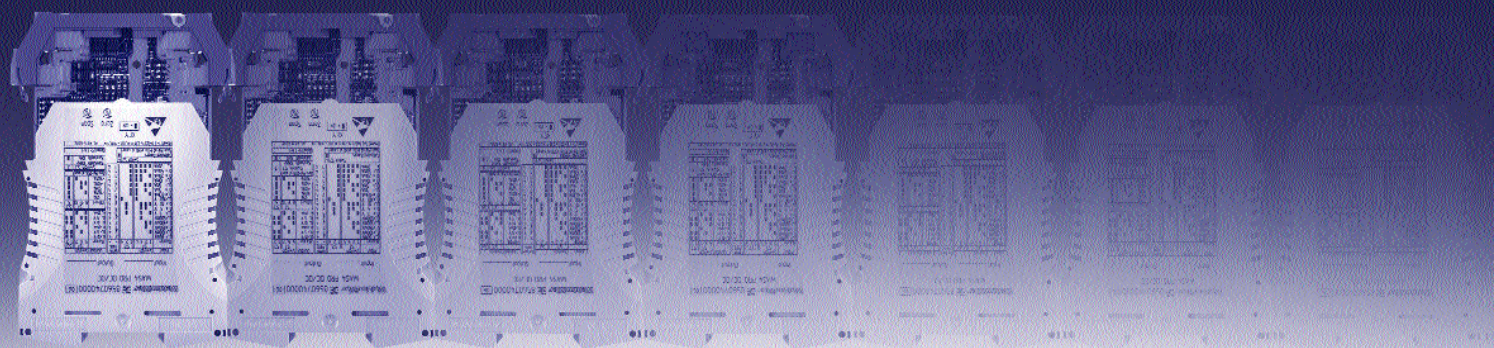


ANALOG SIGNAL CONDITIONING ANALOG SIGNAL CONDITIONING



WAVESERIES MICROSERIES MCZ SERIES
WAVESERIES MICROSERIES MCZ SERIES
WAVESERIES MICROSERIES MCZ SERIES

PRODUCT INFORMATION

When good enough just isn't good enough

Weidmüller 

Table of contents	Page
Preface	3
Description of technical data	4
Examples of application	7
Analog Signal Conditioning - overview	8
WAVESERIES and the benefits	12
MCZ / MICROSERIES and the benefits	13
DC Signal Conditioners	14
WAVEANALOG PRO DC/DC and the benefits	28
DC/DC Signal Conditioners	30
DC Alarm Conditioners	32
PT100 / RTD / Thermo - Signal Conditioners	35
Frequency Signal Conditioners	46
Bridge Signal Conditioners	49
Interface Converter	50
Current monitoring up to 60A ac/dc	51
Current monitoring	52
Voltage monitoring	56
Power supply	57
Dimensions / Accessories	58

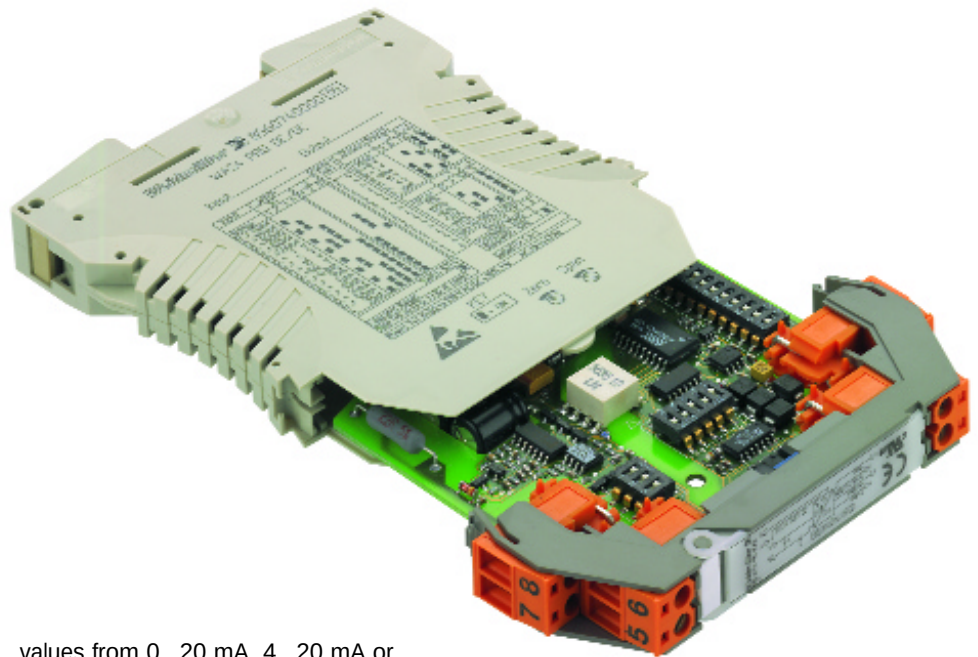
Preface

The real world can be measured in many ways, for example, via temperature, humidity, air pressure and so on. The parameters of these different physical quantities change continuously.

Elements that check the status and changes in status of a given environment, and then report on this changed environment, must reflect these continual changes. Within the framework of industrial monitoring tasks, the status of an environment is monitored using sensors.

Sensors have the task of providing signals that enable connected evaluating and monitoring installations to draw detailed conclusions concerning the status of, for example, a production process. The sensor signals reflect the continuous changes in the monitored range. The signals can be in analog or digital form; which means in normal cases, an electrical voltage or current value is produced that corresponds, in proportion, to the monitored physical quantities.

Increasing automation with the intention of achieving or maintaining a certain status makes the processing of analog values increasingly important. This is also true of fields beyond those where this has been necessary and standard for a long time, for example, in processing technology in the chemical industry. Electrical signal values are standard within the framework of this processing technology. Current

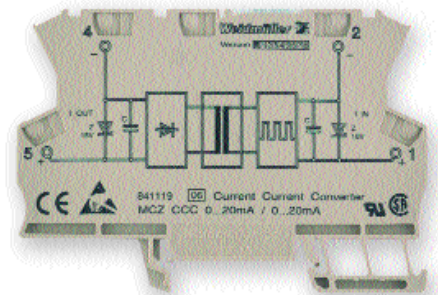


values from 0...20 mA, 4...20 mA or voltage values from 0...10 V have been introduced as sensor output values for differing physical quantities.

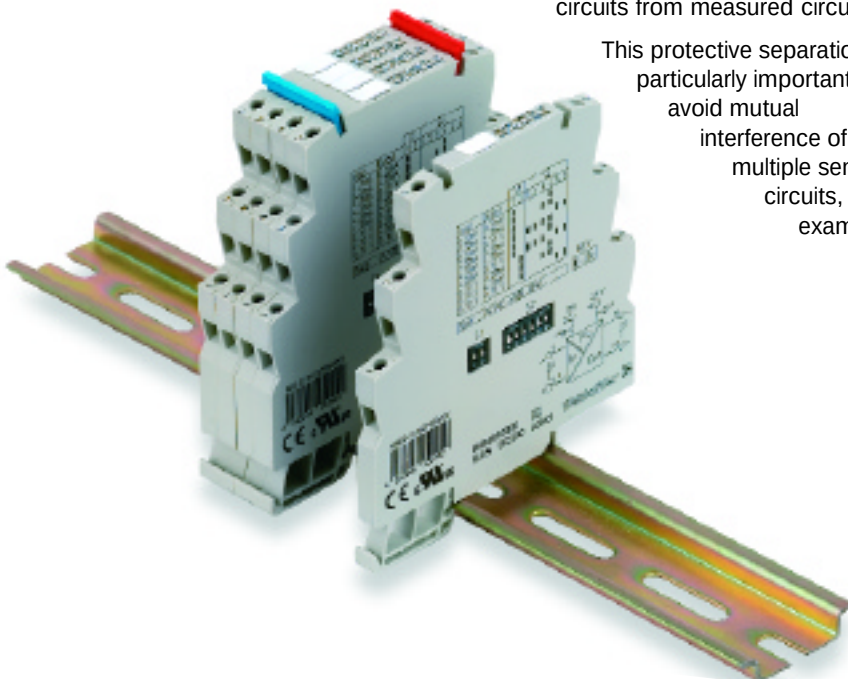
Weidmüller is supporting the need for increasing automation with the processing of these analog signals and is offering a wide range of products that are designed to deal with the demands required when handling sensor signals. This means units are made available for standard signals (0...20 mA, 4...20 mA, 0...10 V) that generate output signal values proportional to the variable input signals, and at the same time enable the protective separation of, for example, sensor circuits from measured circuit.

This protective 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, separating and monitoring signals. The different designs in connection with the respective function covers practically all applications in industrial measurement technology.



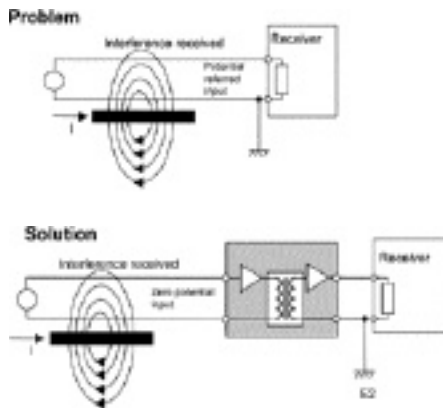
With these new products, Weidmüller is offering the option of taking into account the demands of modern automation technology by incorporating analog signals. These products guarantee an elementary function between signals from the field and the local control system. The mechanical characteristics of these products correspond to those of the well-known Weidmüller products and are part of an ongoing concept. The signal conditioners can be used together with other Weidmüller products. They have been electrically and mechanically designed so that only a minimum of wiring and maintenance costs are required.





Common Mode Noise Elimination

- Generally, signals emitted by sensors have low levels and are thus susceptible to capacitive and inductive interference, such as those generated by motors, frequency changers and other change processes. This noise contents the measuring value and frequently destroy expensive analog I/O cards in the control electronics. Through the utilisation of analog signal isolators this interference, which usually action both signal lines in common mode (push push), is effectively eliminated through the zero potential input.



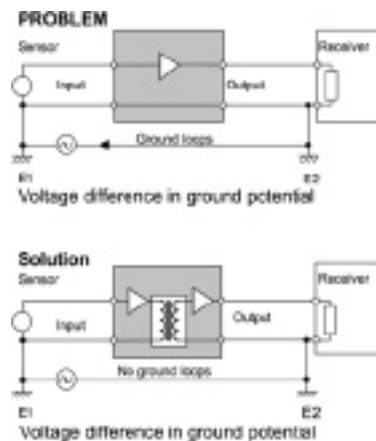
Active Isolator / Passive Isolator

- Active isolators draw their power supply from a separate supply terminal to ensure that they can operate perfectly. Depending upon the applications the input, output and additionally the power supply are isolated from each other. Only one supply is required for 3-port isolation. However, it is isolated from the input and output circuits. Thus even in the event of a short circuit, surge voltage or reverse polarity, the downstream control electronics cannot be damaged. Isolating the signals between the input and output can be conducted either optically or by transformer barrier depending upon the transfer rate. Active isolators are non interacting, i.e. a change in the load does not exert any influence on an input circuit.

- Passive isolators generate the current required for the supply from the measuring signal. The current required internally is so small that transfer problems do not occur here.
- The feed can be effected from either the input or the output side. Isolation is by transformer barrier. The advantages are: cessation of network influences, outstanding accuracy, low signal delay and low potential requirement. Passive isolators are not non interacting; a change in load in the output circuit will influence the input circuit.

Ground Loops

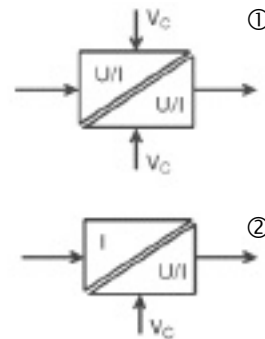
- The voltage supply's secondary side is earthed for the purpose of setting up fast and secure ground loop monitoring. If an analog signal is fed in from a separate voltage supply or if the sensing device itself is earthed, then transient currents will flow between the ground potentials across the interconnected ground connectors, which in turn corrupts the measuring signal. Analog signal isolating amplifiers prevent this form of measuring signal corruption and influence.



2-port Isolation

- The simplest form of analog signal isolator is that of 2-port isolation. It serves to isolate the input circuit from

the output circuit as well as the two auxiliary voltages from each other. Depending upon the isolator design and the observed isolation data one refers here to base isolation (galvanic isolation) or safe separation. ① For current signals, 4...20 mA input current loop fed modules are available. An additional auxiliary voltage for the input circuit is not required with here. ② By connecting the input and output side voltage supplies, the 2-port isolation can be converted to operate as a simple signal converter. This is of particular interest where isolation is not required for an application, but a signal conversion has to be performed.

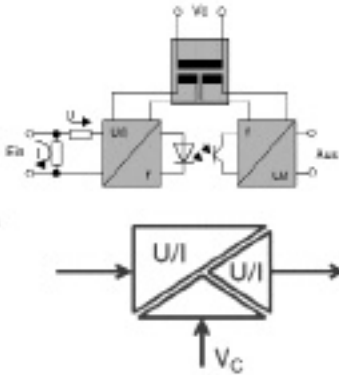


3-port Isolation

- 3-port isolation is the most universal form of signal isolator
- An optical coupler or transformer isolates the input from the output circuit. Together with the clearance and creepage distances it serves to define the isolation level. For example, the input signal is converted by means of pulse-width modulation into a frequency signal and demodulated again on the output side to form an analog value. An amplifier then generates a standardised analog signal. A galvanic isolated DC/DC converter feeds the input and output circuit with a potential free supply voltage. It too determines the isolation level through its data, air and creepage distances. In the case of these three isolation paths

Description of technical data

(input/output, input/auxiliary voltage, output/auxiliary voltage) one refers to 3-port isolation.

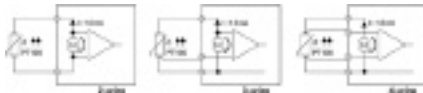


Temperature Signal Measuring Method

- Measurement using resistors (RTD)
When measuring with temperature-dependent resistors a current of approx. 1.5mA is passed through the resistor from a constant current source in the signal converter.
An operational amplifier is used to measure the potential drop at the resistor (2-wire circuit).
In order to take account of lead length, the voltage drop is measured at the return conductor and calculated with double the value (3-wire circuit). This thus simulates the wire resistances from the feed and return lines.
Accurate measurements are achieved by separately measuring the voltage drop at the feed and return lines (4-wire circuit).
The values for the supply lines are calculated against the measured value.

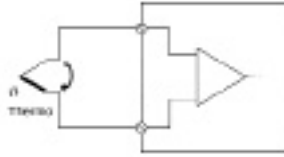
Temperature Signal Measuring Method

- Measurements using thermocouples
When conducting measurements using



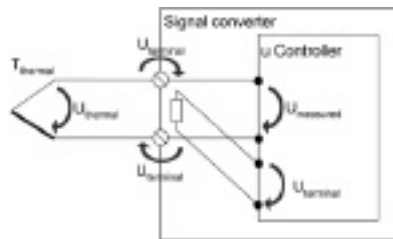
thermocouples the voltage that is generated when two differently alloyed metals come into contact with each other is measured. A differential amplifier is then used to recondition the signal. The easiest (and thus the most cost effective) method of subsequent processing is conducted by means of an amplifier circuit, which converts these

signals into standard signals. High-end components process the measuring signal using a microprocessor, which simultaneously reconditions the signal (filtering, linearization).



Cold Junction Compensation For Thermocouples

- Recording temperatures by using thermocouples encounters the problem of a thermal voltage forming at the clamping terminals on the signal converter on account of the different materials in the conductors and bus bar. This voltage then counteracts the thermal element's voltage.
In order to compensate for the error to the measured value which arises here, the temperature is measured at the clamping terminal. The microprocessor in the signal converter reads the value measured there and calculates it against the measured value.



This procedure is known as cold junction compensation.

$$\begin{aligned} & \text{Voltage at the measuring point (V}_{\text{meas}}) \\ & + \text{Voltage at the terminal (V}_{\text{terminal}}) \\ & = \text{Voltage at the thermocouple (V}_{\text{thermo}}) \\ \Rightarrow & \text{Temperature at the thermocouple (T}_{\text{thermo}}) \end{aligned}$$

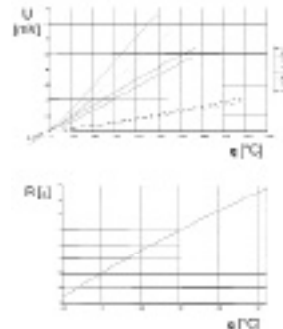
Linearisation

- Temperature-dependent components do not normally have linear characteristic curves. To ensure that further processing can take place with the necessary accuracy, these characteristic curves have to be linearised to some extent.

The graph showing measurements of thermocouples, in particular, reveals significant deviations at some points from the "ideal graph". As a consequence, the signal which has been measured is worked up by a

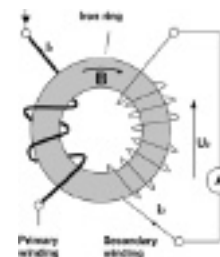
microprocessor. The microprocessor compares the value measured with the characteristic curve for the thermocouple in its memory and calculates the corresponding value on the "ideal characteristic curve". At the output, it supplies the latter to an amplifier, which produces the analog value in linear form. The output stage converts this into a standardised value or into a switching output with a switching threshold.

The linearisation of PT100-elements can be undertaken via simple amplifier stages. The first stage corrects the peak value of the graph of the measurements. The deviation at the end of the graph resulting from this is corrected by a second stage. The under- and overshooting generated in this way is very slight and is covered by the tolerance for the module.



Current Measurement Using A Measuring Transformer

- Transformer principle Each conductor through which current flows is surrounded by a magnetic field H, the intensity of which is proportional to the current. The field, which is bundled in a magnetic core, generates a magnetic flux B, through which suitable sensors are used to measure current. Converters with transformer-type couplings are used to establish the most cost effective measurement method for simple sinusoidal currents. The current to be measured flows directly through the measuring transformer's primary winding. The secondary winding supplies the measuring electronics with a

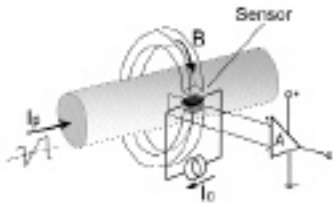


Description of technical data

proportional current signal. Because of power loss this method of measuring current is limited to smaller currents up to 5A. These converters react sensitively to peak loads and therefore have to be fused on the primary winding side.

Measuring Current Using A Hall-type Sensor

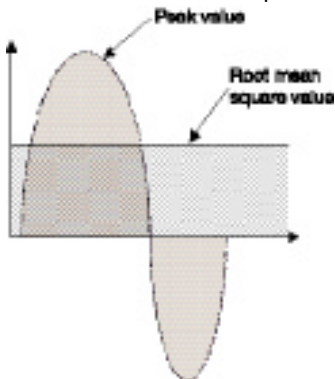
- Hall-type sensor principle
Hall-type sensors also measure the magnetic flux B and supply a proportional voltage at the measured output, which is then reconditioned to form a standard signal by an amplifier



- circuit.
- Components with Hall-type sensors are ideally suited to measuring higher currents, as any possible high residual currents from motors or peak loads cannot damage the component. Additionally, they are also ideal for measuring direct and alternating currents of various curve shapes.

Root Mean Square Measurement / Crest Factor

- The root mean square value (r.m.s) of a sinusoidal shaped alternating current is the value, which in an ohmic resistor converts the same (effective) output as that of an equal sized direct current.
- Non sinusoidal shaped signals can only be measured with "True RMS" capable devices and/or further processed.



- True RMS = True root mean square
- Root mean square measurement is required where the (effective) output content of alternating voltages or currents are to be measured or evaluated.
- The crest factor indicates the ratio of the crest factor to the root mean square value.

Load / Load Resistor

- The load is a load resistor on the output side of a measuring transducer or isolating amplifier.
For current outputs the load is generally 500 ohm.
Voltage outputs usually have a 10KOhm load.

Galvanic Isolation / Safe Separation

- Galvanic isolation is understood to mean an electrical isolation between the input and output circuit and the circuit's supply voltage. It can be set up either optically using an opto coupler or with a transformer. The isolation serves to safeguard the measuring circuit against damage and to eliminate ground loops, which could cause the measured signal to be corrupted.
- Safe separation is specified under the German DIN VDE 0106 Section 101 standard. This fundamental safety standard is intended to safeguard persons against hazardous body currents and describes the basic requirements for safe separation in electrical operating equipment. Thus, for instance, the voltage supply of 50V ac/120V dc as under 50178 may not be exceeded. If this voltage is exceeded a reinforced or double insulated and thus an increase in the clearance and creepage distances is stipulated.

Cut-off Frequency

- Cut-off frequencies indicate the dynamic transfer characteristic of an isolation amplifier.
- The given frequency is the (-3dB) limit, at which a distinct change occurs to the signal.
- An increased cut-off frequency leads to a transmission of higher-frequency alternating components, which corrupts the required signal.

Hysteresis

- Hysteresis indicates the percentage difference between the input and output points of a switching contact. It should not be lower than a given minimum value, as otherwise a specified chase can no longer be implemented.

Broken-wire Detection

- When measuring transformers with broken wire detection the input signal is monitored permanently. In the event of a fault (broken wire) the output signal exceeds its rated range. The downstream control circuit can then analyse the fault case.

Response Time

- Response time refers to the change in output signal for an input signal jump(10...90%). It is directly related to the cut-off frequency (inversely proportional).

Accuracy / Temperature Coefficient

- Accuracy describes the capability of a measuring device to deliver a measured value as accurately as possible. It relates to the end value and is given for ambient temperature (23°C).

Example:

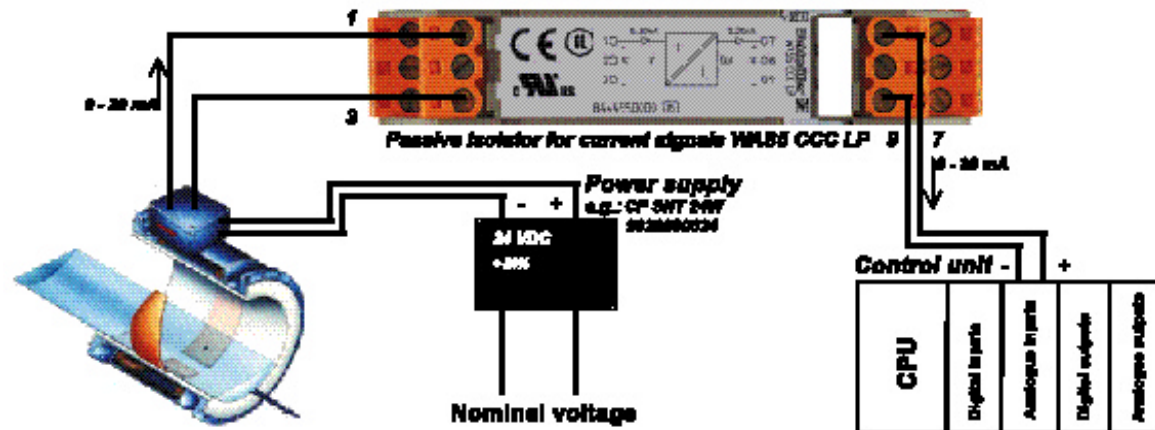
An RTD is given with an accuracy of 1%. The measuring range is set to 0-200 °C. The expected effective error of:
 $200 \times 1\% = \pm 2K$

applies across the entire measurement range.

- Temperature coefficient describes the deviations in accuracy of the measuring devices dependent on the ambient temperature. It is given as a % or in parts per million / Kelvin (ppm / K).
Example:

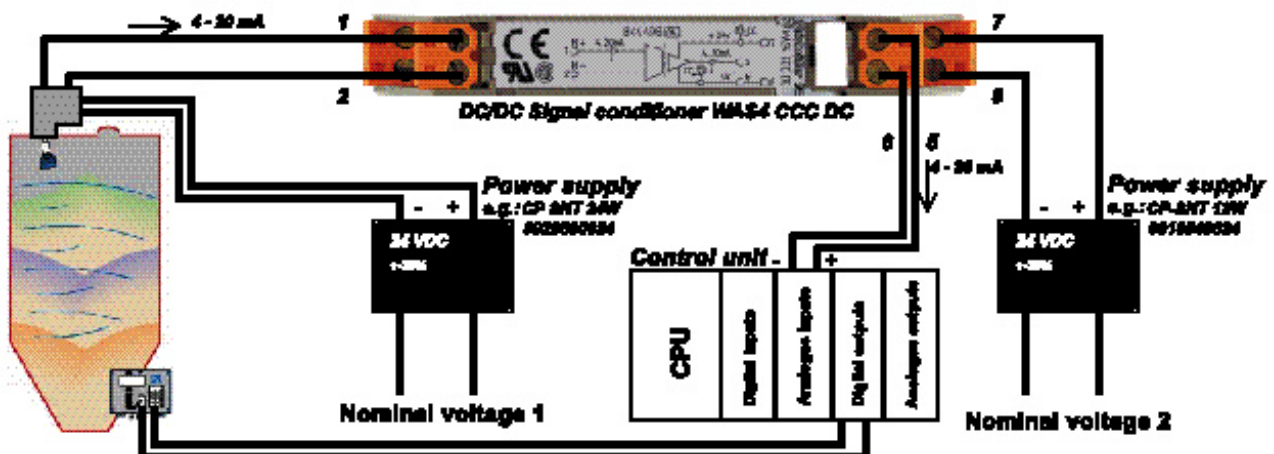
An RTD with an accuracy of 1% and a measuring range of 0-200 °C has a temperature coefficient of 250 ppm / K. If the device is operated at +40°C, it will then contribute the following to an expected absolute error:
 $(([40^{\circ}C - 23^{\circ}C] \times 250ppm/K) + 1\%) \times 200K$
 $= \pm 2,85K$
across the entire measurement range.

