Output voltage | 0...10 V |
| Offset voltage | max. 0.05 V |
| Load resistance | ≥ 1 kΩ |
| Output current | 0/4 ... 20 mA |
| Offset current | max. 100 μA |
| Load resistance | ≤ 600 Ω |
| Accuracy, slow/fast step response | |

Step response (switchable via DIP switch)

| | | |
|-------------------------|-----------------------------------|---------|
| RTD, R | typ. fast | slow |
| Potentiometer | < 1.2 s | < 2.2 s |
| Temperature coefficient | measurement range ≥ 200 K | |
| | 100 K ≤ measurement range < 200 K | |
| | 40 K ≤ measurement range < 100 K | |

Max. wire resistance:

| | |
|--------------------------------|---|
| Influence of wire resistances: | 50 Ω for 3- and 4-wire |
| Open circuit recognition: | max. + 0.25°C at 50 Ω wire resistance |
| Range of man. fine adjustment | Output signal > 10 V or > 20 mA, LED blinks |
| Status LED: | ≥ ± 5%, from ver. 1: ≥ 12.5%, potentiometer ≥ 12.5 %...25 % |

General

| | |
|---|--|
| Supply voltage | 18 Vdc ... 24 Vdc ... 30 Vdc |
| Power consumption | 830 mW ... 880 mW ... 980mW @ I _{out} = 20 mA |
| Current carrying capacity of cross-connection | ≤ 2 A |
| Operating temperature | 0...55°C |
| Storage temperature | -20...85°C |
| Factory setting | PT 100/3 0 ... 100 °C / 4 ... 20 mA |
| Dimensions L/H/B mm | No manual fine adjustment; slow step response |
| Weight | 92.4 / 112.5 / 17.5 |
| Approvals | approx. 100 g |
| | 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 _{eff} |

Standards/specifications

| | |
|--------------------------------|----------------------------|
| EMC standards | EN 50178, IEC751 |
| Dimensions and accessories see | EN 50081, EN50082, EN55011 |
| | Page 298 + 308 |

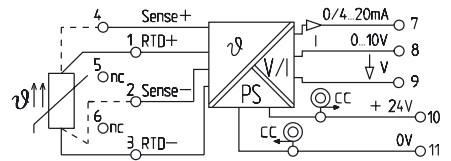
* T_J = 23 °C single module

PRO RTD



Adjustment help

WAVEtool
This service tool enables quick and uncomplicated configuration of WAVEANALOG PRO. Download from Internet: <http://www.weidmueller.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 | |
| ≥ 1 kΩ | |
| 0/4 ... 20 mA | |
| max. 100 μA | |
| ≤ 600 Ω | |
| PT 100,Ni 100: 0.3% of measurement range 0.8%, 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 |

| |
|---|
| ≤ 200 ppm / °C |
| ≤ 250 ppm / °C |
| ≤ 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 |
| ≥ ± 5%, from ver. 1: ≥ 12.5%, potentiometer ≥ 12.5 %...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 |
| ≤ 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 _{eff} |

| |
|----------------------------|
| 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

| ∅ _{min} | R _{min} | Pot.min | Switch 1 | | | |
|------------------|------------------|---------|----------|---|---|---|
| | | | 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 | | | | | | ■ |

| T | R | pot. | Switch 2 | | | | |
|------|-------|-------|----------|---|---|---|---|
| | | | 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 | |
|---|-----|
| man. adj.. | S.1 |
| off | 8 |
| 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

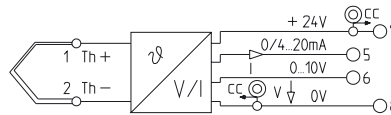
Dimensions and accessories see

* $T_u = 23\text{ °C}$ 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 | | | | 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 | | | | 1400 °C | ■ | ■ | ■ | ■ | ■ |
| 0 - 10 V | | | | 1450 °C | ■ | ■ | ■ | ■ | ■ |
| 0 - 20 mA | | | | 1500 °C | ■ | ■ | ■ | ■ | ■ |
| 4 - 20 mA | | | | 1600 °C | ■ | ■ | ■ | ■ | ■ |
| Filter | | | | 1700 °C | ■ | ■ | ■ | ■ | ■ |
| off | | | | 1800 °C | ■ | ■ | ■ | ■ | ■ |
| on | | | | | | | | | |

■ = 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 Tu = 23 °C

Output (adjustable)

Output voltage: 0...10 V
 Offset voltage: Max. 0.05 V
 Load resistance: ≥ 1 KΩ
 Output current: 0/4 ... 20 mA
 Offset current: max. 100 μA
 Load resistance: ≤ 600 Ω
 Step response: max. 1.4 s
 at connected filter function: max. 7.5 s
 Max. wire resistance: 50 Ω for 3- and 4-wire
 Open circuit recognition: Output signal > 10 V or > 20 mA, LED blinks
 Range of man. fine adjustment: ≥ ±5%
 Status LED: Module active: LED lights up / open circuit: LED blinks
 Error: LED off

General

Supply voltage: 18 Vdc ... 24 Vdc ... 30 Vdc
 Power consumption: 800 mV ... 850 mW ... 950 mW @ I output = 20 mA
 Current carrying capacity of cross-connection: ≤ 2 A
 Operating temperature: 0 °C ... +55 °C
 Storage temperature: -20 ... +85 °C

Standards/specifications

EN 50178, IEC751
 EN 50081, EN50082, EN55011

Factory setting

Type K 0 ... 1000 °C / 4 ... 20 mA; no filter;
 No manual fine adjustment
 92.4 / 112.5 / 17.5
 100 g

Dimensions L/H/W mm

Weight

Approvals

Dimensions and accessories see

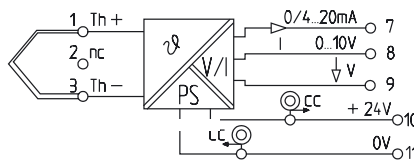
* Tu = 23 °C single module

PRO Thermo



Adjustment help WAVE TOOL

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 |

configurable

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 |

| Selection the thermocoupler | | | |
|-----------------------------|-----|---|---|
| Type | SW1 | | |
| | 1 | 2 | 3 |
| K | ■ | ■ | ■ |
| J | ■ | ■ | ■ |
| T | ■ | ■ | ■ |
| E | ■ | ■ | ■ |
| N | ■ | ■ | ■ |
| R | ■ | ■ | ■ |
| S | ■ | ■ | ■ |
| B | ■ | ■ | ■ |

| Selection of minimum temperature | | | | | | |
|----------------------------------|-----|---|---|---|--|--|
| θ _{min} | SW1 | | | | | |
| | 4 | 5 | 6 | 7 | | |
| 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 | | | |
| | 1 | 2 | 3 | 4 |
| 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 _{eff} |

| Selection of output | |
|---------------------|-----|
| Output | SW2 |
| | 6 7 |
| 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 |
|--------|-----|
| | 8 |
| off | ■ |
| on | ■ |