Magnetic – Inductive flow measurement

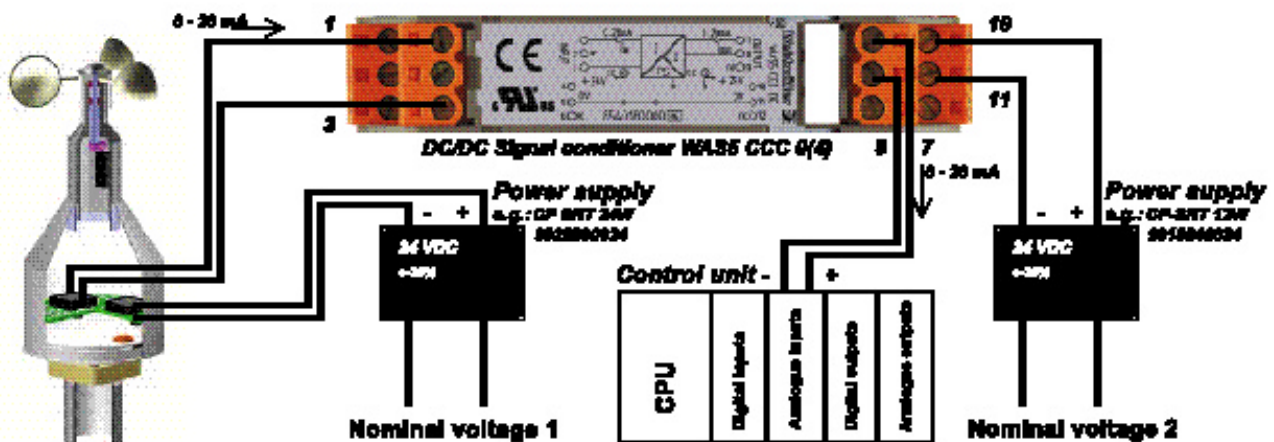


Magnetic – Inductive flow measurement

Level measurement with microwaves



Wind speed measurement

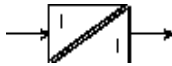


ANALOG SIGNAL CONDITIONING - overview

Signal Conditioners DC/DC

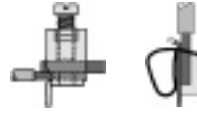
- **Loop Powered Isolator**
 - Input loop powered
 - Output loop powered
 - Loop splitter
- **2-way-isolation**
 - Signal Conditioner with voltage supply on output side
 - Signal Conditioner with voltage supply on both sides

Loop Powered Isolator
(Input Loop Powered)



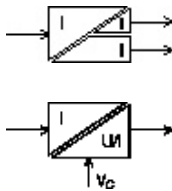
Input

Output

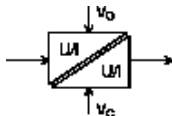


Signal conversion		Connecton type	Type	Part No.	Page
Loop Powered Isolator					
Input loop powered					
1-channel					
0(4) ... 20 mA	0(4) ... 20 mA	X	WAS5 CCC LP	8444950000	17
0(4) ... 20 mA	0(4) ... 20 mA	X	WAZ5 CCC LP	8444960000	17
0(4) ... 20 mA	0(4) ... 20 mA	X	MCZ CCC	8411190000	16
2-channel					
0(4) ... 20 mA	0(4) ... 20 mA	X	WAS5 CCC LP	8463580000	17
0(4) ... 20 mA	0(4) ... 20 mA	X	WAZ5 CCC LP	8463590000	17
Output loop powered					
0(4) ... 20 mA	0(4) ... 20 mA	X	WAS5 CCC OLP	8543720000	14
0(4) ... 20 mA	0(4) ... 20 mA	X	WAZ5 CCC OLP	8543730000	14
Loop splitter					
4 ... 20 mA (1 Kanal)	4 ... 20 mA (2 Kanäle)	X	WAS5 CCC 2OLP	8581160000	15
4 ... 20 mA (1 Kanal)	4 ... 20 mA (2 Kanäle)	X	WAS5 CCC 2OLP	8581170000	15
Signal Conditioner with voltage supply on output side					
4 ... 20 mA	4 ... 20 mA	X	WAS4 CCC DC	8444980000	18
4 ... 20 mA	4 ... 20 mA	X	WAZ4 CCC DC	8444990000	18
4 ... 20 mA	0 ... 20 mA	X	WAS4 CCC DC	8445010000	18
4 ... 20 mA	0 ... 20 mA	X	WAZ4 CCC DC	8445020000	18
4 ... 20 mA	0 ... 10 V	X	WAS4 CVC DC	8445040000	18
4 ... 20 mA	0 ... 10 V	X	WAZ4 CVC DC	8445050000	18
Signal Conditioner with voltage supply on both sides					
0 ... 20 mA	0 ... 20 mA	X	WAS4 CCC DC	8445070000	19
0 ... 20 mA	0 ... 20 mA	X	WAZ4 CCC DC	8445080000	19
0 ... 20 mA	4 ... 20 mA	X	WAS4 CCC DC	8446970000	19
0 ... 20 mA	4 ... 20 mA	X	WAZ4 CCC DC	8446990000	19
0 ... 20 mA	0 ... 10 V	X	WAS4 CVC DC	8447020000	19
0 ... 20 mA	0 ... 10 V	X	WAZ4 CVC DC	8447030000	19
0 ... 10 V	0 ... 20 mA	X	WAS4 VCC DC	8447050000	20
0 ... 10 V	0 ... 20 mA	X	WAZ4 VCC DC	8447080000	20
0 ... 10 V	4 ... 20 mA	X	WAS4 VCC DC	8447100000	20
0 ... 10 V	4 ... 20 mA	X	WAZ4 VCC DC	8447110000	20
0 ... 10 V	0 ... 10 V	X	WAS4 VVC DC	8447130000	20
0 ... 10 V	0 ... 10 V	X	WAZ4 VVC DC	8447140000	20

Signal Conditioner with
voltage supply on output
side



Signal Conditioner with
voltage supply on both
sides



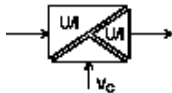
ANALOG SIGNAL CONDITIONING - overview

Signal Conditioners DC/DC

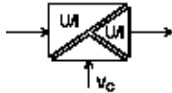
- 3-way-isolation
 - transmission frequency 10 Hz
 - transmission frequency 20 kHz
 - free configurable

DC Alarm conditioners

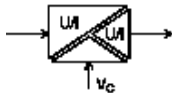
3-way-isolation
transmission
frequency 10 Hz



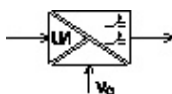
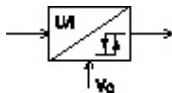
3-way-isolation
transmission
frequency 20 kHz



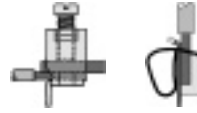
3-way-isolation
(universal)



DC Alarm conditioners



Signal conversion	Connecton type	Type	Part No.	Page
-------------------	----------------	------	----------	------



Input

Output

3-way-isolation transmission frequency 10 Hz				
0 ... 20 mA	0 ... 20 mA	X	WAS5 CCC	8540180000 21
0 ... 20 mA	0 ... 20 mA	X	WAZ5 CCC	8540190000 21
0 ... 20 mA	4 ... 20 mA	X	WAS5 CCC	8540250000 21
0 ... 20 mA	4 ... 20 mA	X	WAZ5 CCC	8540260000 21
0 ... 20 mA	0 ... 10 V	X	WAS5 CVC	8540270000 21
0 ... 20 mA	0 ... 10 V	X	WAZ5 CVC	8540280000 21
4 ... 20 mA	0 ... 20 mA	X	WAS5 CCC	8540200000 22
4 ... 20 mA	0 ... 20 mA	X	WAZ5 CCC	8540210000 22
4 ... 20 mA	0 ... 10 V	X	WAS5 CVC	8540230000 22
4 ... 20 mA	0 ... 10 V	X	WAZ5 CVC	8540240000 22
0 ... 10 V	0 ... 20 mA	X	WAS5 VCC	8540310000 23
0 ... 10 V	0 ... 20 mA	X	WAZ5 VCC	8540320000 23
0 ... 10 V	4 ... 20 mA	X	WAS5 VCC	8540290000 23
0 ... 10 V	4 ... 20 mA	X	WAZ5 VCC	8540300000 23
0 ... 10 V	0 ... 10 V	X	WAS5 VVC	8540330000 23
0 ... 10 V	0 ... 10 V	X	WAZ5 VVC	8540340000 23

3-way-isolation transmission frequency 20 kHz				
0 ... 20 mA	0 ... 20 mA	X	WAS5 CCC HF	8447160000 24
0 ... 20 mA	0 ... 20 mA	X	WAZ5 CCC HF	8447170000 24
0 ... 20 mA	4 ... 20 mA	X	WAS5 CCC HF	8447190000 24
0 ... 20 mA	4 ... 20 mA	X	WAZ5 CCC HF	8447200000 24
0 ... 20 mA	0 ... 10 V	X	WAS5 CVC HF	8447220000 24
0 ... 20 mA	0 ... 10 V	X	WAZ5 CVC HF	8447230000 24
4 ... 20 mA	0 ... 20 mA	X	WAS5 CCC HF	8447250000 25
4 ... 20 mA	0 ... 20 mA	X	WAZ5 CCC HF	8447260000 25
4 ... 20 mA	0 ... 10 V	X	WAS5 CVC HF	8447280000 25
4 ... 20 mA	0 ... 10 V	X	WAZ5 CVC HF	8447290000 25
0 ... 10 V	0 ... 20 mA	X	WAS5 VCC HF	8447310000 26
0 ... 10 V	0 ... 20 mA	X	WAZ5 VCC HF	8447320000 26
0 ... 10 V	4 ... 20 mA	X	WAS5 VCC HF	8447340000 26
0 ... 10 V	4 ... 20 mA	X	WAZ5 VCC HF	8447350000 26
0 ... 10 V	0 ... 10 V	X	WAS5 VVC HF	8447370000 27
0 ... 10 V	0 ... 10 V	X	WAZ5 VVC HF	8447380000 27
-10 ... +10 V	-10 ... +10 V	X	WAS5 VVC HF	8561610000 27
-10 ... +10 V	-10 ... +10 V	X	WAZ5 VVC HF	8587000000 27

3-way-isolation free configurable				
universal		X	WAS4 PRO DC/DC	8560740000 30
universal		X	WAZ4 PRO DC/DC	8560750000 30

0(4) ... 20 mA	0(4) ... 20 mA	X	MAS DC/DC select	8594810000 31
0 ... 10 V	0 ... 10 V			
0(4) ... 20 mA	0(4) ... 20 mA	X	MAZ DC/DC select	8594840000 31
0 ... 10 V	0 ... 10 V			

Alarm Conditioners				
2 times PNP output		X	MCZ SC	8260280000 32
0 ... 10 V	2 times PNP			
2 times PNP output			MCZ SC	8227350000 32
0 ... 20 mA	2 times PNP	X		

0 ... 10 V / 0(4) ... 20 mA	2 CO	X	WAS5 DC/Alarm	8543820000 33
0 ... 10 V / 0(4) ... 20 mA	2 CO	X	WAZ5 DC/Alarm	8543830000 33

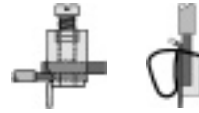
ANALOG SIGNAL CONDITIONING - overview

Signal Conditioners RTD
Thermo Signal Conditioners
Frequency Signal Conditioners
Bridge Signal Conditioners
Interface Converter

- PT100 Select
- PT100 Output select
- RTD universal (3-way-isolation)
- Thermo Select
- Thermo universal (3-way-isolation)
- Frequency Signal Conditioner

- Frequency Signal Conditioner (3-way-isolation)
- Bridge Signal Conditioners (3-way-isolation)
- Interface Converter for RS232 to RS485/TTY

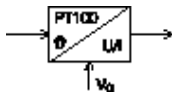
Signal conversion	Connection type	Type	Part No.	Page
-------------------	-----------------	------	----------	------



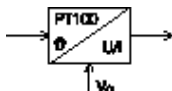
PT 100
Output loop powered



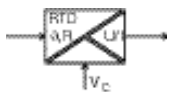
PT 100 Select



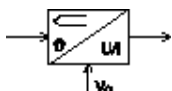
PT 100 Output select
2-way-isolation



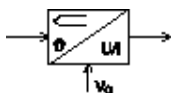
PRO RTD (configurable)
3-way-isolation



Thermo Select



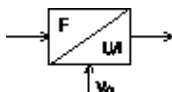
Thermo Output select
2-way-isolation



PRO Thermo (configurable)
3-way-isolation



Frequency Signal
Conditioner



Frequency Signal
Conditioner
(3 way isolation)



Bridge Signal Conditioners
(3 way isolation)



Interface Converter



Input

Output

MCZ PT100 CLP				
PT 100/2/3 0...100°C	4 ... 20 mA	X	MCZ P100/3 CLP	8425720000 35
PT 100/2/3 0...120°C	4 ... 20 mA	X	MCZ P100/3 CLP	8483680000 35
PT 100/2/3 0...150°C	4 ... 20 mA	X	MCZ P100/3 CLP	8604420000 35
PT 100/2/3 0...200°C	4 ... 20 mA	X	MCZ P100/3 CLP	8473010000 35
PT 100/2/3 0...300°C	4 ... 20 mA	X	MCZ P100/3 CLP	8473020000 35
PT 100/2/3 -50...150°C	4 ... 20 mA	X	MCZ P100/3 CLP	8473000000 35
PT 100/2/3 -40...100°C	4 ... 20 mA	X	MCZ P100/3 CLP	8604430000 35

WAVEANALOG PT100 Select

PT100/2	0(4) ... 20 mA	X	WTS4 PT100/2 C	8432210000 37
PT100/2	0(4) ... 20 mA	X	WTZ4 PT100/2 C	8432220000 37
PT100/2	0 ... 10 V	X	WTS4 PT100/2 V	8432180000 37
PT100/2	0 ... 10 V	X	WTZ4 PT100/2 V	8432190000 37
PT100/3	0(4) ... 20 mA	X	WTS4 PT100/3 C	8432150000 38
PT100/3	0(4) ... 20 mA	X	WTZ4 PT100/3 C	8432160000 38
PT100/3	0 ... 10 V	X	WTS4 PT100/3 V	8432090000 38
PT100/3	0 ... 10 V	X	WTZ4 PT100/3 V	8432130000 38
PT100/4	0(4) ... 20 mA	X	WTS4 PT100/4 C	8432270000 39
PT100/4	0(4) ... 20 mA	X	WTZ4 PT100/4 C	8432280000 39
PT100/4	0 ... 10 V	X	WTS4 PT100/4 V	8432240000 39
PT100/4	0 ... 10 V	X	WTZ4 PT100/4 V	8432250000 39

MICROANALOG PT100 output select

PT100 2/3	0... 100°C	X	MAS PT100 output select	8594820000 36
PT100 2/3	0... 100°C	X	MAZ PT100 output select	8594850000 36

WAVEANALOG PRO RTD

universal	X	WAS5 PRO RTD	8560700000 40
universal	X	WAZ5 PRO RTD	8560710000 40

WAVEANALOG Thermo Select

°C	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V	X	WTS4 Thermo Select	8432300000 43
°C	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V	X	WTZ4 Thermo Select	8432310000 43

MICROANALOG Thermo output select

Thermoelement Typ K	X	MAS Thermo-K Output select	8594830000 44
Thermoelement Typ K	X	MAZ Thermo-K Output select	8594860000 44
Thermoelement Typ J	X	MAS Thermo-J Output select	8615210000 44
Thermoelement Typ J	X	MAS Thermo-J Output select	8615240000 44

WAVEANALOG PRO Thermo

°C	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V	X	WAS5 PRO Thermo	8560720000 45
°C	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V	X	WAZ5 PRO Thermo	8560730000 45

MCZ Frequency Signal Conditioner

0...10 V	f-configurable	X	MCZ VFC	8461470000 48
0...20 mA	f-configurable	X	MCZ CFC	8461480000 48
4...20 mA	f-configurable	X	MCZ CFC	8461490000 48

WAVEANALOG PRO Frequency

configurable	configurable	X	WAS4 PRO Freq	8581180000 46
configurable	configurable	X	WAZ4 PRO Freq	8581190000 46

WAVEANALOG PRO Bridge

configurable	configurable	X	WAS5 PRO Bridge	8581200000 49
configurable	configurable	X	WAZ5 PRO Bridge	8581210000 49

WAVEDATA

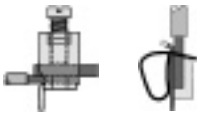
RS232	RS485/422	X	WAS RS232/RS485/422	8615700000 50
RS485	TTY	X	WAS RS232/TTY	8615690000 50

ANALOG SIGNAL CONDITIONING - overview

Current monitoring up to 60 A ac/dc
Voltage monitoring up to 450 Vac_{eff}
Power supply

- Current monitoring with relay output
- Current monitoring with analog output
- Voltage monitoring with analog output
- Power supply 24V/0.5A

Signal conversion	Connection type		Type	Part No.	Page
-------------------	-----------------	--	------	----------	------



Current monitoring		Input		Output				
		WAVECONTROL Current monitoring						
		1/5/10 A ac	relay	X	WAS2 CMR	8516560000	52	
		1/5/10 A ac	relay		X	WAZ2 CMR	8516570000	52
		20/40/60 A ac	relay	X	WAS2 CMR	8513340000	52	
		20/40/60 A ac	relay		X	WAZ2 CMR	8526600000	52
		1/5/10 A ac	0(4) ... 20 mA					
			0 ... 10 V	X	WAS1 CMA	8523400000	53	
		1/5/10 A ac	0(4) ... 20 mA					
			0 ... 10 V		X	WAZ1 CMA	8523410000	53
		1/5/10 A ac	4 ... 20 mA	X	WAS1 LP CMA	8528650000	53	
		1/5/10 A ac	4 ... 20 mA		X	WAZ1 LP CMA	8528660000	53
		5/10 A ac/dc	0(4) ... 20 mA					
			0 ... 10 V	X	WAS2 CMA	8526610000	54	
		5/10 A ac/dc	0(4) ... 20 mA					
			0 ... 10 V		X	WAZ2 CMA	8526620000	54
		20/25/30 A ac/dc	0(4) ... 20 mA					
			0 ... 10 V	X	WAS2 CMA	8545830000	54	
		20/25/30 A ac/dc	0(4) ... 20 mA					
			0 ... 10 V		X	WAZ2 CMA	8545840000	54
		40/50/60 A ac/dc	0(4) ... 20 mA					
			0 ... 10 V	X	WAS2 CMA	8513330000	55	
		40/50/60 A ac/dc	0(4) ... 20 mA					
			0 ... 10 V		X	WAZ2 CMA	8526590000	55

Voltage monitoring		WAVECONTROL voltage monitoring					
		0...450 Vac _{eff}		X	WAS2 VMA Vac	8581220000	56
		0...450 Vac _{eff}			X	WAZ2 VMA Vac	8581230000

Power supply		WAVEPOWER Power supply					
		115-230 Vac	24 Vdc	X	CP-SNT 12W	9918840024	57

Concept

WAVESERIES - a new generation of analog signal conditioners. The WAVESERIES range of modules from Weidmüller brings together the compact, space-saving enclosure design (WAVEBOX) and a wide variety of functions. The product family provides a comprehensive range of signal conditioners.

Independent connection technology – screw-type or tension clamp via pluggable terminal connectors

Mounting without tools

Quick power-up – pluggable circuit board

Standardized current and voltage signals

Minimum wiring thanks to cross-connections

High functionality

Easy selection thanks to clear type designation

Space-saving – more space in switchgear cabinet

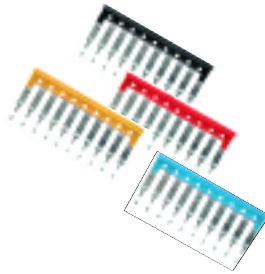
Saves costs

Replacement

The circuit board can be removed from the enclosure without using tools. Just press the locking clips on the head piece, and pull out the circuit board along with the connection terminals.

Cross-connection

Enclosures from the same family, can be joined together using cross-connections in order to connect the supply voltage from one module to another.



Safety

"Safety separation" according to EN 50178 is a standard that nowadays is taken for granted. WAVESERIES fulfils this requirement for the conversion of analog, potentially-separated signals.

The housing (WAVEBOX)

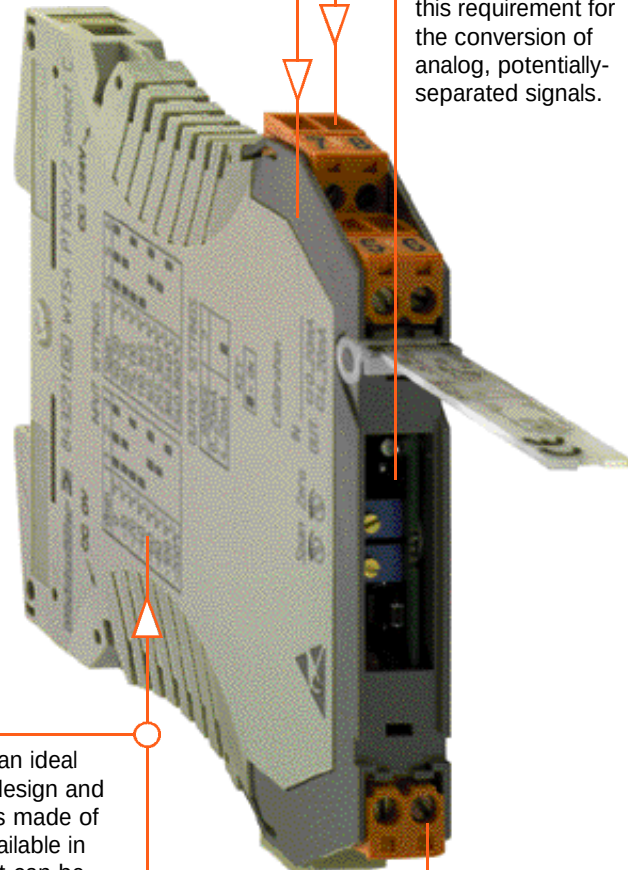
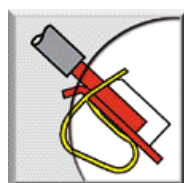
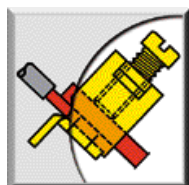
The WAVEBOX enclosure is an ideal combination of technology, design and functionality. The enclosure is made of recyclable plastics, and is available in four different overall widths. It can be mounted without tools. Fulfilling the necessary EMC requirements, the enclosure also provides good thermal dissipation thanks to the ventilation slots on the side.

Coding

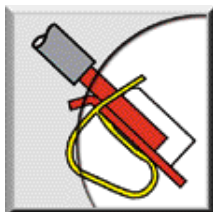
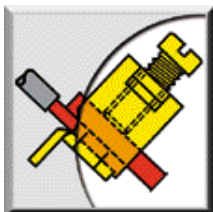
The coding element enables screw-type connections as well as tension clamp connections to be coded without reducing the number of poles. This ensures that the connectors cannot be reversed.

Connection

High flexibility during wiring thanks to BLZ screw-type connections and the BLZF tension clamp connector system (up to 2.5 mm²).



MCZ / MICROSERIES benefits



Connection

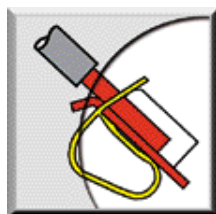
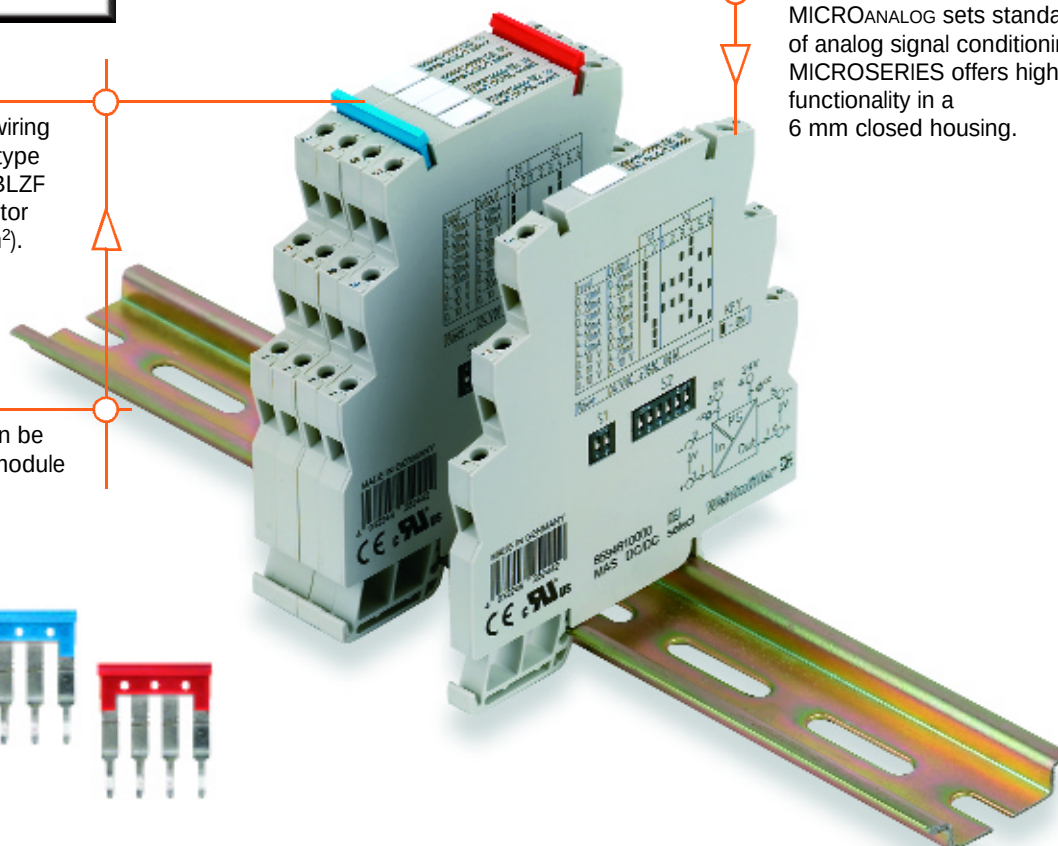
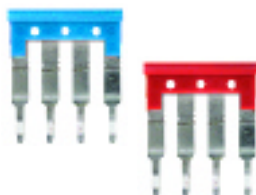
High flexibility during wiring thanks to BLZ screw-type connections and the BLZF tension clamp connector system (up to 2.5 mm²).

Cross-connection

The supply voltage can be connected from one module to another.

Width

MICROANALOG sets standards of analog signal conditioning. MICROSERIES offers high functionality in a 6 mm closed housing.



Connection

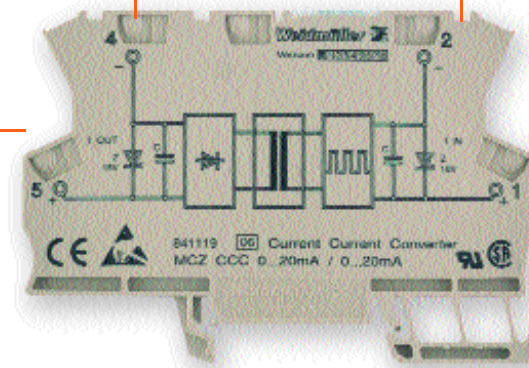
Tension clamp connector

Cross-connection

The power supply is cross connectable from one module to the other.

Width

6 mm width (without end plate) offers MCZ-SERIES enough space for electronic circuits.



DC/DC Loop Powered Isolator(Output loop powered)

WAVEANALOG OLP

- Galvanic isolation
- Output Loop Powered
- Low power consumption
- Input range adjustable by DIP-Switches
- No adjustment required

Approvals:



Schematic circuit diagram



Ordering data

Screw connection

Tension clamp connection

Technical data*

Input (adjustable by DIP-Switches)

Input voltage

Maximum input voltage

Input resistance

Input current

Maximum input current

Input resistance

Output

Output current

Output current limitation

Load resistance

Transmission frequency (adjustable by DIP-Switch)

Response time

Accuracy

Temperature coefficient

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

Supply voltage

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distances

Test voltage

General Data

Operating temperature

Storage temperature

Standards/Specifications

EMC standards

Factory setting

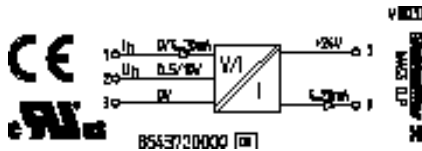
Dimensions L/H/W

Weight

Approvals

* Tu 23°C, single module

CCC OLP



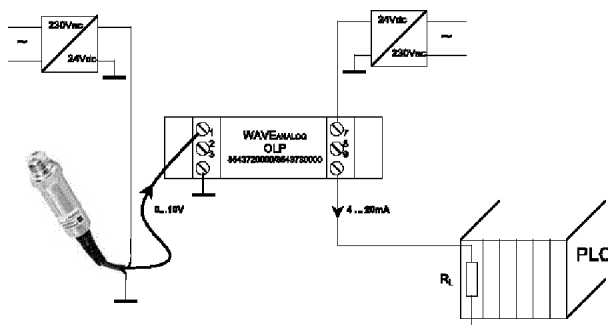
Type	Part No.
WAS5 CCC OLP	8543720000
WAZ5 CCC OLP	8543730000

Input voltage	0...5 V, 0...10 V
Maximum input voltage	30 V
Input resistance	0...5 V, 210 kW; 0...10 V, 430 kW
Input current	0/4...20 mA
Maximum input current	40 mA
Input resistance	51 W
Output current	4...20 mA (current loop)
Output current limitation	approx. 24 mA
Load resistance	$R_L = (U_b - 12 V) / 20 \text{ mA}$, e.g. 600 Wat 24 V
Transmission frequency (adjustable by DIP-Switch)	10 Hz, 100 Hz
Response time	<10 Hz (typ 8 Hz) = 80 ms 100 Hz = 8 ms
Accuracy	± 0.2 %
Temperature coefficient	± 200 ppm/K
Supply voltage	min. 12 Vdc max. 30 Vdc
Rated voltage	300 V
Rated surge voltage	4 kV
Overvoltage category	III
Contamination class	2
Clearance and creepage distances	5.5 mm
Test voltage	4 kV _{eff}
Operating temperature	0...+55 °C (mounted on horizontal DIN rail)
Storage temperature	-20 °C...+85 °C
Standards/Specifications	EN 50178
EMC standards	EN 50082-2, EN 50081-1, EN 50081-2 EN 55011
Factory setting	0...20 mA, 10 Hz
Dimensions L/H/W	92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
Weight	100 g (0.22 lbs.)
Approvals	CE, cULus

Input	SW 1			
	1	2	3	4
0...20 mA	☐	☐	☐	☐
4...20 mA	☒	☐	☐	☐
0...5 V	☒	☒	☒	☐
0...10 V	☐	☒	☐	☐
Transmission frequency				
10 Hz	☐	☐	☐	☒
100 Hz	☐	☐	☐	☐

■ = on
□ = off

Application



DC/DC Loop Powered Isolator (Loop splitter)

WAVEANALOG 2OLP

- Galvanic isolation
- Input and output Loop Powered
- Low power consumption
- No adjustment required

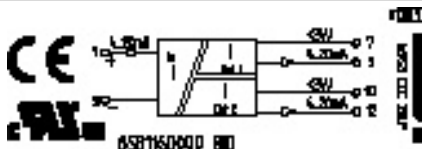
CCC 2OLP



Approvals:



Schematic circuit diagram



Ordering data

Screw connection

Tension clamp connection

Technical data*

Input

Input current

max. input current

Input voltage drop

Output

Output current (Channel 1)

Output current (Channel 2)

Output current limitation

Load resistance

Minimum voltage supply

Transmission frequency

Response time

Accuracy

Temperature coefficient

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

Supply voltage

Rated voltage

Rated surge voltage

Overtoltage category

Contamination class

Clearance and creepage distance

Test voltage

General Data

Operating temperature

Storage temperature

Standards/Specifications

EMC standards

Dimensions L/H/W

Weight

Approvals

* Tu 23°C, single module

Type

WAS5 CCC 2OLP

WAZ5 CCC 2OLP

Part No.

8581160000

8581170000

4...20 mA (current loop)

40 mA

3.8 V

4...20 mA (current loop)

4...20 mA (current loop)

approx. 31 mA

$RL = (V_L - RV) / 20 \text{ mA}$, e.g. 600 Ω at 24 V

12 Vdc

30 Hz

< 20 ms

0.2 % (typ. 0.1 %)

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

min. 12 Vdc max. 30 Vdc

300 V

4 kV

III

2

5.5 mm

4 kV_{eff}

0...+55 °C (mounted on horizontal DIN rail)

-20 °C...+85 °C

EN 50178

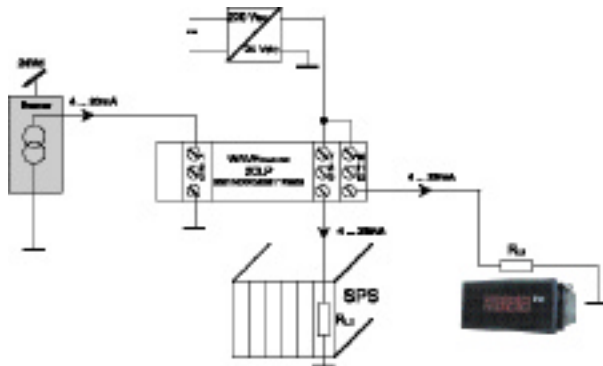
EN 50082-2, EN 50081-1, EN 50081-2 EN 55011

92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)

100 g (0.22 lbs.)

CE, cULus

Application



DC/DC Loop Powered Isolator (Input loop powered)

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

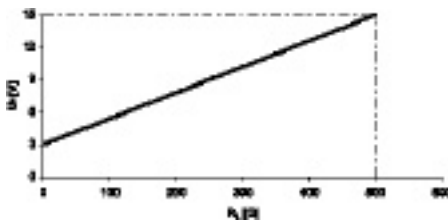
Approvals:



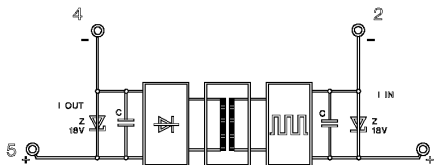
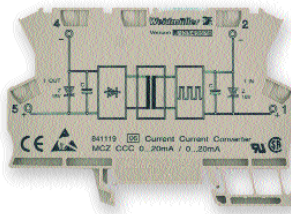
Schematic circuit diagram



Working resistance diagram



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



Ordering data

for TS 35

Technical data

Input

Response current
Voltage drop
Maximum overload capacity at input

Output

Set time (T99)
Residual ripple
Chopper frequency
Transmission error
Temperature effect

Voltage strength

Input / Output

EMC

Approvals

Operating temperature

Storage temperature
Conductor
Conductor cross-section
Overall width

Type

MCZ CCC 0...20 mA/0...20 mA
without power supply

Part No.

8411190000

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

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

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

approx. 5 ms at 500 W working resistance impedance
< 10 mV_{eff}
approx. 200 kHz
< 0.1 % from end value, + 0.05 % from mean/100 W working resistance
< 50 ppm/K from measurement value for working resistance 0 W

510 V_{eff}

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

-25 °C...+60 °C

-40 °C...+85 °C
AWG 22...12
1.5 mm²
6 mm (0.24 in.)

DC/DC Loop Powered Isolator input loop powered

WAVEANALOG DC/DC

- Input loop powered
- Galvanic isolation
- 1-, 2-channel versions
- Low power consumption
- Safety separation

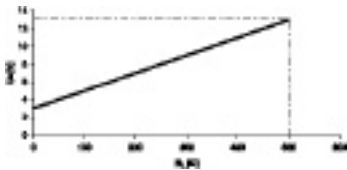
Approvals:



Schematic circuit diagram



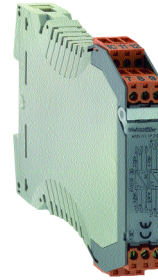
Working resistance diagram



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

Technical data* (per channel)
Input signal
Input voltage max.
Input current max.
Response current
Voltage drop

Output signal
Load resistance
Accuracy at Tu=23 °C
Influence of load resistance
Temperature coefficient
Set time
Residual ripple
Chopper frequency

General Data
Operating temperature
Storage temperature
Dimensions L/H/W
Approvals

Type	Part No.
WAS5 CCC LP	8444950000
WAZ5 CCC LP	8444960000
0(4) ... 20 mA / 0(4) ... 20 mA	

0 ... 20 mA (4 ... 20 mA)
18 V
50 mA
< 100 µA
approx. 3 V at RL = 0 W
Iin = 20 mA
approx. 13 V at RL = 500 W
at Iin = 20 mA
0 ... 20 mA (4 ... 20 mA)
£ 500 W
< 0.1% from end value
< 0.1% from measurement value
per 100 Wload resistance
50 ppm / K from end value
4,5 ms at 500 Wworking resistance
< 20 mVeff
approx. 170 kHz

-25 °C ... +70 °C
-40 °C ... +80 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA, GL

Coordination of insulation according to EN 50178, 04/98 (safe separation)	
Rated voltage	300 V
Rated surge voltage	6 kV
Overvoltage 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

*Tu = 23 °C single module

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

0 ... 20 mA (4 ... 20 mA)
18 V
50 mA
< 100 µA
approx. 3 V at RL = 0 W
Iin = 20 mA
approx. 13 V at RL = 500 W
at Iin = 20 mA
0 ... 20 mA (4 ... 20 mA)
£ 500 W
< 0.1% from end value
< 0.1% from measurement value
per 100 Wload resistance
50 ppm / K from end value
4,5 ms at 500 Wworking resistance
< 20 mVeff
approx. 170 kHz

-25 °C ... +70 °C
-40 °C ... +80 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA, GL

300 V
6 kV
III
2
≥ 5.5 mm
4 kVeff / 1 s
4 kVeff / 1 min
EN 50178 (safe separation)
EN 50081, EN 50082, EN 55011

DC/DC-Signal Conditioners 2-way-isolation

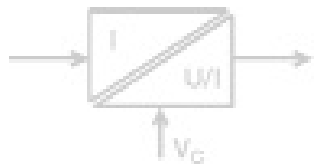
WAVEANALOG DC/DC

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

Approvals:



Schematic circuit diagram



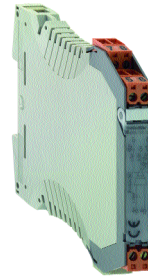
CCC DC

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	Part No.
WAS4 CCC DC	8444980000
WAZ4 CCC DC	8444990000
4 ... 20 mA / 4...20 mA	

Type	Part No.
WAS4 CCC DC	8445010000
WAZ4 CCC DC	8445020000
4 ... 20 mA / 0 ... 20 mA	

Type	Part No.
WAS4 CVC DC	8445040000
WAZ4 CVC DC	8445050000
4 ... 20 mA / 0 ... 10V	

Technical data*

Input signal	4 ... 20 mA
Input voltage max.	7 V
Input current max	25 mA
Output signal	4 ... 20 mA
Load resistance	740 Wat 24 Vdc
Accuracy at Tu=23 °C	± 0.2% from end value
Temperature coefficient	£ 250 ppm / K from end value
Response time	£ 30 ms (typ. 20 ms)
Cut-off frequency (-3 dB)	≥ 15 Hz (typ. 20 Hz)

Input signal	4 ... 20 mA
Input voltage max.	7 V
Input current max	25 mA
Output signal	0 ... 20 mA
Load resistance	740 Wat 24 Vdc
Accuracy at Tu=23 °C	± 0.2% from end value
Temperature coefficient	£ 250 ppm / K from end value
Response time	£ 30 ms (typ. 20 ms)
Cut-off frequency (-3 dB)	≥ 15 Hz (typ. 20 Hz)

Input signal	4 ... 20 mA
Input voltage max.	7 V
Input current max	25 mA
Output signal	0 ... 10 V
Load resistance	≥ 1 kW
Accuracy at Tu=23 °C	± 0.2% from end value
Temperature coefficient	£ 250 ppm / K from end value
Response time	£ 30 ms (typ. 20 ms)
Cut-off frequency (-3 dB)	≥ 15 Hz (typ. 20 Hz)

General Data

Voltage supply	24 Vdc ±20% (19.2 ... 28.8 Vdc)	24 Vdc ±20% (19.2 ... 28.8 Vdc)	24 Vdc ±20% (19.2 ... 28.8 Vdc)
Power consumption	< 32 mA at I _{out} = 20 mA	< 32 mA at I _{out} = 20 mA	< 20 mA at I _{out} = 10 mA
Current carrying capacity of cross-connection	£ 2 A	£ 2 A	£ 2 A
Operating temperature	0 °C ... +55 °C (line up on DIN rail)	0 °C ... +55 °C (line up on DIN rail)	0 °C ... +55 °C (line up on DIN rail)
Storage temperature	-20 °C ... +85 °C	-20 °C ... +85 °C	-20 °C ... +85 °C
Dimensions L/H/W	92.4 / 112.5 / 12.5 mm (3.64 / 4.43 / 0.49 in.)	92.4 / 112.5 / 12.5 mm (3.64 / 4.43 / 0.49 in.)	92.4 / 112.5 / 12.5 mm (3.64 / 4.43 / 0.49 in.)
Approvals	CE, cULus, CSA	CE, cULus, CSA	CE, cULus, CSA

Coordination of insulation according to EN 50178, 04/98

Rated voltage	300 V	300 V	300 V
Rated surge voltage	4 kV	4 kV	4 kV
Overvoltage category	III	III	III
Contamination class	2	2	2
Clearance and creepage distance	≥ 3 mm	≥ 3 mm	≥ 3 mm
Isolation voltage, voltage strength			
Input/output to mounting rail	4 kV _{eff} / 1 min	4 kV _{eff} / 1 min	4 kV _{eff} / 1 min
Standards/Specifications	EN 50178	EN 50178	EN 50178
EMC standards	EN 50081, EN 50082, EN 55011	EN 50081, EN 50082, EN 55011	EN 50081, EN 50082, EN 55011

*T_U = 23 °C single module

DC/DC-Signal Conditioners 2-way-isolation

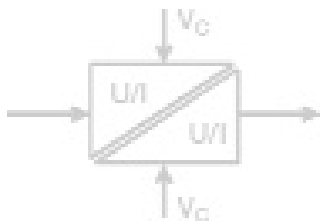
WAVEANALOG DC/DC

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

Approvals:

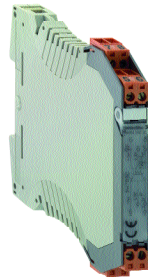


Schematic circuit diagram



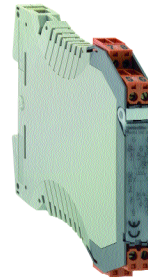
CCC DC

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



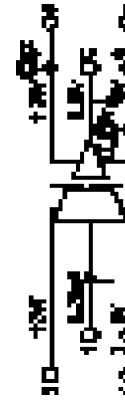
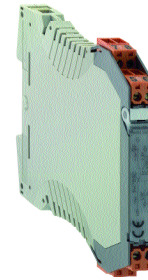
CCC DC

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



CVC DC

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type Part No.
WAS4 CCC DC **8445070000**
WAZ4 CCC DC **8445080000**
0 ... 20 mA / 0 ... 20 mA

Type Part No.
WAS4 CCC DC **8446970000**
WAZ4 CCC DC **8446990000**
0 ... 20 mA / 4 ... 20 mA

Type Part No.
WAS4 CVC DC **8447020000**
WAZ4 CVC DC **8447030000**
0 ... 20 mA / 0 ... 10 V

Technical data*

Input signal
Input current max. 25 mA
Input resistance 50 W
Output signal
Load resistance 740 Wat 24 Vdc
Accuracy at Tu=23 °C ± 0.2% from end value
Temperature coefficient £ 250 ppm / K from end value
Response time £ 30 ms (typ. 16 ms)
Cut-off frequency (-3 dB) ≥ 15 Hz (typ. 25 Hz)

0 ... 20 mA
25 mA
50 W
4 ... 20 mA
740 Wat 24 Vdc
± 0.2% from end value
£ 250 ppm / K from end value
£ 30 ms (typ. 16 ms)
≥ 15 Hz (typ. 25 Hz)

0 ... 20 mA
25 mA
50 W
0 ... 10 V
≥ 1 kW
± 0.2% from end value
£ 250 ppm / K from end value
£ 30 ms (typ. 16 ms)
≥ 15 Hz (typ. 25 Hz)

General Data

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 (line up on DIN rail)
Storage temperature -20 °C ... +85 °C
Dimensions L/H/W 92.4 / 112.5 / 12.5 mm
Approvals (3.64 / 4.43 / 0.49 in.)
CE, cULus, 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 (line up on DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 12.5
(3.64 / 4.43 / 0.49 in.)
CE, cULus, 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 (line up on DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 12.5
(3.64 / 4.43 / 0.49 in.)
CE, cULus, 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 4 kV_{eff} / 1 min
Input/output to mounting rail

300 V
4 kV
III
2
≥ 3 mm
4 kV_{eff} / 1 min

300 V
4 kV
III
2
≥ 3 mm
4 kV_{eff} / 1 min

Standards/Specifications EN 50178
EMC standards EN 50081, EN 50082,
EN 55011

EN 50178
EN 50081, EN 50082,
EN 55011

EN 50178
EN 50081, EN 50082,
EN 55011

*T_U = 23 °C single module

DC/DC-Signal Conditioners 2-way-isolation

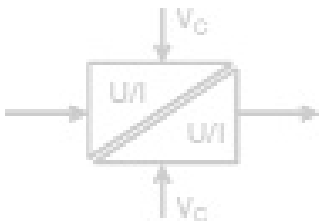
WAVEANALOG DC/DC

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

Approvals:

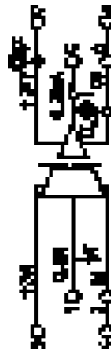
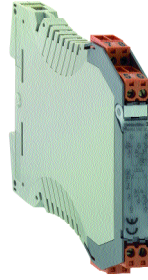


Schematic circuit diagram



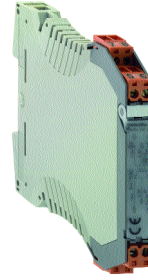
VCC DC

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



VCC DC

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



VVC DC

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type Part No.
WAS4 VCC DC **8447050000**
WAZ4 VCC DC **8447080000**
0 ... 10 V / 0 ... 20 mA

Type Part No.
WAS4 VCC DC **8447100000**
WAZ4 VCC DC **8447110000**
0 ... 10 V / 4 ... 20 mA

Type Part No.
WAS4 VVC DC **8447130000**
WAZ4 VVC DC **8447140000**
0 ... 10 V / 0 ... 10 V

Technical data*

Input signal

Input voltage max.