Adjustment Help WAVE TOOL

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

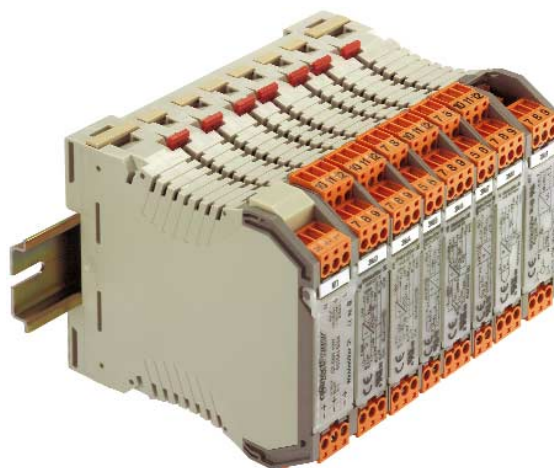
Menu for selecting the functions



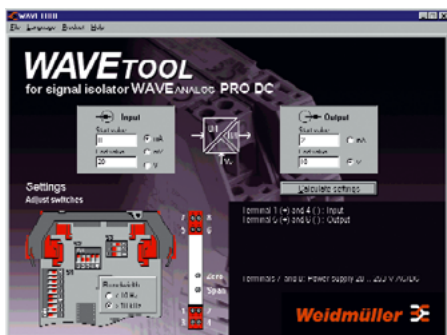
Once the required input and output parameters have been entered, the program determines the correct switch setting and gives instructions for the electrical connection of the module. Where necessary, it also determines and displays the required calibration values. The entire process can be printed out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

WAVE TOOL
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

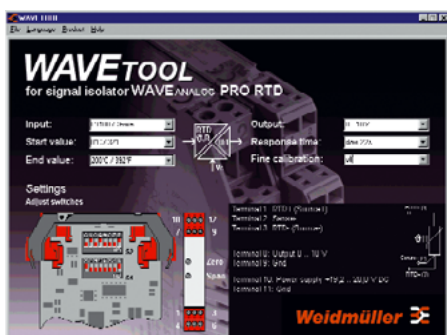
Weidmüller Interface GmbH & Co.
P.O. Box 3030
D-32729 Detmold
T: +49-(0)5231-14-0
F: +49-(0)5231-14-2083
Date: 02.04.02

Terminal 1: RTD+ (Source+)
Terminal 2: Sense-
Terminal 3: RTD- (Source-)
Terminal 4: Sense+

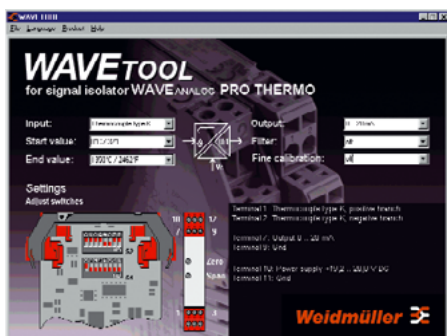
Terminal 8: Output 0 .. 10 V
Terminal 9: Gnd

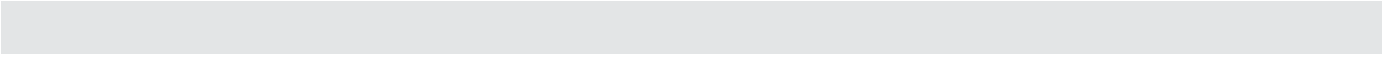
Terminal 10: Power supply +18 .. 30 V DC
Terminal 11: Gnd

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.

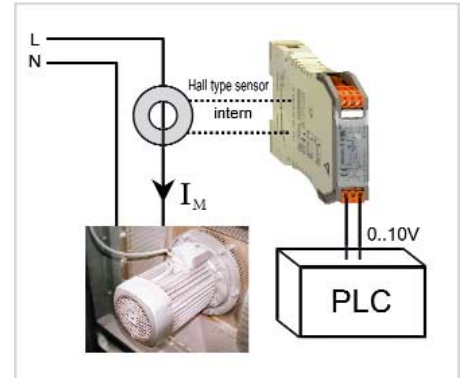
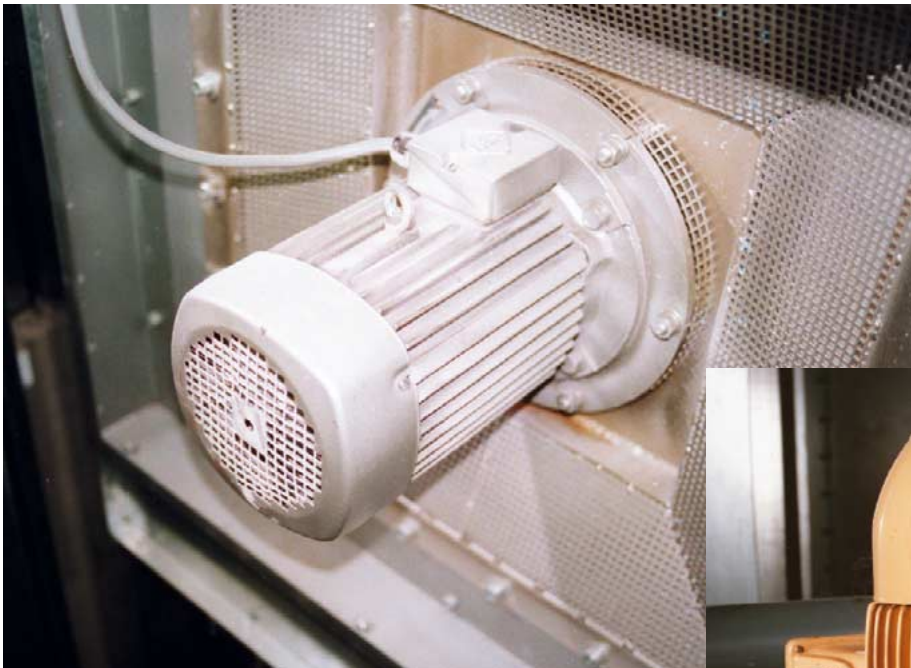