Input resistance

Output signal

Load resistance

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

Temperature coefficient

Response time

Cut-off frequency (-3 dB)

0 ... 10 V
15 V
500 kW
0 ... 20 mA
740 Wat 24 Vdc
 $\pm 0.2\%$ from end value
 ± 250 ppm / K from end value
 ± 30 ms (typ. 25 ms)
 ≥ 13 Hz (typ. 17 Hz)

0 ... 10 V
15 V
500 kW
4 ... 20 mA
740 Wat 24 Vdc
 $\pm 0.2\%$ from end value
 ± 250 ppm / K from end value
 ± 30 ms (typ. 25 ms)
 ≥ 13 Hz (typ. 17 Hz)

0 ... 10 V
15 V
500 kW
0 ... 10 V
 ≥ 1 kW
 $\pm 0.2\%$ from end value
 ± 250 ppm / K from end value
 ± 30 ms (typ. 25 ms)
 ≥ 13 Hz (typ. 17 Hz)

General Data

Voltage supply

Power consumption input

Power consumption output

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L/H/W

Approvals

24 Vdc $\pm 20\%$
(19.2 ... 28.8 Vdc)
 < 11 mA at $U_{in} = 10$ V
 < 32 mA at $I_{out} = 20$ mA
 ± 2 A
 $0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted on horizontal DIN rail)
 $-20^\circ\text{C} \dots +85^\circ\text{C}$
92.4 / 112.5 / 12.5 mm
(3.64 / 4.43 / 0.49 in.)
CE, cULus, CSA

24 Vdc $\pm 20\%$
(19.2 ... 28.8 Vdc)
 < 11 mA at $U_{in} = 10$ V
 < 32 mA at $I_{out} = 20$ mA
 ± 2 A
 $0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted on horizontal DIN rail)
 $-20^\circ\text{C} \dots +85^\circ\text{C}$
92.4 / 112.5 / 12.5 mm
(3.64 / 4.43 / 0.49 in.)
CE, cULus, CSA

24 Vdc $\pm 20\%$
(19.2 ... 28.8 Vdc)
 < 11 mA at $U_{in} = 10$ V
 < 20 mA at $I_{out} = 10$ mA
 ± 2 A
 $0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted on horizontal DIN rail)
 $-20^\circ\text{C} \dots +85^\circ\text{C}$
92.4 / 112.5 / 12.5 mm
(3.64 / 4.43 / 0.49 in.)
CE, cULus, 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
 ≥ 3 mm
4 kV_{eff} / 1 min

300 V
4 kV
III
2
 ≥ 3 mm
4 kV_{eff} / 1 min

300 V
4 kV
III
2
 ≥ 3 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

DC/DC-Signal Conditioners 3-way-isolation 10 Hz

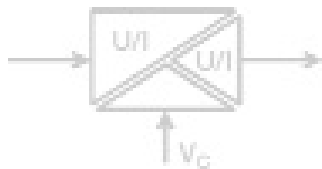
WAVEANALOG DC/DC

- 3-way-isolation
- Analog signal conditioning
- Indication LED
- Cross-connectable voltage supply via cross-connectors

Approvals:

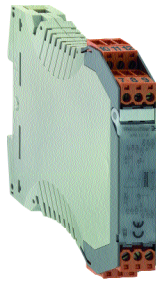


Schematic circuit diagram



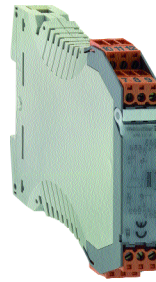
CCC

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



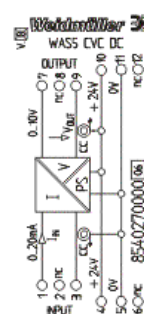
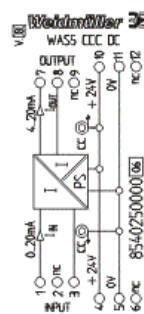
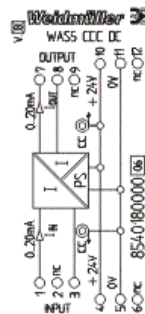
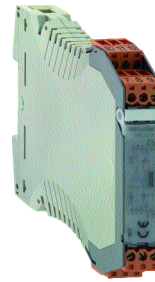
CCC

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



CVC

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type	Part No.
WAS5 CCC	8540180000*
WAZ5 CCC	8540190000*

Type	Part No.
WAS5 CCC	8540250000
WAZ5 CCC	8540260000

Type	Part No.
WAS5 CVC	8540270000
WAZ5 CVC	8540280000

Technical data**

Input signal

Input current max.
Input resistance

Output signal

Load resistance
Accuracy at $T_u=23^\circ\text{C}$
Temperature coefficient
Response time
Cut-off frequency (-3 dB)

0 ... 20 mA
25 mA
$\leq 110\ \Omega$
0 ... 20 mA
$\leq 600\ \Omega$
0.2%
$\pm 250\ \text{ppm/K}$
$\leq 45\ \text{ms}$
10 Hz

0 ... 20 mA
25 mA
$\leq 110\ \Omega$
4 ... 20 mA
$\leq 600\ \Omega$
0.2%
$\pm 250\ \text{ppm/K}$
$\leq 45\ \text{ms}$
10 Hz

0 ... 20 mA
25 mA
$\leq 110\ \Omega$
0 ... 10 V
$\geq 1\ \text{k}\Omega$
0.2%
$\pm 250\ \text{ppm/K}$
$\leq 45\ \text{ms}$
10 Hz

General Data

Voltage supply	24 Vdc $\pm 25\%$ (18 Vdc ... 24 Vdc ... 30 Vdc)
Power consumption	$< 1.5\ \text{W}$ at $I_{\text{out}} = 20\ \text{mA}$
Current carrying capacity of cross-connection	$\leq 2\ \text{A}$
Operating temperature	$0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted on horizontal DIN rail)
Storage temperature	$-20^\circ\text{C} \dots +85^\circ\text{C}$
Dimensions L/H/W	92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.49 in.)
Approvals	CE, cULus

Voltage supply	24 Vdc $\pm 25\%$ (18 Vdc ... 24 Vdc ... 30 Vdc)
Power consumption	$< 1.5\ \text{W}$ at $I_{\text{out}} = 20\ \text{mA}$
Current carrying capacity of cross-connection	$\leq 2\ \text{A}$
Operating temperature	$0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted on horizontal DIN rail)
Storage temperature	$-20^\circ\text{C} \dots +85^\circ\text{C}$
Dimensions L/H/W	92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.49 in.)
Approvals	CE, cULus

Voltage supply	24 Vdc $\pm 25\%$ (18 Vdc ... 24 Vdc ... 30 Vdc)
Power consumption	$< 1.3\ \text{W}$ at $I_{\text{out}} = 5\ \text{mA}$
Current carrying capacity of cross-connection	$\leq 2\ \text{A}$
Operating temperature	$0^\circ\text{C} \dots +55^\circ\text{C}$ (mounted on horizontal DIN rail)
Storage temperature	$-20^\circ\text{C} \dots +85^\circ\text{C}$
Dimensions L/H/W	92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.49 in.)
Approvals	CE, cULus

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	$\geq 3\ \text{mm}$
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

Rated voltage	300 V
Rated surge voltage	4 kV
Overvoltage category	III
Contamination class	2
Clearance and creepage distance	$\geq 3\ \text{mm}$
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

Rated voltage	300 V
Rated surge voltage	4 kV
Overvoltage category	III
Contamination class	2
Clearance and creepage distance	$\geq 3\ \text{mm}$
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

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

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

DC/DC-Signal Conditioners 3-way-isolation 10 Hz

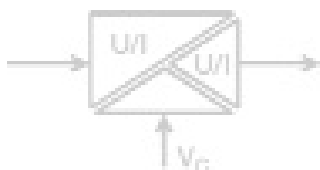
WAVEANALOG DC/DC

- 3-way-isolation
- Analog signal conditioning
- Indication LED
- Cross-connectable voltage supply via cross-connectors

Approvals:

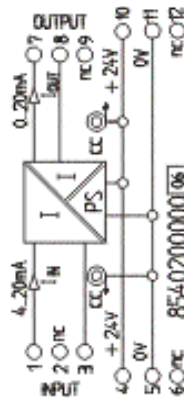
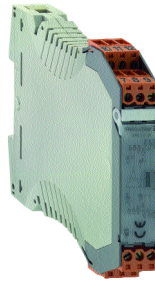


Schematic circuit diagram



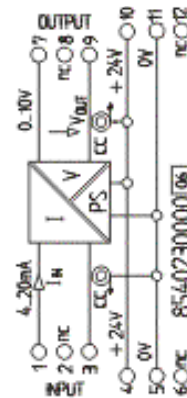
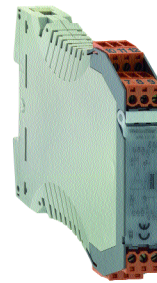
CCC

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



CVC

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type	Part No.
WAS5 CCC	8540200000
WAZ5 CCC	8540210000

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

Type	Part No.
WAS5 CVC	8540230000
WAZ5 CVC	8540240000

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

Technical data

Input signal
Input current max.
Input resistance
Output signal
Load resistance
Accuracy at $T_U=23^\circ\text{C}$
Temperature coefficient
Response time
Cut-off frequency (-3 dB)

4 ... 20 mA
25 mA
 $\leq 110\ \Omega$
0 ... 20 mA
 $\leq 600\ \Omega$
0.2%
 $\pm 250\ \text{ppm} / \text{K}$
45 ms
10 Hz

4 ... 20 mA
25 mA
 $\leq 110\ \Omega$
0 ... 10 V
 $\geq 1\ \text{k}\Omega$
0.2%
 $\pm 250\ \text{ppm} / \text{K}$
45 ms
10 Hz

General Data*

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

24 Vdc $\pm 25\%$
(18 Vdc ... **24 Vdc** ... 30 Vdc)
 $< 1.5\ \text{W}$ at $I_{out} = 20\ \text{mA}$
2 A
0 °C ... +55 °C (mounted on horizontal DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus

24 Vdc $\pm 25\%$
(18 Vdc ... **24 Vdc** ... 30 Vdc)
 $< 1.3\ \text{W}$ at $I_{out} = 5\ \text{mA}$
2 A
0 °C ... +55 °C (mounted on horizontal DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus

Coordination of insulation according to EN 50178, 04/98

Rated voltage
Rated surge voltage
Overvoltage category
Contamination class
Clearance and creepage distance
Coupling capacity
Input / output to supply
Isolation voltage, voltage strength
Input/output to mounting rail

300 V
4 kV
III
2
 $\geq 3\ \text{mm}$
1 nF
4 kV_{eff} / 1 min

300 V
4 kV
III
2
 $\geq 3\ \text{mm}$
1 nF
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

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

DC/DC-Signal Conditioners 3-way-isolation 10 Hz

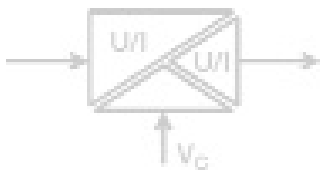
WAVEANALOG DC/DC

- 3-way-isolation
- Analog signal conditioning
- Indication LED
- Cross-connectable voltage supply via cross-connectors

Approvals:

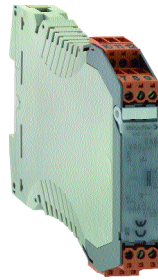


Schematic circuit diagram



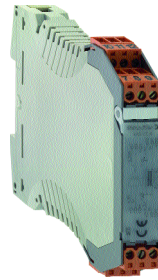
VCC

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



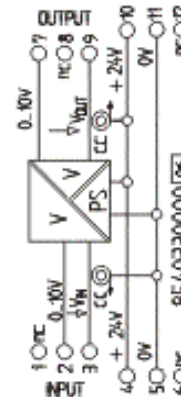
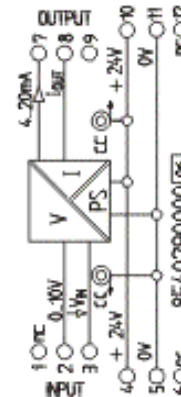
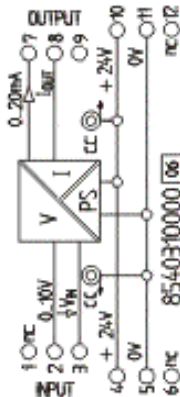
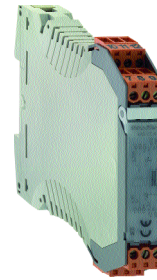
VCC

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



VVC

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type Part No.
WAS5 VCC **8540310000**
WAZ5 VCC **8540320000**
0 ... 10 V / 0 ... 20 mA

Type Part No.
WAS5 VCC **8540290000**
WAZ5 VCC **8540300000**
0 ... 10 V / 4 ... 20 mA

Type Part No.
WAS5 VVC **8540330000**
WAZ5 VVC **8540340000**
0 ... 10 V / 0 ... 10 V

Technical data*

Input signal

Input voltage max.
Input resistance

Output signal

Load resistance
Accuracy at $T_u=23^\circ\text{C}$
Temperature coefficient
Response time
Cut-off frequency (-3 dB)

0 ... 10 V
15 V
typ. 100 kW
0 ... 20 mA
£ 600 W
0.2%
 $\pm 250 \text{ ppm / K}$
£ 45 ms
10 Hz

0 ... 10 V
15 V
typ. 100 kW
4 ... 20 mA
£ 600 W
0.2%
 $\pm 250 \text{ ppm / K}$
£ 45 ms
10 Hz

0 ... 10 V
15 V
typ. 100 kW
0 ... 10 V
 $\geq 1 \text{ kW}$
0.2%
 $\pm 250 \text{ ppm / K}$
£ 45 ms
10 Hz

General Data

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Dimensions L/H/W

Approvals

24 Vdc $\pm 25\%$
(18 Vdc ... **24 Vdc** ... 30 Vdc)
 $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$
£ 2 A
0 °C ... +55 °C (mounted on horizontal DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm
(3.64 / 4.43 / 0.69 in.)
CE, cULus

24 Vdc $\pm 25\%$
(18 Vdc ... **24 Vdc** ... 30 Vdc)
 $< 1.5 \text{ W}$ at $I_{out} = 20 \text{ mA}$
£ 2 A
0 °C ... +55 °C (mounted on horizontal DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm
(3.64 / 4.43 / 0.69 in.)
CE, cULus

24 Vdc $\pm 25\%$
(18 Vdc ... **24 Vdc** ... 30 Vdc)
 $< 1.3 \text{ W}$ at $I_{out} = 5 \text{ mA}$
£ 2 A
0 °C ... +55 °C (mounted on horizontal DIN rail)
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm
(3.64 / 4.43 / 0.69 in.)
CE, cULus

Coordination of insulation according to EN 50178, 04/98

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Coupling capacity

Input / output to supply

Isolation voltage, voltage strength

Input/output to mounting rail

300 V
4 kV
III
2
 $\geq 3 \text{ mm}$
1 nF
4 kV_{eff} / 1 min

300 V
4 kV
III
2
 $\geq 3 \text{ mm}$
1 nF
4 kV_{eff} / 1 min

300 V
4 kV
III
2
 $\geq 3 \text{ mm}$
1 nF
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

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

DC/DC-Signal Conditioners 3-way-isolation 20 kHz

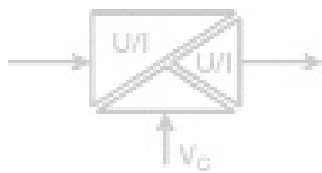
WAVEANALOG DC/DC 20 kHz

- 3-way-isolation
- Transmission frequency 20 kHz
- Analog signal conditioning
- Cross-connectable voltage supply via cross-connectors

Approvals:

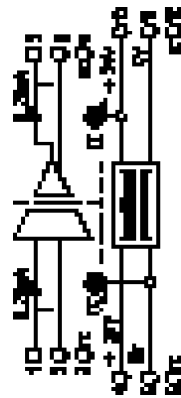
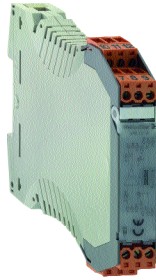


Schematic circuit diagram



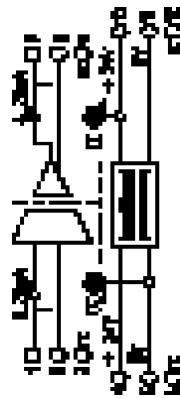
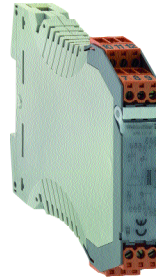
CCC HF

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



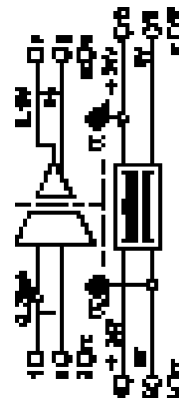
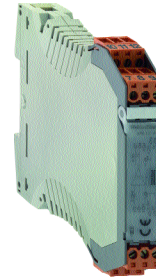
CCC HF

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



CVC HF

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type Part No.
WAS5 CCC HF **8447160000***
WAZ5 CCC HF **8447170000***
0 ... 20 mA / 0 ... 20 mA

Type Part No.
WAS5 CCC HF **8447190000**
WAZ5 CCC HF **8447200000**
0 ... 20 mA / 4 ... 20 mA

Type Part No.
WAS5 CVC HF **8447220000**
WAZ5 CVC HF **8447230000**
0 ... 20 mA / 0 ... 10 V

Technical data**

Input signal

Input current max.
Input resistance

50 mA
50 W

Output signal

Load resistance
Accuracy at $T_u=23^\circ\text{C}$
Temperature coefficient
Response time
Cut-off frequency (-3 dB)

0 ... 20 mA
50 mA
50 W
0 ... 20 mA
£ 500 W
< 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

0 ... 20 mA
50 mA
50 W
4 ... 20 mA
£ 500 W
< 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

0 ... 20 mA
50 mA
50 W
0 ... 10 V
≥ 2 kW
< 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

General Data

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

24 Vdc ±25% (18 ... 30 Vdc)
< 1.5 W at $I_{out} = 20\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm
(3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

24 Vdc ±25% (18 ... 30 Vdc)
< 1.5 W at $I_{out} = 20\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm
(3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

24 Vdc ±25% (18 ... 30 Vdc)
< 1.3 W at $I_{out} = 5\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm
(3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

Coordination of insulation according to EN 50178, 04/98

Rated voltage
Rated surge voltage
Overvoltage category
Contamination class
Clearance and creepage distance
Coupling capacity
Input / output to supply
Isolation voltage, voltage strength
Input/output to mounting rail
Standards/Specifications
EMC standards

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

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

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

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

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

DC/DC-Signal Conditioners 3-way-isolation 20 kHz

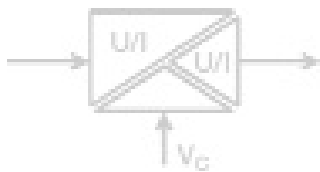
WAVEANALOG DC/DC 20 kHz

- 3-way-isolation
- Transmission frequency 20 kHz
- Analog signal conditioning
- Cross-connectable voltage supply via cross-connectors

Approvals:

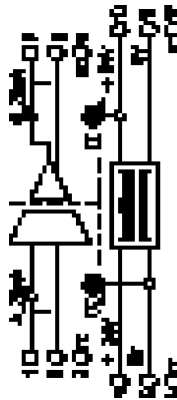
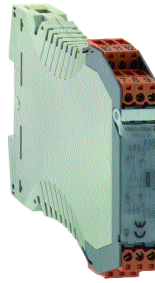


Schematic circuit diagram



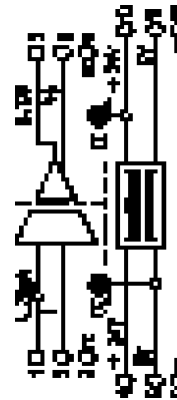
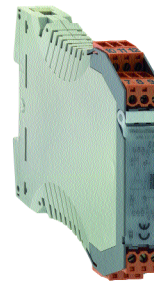
CCC HF

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



CVC HF

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type	Part No.
WAS5 CCC HF	8447250000
WAZ5 CCC HF	8447260000
4 ... 20 mA / 0 ... 20 mA	

Type	Part No.
WAS5 CVC HF	8447280000
WAZ5 CVC HF	8447290000
4 ... 20 mA / 0 ... 10 V	

Technical data*

Input signal

Input current max.
Input resistance

Output signal

Load resistance
Accuracy at $T_U=23^\circ\text{C}$
Temperature coefficient
Response time
Cut-off frequency (-3 dB)

4 ... 20 mA
50 mA
50 W
0 ... 20 mA
£ 500 W
< 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

4 ... 20 mA
50 mA
50 W
0 ... 10 V
≥ 2 kW
< 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

General Data

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

24 Vdc ±25% (18 ... 30 Vdc)
< 1.5 W at $I_{out} = 20\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

24 Vdc ±25% (18 ... 30 Vdc)
< 1.3 W at $I_{out} = 5\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

Coordination of insulation according to EN 50178, 04/98

Rated voltage
Rated surge voltage
Overvoltage category
Contamination class
Clearance and creepage distance
Coupling capacity
Input / output to supply
Isolation voltage, voltage strength
Input/output to mounting rail

300 V
4 kV
III
2
≥ 3 mm
1 nF
4 kVeff / 1 min

300 V
4 kV
III
2
≥ 3 mm
1 nF
4 kVeff / 1 min

Standards/Specifications
EMC standards

EN 50178
EN 50081, EN 50082,
EN 55011

EN 50178
EN 50081, EN 50082
EN 55011

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

DC/DC-Signal Conditioners 3-way-isolation 20 kHz

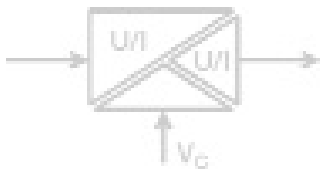
WAVEANALOG DC/DC 20 kHz

- 3-way-isolation
- Transmission frequency 20 kHz
- Analog signal conditioning
- Cross-connectable voltage supply via cross-connectors

Approvals:

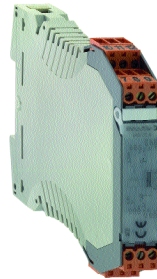


Schematic circuit diagram



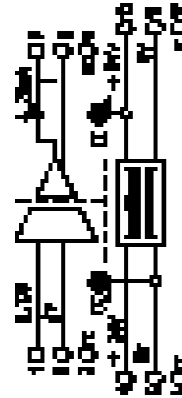
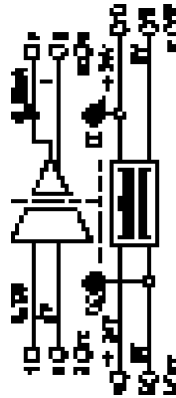
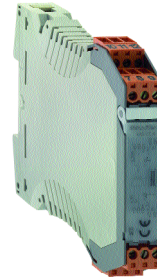
VCC HF

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



VCC HF

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



Ordering data

Screw connection
Tension clamp connection
Input/Output

Type	Part No.
WAS5 VCC HF	8447310000
WAZ5 VCC HF	8447320000
0 ... 10 V / 0 ... 20 mA	

Type	Part No.
WAS5 VCC HF	8447340000
WAZ5 VCC HF	8447350000
0 ... 10 V / 4 ... 20 mA	

Technical data*

Input signal

Input voltage max.
Input resistance

Output signal

Load resistance
Accuracy at $T_U=23^\circ\text{C}$
Temperature coefficient
Response time
Cut-off frequency (-3 dB)

0 ... 10 V
15 V
500 kW
0 ... 20 mA
£ 500 W
± 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

0 ... 10 V
15 V
500 kW
4 ... 20 mA
£ 500 W
± 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

General Data

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

24 Vdc ±25% (18 ... 30 Vdc)
< 1.5 W at $I_{out} = 20\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

24 Vdc ±25% (18 ... 30 Vdc)
< 1.5 W at $I_{out} = 20\text{ mA}$
£ 2 A
0 °C ... +55 °C
-20 °C ... +85 °C
92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

Coordination of insulation according to EN 50178, 04/98

Rated voltage
Rated surge voltage
Overvoltage category
Contamination class
Clearance and creepage distance
Coupling capacity
Input / output to supply
Isolation voltage, voltage strength
Input/output to mounting rail

300 V
4 kV
III
2
≥ 3 mm
1 nF
4 kVeff / 1 min

300 V
4 kV
III
2
≥ 3 mm
1 nF
4 kVeff / 1 min

Standards/Specifications
EMC standards

EN 50178
EN 50081, EN 50082,
EN 55011

EN 50178
EN 50081, EN 50082
EN 55011

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

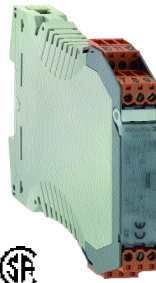
DC/DC-Signal Conditioners 3-way-isolation 20 kHz

WAVEANALOG DC/DC 20 kHz

- 3-way-isolation
- Transmission frequency 20 kHz
- Analog signal conditioning
- Cross-connectable voltage supply via cross-connectors

VVC HF

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

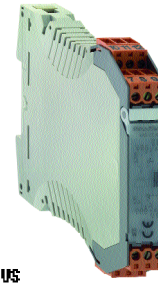


Approvals:



VVC HF

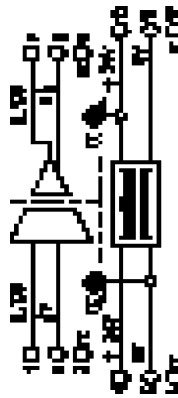
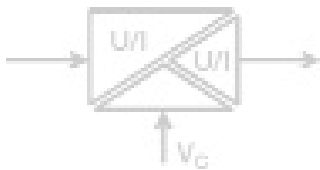
-10 ... +10 V / -10 ... +10 V



Approvals:



Schematic circuit diagram



Ordering data

Schraubanschluß
Zugfederanschluß
Input/Output

Type	Part No.
WAS5 VVC HF	8447370000
WAZ5 VVC HF	8447380000
0 ... 10 V / 0 ... 10 V	

Type	Part No.
WAS5 VVC HF	8561610000
WAZ5 VVC HF	8587000000
±10 V / ±10 V	

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)

0 ... 10 V
15 V
500 kW
0 ... 10 V
≥ 2 kW
± 0.2% of full scale value
£ 250 ppm / K of full scale value
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

-10 ... +10 V
± 15 V
500 kW
-10 ... +10 V
≥ 2 kW
± 0.2% of measurement range
£ 250 ppm / K of measurement range
£ 40 µs (typ. 30 µs)
≥ 15 kHz (typ. 20 kHz)

General Data

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

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 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus, CSA

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 mm (3.64 / 4.43 / 0.69 in.)
CE, cULus

Coordination of insulation according to EN 50178, 04/98

Rated voltage
Rated surge voltage
Overvoltage category
Contamination class
Clearance and creepage distance
Coupling capacity
Input / output to supply
Isolation voltage, voltage strength
Input/output to mounting rail

300 V
4 kV
III
2
≥ 3 mm
1 nF
4 kVeff / 1 min

300 V
4 kV
III
2
≥ 3 mm
1 nF
4 kVeff / 1 min

Standards/Specifications
EMC standards

EN 50178
EN 50081, EN 50082, EN 55011

EN 50178
EN 50081, EN 50082, EN 55011

*T_U = 23 °C single module

ADVANTAGES ...

The **WAVEANALOG PRO** is a universal, isolating signal conditioner that converts current and voltage signals to standard signals in accordance with IEC 381. **WAVEANALOG PRO** settings are easily carried out via DIP switches; an additional calibration is no longer necessary, although possible, to enable adjustments to be made to the signal. The software "**WAVEtool**" is available to provide support when making the settings. **Wavetool** describes the necessary steps to configure the module once the required input and output ranges have been entered.

The **WAVEANALOG PRO** is supplied with power via an internal, wide voltage-range power supply unit; thus increase the flexibility and use anywhere in the system.

Product features:

- Wide voltage-range power supply unit from 20...253Vac/dc

- Extremely slim design, 12.6 mm mounting width

- Low power loss

- Operates independent of mounting position

- 440 pre-programmed configurations

- Input signals:
voltage: 20mV...200Vdc,
current: 1mA...50mA, uni and bipolar

- Output signals:
voltage : max. $\pm 10V$;
current : max. $\pm 20 mA$

- The offline configuration assistant "**WAVEtool**" supports the configuration and creates module-specific documentation

- Operation indicator LED

- Fine calibration via switchable potentiometers possible

- Selectable transmission frequency between 10Hz and 10 kHz enables response time to be optimized

- Further features
WAVEBox

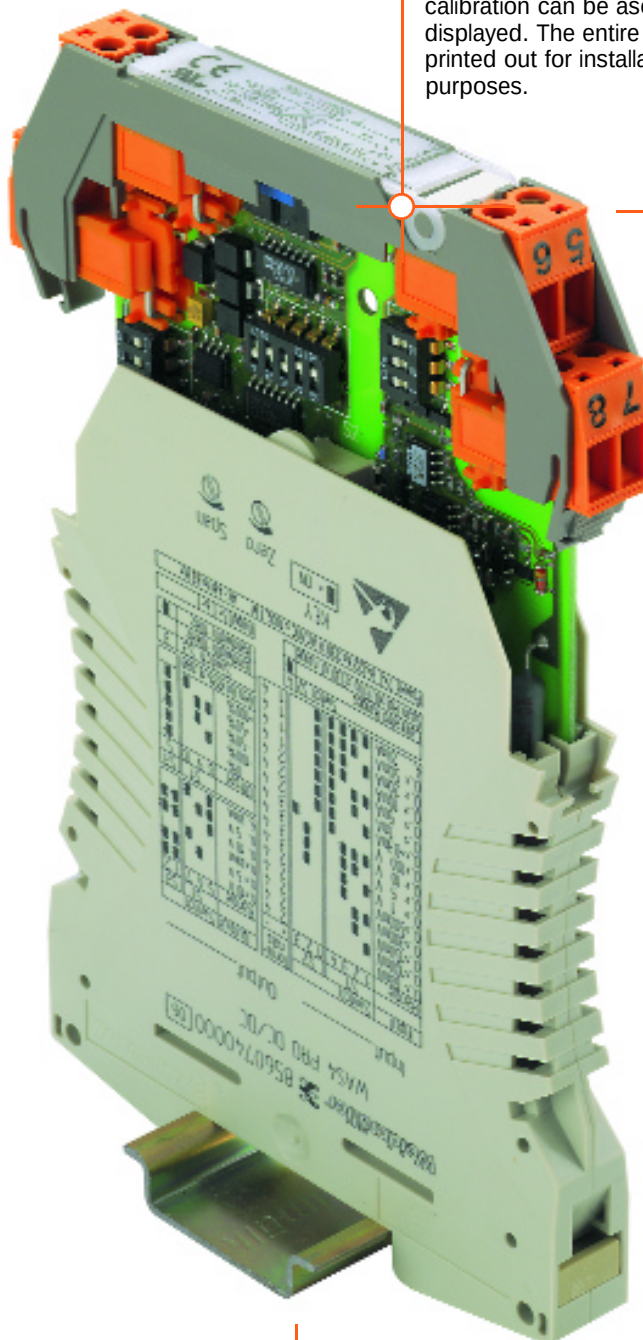
Approvals:  

- Protective separation according to EN 50178

WAVEtool

The service tool enables fast and uncomplicated configuration of the **WAVEANALOG PRO**. By simply entering the required input and output parameters, the program determines the correct switch settings and gives instructions for correctly connecting the module.

If required, the necessary values for a calibration can be ascertained and displayed. The entire process can be printed out for installation documentation purposes.

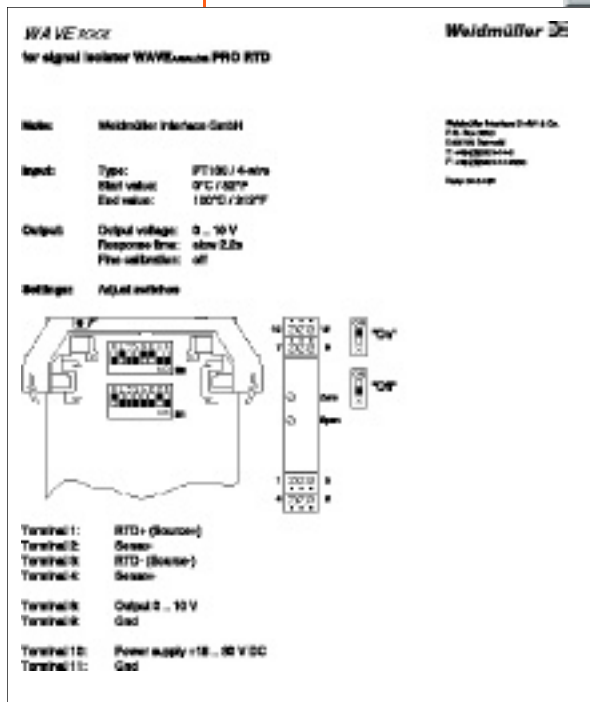


Setting

440 pre-configured input and output settings can easily be selected via DIP switches. It is also possible to alter the transmission frequency via DIP switches. A further calibration is no longer necessary for the pre-programmed ranges.

Download:

www.weidmuller.com
Æ Products
Æ Downloads



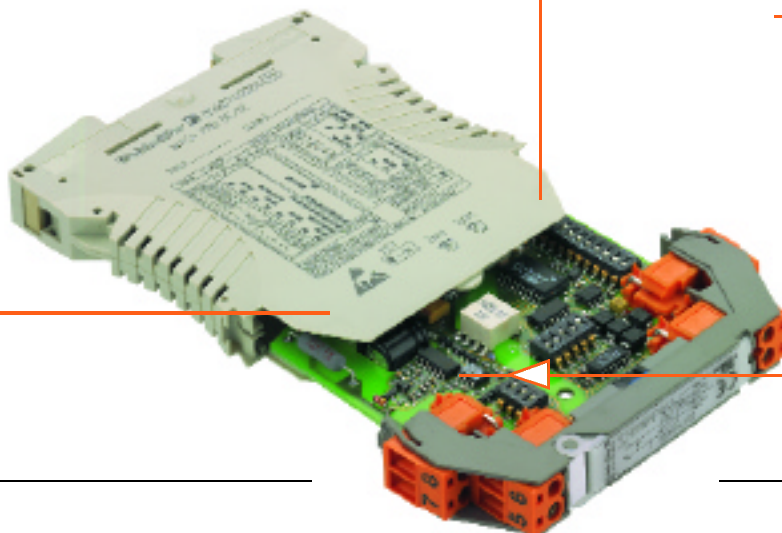
Wide-range power supply unit

The wide-range power supply unit in the **WAVEANALOG PRO DC/DC** makes it possible to use the module in all common voltage supply systems worldwide.

The module can be operated with DC or AC voltages from 20 to 253 V. The AC voltages can be in the 48...62 Hz range.

Switchable fine calibration

To be able to set the module to suit applications with ranges other than the pre-programmed ranges, the **WAVEANALOG PRO DC/DC** offers the option of switching in zero and span potentiometers via DIP switches. This allows the span to be adjusted by $\pm 25\%$ of the measuring span of the selected output range and the zero to 0.3...3.33 x end value of the selected input range.



DC/DC-Signal Conditioners - configurable

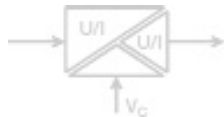
WAVEANALOG PRO DC/DC

- Universally adjustable by DIP-switches
- Adjustment help via Internet
- 3-way-isolation
- Voltage supply from 20 - 230 V ac/dc
- Low power loss
- Adjustable transmission frequency
- Indication LED

Approvals:



Schematic circuit diagram



Ordering data

Screw connection

Tension clamp connection

Input/Output

Technical data*

Input (adjustable)

Voltage uni-/bipolar adjustable

Voltage calibrated ranges

Current uni-/bipolar adjustable

Current calibrated ranges

Input resistance

at current input range < 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

at 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 resistance

at output current

at output voltage

Offset

Residual ripple

Adjustment zero pot.

Adjustment span pot.

Gain error

Temperature coefficient

Cut-off frequency

General Data

Voltage supply

Power consumption

Frequency range

Operating temperature

Storage temperature

Factory setting

Dimensions L/H/W

Weight

Approvals

Coordination of insulation according to EN 50178, 04/98

Rated voltage

Rated surge voltage

Overvoltage category

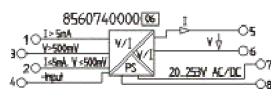
Contamination class

Test voltage

Standards/specifications

EMC standards

PRO DC/DC



Type	Part No.
WAS4 PRO DC/DC	8560740000
WAZ4 PRO DC/DC	8560750000
configurable	
20 mV ... 200 V	
0 ... ±60 mV, 0 ... ±100 mV, 0 ... ±150 mV, 0 ... ±300 mV, 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 W/ approx. 5 W	
approx. 1 mW	
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 Wat 20 mA)	
< 10 mA (1 KWat 10 V)	
20 µA or 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 full scale value	
< 60 ppm/K of full scale value	
> 10 kHz, < 10 Hz selectable	
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 mm (3.64 / 4.43 / 0.49 in.)	
approx. 100 g (0.22 lbs.)	
CE, cULus, 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: www.weidmuller.com

Æ Products

Æ Downloads (see page 29)

Switch position/setting options

Input	S1	Switch							
		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		□	□	■	■	■	□	□	■
4 ... ±20 mA*		■	■	■	■	■	□	□	■

*Offset conversion not calibrated

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

Output	Output range	Switch			
		S1		S3	
		5	6	7	1 2
0 ... ±10 V		□	□	□	■ ■
2 ... 10 V		■	□	□	■ ■
0 ... ±5 V		□	■	□	■ ■
1 ... 5 V		■	■	□	■ ■
0 ... ±20 mA		□	□	■	□ □
4 ... 20 mA		■	□	■	□ □

Offset	(in % of output voltage)	S1			S2
		8	9	10	5
0 %		□	□	□	■
-100 %		■	□	□	■
-50 %		□	■	□	■
+50 %		■	■	□	■
+100 %		□	□	■	■
Zero pot. activated: additional ±25 %					

Switch S3		3
Bandwidth 10 kHz		□
Bandwidth 10 Hz		■

Set range can be documented on side of housing.

■ = on
□ = off

*T_U = 23 °C single module

DC/DC-Signal Conditioners - configurable

MICROANALOG DC/DC select

- 3-way isolation between Input, output and supply voltage
- Calibrated selectable by DIP-switches
- Cross-connectable voltage supply via cross-connectors
- Low heat dissipation

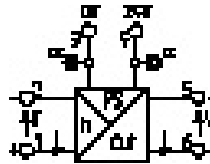
DC/DC select



Approvals:



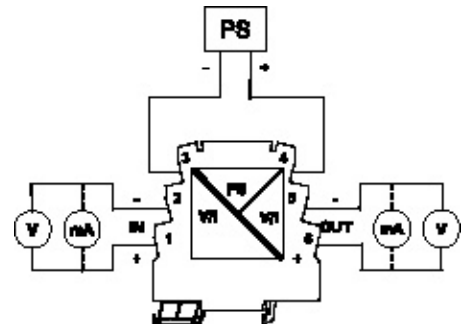
Schematic circuit diagram



		Switch					
		S1		S2			
Input	Output	1	2	1	2	3	4
0 ... 20 mA	0 ... 20 mA	■	□	□	□	□	□
0 ... 20 mA	4 ... 20 mA	■	□	□	□	■	□
0 ... 20 mA	0 ... 10 V	■	□	□	□	□	■
4 ... 20 mA	0 ... 20 mA	■	□	■	■	■	□
4 ... 20 mA	4 ... 20 mA	■	□	□	□	■	□
4 ... 20 mA	0 ... 10 V	■	□	■	■	□	■
0 ... 10 V	0 ... 20 mA	□	■	□	□	□	□
0 ... 10 V	4 ... 20 mA	□	■	□	■	■	□
0 ... 10 V	0 ... 10 V	□	■	□	□	□	■

■ = on
□ = off

Connection



Ordering data

Screw connection
Tension clamp connection

Type Part No.

MAS DC/DC select **8594810000**
MAZ DC/DC select **8594840000**

Technical data*

Input (calibrated selectable)	0...10 V / 4...20 mA / 0...20 mA (factory setting)
Input resistance	
Input current (Voltage drop)	< 0.1 V at 20 mA
Input voltage	100 kOhm
Overload	
Input current	< 100 mA
Input voltage	max. 30 V, 3 mA
Output (selectable)	0...10 V / 4...20 mA / 0...20 mA (factory setting)
Load resistance	
Output current	E 500 Ohm
Output voltage	≥ 10 kOhm
Residual ripple	< 20 mV _{eff}
Transmission error	< 0.5 % of full scale value
Temperature coefficient	< 150 ppm/K of full scale value
Cut-off frequency	> 100 Hz

General Data

Supply voltage	24 Vdc (±15%)
Power consumption	approx. 0.6 W
Operating temperature	0...+55 °C
Storage temperature	-25 °C...+85 °C
Approvals	CE, cULus
Dimensions L/H/W	88 / 98 / 6.1 mm (3.46 / 3.86 / 0.24 in.)

Coordination of insulation according to DIN EN50178, 04/98

Rated voltage	50 V
Test voltage	500 V
Overvoltage category	II
Contamination class	2

* Tu 20 °C

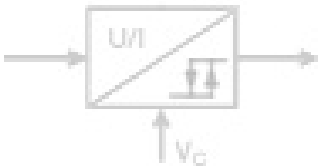
DC Alarm Conditioners

The Setpoint Controller allows cost effective units to be built for monitoring analog 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).

Approvals:



Schematic circuit diagram



Ordering data

for TS 35

Technical data

Voltage supply

Supply voltage

Supply current

Input

Input voltage

Input resistance

Voltage drop at full scale

max. input current

Cut-off frequency

Transmission behaviour

Threshold voltage ranges of U_{th}

Setting of switching threshold

Hysteresis of switching threshold

Function of output 1

Function of output 2

Response time

Output

Output current per output

Voltage drop at output transistor

Insulation coordination/safe separation to EN 50178

Separation input / output

Dielectric strength I/O to mounting rail

Ambient temperature

Storage temperature

Conductor

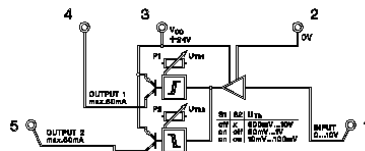
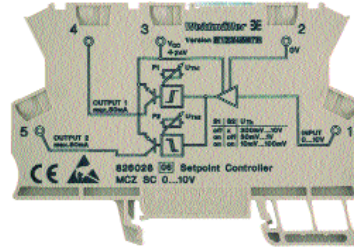
Conductor cross-section

Approvals

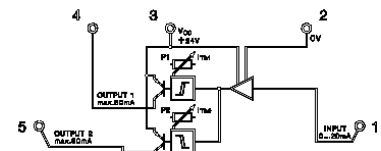
Overall width

MCZ SC 0...10 Vdc

MCZ SC 0...20 mA



Type	Part No.		
MCZ SC 24 V/0...10V	8260280000		
24 Vdc $\pm 20\%$	15 mA		
0...10 V	60 kW		
100 Hz			
	S1	S2	Temperature coefficient T_k
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.
via 2 potentiometers (12 turns)			
1 % of full scale value			
active High for $U_{input} < U_{th1}$ (set via P1)			
active High for $U_{input} > U_{th2}$ (set via P2)			
< 250 μ s (switch threshold at 90% of the max. input signal;			
$R_L \leq 1$ kW)			
2 channel switching PNP			
max. 50 mA			
< 1.2 V at 50 mA			



Type	Part No.
MCZ SC 24 V/0...20 mA	8227350000
24 Vdc ± 20 %	
15 mA	
0.5...20 mA	
50 W	
1 V	
40 mA	
100 Hz	
Temperature coefficient T _k 250 ppm max.	
via 2 potentiometers (12 turns)	
1 % of full scale value	
active High for I _{input} < I _{th1} (set via P1)	
active High for I _{input} > I _{th2} (set via P2)	
< 250 µs (switch threshold at 90% of the max. input signal;	
R _L ≤ 1 kW)	
2 channel switching PNP	
max. 50 mA	
< 1.2 V at 50 mA	

DC Alarm Conditioners

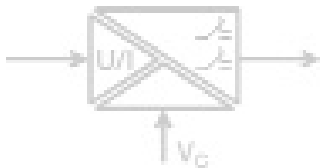
WAVEANALOG DC/Alarm

- 3-way-isolation
- Low trip / high trip
- FAILSAFE / NON FAILSAFE
- 1 relay per setpoint 250V ac @ 3A

Approvals:



Schematic circuit diagram



Ordering data

Screw connection

Tension clamp connection

Technical data*

Input

Input voltage

Input resistance

Input current

Input resistance

Output

Relay

Relay type

Contact material

Switching voltage

max. switching voltage

Permanent current ac

Switching load ac

Status indication

Mechanical lifetime (Switching cycles)

Electrical lifetime (Switching cycles at max. load)

Threshold

Hysteresis

Temperature coefficient

Repeatability

Coordination of insulation according to EN 50178, 04/98

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

General Data

Supply voltage

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Standards/Specifications

EMC standards

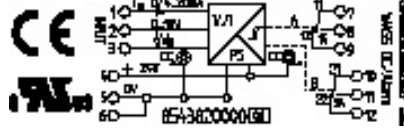
Dimensions L/H/W

Weight

Approvals

* Tu 23 °C, single module

DC/Alarm



Type	Part No.
------	----------

WAS5 DC/Alarm 8543820000

WAZ5 DC/Alarm 8543880000

0...10 V

$\geq 100 \text{ kW}$

0/4...20 mA

$\leq 110 \text{ W}$

1 relay per channel

1 change over (SPDT)

AgNi 90/10

253 Vac

253 Vac

3 A

750 VA

1 red LED per channel for alarm indication,

power on: green LED

15×10^6 operations

10^5

1...90% (independent for channel 1 & 2)

1...10% (independent for channel 1 & 2)

$\leq 500 \text{ ppm/K}$

max. $\pm 0.3 \%$ from full scale value

10 V or 20m A

300 V

4 kV

III

2

3 mm

4 kV_{eff}

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

typ. 1 W both relay detected

E 2 A

0...+55 °C (mounted on horizontal DIN rail)

-20 °C...+85 °C

EN 50178

EN 50082-2, EN 50081-1, EN 50081-2 EN 55011

92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)

150 g (0.33 lbs.)

CE, cULus

Function	SW 1			
	1	2	3	4
Channel A High Trip	■			
Channel A Low Trip	□			
Channel B High Trip		■		
Channel B Low Trip		□		
FAILSAFE, Channel 1 & 2			□	□
NON FAILSAFE, Channel 1 & 2			■	■

■ = on

□ = off

NON FAILSAFE: The relay picks up when the alarm is triggered.
FAILSAFE: The relay drops out when the alarm is triggered. An alarm is also triggered in the FAILSAFE mode, if for example, the operating voltage to the module fails.

Low trip: Alarm is triggered if the signal is undershoot the threshold.

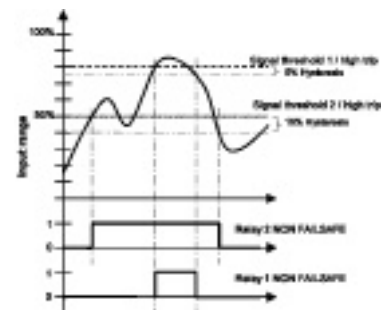
High trip: Alarm is triggered if the signal is overshoot the threshold.

Signal threshold: Adjustments of the signal threshold (1...90 %) are made for channel 1 with the potentiometer P1, and separately for channel 2 via potentiometer P2.

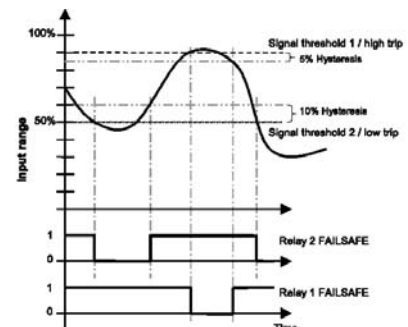
Hysteresis: Adjustments of the hysteresis (1...90 %) are made for channel 1 with the potentiometer P3, and separately for channel 2 via potentiometer P4.

WAVEANALOG DC/Alarm – Alarm Indication

Example 1



Example 2



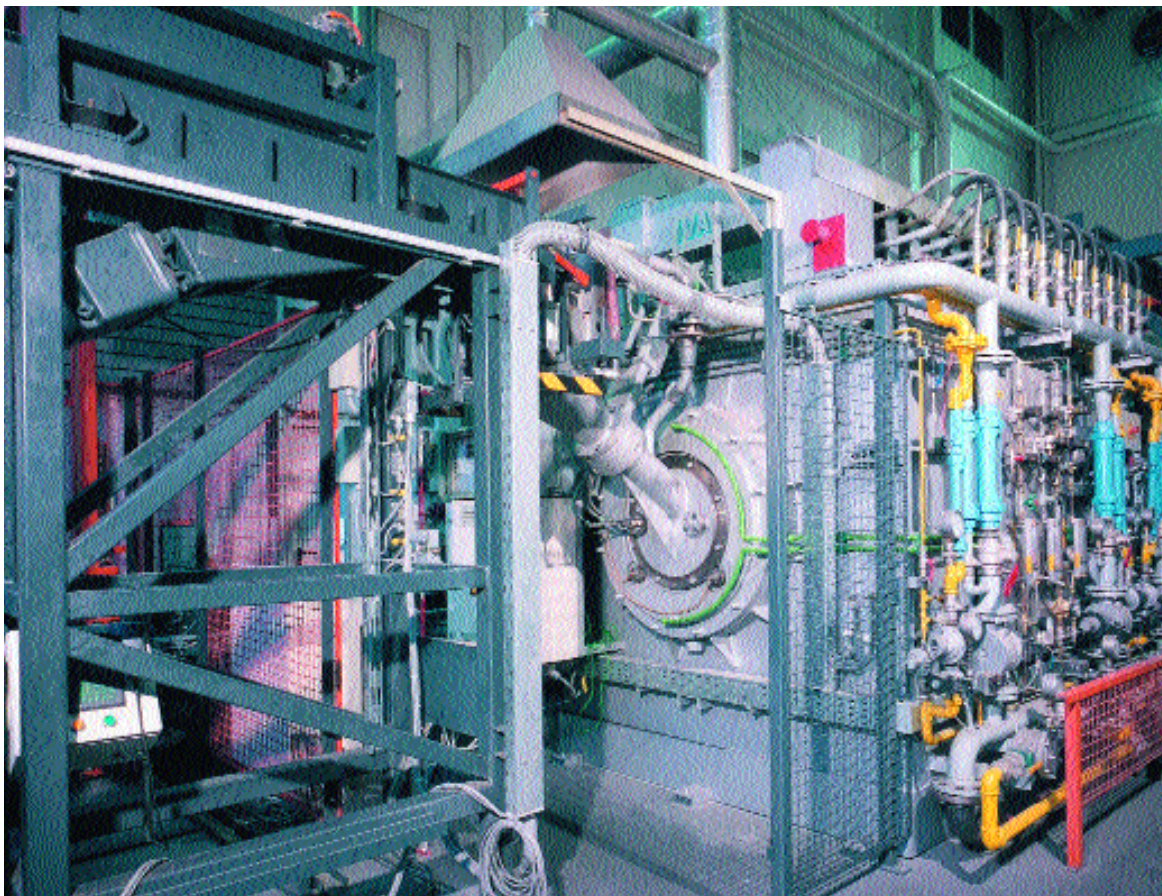
Signal monitoring and temperature conversion

Reliable recording and monitoring of temperature is important in a number of industries. In industrial processes the point of measurement is very often some distance from the point of the measured value process, for example in the case of melting and annealing furnaces a central data processing system is required. Here the measured values are fed to regulators or recording units to guarantee optimum process control. Two measurement methods are predominantly used today to record temperature in the industrial field. First the **resistance thermometer** (e.g. PT 100), which makes use of the fact that the electrical resistance of an electrical conductor varies with temperature, a distinction being made between cold and hot conductors. For an exact temperature measurement the resistance value

must be recorded, linearized and converted to a temperature-proportional analog signal. Here a distinction is made between 2-, 3- and 4- wire temperature records. The applications of these different versions depend essentially on the distance between the measuring point and the place where the signals are further processed. Second, there are **thermocouples**. Here use is made of the effect that a voltage, which increases with temperature, is generated at the point of connection between two different metals. They have the distinct advantage over resistance thermometers that they have a higher upper temperature limit of up to several thousand degrees Celsius. A common area of application includes furnaces, measurements in charges, plastic injection moulding and aluminium die casting machines

with temperatures above approximately 250° Celsius. Here signal separating converters perform an important function. First they separate signals between the harsh industrial environment and the series-connected electronics to protect against destruction. They also eliminate potential differences caused by long distances. Second they convert small temperature recorder signals to standard signals to minimize measuring errors. The sensor-specific shortcomings, such as cold point and linearization errors, are also reduced to a minimum.

Figure: Hardening shop furnace



PT100/2- /3-wire Signal Conditioners (Output loop powered)

MCZ PT100/3 CLP

• for 2 and 3 wire sensors

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

Approvals:



Schematic circuit diagram



Ordering data

for TS 35

Technical data

Input

Connection
Max. wire resistance
Leadwire resistance effect
Supply current

Output

Load resistance
Supply voltage
Residual ripple of supply voltage
Set time
Accuracy
Linearity
Temperature coefficient

Open circuit recognition

EMC

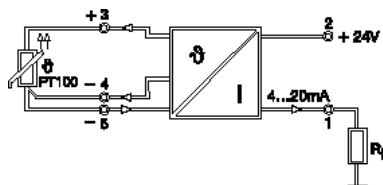
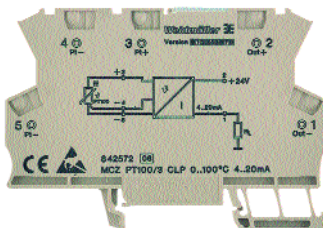
Approvals

Ambient temperature
Storage temperature
Conductor
Conductor cross-section
Overall width

* Putting a bridge between Pins 4 and 5

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



Type	Part 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

PT 100 (according to IEC 751)

3- Conductor / 2- Conductor*
each 50 W
max. 0.006 °C/W
0.8 mA

4...20 mA**

750 Wat 24 V
max: 30V / min: 9V + 20mA x R_L
max: 1.5 V at 100 Hz
10 ms
type. 0.2 % max. 0.5 % v. FSR
<0.1 % v. FSR
max. ±250 ppm/°C

yes

EMVG

EN 50081-1
EN 50082-2
CE, cULus, CSA

0 °C...+50 °C
-20 °C...+85 °C
AWG 22...12
1.5 mm²
6 mm (0.24 in.)