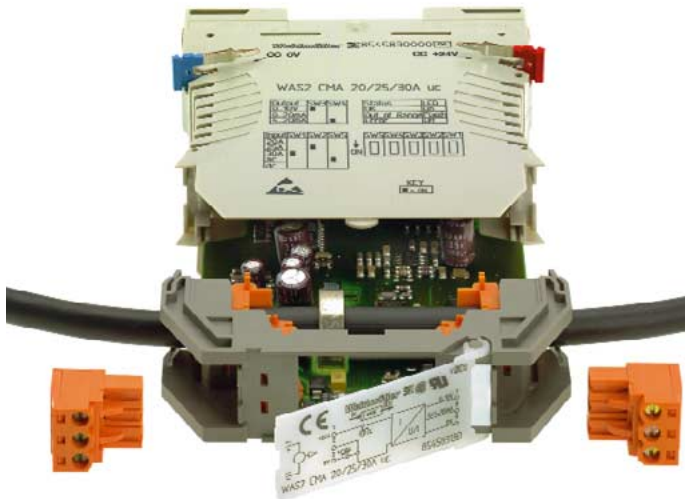
Fig.: Monitoring motor currents



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

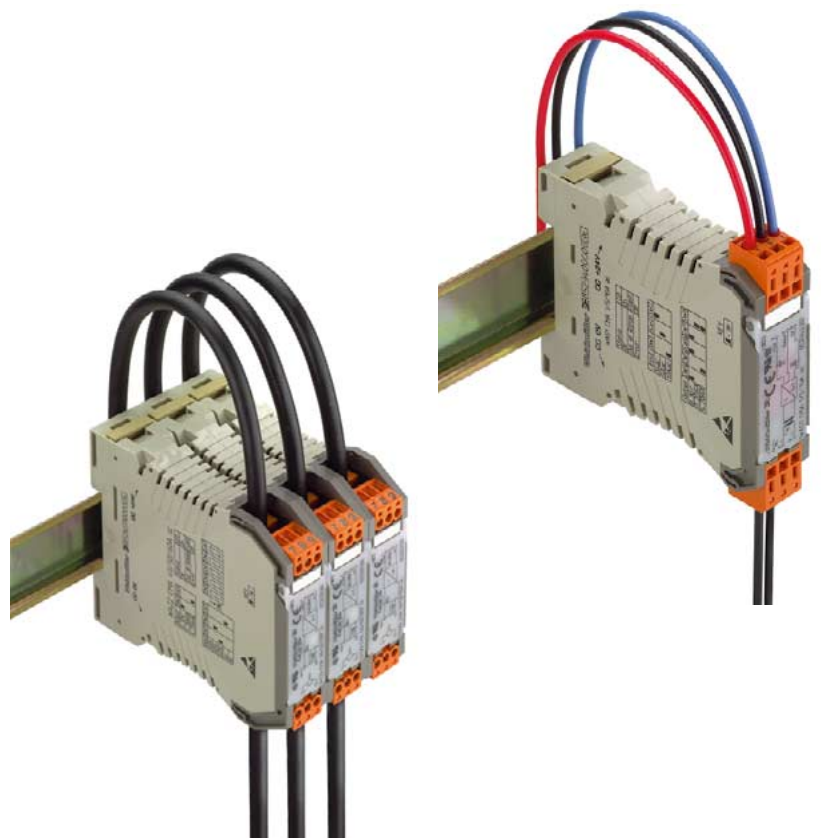
Very good marking options

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



Current Monitoring

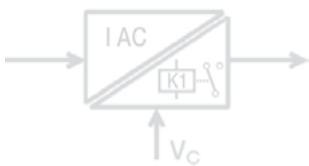
WAVECONTROL

- 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



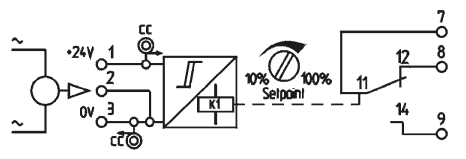
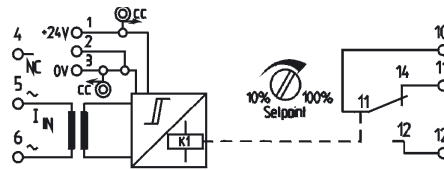
WAS2 CMR WAZ2 CMR

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 | WAS2 CMR 1/5/10A ac | 8516560000 | 1 |
| Tension clamp connection | WAZ2 CMR 1/5/10A ac | 8516570000 | 1 |

Technical data*

| | |
|-----------------------------|---|
| Input | |
| Input current | 1A ac/5A ac/10A ac selectable (without additional adjustment) |
| Input frequency | 50Hz/60Hz |
| Pass through diameter | 8mm |
| Measuring principle | transformer coupled |
| Connection type | screw or tension clamp connection |
| Measurement circuit voltage | 250Vac |

Max. measuring circuit

| | |
|--|-------------|
| | 100A for 1s |
|--|-------------|

Output

| | |
|--|---|
| Contact set | 1 changeover contact |
| Min. switching voltage | 6Vdc/6Vac |
| Max. switching voltage | 60Vdc/250Vac |
| Continuous current AC | 3A |
| Continuous current DC | 0.7A |
| Max. switching current | 7A |
| Min. switching current | 100mA |
| Status LED | green LED |
| Threshold | 10% ... 100% adjustable via front potentiometer |
| Hysteresis | approx. 5% or approx. 10% selectable from set threshold |
| Temperature coefficient | ≤ 800 ppm/K |
| Response time (10 ... 90%) | typ. 700 ms |
| Working/closed-circuit current principle | selectable |

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

| | |
|---------------------------------|---------|
| Rated voltage | 300V |
| Surge voltage | 4kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| Test voltage | 4kV eff |

General

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

* T_U = 23 °C single module

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

1A ac/5A ac/10A ac selectable (without additional adjustment)

50Hz/60Hz

transformer coupled

screw or tension clamp connection

250Vac

100A for 1s

1 changeover contact

6Vdc/6Vac

60Vdc/250Vac

3A

0.7A

7A

100mA

green LED

10% ... 100% adjustable via front potentiometer

approx. 5% or approx. 10% selectable from set threshold

≤ 800 ppm/K

typ. 700 ms

selectable

300V

4kV

III

2

≥ 3 mm

4kV eff

21.6Vdc...24Vdc...26.4Vdc

8.3 mA (relay not switched)

24 mA (relay switched)

yes

≤ 2 A

0 ... 50°C

-20 ... +70°C

Input range: 5A ac; hysteresis 10%, working current principle

92.4/112.4/22.5

150g

CE, cUL

Page 298 + 308

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

20A ac/40A ac/60A ac selectable (without additional adjustment)

50Hz/60Hz

8mm

Contact-free current monitoring using Hall sensor

Push-through connection

400Vac, higher voltages dependent on wire insulation

dependent on wire cross-section

1 changeover contact

6Vdc/6Vac

60Vdc/250Vac

3A

0.7A

7A

100mA

green LED

10% ... 100% adjustable via front potentiometer

approx. 5% or approx. 10% selectable from set threshold

≤ 250 ppm/K

typ. 700 ms

selectable

300V

4kV

III

2

≥ 3 mm

4kV eff

21.6Vdc...24Vdc...26.4Vdc

23 mA (relay not switched)

47 mA (relay switched)