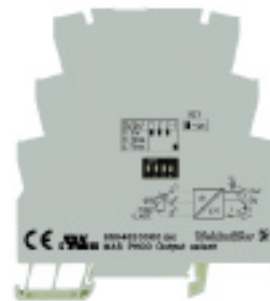
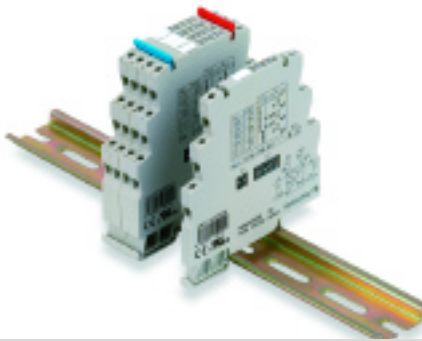
** current loop supplied

PT100/2- /3-wire Signal Conditioners

MICROANALOG PT100 Output select

- 2-way isolation between input, output and supply voltage
- PT100 2-/3-wire
- Output calibrated selectable by DIP-switches

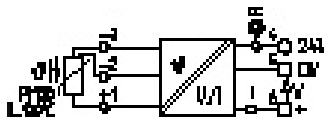
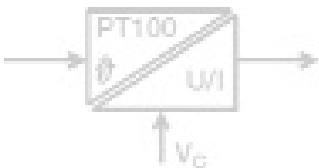
PT100 Output select



Approvals:



Schematic circuit diagram



Output	Switch			
	1	2	3	4
0 ... 10 V	■	■	■	□
0 ... 20 mA	□	□	□	□
4 ... 20 mA	□	□	□	■

■ = on
□ = off

Ordering data

Screw connection

Tension clamp connection

Technical data*

Input (fix)

Temperature range

Sensor current

Output (calibrated selectable)

Load resistance

Output current

Output voltage

Transmission error/accuracy

Temperature coefficient

Response time

Type

MAS PT100 Output select

MAZ PT100 Output select

Part No.

8594820000

8594850000

PT 100 2-/3-Wire

(2-Wire-Connection by putting bridge between 2 + 3)

0...100 °C

0.8 mA

0...10 V / 4...20 mA / 0...5V / 0...20mA (factory setting)

< 400 Ohm @ providing 24Vdc

> 10 kOhm

< 0.5 % of selected range

< 250 ppm/K of selected range

< 0.7 sec.

General Data

Voltage supply

Power consumption

Operating temperature

Storage temperature

Approvals

Dimensions L/H/W

24 Vdc (±10%)

approx. 0.6 W

0...+55 °C

-25 °C...+85 °C

CE, cULus

88 / 98 / 6.1 mm (3.46 / 3.86 / 0.24 in.)

Coordination of insulation according to DIN EN50178, 04/98

Rated voltage

Test voltage

Overvoltage category

Contamination class

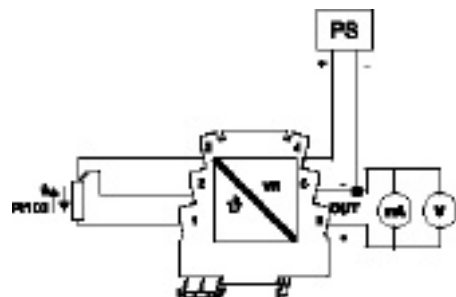
100 V

500 V

III

2

Connection



* Tu 20 °C

PT100/2-wire Signal Conditioners

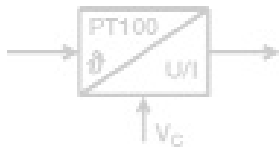
WAVEANALOG PT100 select

- 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:



Schematic circuit diagram



Ordering data

Screw connection
Tension clamp connection
Input/Output

Technical data***

Input signal
Temperature range
Supply current
Output signal
Load resistance
Accuracy at Tu=23 °C
Temperature coefficient
Measurement range ≥ 200 K
100 K E measurement range < 200 K
40 K E measurement range < 100 K

General Data

Voltage supply
Power consumption
Current carrying capacity of cross-connection
Operating temperature
Storage temperature

Standards/specifications

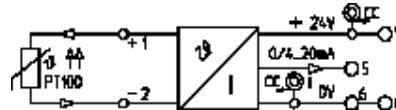
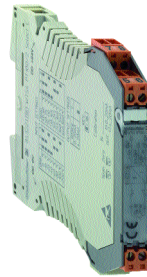
EMC standards
Dimensions L/H/W
Approvals

* without balancing

*** T_U = 23 °C single module

PT100/2

0(4) ... 20 mA



Type	Part No.
WTS4 PT100/2 C	8432210000*
WTZ4 PT100/2 C	8432220000*
PT100/2 / 0(4) ... 20 mA	

PT100/2- wire

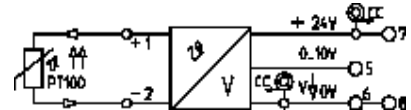
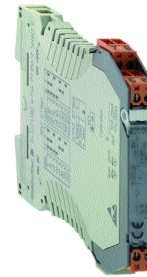
-200 ... +800 °C
1.45 mA
0(4) ... 20 mA
E 500 W
± 0.5% of measurement range
E 200 ppm / °C (typ. 80 ppm / °C)
E 250 ppm / °C (typ. 100 ppm / °C)
E 500 ppm / °C

24 Vdc ±20% (19.2 ... 28.8 Vdc)
< 48 mA at I _{out} = 20 mA
E 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 mm (3.64 / 4.43 / 0.49 in.)
CE, cULus, CSA

PT100/2

0 ... 10 V



Type	Part No.
WTS4 PT100/2 V	8432180000*
WTZ4 PT100/2 V	8432190000*
PT100/2 / 0 ... 10 V	

PT100/2- wire

-200 ... +800 °C
1.45 mA
0 ... 10 V
≥ 1 kW
± 0.5% of measurement range
E 200 ppm / °C (typ. 80 ppm / °C)
E 250 ppm / °C (typ. 100 ppm / °C)
E 500 ppm / °C

24 Vdc ±20% (19.2 ... 28.8 Vdc)
< 38 mA at I _{out} = 10 mA
E 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 mm (3.64 / 4.43 / 0.49 in.)
CE, cULus, CSA

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	☒

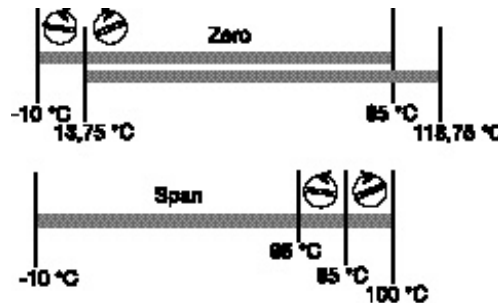
1) only modules with current output

■ = on
□ = off

Example for Zero and Span

Temperature adjustment:

Tmin	-10 °C
Span	75...110 °C
Span	95 °C
Adjustment of Span	+ 25 %



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.

PT100/3-wire Signal Conditioners

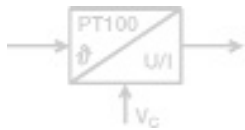
WAVEANALOG PT100 select

- 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:



Schematic circuit diagram



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
Temperature coefficient
Measurement range ≥ 200 K
100 K Δ measurement range < 200 K
40 K Δ measurement range < 100 K

General Data

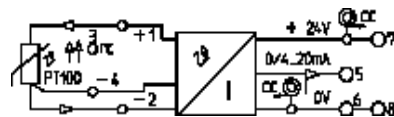
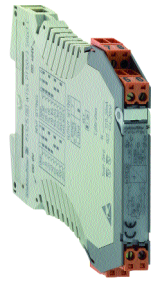
Voltage supply
Power consumption
Current carrying capacity of cross-connection
Operating temperature
Storage temperature
Standards/specifications
EMC standards
Dimensions L/H/W
Approvals

* without balancing

*** Tu = 23 °C single module

PT100/3

0(4) ... 20 mA

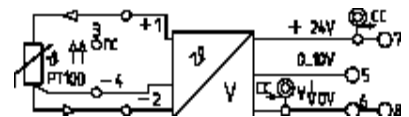
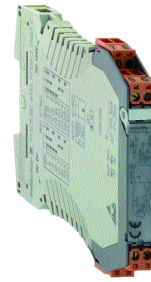


Type	Part No.
WTS4 PT100/3 C	8432150000*
WTZ4 PT100/3 C	8432160000*
PT100/3 / 0(4) ... 20 mA	

PT100/3- wire
-200 ... +800 °C
1.45 mA
£ 50 W
0(4) ... 20 mA
£ 500 W
± 0.5% of measurement range
£ 200 ppm / °C (typ. 80 ppm / °C)
£ 250 ppm / °C (typ. 100 ppm / °C)
£ 500 ppm / °C (typ. 200 ppm / °C)

PT100/3

0 ... 10 V

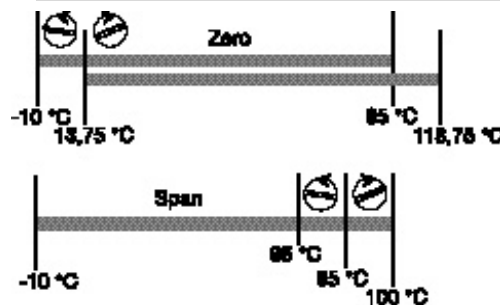


Type	Part No.
WTS4 PT100/3 V	8432090000*
WTZ4 PT100/3 V	8432130000*
PT100/3 / 0 ... 10 V	

PT100/3- wire
-200 ... +800 °C
1.45 mA
£ 50 W
0 ... 10 V
≥ 1 kW
± 0.5% of measurement range
£ 200 ppm / °C (typ. 80 ppm / °C)
£ 250 ppm / °C (typ. 100 ppm / °C)
£ 500 ppm / °C (typ. 200 ppm / °C)

24 Vdc ±20% (19.2 ... 28.8 Vdc)
< 48 mA at Iout = 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 mm (3.64 / 4.43 / 0.49 in.)
CE, cULus, CSA

Example for Zero and Span



Temperature adjustment:

Tmin	-10 °C
Span	75...110 °C

Preconfigured modules

	Input	Output	0 ... 20 mA	4 ... 20 mA	0 ... 10 V
Screw connection	0 ... 100 °C	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

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	□	□	□

Output¹⁾

Range	7
0 ... 20 mA	□
4 ... 20 mA	■

¹⁾ only modules with current output

■ = on
□ = off

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.

PT100/2- /3- /4-wire Signal Conditioners

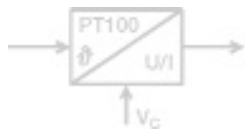
WAVEANALOG PT100 select

- 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:

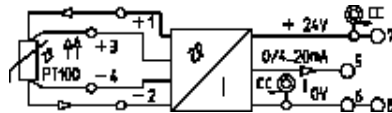
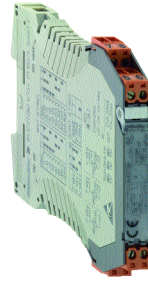


Schematic circuit diagram



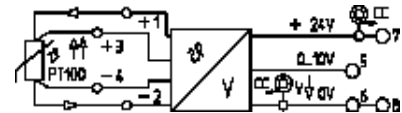
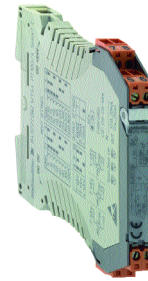
PT100/4

0(4) ... 20 mA



PT100/4

0 ... 10 V



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 $T_u=23\text{ °C}$

100 K $\pm$ measurement range < 600 K

Measurement range $\geq$ 100 K

Measurement range $\geq$ 600 K

Temperature coefficient

Measurement range $\geq$ 200 K

100 K $\pm$ measurement range < 200 K

40 K $\pm$ measurement range < 100 K

General Data

Voltage supply

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Standards/specifications

EMC standards

Dimensions L/H/W

Approvals

* without balancing

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

Type

WTS4 PT100/4 C

WTZ4 PT100/4 C

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

PT100/4-wire

-200 ... +800 °C

1.45 mA

$\pm$ 50 W(3- & 4-wire)

0(4) ... 20 mA

$\pm$ 500 W

$\pm$ 0.1% of measurement range

$\pm$ 0.1 K

$\pm$ 0.2% of measurement range

$\pm$ 200 ppm / °C (typ. 80 ppm / °C)

$\pm$ 225 ppm / °C (typ. 90 ppm / °C)

$\pm$ 450 ppm / °C (typ. 180 ppm / °C)

24 Vdc $\pm$ 20% (19.2 ... 28.8 Vdc)

< 48 mA at $I_{out} = 20\text{ mA}$

$\pm$ 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 mm (3.64 / 4.43 / 0.49 in.)

CE, cULus, CSA

Type

WTS4 PT100/4 V

WTZ4 PT100/4 V

PT100/4 / 0 ... 10 V

PT100/4-wire

-200 ... +800 °C

1.45 mA

$\pm$ 50 W(3- & 4-wire)

0 ... 10 V

$\geq$ 1 kW

$\pm$ 0.1% of measurement range

$\pm$ 0.1 K

$\pm$ 0.2% of measurement range

$\pm$ 200 ppm / °C (typ. 80 ppm / °C)

$\pm$ 225 ppm / °C (typ. 90 ppm / °C)

$\pm$ 450 ppm / °C (typ. 180 ppm / °C)

24 Vdc $\pm$ 20% (19.2 ... 28.8 Vdc)

< 38 mA at $I_{out} = 10\text{ mA}$

$\pm$ 2 A

0 °C ... +55 °C

-20 °C ... +85 °C

EN 50178, IEC 751

EN 50081, EN 50082, EN 55011

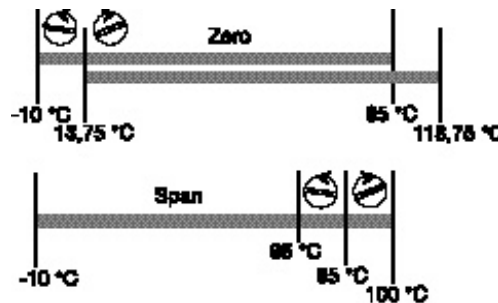
92.4 / 112.5 / 12.5 mm (3.64 / 4.43 / 0.49 in.)

CE, cULus, CSA

Example for Zero and Span

Temperature adjustment:

Tmin	-10 °C
Span	75...110 °C
Span	95 °C
Adjustment of Span	+ 25 %



Preconfigured modules

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

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

Please indicate additional output signal of current output

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	PT 100	8	9	10
Range					
0 ... 20 mA	■	■	■	■	■
4 ... 20 mA	■	■	■	■	■

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

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 Conditioner (configurable)

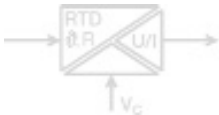
WAVEANALOG PRO RTD

- Measurement from PT 100 (PRO RTD), measurement from PT 1000 (PRO RTD 1000) Ni 100, R, potentiometer
- Universally adjustable by DIP switches
- 3-way-isolation
- status LED
- Linearization
- Cross-connectable voltage supply via cross-connectors

Approvals:

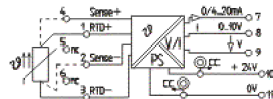
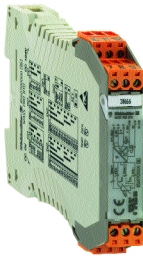


Schematic circuit diagram



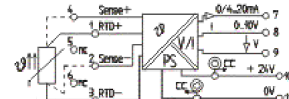
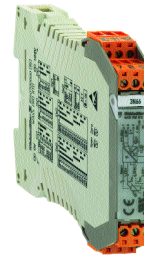
Ordering data	
Screw connection	
Tension clamp connection	
Input/Output	
Technical data*	
Input (adjustable)	
Output (adjustable)	
Output voltage	
Offset voltage	
Load resistance	
Output current	
Offset current	
Load resistance	
Accuracy, slow/fast step response	
Step response (selectable by DIP-switches)	
RTD, R	
Potentiometer	
Temperature coefficient	measurement range $\geq 200\text{ K}$
	100 K Δ measurement range $< 200\text{ K}$
	40 K Δ measurement range $< 100\text{ K}$
Max. wire resistance:	
Influence of wire resistances:	
Open circuit recognition:	
Range of man. fine adjustment (switchable)	
Status LED:	
General Data	
Supply voltage	
Power consumption	
Current carrying capacity of cross-connection	
Operating temperature	
Storage temperature	
Factory setting	
Dimensions L/H/W	
Weight	
Approvals	
Coordination of insulation according to DIN EN 50178, 04/98	
Rated voltage	
Rated surge voltage	
Overvoltage category	
Contamination class	
Clearance and creepage distance	
Test voltage	
Standards/specifications	
EMC standards	
* $T_U = 23\text{ }^{\circ}\text{C}$ single module	

PRO RTD



Type	Part 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...100 W/ max: 0...100 kW	
Resistance: 0 ... 450W	
0...10 V	
max. 0.05 V	
$\geq 1\text{ kW}$	
0/4 ... 20 mA	
max. 100 μA	
$\leq 600\text{ W}$	
PT 100, Ni 100: 0.3% of measurement range 0.8%,	
Measurement range $< 100\text{ K} / 0.3\text{ K} / 0.8\text{ K}$	
Potentiometer: 0.2% from end value / 0.3%	
Resistance : 0.2% from end value / 0.3%	
type	fast slow
	$< 1.2\text{ s}$ $< 2.2\text{ s}$
	$< 500\text{ ms}$ $< 1.1\text{ s}$
$\leq 200\text{ ppm} / ^{\circ}\text{C}$	
$\leq 250\text{ ppm} / ^{\circ}\text{C}$	
$\leq 400\text{ ppm} / ^{\circ}\text{C}$	
50 W for 3- and 4-wire	
max. + 0.25°C at 50 W wire resistance	
Output signal $> 10\text{ V}$ or $> 20\text{ mA}$, LED flashing	
$\geq \pm 5\%$, from ver. 1: $\geq 12.5\%$, potentiometer $\geq 12.5\% \dots 25\%$	
Module active: LED on / open circuit: LED flashing	
Error: LED off	
18 Vdc ... 24 Vdc ... 30 Vdc	
830 mW ... 880 mW ... 980mW @ $I_{out} = 20\text{ mA}$	
$\leq 2\text{ A}$	
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 mm (3.64 / 4.43 / 0.69 in.)	
approx. 100 g (0.22 lbs.)	
CE, cULus, GL	
300 V	
4 kV	
III	
2	
3 mm	
2 kVeff	
EN 50178, IEC751	
EN 50081, EN50082, EN55011	

PRO RTD1000



Switch position/setting options (see next page)

Type	Part No.
WAS5 PRO RTD 1000	8679490000
on request	
PT1000/2-/3-/4-wire: 200°C to 850°C	
Ni1000: -60°C to + 250°C	
Potentiometer: min: 0...1 kW/ max: 0...100 kW	
Resistance : 0 ... 4500 W	
0...10 V	
max. 0.05 V	
$\geq 1\text{ kW}$	
0/4 ... 20 mA	
max. 100 μA	
$\leq 600\text{ W}$	
PT 100, Ni 100: 0.3 % of measurement range 0.8%,	
Measurement range $< 100\text{ K} / 0.3\text{ K} / 0.8\text{ K}$	
Potentiometer: 0.2% from end value / 0.3%	
Resistance : 0.2% from end value / 0.3%	
type	fast slow
	$< 1.2\text{ s}$ $< 2.2\text{ s}$
	$< 500\text{ ms}$ $< 1.1\text{ s}$
$\leq 200\text{ ppm} / ^{\circ}\text{C}$	
$\leq 250\text{ ppm} / ^{\circ}\text{C}$	
$\leq 400\text{ ppm} / ^{\circ}\text{C}$	
50 W for 3- and 4-wire	
max. + 0.25°C at 50 W wire resistance	
Output signal $> 10\text{ V}$ or $> 20\text{ mA}$, LED flashing	
$\geq \pm 5\%$, ab Ver. 1: $\geq 12.5\%$, Potentiometer $\geq 12.5\% \dots 25\%$	
Module active: LED on / open circuit: LED flashing	
Error: LED off	
18 Vdc ... 24 Vdc ... 30 Vdc	
830 mW ... 880 mW ... 980mW @ $I_{out} = 20\text{ mA}$	
$\leq 2\text{ A}$	
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 mm (3.64 / 4.43 / 0.69 in.)	
approx. 100 g (0.22 lbs.)	
CE, cULus, GL	
300 V	
4 kV	
III	
2	
3 mm	
2 kVeff	
EN 50178, IEC751	
EN 50081, EN50082, EN55011	

RTD-Signal Conditioner (configurable)

WAVEANALOG PRO RTD

WAVEANALOG PRO RTD 1000

Switch position/setting options

Selection of input		Switch 1		
Input		1	2	3
PT100 2-wire		■	■	■
PT100 3-wire		□	■	■
PT100 4-wire		■	□	■
R 2-wire		□	□	■
NI100 2-wire		■	■	□
NI100 3-wire		□	■	□
NI100 4-wire		■	□	□
Potentiometer		□	□	□

■ = on
□ = off

Selection of minimum input values				Switch 1			
Q _{min}	R _{min}	Pot.min		4	5	6	7
0°C	0 W	0%		■	■	■	■
-10°C	10 W	10%		■	■	■	□
-20°C	20 W	20%		■	■	□	■
-25°C	20 W	25%		■	■	□	□
-30°C	30 W	30%		■	□	■	■
-40°C	40 W	40%		■	□	■	□
-50°C	50 W	50%		■	□	□	■
-60°C	60 W	60%		■	□	□	□
-70°C	70 W	70%		□	■	■	■
-80°C	80 W	80%		□	■	■	□
-90°C	90 W			□	■	□	■
-100°C	100 W			□	■	□	□
-150°C	150 W			□	□	■	■
-200°C	200 W			□	□	■	□
Special range				□	□	□	■

Switch position/setting options

Selection of input		Switch 1		
Input		1	2	3
PT1000 2-wire		■	■	■
PT1000 3-wire		□	■	■
PT1000 4-wire		■	□	■
R 2-wire		□	□	■
NI1000 2-wire		■	■	□
NI1000 3-wire		□	■	□
NI1000 4-wire		■	□	□
Potentiometer		□	□	□

■ = on
□ = off

Selection of minimum input values				Switch 1			
Q _{min}	R _{min}	Pot.min		4	5	6	7
0°C	0 W	0%		■	■	■	■
-10°C	100 W	10%		■	■	■	□
-20°C	200 W	20%		■	■	□	■
-25°C	200 W	25%		■	■	□	□
-30°C	300 W	30%		■	□	■	■
-40°C	400 W	40%		■	□	■	□
-50°C	500 W	50%		■	□	□	■
-60°C	600 W	60%		■	□	□	□
-70°C	700 W	70%		□	■	■	■
-80°C	800 W	80%		□	■	■	□
-90°C	900 W			□	■	□	■
-100°C	1000 W			□	■	□	□
-150°C	1500 W			□	□	■	■
-200°C	2000 W			□	□	■	□
Special range				□	□	□	■

Selection of the measurement range				Switch 2				
T	R	pot.		1	2	3	4	5
40K	20W	20%		■	■	■	■	■
50K	25W	25%		■	■	■	■	□
60K	30W	30%		■	■	■	□	■
70K	35W	35%		■	■	■	□	□
80K	40W	40%		■	■	□	■	■
90K	45W	45%		■	■	□	■	□
100K	50W	50%		■	■	□	□	■
110K	55W	55%		■	■	□	□	v
120K	60W	60%		■	□	■	■	■
125K	62,5W	62,5%		■	□	■	■	□
130K	65W	65%		■	□	■	□	■
140K	70W	70%		■	□	■	□	□
150K	75W	75%		■	□	□	■	■
160K	80W	80%		■	□	□	■	□
170K	85W	85%		■	□	□	□	■
180K	90W	90%		■	□	□	□	□
190K	95W	95%		□	■	■	■	■
200K	100W	100%		□	■	■	■	□
250K	125W	---		□	■	■	□	■
300K	150W	---		□	■	■	□	□
350K	175W	---		□	■	□	■	■
400K	200W	---		□	■	□	■	□
450K	225W	---		□	■	□	□	■
500K	250W	---		□	■	□	□	□
550K	275W	---		□	□	■	■	■
600K	300W	---		□	□	■	■	□
650K	325W	---		□	□	■	□	■
700K	350W	---		□	□	■	□	□
750K	375W	---		□	□	□	■	■
800K	400W	---		□	□	□	■	□
850K	425W	---		□	□	□	□	■
900K	450W	---		□	□	□	□	□

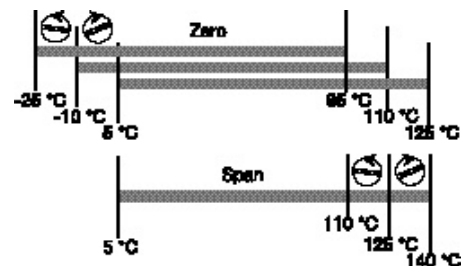
Selection of the measurement range				Switch 2				
T	R	pot.		1	2	3	4	5
40K	200W	20%		■	■	■	■	■
50K	250W	25%		■	■	■	■	□
60K	300W	30%		■	■	■	■	■
70K	350W	35%		■	■	■	□	□
80K	400W	40%		■	■	□	■	■
90K	450W	45%		■	■	□	■	□
100K	500W	50%		■	■	□	□	■
110K	550W	55%		■	■	□	□	v
120K	600W	60%		■	□	■	■	■
125K	625W	62,5%		■	□	■	■	□
130K	650W	65%		■	□	■	□	■
140K	700W	70%		■	□	■	□	□
150K	750W	75%		■	□	□	■	■
160K	800W	80%		■	□	□	■	□
170K	850W	85%		■	□	□	□	■
180K	900W	90%		■	□	□	□	□
190K	950W	95%		□	■	■	■	■
200K	1000W	100%		□	■	■	■	□
250K	1250W	---		□	■	■	□	■
300K	1500W	---		□	■	■	□	□
350K	1750W	---		□	■	□	■	■
400K	2000W	---		□	■	□	■	□
450K	2250W	---		□	■	□	□	■
500K	2500W	---		□	■	□	□	□
550K	2750W	---		□	□	■	■	■
600K	3000W	---		□	□	■	■	□
650K	3250W	---		□	□	■	□	■
700K	3500W	---		□	□	■	□	□
750K	3750W	---		□	□	□	■	■
800K	4000W	---		□	□	□	■	□
850K	4250W	---		□	□	□	□	■
900K	4500W	---		□	□	□	□	□

Selection of output		Switch 2	
Output		6	7
0...10V		■	□
0...20mA		□	□
4...20mA		□	■

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

Selection of step set time		S.2
Time of step response		8
slow		■
fast		□

Example for Zero and Span	
Temperature adjustment:	
Output	4...20 mA
DIP-switch	-10 °C...+110 °C
Span	75...110 °C
Span	120 °C
Adjustment of Span	± 12.5 %



Adjustment help WAVEtool
This service tool enables quick and uncomplicated configuration of WAVEANALOG PRO.
Download from Internet:
www.weidmuller.com
Æ Products
Æ Downloads

(see page 29)

RTD-Signal Conditioner for copper elements (configurable)

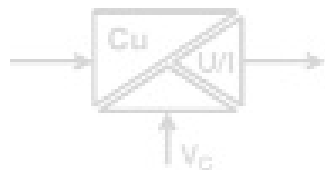
WAVEANALOG PRO RTD Cu

- Universally adjustable by DIP-switches
- 3-way-isolation
- Status LED
- Linearization
- Cross-connectable voltage supply via cross-connectors

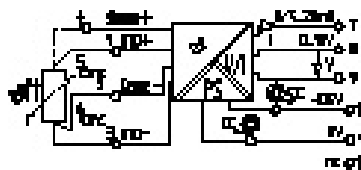
Approvals:



Schematic circuit diagram



PRO RTD Cu



Ordering data

Screw connection

Tension clamp connection

Input/Output

Technical data*

Input (adjustable)

Output (adjustable)

Output voltage

Offset voltage

Load resistance

Output current

Offset current

Load resistance

Accuracy, slow/fast step response

Step response (selectable by DIP-switches)

Temperature coefficient

max. wire resistance:

Influence of wire resistances:

Open circuit recognition:

Range of man. fine adjustment

Status LED:

General Data

Supply voltage

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Factory setting

Dimensions L/H/W

Weight

Approvals

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

Standards/specifications

EMC standards

* T_u = 23 °C single module

Type Part No.