yes

≤ 2 A

0 ... 50°C

-20 ... +70°C

Input range :40A ac; hysteresis 10% working current principle

92.4/112.4/22.5

150g

CE, cUL

Page 298 + 308

Current Monitoring

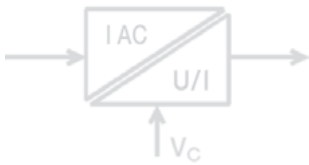
WAVECONTROL

- 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*

| | Type | Cat. No. | Qty. | Type | Cat. No. | Qty. |
|--|--|----------|------|---|----------|------|
| Input current | 1 A ac/5 A ac/10 A ac selectable (without additional adjustment) | | | 1A ac/5A ac/10A ac selectable (without additional adjustment) | | |
| Input frequency | 50 Hz/60 Hz | | | 50 Hz/60 Hz | | |
| Accuracy | 0.5% FSR | | | 0.5% FSR | | |
| Measuring principle | transformer coupled | | | transformer coupled | | |
| Connection type | Screw or tension clamp connection | | | Screw or tension clamp connection | | |
| Measurement circuit voltage | 250 Vac | | | 250 Vac | | |
| Max. measuring circuit | 100 A for 1s | | | 100 A for 1s | | |
| Output | | | | | | |
| Current/voltage selectable | 0 ... 10 V 0 ... 20 mA 4 ... 20 mA | | | 4 ... 20mA current loop supply | | |
| Output voltage | 0 ... 10 V | | | | | |
| Offset voltage | max. 0.05 V | | | | | |
| Load resistance | ≥1 K Ω | | | | | |
| Output signal limit | approx. 13 V and 24 mA | | | approx. 24 mA | | |
| Output current | 0/4 ... 20 mA | | | 4 ... 20 mA | | |
| Offset current | max. 100 μA | | | max. 100 μA | | |
| Load resistance | ≤ 600 Ω | | | ≤ 550 Ω (at 24 V) RL = (Vcc - 13V) / 20 mA | | |
| Status LED | green LED ON → OK; blinks → signal out of range; OFF → Error | | | green LED ON → OK; blinks → signal out of range; OFF → Error | | |
| Temperature coefficient | ≤ 200 ppm/K | | | ≤ 200 ppm/K | | |
| Response time (10 ... 90%) | typ. 700 ms | | | typ. 700 ms | | |
| Coordination of insulation acc. to DIN EN 50178, 04/98 (safe separation) | | | | | | |
| Rated voltage | 300V | | | 300V | | |
| Surge voltage | 6KV | | | 6KV | | |
| Overvoltage category | III | | | III | | |
| Contamination class | 2 | | | 2 | | |
| Clearance and creepage distance | ≥ 5.5 mm | | | ≥ 5.5 mm | | |
| Test voltage | 4kV eff | | | 4kV eff | | |
| General | | | | | | |
| Supply | | | | | | |
| Supply voltage | 21.6 Vdc...24 Vdc...26.4 Vdc | | | 13 Vdc ... 30 Vdc | | |
| Power consumption at rated voltage | 40 mA at I _{out} = 20 mA | | | | | |
| Reverse polarity protection | yes | | | yes | | |
| Operating temperature range | 0 ... 50°C | | | 0 ... 50°C | | |
| Storage/transport | - 20 ... + 70°C | | | -20 ... +70°C | | |
| Factory setting | 0 ... 5A ac; 4 ... 20mA | | | 0 ... 5A ac; 4 ... 20mA | | |
| Dimensions L/H/W (mm) | 72/92.4/22.5 | | | 72/92.4/22.5 | | |
| Weight | 150g | | | 150g | | |
| Approvals | CE, cUL | | | CE, cUL | | |
| Dimensions and accessories see | Page 298 + 308 | | | Page 298 + 308 | | |

* T_U = 23 °C single module

Current Monitoring

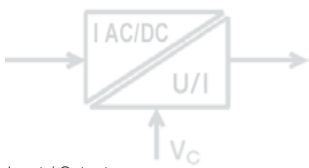
WAVECONTROL

- 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 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 0 ... 20 mA 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 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 |
| Overtoltage 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 _{out} = 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 |

* Tu = 23 °C single module

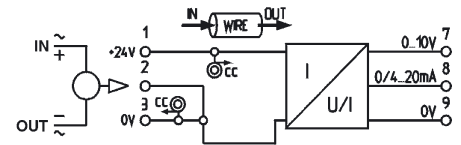
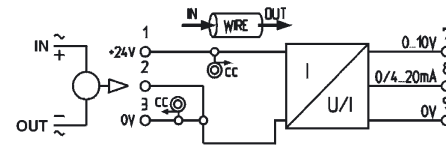
WAS2 CMA WAZ2 CMA

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



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 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 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 0 ... 20 mA 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 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 | |
| Overtoltage 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 _{out} = 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 | |

| 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% (0Hz - 1kHz) Crest factor 3 FSR 2% (0Hz - 2kHz) 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 0 ... 20 mA 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 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 | |
| Overtoltage 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 _{out} = 20 mA | |
| Reverse polarity protection | yes | |
| Operating temperature range | 0 ... 50 °C | |
| Storage/transport | -20 ... +70 °C | |
| Factory setting | 0 ... 25 A uc; 4 ... 20mA | |
| 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

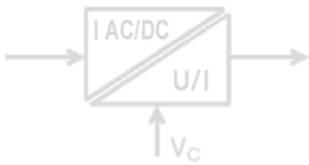
WAVECONTROL

- 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:

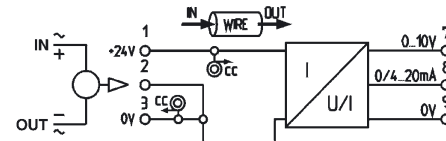


Block diagram



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

* Tu = 23 °C single module

| Type | Cat. No. | Qty. |
|---|------------|------|
| WAS2 CMA 40/50/60A uc | 8513330000 | 1 |
| WAZ2 CMA 40/50/60A uc | 8526590000 | 1 |
| Technical data* | | |
| 40/50/60A uc selectable (without additional adjustment) | | |
| 0 Hz - 2 kHz (True RMS to DC Converter) | | |
| 1% (0Hz - 1kHz) Crest factor 3 FSR | | |
| 2% (0Hz - 2kHz) Crest factor 5 FSR | | |
| Contact-free current monitoring using Hall sensor | | |
| Push-through connection | | |
| 8 mm | | |
| 400 Vac, higher voltages dependent on wire insulation | | |
| dependent on wire cross-section | | |
| 0 ... 10 V | | |
| 0 ... 20 mA | | |
| 4 ... 20 mA | | |
| 0 ... 10V | | |
| max. 0.08 V | | |
| ≥ 1 kΩ | | |
| approx. 13 V and. 24 mA | | |
| 0/4 ... 20 mA | | |
| max. 150 μA | | |
| ≤ 600 Ω | | |
| green LED | | |
| ON → OK; blinks → signal out of range; OFF → Error | | |
| ≤ 650 ppm/K | | |
| type 700 ms | | |
| 300 V | | |
| 6 kV | | |
| III | | |
| 2 | | |
| ≥ 5.5 mm | | |
| 4 kV eff | | |
| 21.6 Vdc...24 Vdc...26.4 Vdc | | |
| 50 mA at I _{out} = 20 mA | | |
| yes | | |
| 0 ... 50°C | | |
| -20 ... +70°C | | |
| 0 ... 50 A uc; 4 ... 20 mA | | |
| 92.4/112.4/22.5 | | |
| 150 g | | |
| CE, cUL | | |
| Page 298 + 308 | | |

Current Monitoring

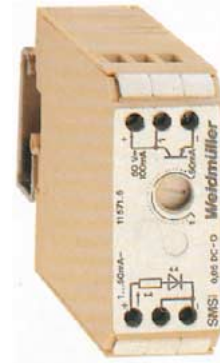
- For AC/DC
- With and without adjustable switching threshold
- Opto-coupler output

SMSI DC O

With adjustable switching threshold

Up to 50 mA

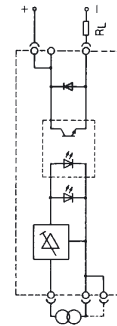
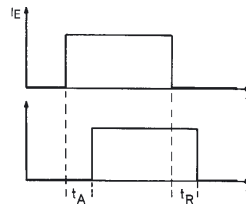
Up to 250 mA



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



Ordering data

| Type | Cat. No. | Type | Cat. No. |
|----------------|------------|----------------|------------|
| SMSI 0.05 DC O | 1157160000 | SMSI 0.25 DC O | 1156360000 |

Technical data

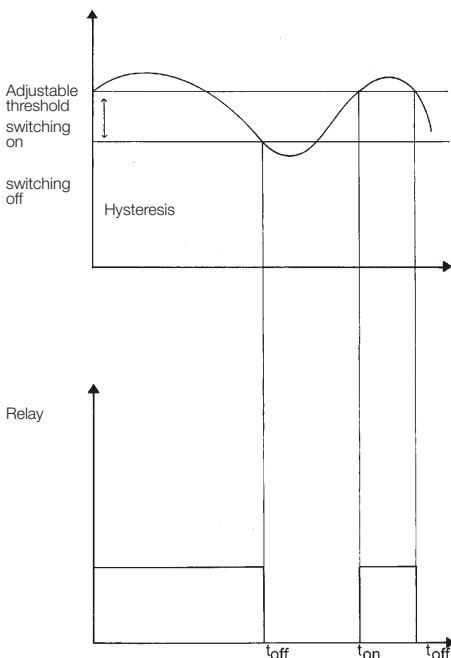
| | | |
|--|---|------------------------------------|
| Measurement circuit voltage | 10 V... 250 Vdc | 10 V... 250 Vdc |
| Max. permissible current in measurement circuit | 70 mA | 350 mA |
| Rated consumption – (W) | 200 mW | 750 mW |
| Rated consumption – (VA) | – | – |
| Adjustable switching threshold | 1 mA...50 mA | 40 mA...250 mA |
| Hysteresis between turn-on and turn-off point | 0.5 % (50 mA)...5 % (1 mA) | 2% (250 mA)...10% (40 mA) |
| Activation time t_A | < 10 ms | < 3 ms |
| Reaction time t_R | < 10 ms | < 3 ms |
| Voltage drop at input | < 4 V | < 3 V |
| Output voltage | 5 V...50 Vdc | 5 V...50 V– |
| Max. continuous output current | 100 mA | 100 mA |
| Saturation voltage | ≤ 1.3 V | ≤ 1.3 V |
| Auxiliary voltage | – | – |
| Auxiliary voltage rated consumption | – | – |
| Auxiliary voltage rated data | – | – |
| Storage temperature | –25 °C...+60 °C | –25 °C...+60 °C |
| Ambient temperature | –, assembled without spacing on TS –, assembled with ≥ 20 mm spacing on TS | –25 °C...+40 °C –25 °C...+50 °C |

Coordination of insulation according to VDE, Draft 11/94

| | | |
|--|-----|-----|
| Overvoltage category, input | II | II |
| Overvoltage category, output | I | I |
| Overvoltage category, input 1-input 2, | I | I |
| Output 1-output 2, input-output | III | III |
| Contamination class | 2 | 2 |

Dimensions and connection data

| | | |
|--------------------|--------|--------|
| see page 306 + 307 | Fig. V | Fig. V |
|--------------------|--------|--------|



SMSI AC O

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



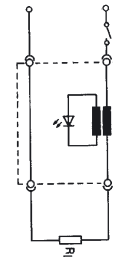
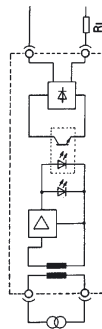
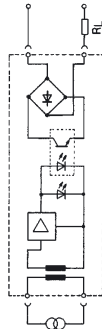
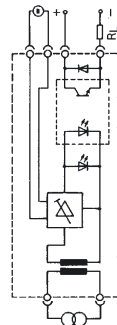
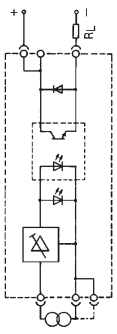
SMSI AC O

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



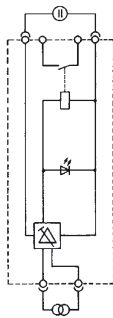
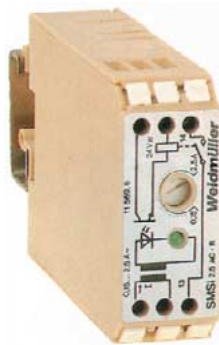
| Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. |
|--------------------------|------------|-------------------------|------------|------------------|------------|------------------|------------|------------------|------------|
| SMSI 0.25 AC O | 1156460000 | 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 Vav | | 5...250 Vac | | 5...250 Vac | |
| 300 mA | | 2.8 A | | 1 A...5 A | | 1 A...5 A | | 1 A...5 A | |
| - | | - | | - | | - | | - | |
| 1075 mVA | | 250 mVA | | - | | - | | - | |
| 40 mA...250 mA | | 0.2 A...2.2 A | | - | | - | | - | |
| ≤ 5% | | ≤ approx. 35% | | - | | - | | - | |
| ≤ 40 ms | | ≤ 55 ms | | ≤ 10 ms | | ≤ 10 ms | | - | |
| ≤ 15 ms | | ≤ 20 ms | | ≤ 20 ms | | ≤ 20 ms | | - | |
| < 4.3 V~eff (I = 250 mA) | | < 100 mV~eff (I = 10 A) | | < 200 mV | | < 200 mV | | < 200 mV | |
| 5 V...50 V~ | | 5 V...50 V~ | | 24 Vuc ± 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 Vuc ± 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

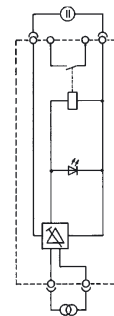
SMSI DC R

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

10 V...250 Vdc
350 mA
750 mVA (I = 250 mA)
≤ 3 V (I = 250 mA)
40 mA...250 mA~
2% (250 mA)<IHY<10% (40 mA)
-
≤ 12 ms
-
250 V
3 A
24 V~ ±10%
250 mW/450 mVA
8 A
1 NO¹⁾
AgNi, gold-flashed

10 V...250 Vac
300 mA
1075 mVA (I = 250 mA)
≤ 3 V (I = 250 mA)
40 mA...250 mA~
≤ 5%
≤ 25 ms
≤ 15 ms
-
250 V
3 A
24 V~ ±10%
250 mW/450 mVA
8 A
1 NO¹⁾
AgNi, gold-flashed

Storage temperature
Ambient temperature
-, assembled without spacing on TS
-, assembled with ≥ 20 mm spacing on TS

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

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

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

Overvoltage category, input, output
Overvoltage category, input1-input2,
Output1-output 2, input-output
Contamination class

II
III
2

II
III
2

Dimensions and connection data

see page 307

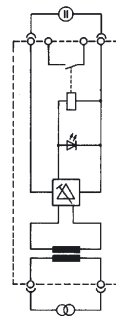
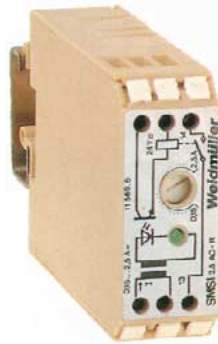
Fig. V
1) NC on request

Fig. V

Current Monitoring

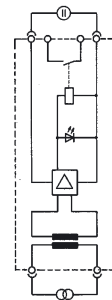
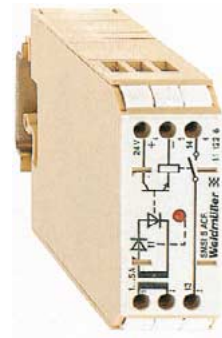
SMSI AC R