WAS5 PRO RTD Cu 8638950000

WAZ5 PRO RTD Cu on request

configurable

Cu 10 -200...+260 °C

Cu 25 -200...+260 °C

Cu 50 -200...+260 °C

Cu 100 -200...+260 °C

0...10 V

max. 0.05 V

≥ 1 kW

0/4 ... 20 mA

max. 100 µA

£ 600 W

0.5 % of measurement range, resp. 0.5 K

1 % of measurement range, resp. 1 K

type fas slow

RTD Cu < 1.2 s < 2.3 s

£ 250 ppm/K of measurement range for span ≥ 100 K

£ 400 ppm/K of measurement range for 40 K £ span < 100 K

5 W for Cu 10; 15 W for Cu 25; 25 W for Cu 50; 50 W for Cu 100

max. + 0.25 °C at max. wire resistance

Output signal > 10 V resp. > 20 mA, LED blinks

≥ ± 12.5%

Module active: LED lit / open circuit: LED blinks

Error: LED off

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

880 mW ... 980 mW...1030 mW @ Output = 20 mA

£ 2 A

0...55 °C

-20...85 °C

CU 10/3 0 ... 100 °C / 4 ... 20 mA; no filter;

No manual fine adjustment; slow step response

92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)

approx. 100 g (0.22 lbs.)

CE, cULus, GL

300 V

4 kV

III

2

3 mm

2 kVeff

EN 50178, IEC751

EN 50081, EN50082, EN55011

Selection of connection	
Connection	Switch 1
3-wire	■
4-wire	□

Selection of sensor		
Type	Switch 1	
	2	3
Cu 10	■	■
Cu 25	■	□
Cu 50	□	■
Cu 100	□	□

Selection of minimum input values				
Q _{min}	Switch 1			
	4	5	6	7
- 0 °C	■	■	■	■
-10 °C	■	■	■	□
-20 °C	■	■	□	■
-25 °C	■	■	□	□
-30 °C	■	□	■	■
-40 °C	■	□	■	□
-50 °C	■	□	□	■
-60 °C	■	□	□	□
-70 °C	□	■	■	■
-80 °C	□	■	■	□
-90 °C	□	■	□	■
-100 °C	□	■	□	□
-150 °C	□	□	■	■
-200 °C	□	□	■	□
Special range	□	□	□	□

Selection of the measurement range				
Span	Switch 2			
	1	2	3	4
40 K	■	■	■	■
50 K	■	■	■	□
60 K	■	■	■	□
70 K	■	■	■	□
80 K	■	■	□	■
90 K	■	■	□	□
100 K	■	■	□	■
110 K	■	■	□	□
120 K	■	□	■	■
125 K	■	□	■	□
130 K	■	□	■	■
140 K	■	□	■	□
150 K	■	□	□	■
160 K	■	□	□	□
170 K	■	□	□	■
180 K	■	□	□	□
190 K	□	■	■	■
200 K	□	■	■	□
210 K	□	■	■	■
220 K	□	■	■	□
230 K	□	■	□	■
240 K	□	■	□	□
250 K	□	■	□	■
260 K	□	■	□	□
270 K	□	□	■	■
280 K	□	□	■	□
290 K	□	□	■	■
300 K	□	□	■	□
350 K	□	□	■	■
400 K	□	□	□	□
450 K	□	□	□	■
460 K	□	□	□	□

Selection of output	
Output	Switch 2
0...10 V	■ □
0...20 mA	□ □
4...20 mA	□ ■

Switching on the manual fine adjustment	
man. adj.	Switch 1
off	□
on	■

Selection of step set time	
Time of step response	Switch 2
slow	■
fast	□

■ = on
□ = off

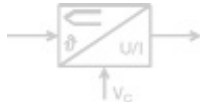
Thermo-Signal Conditioners

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:   

Schematic circuit diagram

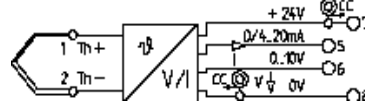


Ordering data	
Screw connection	
Tension clamp connection	
Input/Output	
Technical data*	
Input signal	
Types	
Output signal	
Load resistance	
Output signal	
Load resistance	
Output signal	
Load resistance	
Accuracy at Tu = 23 °C	

Temperature coefficient	
Response time without filter	
Response time with Filter	
General Data	
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	
Approvals	
* Tu = 23 °C single module	

Thermo Select

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



Type	Part 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 W	
4 ... 20 mA	
£ 500 W	
0 ... 10 V	
≥ 1 kW	
Typ 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)	
Typ J -200°C ... -150°C ± (4K + 0.1% of set range)	
-150°C ... 1200°C ± (3K + 0.1% of set range)	
Typ T -200°C ... -150°C ± (5K + 0.1% of set range)	
-150°C ... 400°C ± (3K + 0.1% of set range)	
Typ E -200°C ... -150°C ± (4K + 0.1% of set range)	
-150°C ... 1000°C ± (3K + 0.1% of set range)	
Typ N -200°C ... -150°C ± (6K + 0.1% of set range)	
-150°C ... 1300°C ± (3K + 0.1% of set range)	
Typ R -50°C ... 200°C ± (10K + 0.1% of set range)	
200°C ... 1760°C ± (6K + 0.1% of set range)	
Typ S -50°C ... 200°C ± (10K + 0.1% of set range)	
200°C ... 1760°C ± (6K + 0.1% of set range)	
Typ 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 Iout = 20 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 mm (3.64 / 4.43 / 0.49 in.)	
CE, cULus, CSA	

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°	■	■	□	□	□
				500 C°	■	□	■	■	□
				550 C°	□	□	■	■	□
SW 1				600 C°	■	□	■	□	□
Tmin	4	5	6	7	650 C°	■	□	■	□
0 C°	■	■	■	■	700 C°	■	□	■	■
-10 C°	■	■	■	□	750 C°	■	□	□	□
-20 C°	■	■	□	■	800 C°	■	□	□	□
-30 C°	■	■	□	□	850 C°	■	□	□	□
-40 C°	■	□	■	■	900 C°	□	■	■	■
-50 C°	■	□	□	□	950 C°	□	■	■	□
-100 C°	■	□	■	■	1000 C°	□	■	■	□
-150 C°	■	□	□	□	1050 C°	□	■	■	□
-200 C°	□	■	■	■	1100 C°	□	■	□	■
+50 C°	□	■	■	□	1150 C°	□	■	□	□
+100 C°	□	■	□	□	1200 C°	□	■	□	■
+150 C°	□	■	□	□	1250 C°	□	■	□	□
+200 C°	□	□	■	■	1300 C°	□	□	■	■
+250 C°	□	□	■	□	1350 C°	□	□	■	■
+500 C°	□	□	□	■	1400 C°	□	□	■	□
				1450 C°	□	□	■	□	□
SW 2				1500 C°	□	□	□	■	■
Output	6	7							
0 - 10 V	■	□							
0 - 20 mA	□	□							
4 - 20 mA	□	■							
				1600 C°	□	□	□	■	□
				1700 C°	□	□	□	□	■
				1800 C°	□	□	□	□	□
Filter 8									
off				□					
on				■					

■ = on
□ = off

Thermo-Signal Conditioners

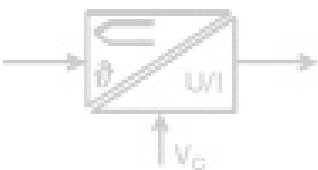
MICROANALOG Thermo Output select

- 2-way isolation between input, output and supply voltage
- Cold junction compensation
- Linearity
- Output calibrated selectable by DIP-switches

Approvals:



Schematic circuit diagram



Ordering data

Screw connection
Tension clamp connection
Screw connection
Tension clamp connection

Technical data*

Input (fix)

Output (calibrated selectable)

Load resistance
Output current
Output voltage
Residual ripple
Accuracy (incl. Lineary and cold junction compensation)
Thermoelemente Typ K, 0...1000 °C
Thermoelemente Typ J, 0...700 °C
Temperature coefficient
Response time

General Data

Voltage supply
Current carrying capacity of the connection between connections 3 and 5:
Power consumption
Operating temperature
Storage temperature
Approvals

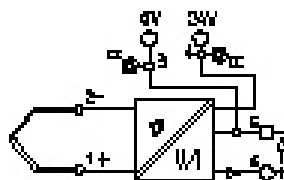
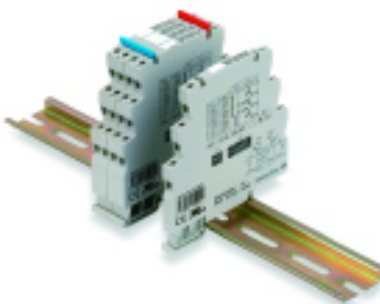
Dimensions L/H/W

Coordination of insulation according to DIN EN50178, 04/98

Rated voltage
Test voltage
Overvoltage category
Contamination class

* Tu 20 °C

Thermo-K Output select Thermo-J Output select



Type

Type	Part No.
MAS Thermo-K Output select	8594830000
MAZ Thermo-K Output select	8594860000
MAS Thermo-J Output select	8615210000
MAZ Thermo-J Output select	8615240000

Thermocouple as in EN 60584-1

Type K, 0...1000 °C
Type J, 0...700 °C

0...10V / 4...20mA / 0...5V / 0...20mA (factory setting)

< 400 Ohm @ providing 24 Vdc
> 10 kOhm
< 20m V _{eff}
< 0.6 % of selected range
< 0.7 % of selected range
< 250 ppm/K of selected range
< 0.7 sek

24 Vdc (±10%)

100 mA

approx. 0.6 W
0...+55 °C
-25 °C...+85 °C
CE, cULus

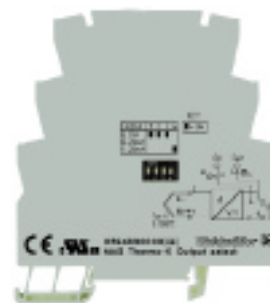
88 / 98 / 6.1 mm (3.46 / 3.86 / 0.24 in.)

100 V

500 V

III

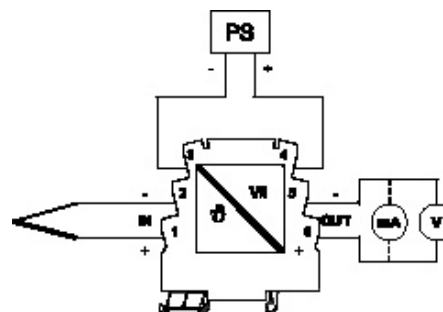
2



Output	Switch			
	1	2	3	4
0 ... 10 V	■	■	■	□
0 ... 20 mA	□	□	□	□
4 ... 20 mA	□	□	□	■

■ = on
□ = off

Connection



Thermo-Signal Conditioners - configurable

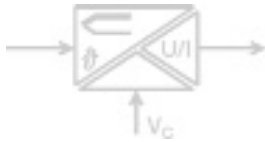
WAVEANALOG PRO Thermo

- 3-way-isolation
- Thermocouples
- K, J, T, E, N, R, S, B configurable
- Temperature range
- -200 °C ... +1820 °C configurable
- No adjustment necessary
- Cold junction compensation
- Configurable output signal
- Cross-connectable voltage supply via cross-connectors

Approvals:



Schematic circuit diagram



Ordering data

Screw connection
Tension clamp connection
Input/Output

Technical data*

Input (adjustable)

Accuracy at $T_u = 23\text{ °C}$

Output (adjustable)

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

General Data

Supply voltage:
Power consumption:
Current carrying capacity of cross-connection
Operating temperature
Storage temperature
Standards/specifications
EMC standards
Factory setting

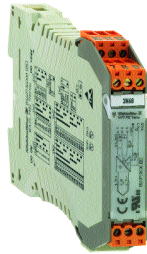
Dimensions L/H/W

Weight

Approvals

* $T_u = 23\text{ °C}$ single module

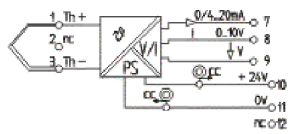
PRO Thermo



Adjustment help

WAVEtool

This service tool enables quick and uncomplicated configuration of WAVEANALOG PRO. Download from the Internet:
www.weidmuller.com
Æ Products
(see page 29)



Type	Part 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

Typ 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)

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

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

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

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

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

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

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

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

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

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

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

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

Typ 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 kW

0/4 ... 20 mA

max. 100 µA

£ 600 W

max. 1.4 s

max. 7.5 s

50 W for 3- and 4-wire

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

≥ ±5%

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

Error: LED off

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

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

£ 2 A

0 °C ... +55 °C

-20 ... +85 °C

EN 50178, IEC751

EN 50081, EN50082, EN55011

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

No manual fine adjustment

92.4 / 112.5 / 17.5 mm (3.64 / 4.43 / 0.69 in.)

100 g (0.22 lbs.)

CE, cULus, GL

Selection of thermocoupler

Type	SW1		
	1	2	3
K	■	■	■
J	□	■	■
T	■	□	■
E	□	□	■
N	■	■	□
R	□	■	□
S	■	□	□
B	□	□	□

Selection of minimum temperature

t_{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	□	□	□	■
Sonderbereich	□	□	□	□

Selection of temperature span

Span	SW2				
	1	2	3	4	5
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	□	□	□	□	□

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

SW2	
Filter	8
off	□
on	■

■ = on

□ = off

Coordination of insulation according to DIN 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
Test voltage	2 kVeff

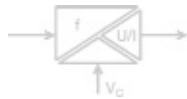
Frequency Signal Conditioners

WAVEANALOG PRO Frequency

- 3-way-isolation
- Max. input frequency 100 kHz
- Input and output selectable by DIP-switches
- No adjustment required
- Special range programmable

Approvals:  

Schematic circuit diagram



Ordering data

Screw connection
Tension clamp connection

Technical data*

Input (adjustable)

Input frequency (selectable by DIP-switches)

Input frequency (programmable)

Resolution

Accuracy of frequency measurement

Namur input according DIN 19234

Threshold

Hysteresis

NPN input

Threshold

Hysteresis

Minimum pulse duration

Minimum pulse separation

PNP output

Threshold

Hysteresis

Minimum pulse duration

Minimum pulse separation

Supply voltage for electrical sensor

Output

Current / voltage (selectable by DIP-switches)

Output voltage

Output offset voltage

Load resistance

Output current

Output offset current

Load resistance

Accuracy

Temperature coefficient

Response time

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

General Data

Supply voltage

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Standards/specifications

EMC standards

Factory setting

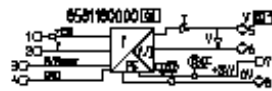
Dimensions L/H/W

Weight

Approvals

* Tu 23°C, single module

PRO Freq



Type

WAS4 PRO Freq

WAZ4 PRO Freq

Part No.

8581180000

8581190000

- 3-wire initiator with PNP output
- 3-wire initiator with PNP output and external power supply
- 3-wire initiator with NPN output
- 3-wire initiator with NPN output and external power supply
- 2-wire initiator
- Namur initiator
- Push-pull output stage

0...15.9 kHz

0...100 kHz

0.1 mHz full scale, 5 ppm from measurement value

max. 100 ppm full scale

approx. 1.7 mA

approx. 0.2 mA

max. input: + 30 V

approx. 6.5 V

approx. 0.2 V

15 µs (5 µs push pull output stage)

5 µs

max. input: ± 30 V

approx. 6.7 V

approx. 0.5 V

5 µs

5 µs

approx. 16 V @ max. 15 mA

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

0...10 V

max. 0.05 V

≥ 1 kW

0/4...20 mA

max. 100 µA

£ 600 W

0.2 % of full scale

max. 200 ppm/K of full scale

360 ms + 2 x period of the input frequency

(safe separation)

300 V

6 kV

III

2

5.5 mm

1.2 KV_{eff}

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

max. 1.6 W @ I_{out}=20 mA

£ 2 A

0...55 °C

-20...85 °C

EN 50178 (safe separation)

EN 50081, EN 50082, EN 55011, EN 61000-6-2, EN 61326

0...10 kHz / 4...20 mA

92.4 / 112.5 / 1.5 mm (3.64 / 4.41 / 0.49 in.)

100 g (0.22 lbs.)

CE, cULus

Selecting the operating mode

Operating mode	Switch 2	
	3	4
0...fmax	☐	☐
fmin...fmax	☐	☒
saving	☐	☐
fmin	☒	☐

$$f = (A+B) \times C$$

Selecting the frequency		Switch 1			
A	1	2	3	4	
0	☐	☐	☐	☐	
1	☐	☐	☐	☒	
2	☐	☐	☒	☐	
3	☐	☐	☐	☒	
4	☐	☒	☐	☐	
5	☐	☒	☐	☒	
6	☐	☒	☒	☐	
7	☐	☒	☒	☒	
8	☒	☐	☐	☐	
9	☒	☐	☐	☒	
10	☒	☐	☒	☐	
11	☒	☐	☐	☒	
12	☒	☒	☐	☐	
13	☒	☒	☐	☒	
14	☒	☒	☒	☐	
15	☒	☒	☒	☒	

Selecting the frequency				
B	Switch 1			
	5	6	7	8
0	☐	☐	☐	☐
0.1	☐	☐	☐	☒
0.2	☐	☐	☒	☐
0.3	☐	☐	☒	☒
0.4	☐	☒	☐	☐
0.5	☐	☒	☐	☒
0.6	☐	☒	☒	☐
0.7	☐	☒	☒	☒
0.8	☒	☐	☐	☐
0.9	☒	☐	☐	☒

Selecting the frequency		Switch 2	
		1	2
x1	☐	☐	☐
x10	☐	☐	☒
x100	☒	☐	☐
x1000	☒	☒	☐

Selecting the output

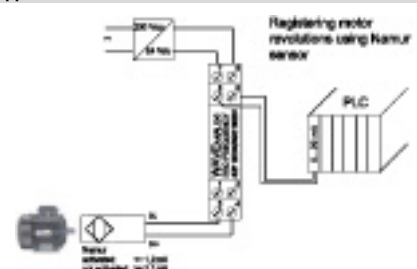
Output	Switch 2			
	5	6	7	8
0...10 V	☒	☐	☐	☒
0...20 mA	☐	☐	☐	☐
4...20 mA	☐	☒	☐	☐
0...5 V	☒	☒	☒	☒

Special range (frequency generator is required)

Funktion	Switch 2			
	1	2	3	4
save min. frequency	☐	☒	☒	☒
save max. frequency	☒	☐	☒	☒
select special range	☒	☒	☒	☒

■ = on
□ = off

Application

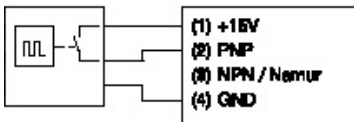


Frequency Signal Conditioners

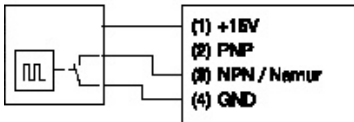
WAVEANALOG PRO Frequency

Wiring diagram

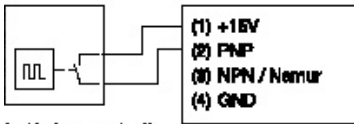
3-wire Initiator with PNP output



3-wire Initiator with NPN output

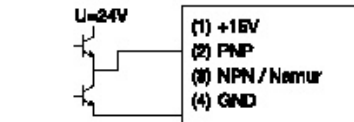


2-wire Initiator

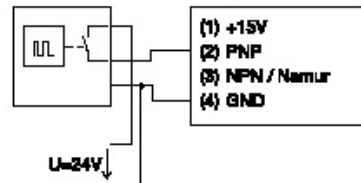


(residual current <1 mA)

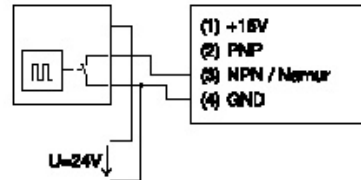
Push-pull output stage



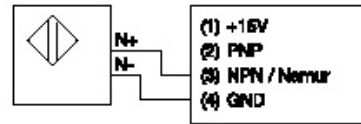
3-wire Initiator with PNP output and external power supply



3-wire Initiator with NPN output and external power supply



Namur Initiator



Adjustment help

Set the input range via the DIP switches
(no frequency generator required):

2 cases are to be distinguished:

1. below measurement frequency = 0 Hz

- Select operating mode „0...fmax".
S2.3 = 0 and S2.4 = 0
- Set upper measurement frequency via the DIP switches S1 and S2.1, S2.2 (see table)
- Ready!

2. lower measurement frequency π 0 Hz

- First, the lower measurement frequency has to be saved.
Select operating mode "save from fmin".
S2.3 = 1 and S2.4 = 0
Set upper measurement frequency via the DIP switches S1 and S2.
(see table).
Connect the module to the power supply to save the frequency.
- Select operating mode "fmin...fmax".
S2.3 = 0 and S2.4 = 1
- Set upper measurement frequency via the DIP switches S1 and S2.1, S2.2 (see table)
- Ready!