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. |
| SMSI 2.5 AC R | 1156960000 |

Technical data

| | |
|--|------------------------|
| Measurement circuit voltage | 10 V...250 Vac |
| Max. permissible current in measurement circuit | 3 A |
| Rated consumption ~ (VA) | 250 mVA (I = 2.5 A) |
| Voltage drop at input | < 0.1 V (I = 2.5 A) |
| Adjustable switching threshold | 0.2...2.2 A |
| 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 ¹⁾ |
| 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, Output1-output 2, input-output | III |
| Contamination class | 2 |

Dimensions and connection data

see page 307

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

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

| | |
|-----------------------------|----------------|
| Measurement circuit voltage | 10 V...250 Vac |
| 1 A...5 A | |

| | |
|---|------------------------|
| Rated consumption ~ (VA) | 1 VA (I = 5 A) |
| Voltage drop at input | < 1 VA (I = 5 A) |
| Hysteresis between turn-on and turn-off point | - |
| Activation time tA | - |
| Reaction time tR | - |
| Recovery | - |
| Output voltage | 250 V |
| Max. continuous output current | 3 A |
| Auxiliary voltage | 24 Vdc ±10% |
| Rated consumption auxiliary voltage | - |
| Max. switching current | 8 A |
| Contact | 1 NO ¹⁾ |
| 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 |

| | |
|-------------------------------------|----|
| Overvoltage category, input, output | II |
|-------------------------------------|----|

| | |
|---|-----|
| Overvoltage category, input1-input2, Output1-output 2, input-output | III |
| Contamination class | 2 |

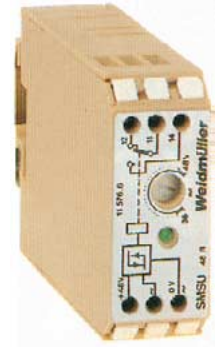
Fig. V

Voltage Monitoring

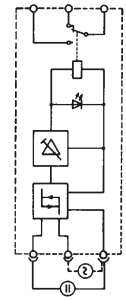
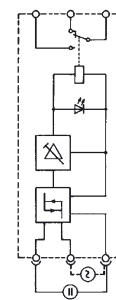
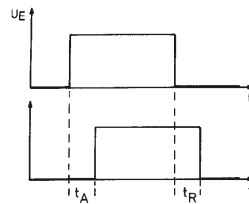
- Voltage monitoring from 18 to 299 V
- One and three phase version
- Adjustable switching threshold

SMSU 24 R

SMSU 48 R



Block diagram/ timing diagram



Ordering data

| Type | Cat. No. | Type | Cat. No. |
|-----------|-----------|-----------|-----------|
| SMSU 24 R | 115760000 | SMSU 48 R | 115766000 |

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 ≥ 20 mm spacing on mounting rail

18 Vdc...27 Vdc or
 18 Vac...27 Vac/50 Hz

< 0.8 W
 < 0.9 VA

18 Vuc...24 Vuc

1%...10%/5%

< 4 s

< 300 ms

36 Vdc...53 Vdc or
 36 Vac...53 Vac/50 Hz

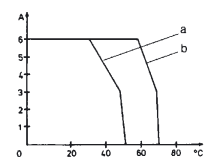
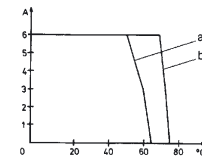
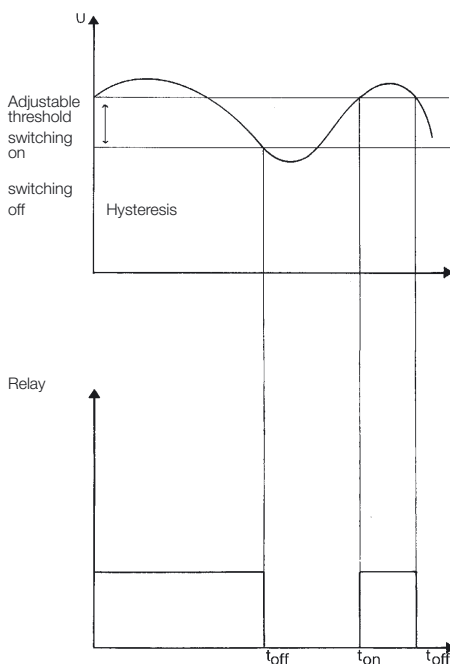
< 1 W
 < 1.5 VA

36 Vuc...48 Vuc

1%...10%/5%

< 2.5 s

< 300 ms



| | |
|--|------------------------|
| Max. output voltage | 250 V~ |
| Max. switching current | 8 A |
| Max. continuous output current | 3 A |
| Contact | 1 changeover contact |
| Contact material | AgNi 0.15 gold-flashed |
| Switching capacity (resistive load) | 2000 VA |
| Fuse | |
| Storage temperature | -40 °C...+60 °C |
| Ambient temperature | |
| - , assembled without spacing on TS | -25 °C...+50 °C |
| - , assembled with ≥ 20 mm spacing on TS | -25 °C...+60 °C |
| 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 | |

| | |
|--|------------------------|
| Max. output voltage | 250 V~ |
| Max. switching current | 8 A |
| Max. continuous output current | 3 A |
| Contact | 1 changeover contact |
| Contact material | AgNi 0.15 gold-flashed |
| Switching capacity (resistive load) | 2000 VA |
| Fuse | |
| Storage temperature | -40 °C...+60 °C |
| Ambient temperature | |
| - , assembled without spacing on TS | -25 °C...+50 °C |
| - , assembled with ≥ 20 mm spacing on TS | -25 °C...+60 °C |
| 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 | |

SMSU 110 R

SMSU 220 R

SMSU 260 R

SMSU 3x220 R

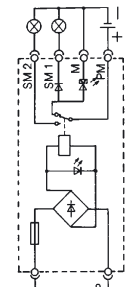
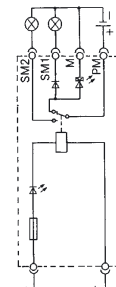
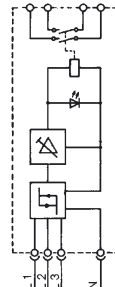
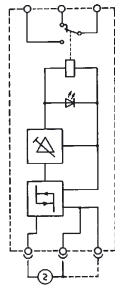
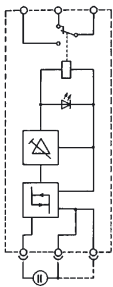
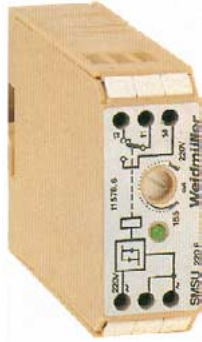
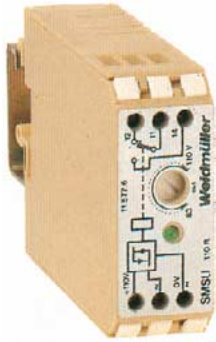
Three-phase with adjustable switching threshold

SMSU 1-24 DC

Single-phase without switching threshold

SMSU 1-230 AC/DC

Single-phase without adjustable switching threshold



| Type | Cat. No. |
|------------|------------|
| SMSU 110 R | 1157760000 |

| Type | Cat. No. |
|------------|------------|
| SMSU 220 R | 1157860000 |

| Type | Cat. No. |
|------------|------------|
| SMSU 260 R | 1160160000 |

| Type | Cat. No. |
|--------------------|------------|
| SMSU | |
| 3x220 R, 2 NO | 1156560000 |
| 3x220 R, 1 NC/1 NO | 1178760000 |

| Type | Cat. No. |
|------------|------------|
| SMSU 24 DC | 0555060000 |

| Type | Cat. No. |
|----------------|------------|
| SMSU 230 AC/DC | 0555160000 |

| |
|-------------------------------|
| 83 Vdc...121 Vdc or |
| 83 Vac...121 Vac/50 Hz |
| < 1.6 W |
| < 1.5 W |
| 83 Vuc...110 Vuc |
| 1%...10%/5% |
| - |
| < 4 s |
| < 300 ms |

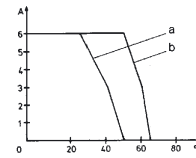
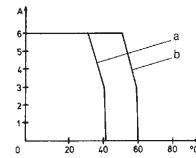
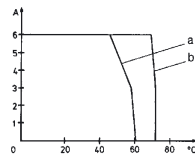
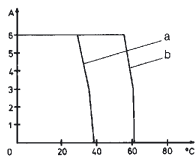
| |
|--------------------------------|
| 165 Vac...253 Vac/50 Hz |
| - |
| < 10 VA |
| 165 Vac...220 Vac |
| 1%...15%/5% |
| - |
| < 3 s |
| < 2 s |

| |
|------------------------------|
| 200 V...299 Vac/50 Hz |
| - |
| < 10 VA |
| 200 V...260 V |
| 1%...15%/5% |
| - |
| < 3 s |
| < 2 s |

| |
|------------------------------|
| 165 V...230 Vac 50 Hz |
| - |
| 9 VA (L3); 60 mA (L 1/L 2) |
| 150 V~...205 V~ |
| -7% |
| - |
| < 4 s |
| < 80 ms |

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

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



| |
|------------------------|
| 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 |

| |
|------------------------|
| 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 |

| |
|------------------------|
| 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 |

| |
|--|
| 250 V~ |
| 8 A |
| 3 A |
| 2 NO (115656) |
| 1 NO/1 NC (117876) |
| AgCdO, gold-flashed |
| 5x10 ⁷ switching operations |
| 2x10 ⁸ switching operations |
| 10 ⁸ switching operations |
| -40 °C...+60 °C |
| -5 °C...+40 °C |
| -5 °C...+55 °C |

| |
|--------------------------------------|
| 24 V~ ± 10% |
| 1 A |
| 1 changeover contact |
| AgNi, gold-flashed |
| 10 ⁸ switching operations |
| 100 mA |
| -40 °C...+60 °C |
| -25 °C...+40 °C |
| -25 °C...+50 °C |

| |
|--------------------------------------|
| 24 V~ ± 10% |
| 1 A |
| 1 changeover contact |
| AgNi, gold-flashed |
| 10 ⁸ switching operations |
| 100 mA |
| -40 °C...+60 °C |
| -25 °C...+40 °C |
| -25 °C...+50 °C |

- II
- III
- 2

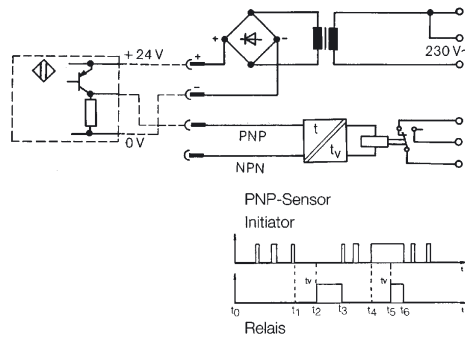
Movement and Rotational Speed Monitoring

SMS SIZA

Rotational speed monitoring



Block diagram



Ordering data

| Type | Cat. No. |
|----------|------------|
| SMS/SIZA | 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 +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

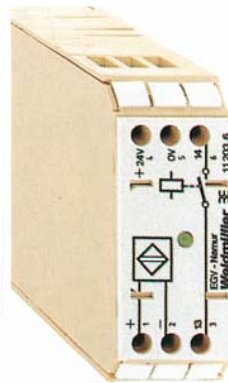
| | |
|---------------------------------|----------------------|
| Rated voltage | 300 V |
| Rated surge voltage | 4 kV |
| Overvoltage category | III |
| Contamination class | 2 |
| Clearance and creepage distance | ≥ 3 mm |
| EMC | EN 50 081-1/50 082-2 |

Accessories and dimensions see page 307

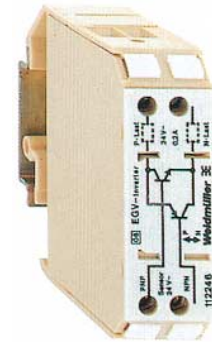
Fig. VI

Namur Switch Amplifiers

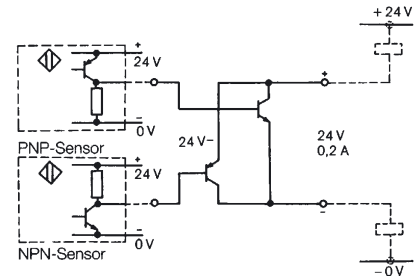
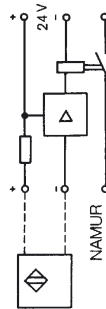
EGV-Namur



EGV-Inverter



Block diagram



Ordering data

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

| Type | Cat. No. |
|--------------|------------|
| EGV Inverter | 1122460000 |

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 ± 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 ± 10% (closed circuit current < 10 mA) |
| 24 Vdc ± 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 | ≥ 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

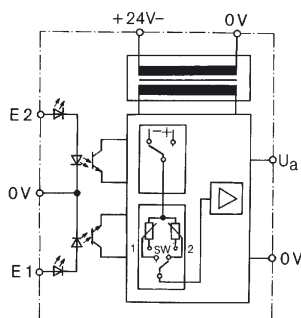
- Set point generator
- switchable $-10.5\text{ V}/+10.5\text{ V}$



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...10.5 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 V = set point 1, 24 V = set point 2,

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



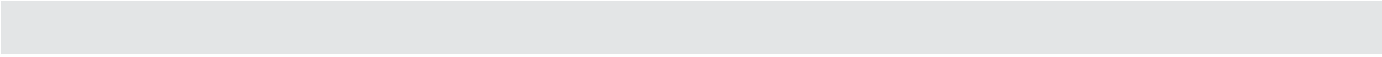
electronic changeover switch

Ordering data

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

Technical data

| Input signal/measurement range | 0=0 V, 1=+24 V |
|--|---|
| Control voltage | 24 V $\pm 20\%$ |
| Max. input current | $\leq 7\text{ mA}$ at 24 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 V/ μs |
| Supply voltage U_B | 24 V $\pm 20\%$, 30 mA ($R_L = \infty$) |
| Residual ripple | 30 mV/106 kHz (at U_{max}) |
| Reaction time | rising 50 μs decreasing 80 μs |
| Isolation voltage, voltage strength | |
| Input/output/supply | 1 kV- |
| Input-Output/TS | 4 kV _{eff} |
| Storage temperature | $-20\text{ }^\circ\text{C} \dots +70\text{ }^\circ\text{C}$ |
| Operating temperature | 0 $^\circ\text{C} \dots +50\text{ }^\circ\text{C}$ |
| Insulation coordination according to EN 50 178 | |
| Overtoltage 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



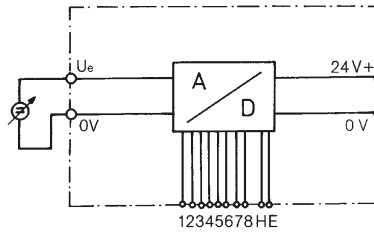
RS/I-D 8



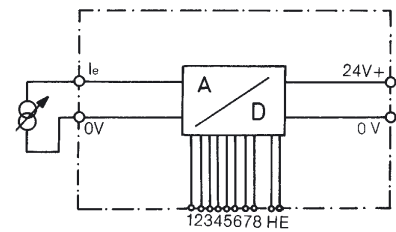
Functions table (example)

| Terminal PIN | | | | | | | | Digital value/ digital value | Analog voltage 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 | 0 | 1 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | |
| - | - | - | - | - | - | - | - | - | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | +10 V |

Block diagram



Block diagram



Ordering data

| | |
|----------|------------|
| Type | Cat. No. |
| RS/U-D 8 | 1122361001 |

| | |
|----------|------------|
| Type | Cat. No. |
| RS/U-D 8 | 1160361001 |

| | |
|----------|------------|
| Type | Cat. No. |
| RS/I-D 8 | 1160561001 |

| | |
|----------|------------|
| Type | Cat. No. |
| RS/I-D 8 | 1168561001 |

Technical data

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

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

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

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

¹⁾ 1 LSB-Accuracy

²⁾ Enable: 24 V = tristate
0 V = free conversion

8-Bit Digital/Analogue Converters

RS/D 8-U

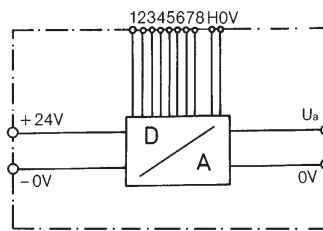


RS/D 8-I



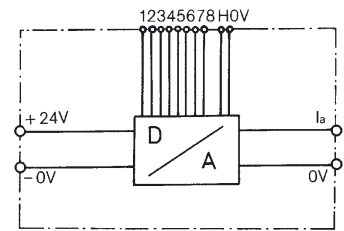
Block diagram

Pin assignment



Block diagram

Pin assignment

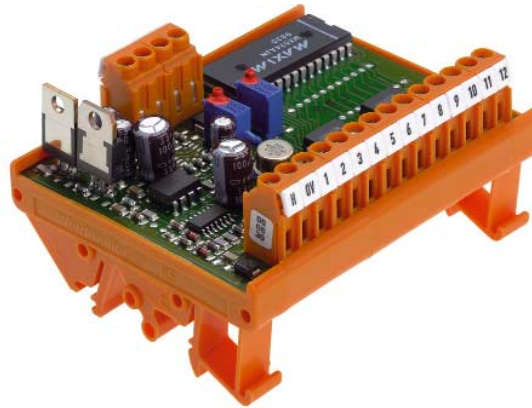


| Ordering data | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. |
|--------------------------|--|-----------------------------|--|--------------|--|--------------|--|--------------|
| | | RS/D 8-U | 1123361001 | RS/D 8-U | 1160761001 | RS/D 8-I | 1165861001 | RS/D 8-I |
| Technical 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 (plus output current) | | 24 V-, ±20 %, 25 mA (plus output current) | | 24 V-, ±20 %, 25 mA (plus output current) | | 24 V-, ±20 %, 25 mA (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 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 | | | | | | | | |

12-Bit Analogue/Digital Converters

Hold function (H):

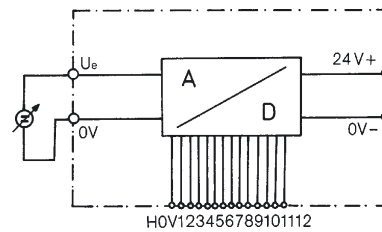
The converter can, for example, by means of the hold function (H) be matched to the cycle time of a PLC. Holding and release of the conversion. The Hold input (H) is internally connected to 0 V via a resistor. In order to store the last signal, the hold input (H) must be supplied with 24 V.



Functions table (example)

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

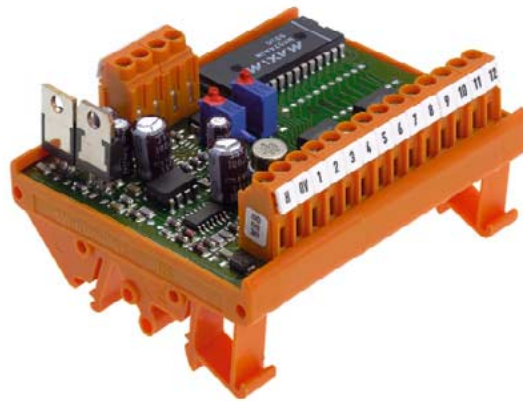
Block diagram



Ordering data

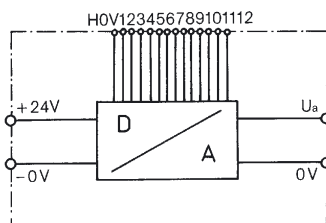
| Ordering data | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. | Type | Cat. No. |
|--------------------------------|---|------------|---|------------|---|------------|---|------------|
| | RS/U-D 12 | 1168261001 | RS/U-D 12 | 1168361001 | RS/I-D 12 | 1168461001 | RS/I-D 12 | 1169161001 |
| Technical data | | | | | | | | |
| Input signal/measurement range | -10...+10 V | | 0...10 V | | 0...20 mA | | 4...20 mA | |
| Max. input voltage | ±15 V | | 15 V | | 30 mA | | 30 mA | |
| Max. input current | | | | | 500 Ω | | 500 Ω | |
| Input resistance | 100 kΩ | | 100 kΩ | | 4.9 μA c 1 LSB | | 4 μA c 1 LSB | |
| Prefix | MSB: H c positive, L c negative | | | | | | | |
| Resolution | 4.88 mV c 1 LSB | | 2.44 mV c 1 LSB | | | | | |
| Output signal | 12 Bit (1 Bit prefix) | | 12 Bit | | 12 Bit | | 12 Bit | |
| 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: | 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 _{nom} | 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 12 MSB | | Terminal 1 LSB : : : Terminal 12 MSB | | Terminal 1 LSB : : : Terminal 12 MSB | | Terminal 1 LSB : : : Terminal 12 MSB | |
| Hold function: | High c +24 V c storage of analogue signal Low c 0 V c enabling the conversion cycle | | High c +24 V c storage of analogue signal Low c 0 V c enabling the conversion cycle | | High c +24 V c storage of analogue signal Low c 0 V c enabling the conversion cycle | | High c +24 V c storage of analogue signal 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 | | | | | | | | |

Analogue Signal Processing