Setting the input range using a frequency generator:

- Select the switch setting for saving the minimum frequency:
S2.1=0 ; S2.2=1; S2.3=1 and S2.4=1
- Apply minimum frequency to the module
- Connect the module to the power supply.
- The LED lights up when the input frequency is measured. The frequency has been saved when the LED goes out;
the module can be disconnected from the power supply.
- Repeat the process with the maximum frequency:
S2.1=1; S2.2=0; S2.3=1 and S2.4=1
- Select special range:
S2.1=1; S2.2=1; S2.3=1 and S2.4=1

DC-Frequency Signal Conditioners

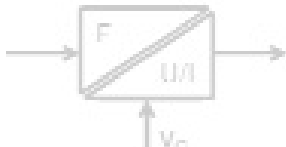
- Tension clamp connection
- LED-Display
- Adjustable frequency output

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

Approvals:



Schematic circuit diagram/settings



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

1	2	3	4	DIP switch
☒	☐	☐	☐	0...16 kHz
☐	☒	☐	☐	0...8 kHz
☐	☐	☒	☐	0...4 kHz
☐	☐	☐	☒	0...1 kHz

MCZ CFC 4...20 mA CLP

1	2	3	4	DIP switch
☒	☐	☐	☐	3.2...16 kHz
☐	☒	☐	☐	1.6...8 kHz
☐	☐	☒	☐	0.8...4 kHz
☐	☐	☐	☒	0.2...1 kHz

■ = on

□ = off

Ordering data

for 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	
Supply voltage	
Power consumption	
Making current limit	
Polarisation protection	

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 (0.24 in.)
Conductor cross-section	1.5 mm ²

MCZ VFC

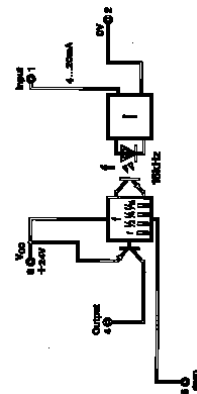
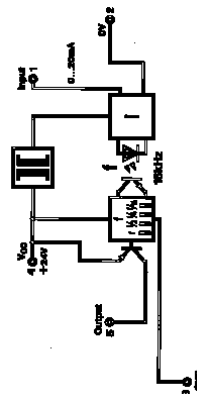
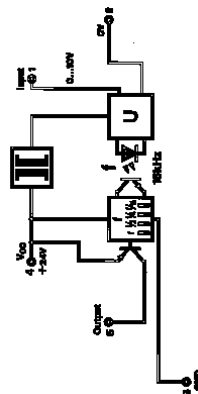
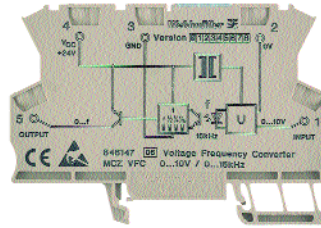
0...10 V

MCZ CFC

0...20 mA

MCZ CFC

4...20 mA CLP



Type	Part No.	Type	Part No.	Type	Part No.
MCZ VFC	8461470000	MCZ CFC	8461480000	MCZ CFC	8461490000
Input ranges	0...10 V	Input ranges	0...20 mA	Input ranges	4...20 mA LP*
Overload limits, input	30 V	Overload limits, input	50 mA	Overload limits, input	50 mA
Input resistance	100 kW	Input resistance	50 W	Input resistance	50 W
Voltage drop, input		Voltage drop, input	1 V at 20 mA	Voltage drop, input	5.8...6.4 at 20 mA
Output		Output		Output	
Output frequency, end value	1 kHz, 4 kHz, 8 kHz, 16 kHz	Output frequency, end value	1 kHz, 4 kHz, 8 kHz, 16 kHz	Output frequency, end value	1 kHz, 4 kHz, 8 kHz, 16 kHz
Frequency adjustment	DIL switch	Frequency adjustment	DIL switch	Frequency adjustment	DIL switch
Readjustment range	±10 %, internal	Readjustment range	±10 %, internal	Readjustment range	±10 %, internal
Output level	PNP, Ub- 0.7 V	Output level	PNP, Ub- 0.7 V	Output level	PNP, Ub- 0.7 V
Output current	max. 20 mA	Output current	max. 20 mA	Output current	max. 20 mA
Display	LED, pulsing	Display	LED, pulsing	Display	LED, pulsing
Supply voltage	24 Vdc ±10 %	Supply voltage	24 Vdc ±10 %	Supply voltage	24 Vdc ±20 %
Power consumption	14 mA, without load	Power consumption	14 mA without load	Power consumption	14 mA without load
Making current limit	200 mA	Making current limit	200 mA	Making current limit	200 mA
Polarisation protection	yes	Polarisation protection	yes	Polarisation protection	yes
Accuracy	0.2 % v. FSR	Accuracy	0.2 % v. FSR	Accuracy	0.15 % v. FSR
Temperature coefficient	< 250 ppm/°C	Temperature coefficient	< 250 ppm/°C	Temperature coefficient	< 250 ppm/°C
Voltage strength input/output	1 kVdc	Voltage strength input/output	1 kVdc	Voltage strength input/output	150 V
Rated voltage	100 V	Rated voltage	100 V	Rated voltage	150 V
Rated surge voltage	1.5 kV	Rated surge voltage	1.5 kV	Rated surge voltage	2.5 kV
Overvoltage category	III	Overvoltage category	III	Overvoltage category	III
Voltage strength I/O to mounting rail	4 kV _{eff} / 1 min	Voltage strength I/O to mounting rail	4 kV _{eff} / 1 min	Voltage strength I/O to mounting rail	4 kV _{eff} / 1 min
Operating temperature	0 °C...+50 °C	Operating temperature	0 °C...+50 °C	Operating temperature	0 °C...+50 °C
Storage temperature	-25 °C...+85 °C	Storage temperature	-25 °C...+85 °C	Storage temperature	-25 °C...+85 °C
Overall width	6 mm (0.24 in.)	Overall width	6 mm (0.24 in.)	Overall width	6 mm (0.24 in.)
Conductor cross-section	1.5 mm ²	Conductor cross-section	1.5 mm ²	Conductor cross-section	1.5 mm ²

* without DC/DC converter input supply via current loop

Bridge Signal Conditioners

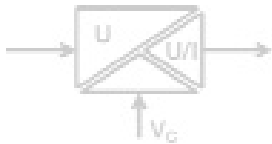
WAVEANALOG PRO Bridge

- 3-way-isolation
- Input and output selectable by DIP-Switches
- No adjustment required
- Inverted output signals possible

Approvals:



Schematic circuit diagram



Ordering data

Screw connection

Tension clamp connection

Technical data*

Input

Input voltage (selectable by DIP-Switches)

Input resistance

Output

Output voltage (selectable by DIP-Switches)

Load resistance (Voltage output)

Output current (selectable by DIP-Switches)

Load resistance (Current output)

Wire break detection

Status indication

Accuracy

Temperature coefficient

Response time

Bridge supply voltage

Coordination of insulation according to EN 50178, 04/98

Rated voltage

Rated surge voltage

Overtoltage category

Contamination class

Clearance and creepage distance

Test voltage

General Data

Supply voltage

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Standards/specifications

EMC standards

Factory setting

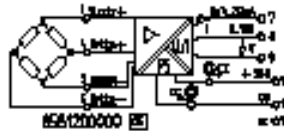
Dimensions L/H/W

Weight

Approvals

* Tu 23 °C, single module

PRO Bridge



Type

WAS5 PRO Bridge

WAZ5 PRO Bridge

Part No.

8581200000

8581210000

0...10 mV, 0...20 mV, 0...50 mV, 0...100 mV, 0...200 mV, 0...500 mV, -10...10 mV, -20...20 mV, -50...50 mV, -100...100 mV, -200...200 mV, -500...500 mV
> 1 MW

0...5 V, 5...0 V, 10...0 V, 0...10 V

≥ 1 kW

0...20 mA, 20...0 mA, 4...20 mA, 20...4 mA

≤ 600 W

Output: 0 V or. 0/4 mA

Power on: LED green

0.3 % of full scale

± 250 ppm/K of full scale

typ. < 200 ms

+10 V, +5 V, 4.8...10.2 V man. adjustment and offset possible

Input voltage	SW 1									
	1	2	3	4	5	6	7	8	9	10
0...10 mV										
0...20 mV										
0...50 mV										
0...100 mV										
0...200 mV										
0...500 mV										
-10 mV...10 mV										
-20 mV...20 mV										
-50 mV...50 mV										
-100 mV...100 mV										
-200 mV...200 mV										
-500 mV...500 mV										
output										
0...+10 V										
0...+5 V										
0...20 mA										
4...20 mA										
Bridge supply voltage										
+10V										
+5V										
+4.8...+10.2V adjustable										
+4.8...+10.2V adjustable man. adjustment and offset possible										
Transmission method										
standard output signal										
inverse output signal										

■ = on

□ = off

Status LED

LED on normal operating

LED off Error

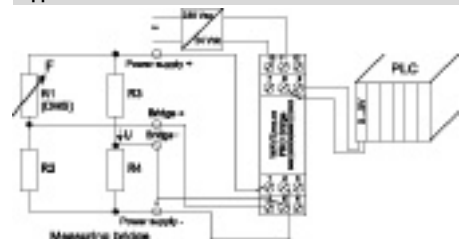
LED blinks slow measurement range undershoot

U_{in} < U_{max} + 10%

LED blinks fast measurement range undershoot

U_{in} < U_{max} - 10 %

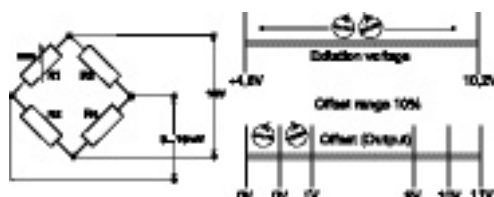
Application



Example for bridge supply voltage

Temperature adjustment:

Input voltage	0...10 mA
Output	0...10 V
Bridge supply voltage	+4.8...10.2 V
Bridge excitation	1 mV/V
(Declaration from manufacturer)	



Interface Converter RS232 / RS485/422 and RS232 / TTY

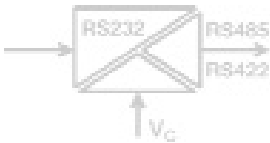
WAVE DATA

- 3-way-isolation
- RS232/RS485/422 = max. transmission rate 115.2 kBit/s
- RS232/TTY = max. transmission rate 19.2 kBit/s
- RS232 connection by SUB-D 9
- RS485/422 shield connection by KLBÜ
- TTY shield connection by KLBÜ
- DTE or DCE connection selectable

Approvals:



Schematic circuit diagram



WDS2 RS232/RS485/422



WDS2 RS232/TTY



Ordering data

Screw connection

Type

WDS2 RS232/RS485/422

Part No.

8615700000

Type

WDS2 RS232/TTY

Part No.

8615690000

Technical data*

RS232 interface

Connection

DTE/DCE connection

SUB-D 9 (connector)

selectable by DIP-switches

SUB-D 9 (connector)

selectable by DIP-switches

RS422/RS485 interface

RS422 interface

Connection

Shield point

Terminal resistance

Transmission length

selectable by DIP-switches

BLZ Screw connection clamp

KLBÜ 4-6 Z/1

by DIP-switches

max. 1200 m

BLZ Screw connection clamp

KLBÜ 4-6 Z/1

max. 1000 m

RS485 interface

Connection

Shield point

Terminal resistance

Transmission length

BLZ Screw connection clamp

KLBÜ 4-6 Z/1

by DIP-switches

max. 1200 m

Maximum transmission rate

Bit distortion

Bit delay

115.2 kBit/s

< 1.5 %

£ 3 µs

19.2 kBit/s

< 1.5 %

£ 3 µs

Coordination of insulation according to DIN EN50178, 04/98

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

300

4 kV

III

2

3 mm

1.2 KV_{eff}

300

4 kV

III

2

3 mm

1.2 KV_{eff}

General Data

Supply voltage

Power consumption

Current carrying capacity of cross-connection

Operating temperature

Storage temperature

Standards/Specifications

EMC standards

Dimensions L/H/W

Weight

Approvals

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

max. 1.6 W @ I_{out} = 20 mA

£ 2 A

0...55 °C

-20...85 °C

EN 50178

EN 50081, EN 50082, EN 55011, EN 610000, EN 61326

92.4 / 112.5 / 22.5 mm (3.64 / 4.43 / 0.88 in.)

150 g (0.33 lbs.)

CE, cULus

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

max. 1.6 W @ I_{out} = 20 mA

£ 2 A

0...55 °C

-20...85 °C

EN 50178

EN 50081, EN 50082, EN 55011, EN 610000, EN 61326

92.4 / 112.5 / 22.5 mm (3.64 / 4.43 / 0.88 in.)

150 g (0.33 lbs.)

CE, cULus

* Tu 23 °C, single module

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 analog 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.

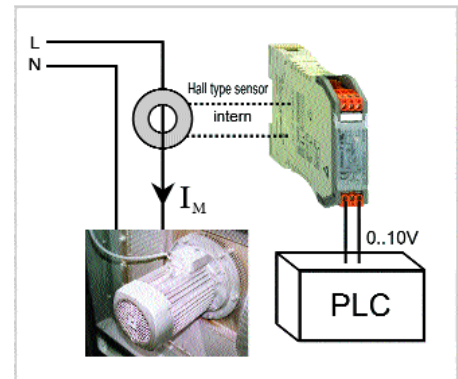
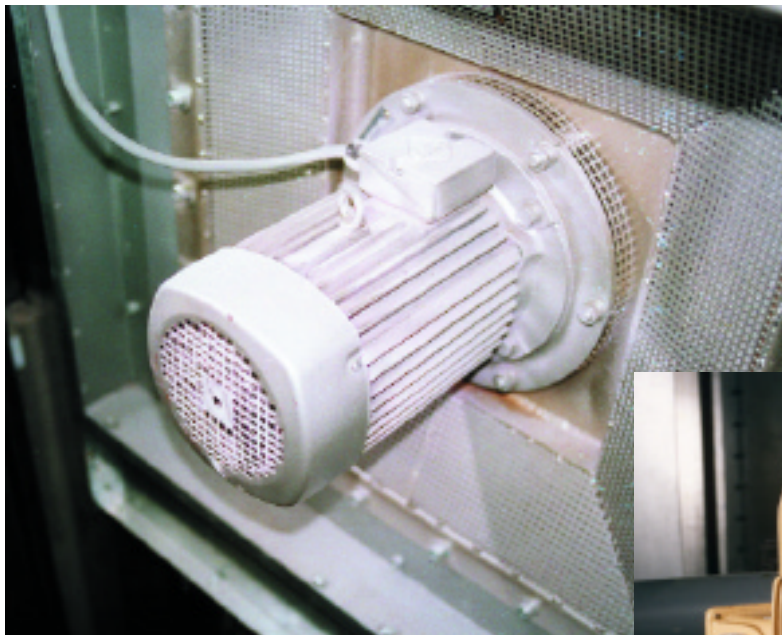
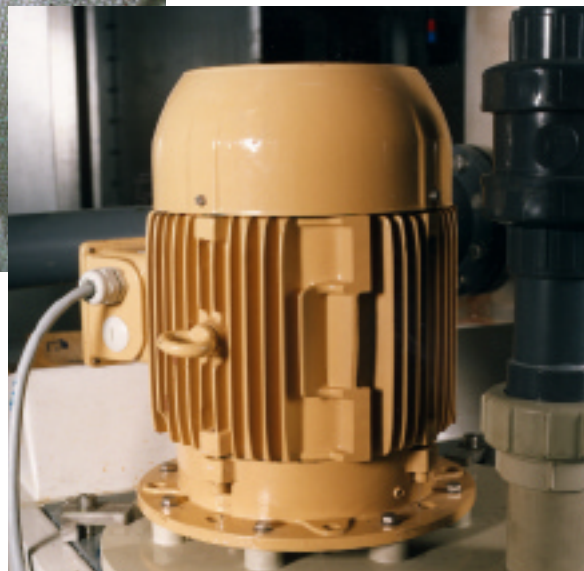


Fig.: Monitoring motor currents



Monitoring a motor in a cooling system



Monitoring a pump in a sewage treatment plant

Current Monitoring

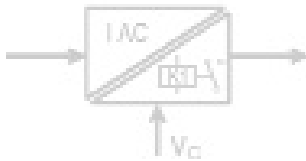
WAVECONTROL

- Current ranges adjustable by DIP switch
- Cross-connectable voltage supply via cross-connectors
- Selectable hysteresis
- Selectable working and closed-circuit current principle

Approvals:

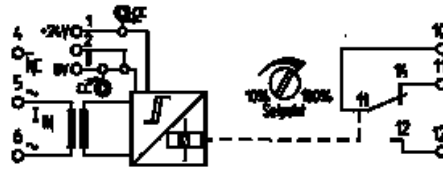


Schematic circuit diagram



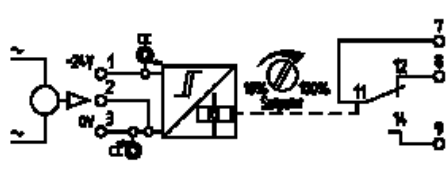
WAS2 CMR WAZ2 CMR

1/5/10 A ac
selectable with
relay output



WAS2 CMR WAZ2 CMR

20/40/60A ac
selectable with
relay output



Ordering data

Screw connection

Tension clamp connection

Technical data*

Input

Input current

Input frequency

Pass through diameter

Measuring principle

Connection type

Measurement circuit voltage

Maximum measuring circuit

Output

Contact set

Minimum switching voltage

Maximum switching voltage

Continuous current AC

Continuous current DC

Maximum switching current

Minimum switching current

Status LED

Threshold

Hysteresis

Temperature coefficient

Response time (10 ... 90%)

Working/closed-circuit current principle

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

Type

WAS2 CMR 1/5/10A ac

WAZ2 CMR 1/5/10A ac

Part No.

8516560000

8516570000

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

6 Vdc/6 Vac

60 Vdc/250 Vac

3 A

0.7 A

7 A

100 mA

green LED

10 % ... 100 % adjustable via front potentiometer

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

£ 800 ppm/K

typ. 700 ms

selectable

300 V

4 KV

III

2

≥ 3 mm

4 kV eff

Type

WAS2 CMR 20/40/60A ac

WAZ2 CMR 20/40/60A ac

Part No.

8513340000

8526600000

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

6 Vdc/6 Vac

60 Vdc/250 Vac

3 A

0.7 A

7 A

100 mA

green LED

10 % ... 100 % adjustable via front potentiometer

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

£ 250 ppm/K

typ. 700 ms

selectable

300 V

4 KV

III

2

≥ 3 mm

4 kV eff

General Data

Supply

Supply voltage

Power consumption at rated voltage

Reverse polarity protection

Current carrying capacity of the cross-connection

Operating temperature

Storage/transport

Factory setting

Dimensions L/H/W

Weight

Approvals

* T_U = 23 °C single module

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

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 mm (3.64 / 4.43 / 0.88 in.)

150g (0.33 lbs.)

CE, cULus

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

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 mm (3.64 / 4.43 / 0.88 in.)

150g (0.33 lbs.)

CE, cULus

Current Monitoring

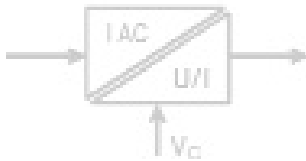
WAVECONTROL

- Input and output range adjustable by DIP switch
- No calibration required
- Cross-connectable voltage supply via cross-connectors

Approvals:



Schematic circuit diagram



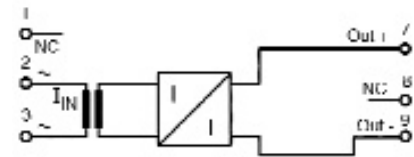
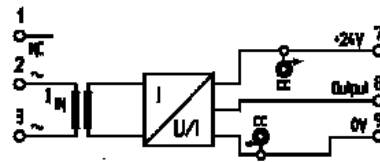
WAS1 CMA WAZ1 CMA

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



WAS1 LP CMA WAZ1 LP CMA

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



Ordering data

Screw connection

Tension clamp connection

Technical data*

Input

Input current

Input frequency

Accuracy

Measuring principle

Connection type

Measurement circuit voltage

Maximum 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 according to DIN EN 50178, 04/98

(safe separation)

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

General Data

Supply

Supply voltage

Power consumption at rated voltage

Reverse polarity protection

Operating temperature

Storage/transport

Factory setting

Dimensions L/H/W

Weight

Approvals

* T_U = 23 °C single module

Type

WAS1 CMA 1/5/10A ac

WAZ1 CMA 1/5/10A ac

Part No.

8523400000

8523410000

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

50 Hz/60 Hz

0.5 % FSR

transformer coupled

Screw or tension clamp connection

250 Vac

100 A for 1s

0 ... 10 V

0 ... 20 mA

4 ... 20 mA

0 ... 10 V

max. 0.05 V

≥1 K W

approx. 13 V and. 24 mA

0/4 ... 20 mA

max. 100 µA

£ 600 W

green LED

ON -> OK; blinks -> signal out of range; OFF -> Error

£ 200 ppm/K

typ. 700 ms

300V

6KV

III

2

≥ 5.5 mm

4kV eff

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

40 mA at I_{out} = 20 mA

yes

0 ... 50 °C

- 20 ... + 70 °C

0 ... 5 Aac; 4 ... 20 mA

72 / 92.4 / 22.5 mm (2.83 / 3.64 / 0.88 in.)

150 g (0.33 lbs.)

CE, cULus

Type

WAS1 LP CMA 1/5/10A ac

WAZ1 LP CMA 1/5/10A ac

Part No.

8528650000

8528660000

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

50 Hz/60 Hz

0.5 % FSR

transformer coupled

Screw or tension clamp connection

250 Vac

100 A for 1s

4 ... 20mA current loop supply

approx. 24 mA

4 ... 20 mA

max. 100 µA

£ 550 W (at 24 V) RL = (V_{cc} - 13V) / 20 mA

Dependent on voltage V_{cc}

green LED

ON -> OK; blinks -> signal out of range; OFF -> Error

£ 200 ppm/K

typ. 700 ms

300V

6KV

III

2

≥ 5.5 mm

4kV eff

13 Vdc ... 30 Vdc

yes

yes

0 ... 50 °C

-20 ... +70 °C

0 ... 5 Aac; 4 ... 20 mA

72 / 92.4 / 22.5 mm (2.83 / 3.64 / 0.88 in.)

150 g (0.33 lbs.)

CE, cULus

Current Monitoring

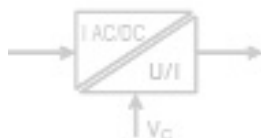
WAVECONTROL

- Input and output range adjustable by DIP switch
- No calibration required
- True TRMS value measurements
- Hall sensor measurement method

Approvals:



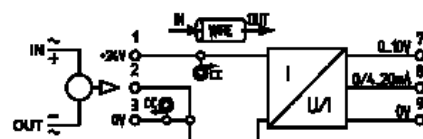
Schematic circuit diagram



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	
Maximum 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 according to DIN EN 50178, 04/98	
(safe separation)	
Rated voltage	
Rated surge voltage	
Overvoltage category	
Contamination class	
Clearance and creepage distance	
Test voltage	
General Data	
Supply	
Supply voltage	
Power consumption at rated voltage	
Reverse polarity protection	
Operating temperature range	
Storage/transport	
Factory setting	
Dimensions L/H/W	
Weight	
Approvals	
* T _U = 23 °C single module	

WAS2 CMA WAZ2 CMA

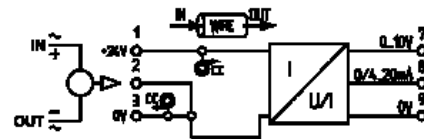
5/10A ac/dc selectable with analog output
0 ... 20 mA/
4 ... 20 mA/
0 ... 10 V



Type	Part No.
WAS2 CMA 5/10A uc	8526610000
WAZ2 CMA 5/10A uc	8526620000
5 A uc/10 A uc selectable (without additional adjustment)	
0 Hz - 2 kHz (True RMS to DC Converter)	
1% (0 Hz - 1 kHz) Crest factor 3 FSR	
2% (0 Hz - 2 kHz) Crest factor 5 FSR	
Contact-free current monitoring using Hall sensor	
Push-through connection	
(Please notice push through direction by DC measurement)	
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 ... 10 V	
max. 0.08 V	
≥1 KW	
approx. 13 V and. 24 mA	
0/4 ... 20 mA	
max.150 µA	
£ 600 W	
green LED	
ON-> OK; blinks -> signal out of range; OFF -> Error	
£ 650 ppm/K	
typ. 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 ... 5A uc; 4 ... 20 mA	
92.4 / 112.4 / 22.5 mm (3.63 / 4.42 / 0.88 in.)	
150 g (0.33 in.)	
CE, cULus	

WAS2 CMA WAZ2 CMA

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



Type	Part No.
WAS2 CMA 20/25/30A uc	8545830000
WAZ2 CMA 20/25/30A uc	8545840000
20/25/30 A 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	
(Please notice push through direction by DC measurement)	
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 ... 10 V	
max. 0.08 V	
≥1 KW	
approx. 13 V and. 24 mA	
0/4 ... 20 mA	
max.150 µA	
£ 600 W	
green LED	
ON-> OK; blinks -> signal out of range; OFF -> Error	
£ 650 ppm/K	
typ.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 ... 25 A uc; 4 ... 20mA	
92.4 / 112.4 / 22.5 mm (3.63 / 4.42 / 0.88 in.)	
150g (0.33 in.)	
CE, cULus	

Current Monitoring

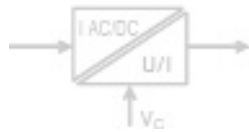
WAVECONTROL

- Input and output range adjustable by DIP switch
- No calibration required
- Cross-connectable voltage supply via cross-connectors
- True TRMS value measurements
- Hall sensor measurement method

Approvals:

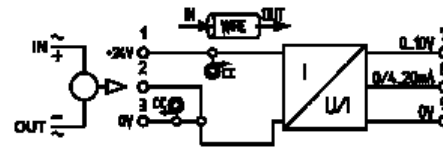
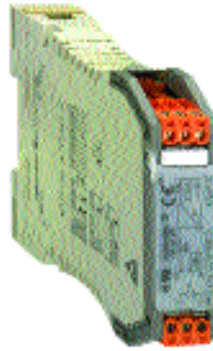


Schematic circuit diagram



WAS2 CMA WAZ2 CMA

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



Ordering data	
Screw connection	
Tension clamp connection	
Technical data*	
Input	
Input current	40/50/60A 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	
Connection type	Contact-free current monitoring using Hall sensor
Pass through diameter	
Measurement circuit voltage	Push-through connection (Please notice push through direction by DC measurement)
Maximum measuring circuit	
Output	
Current/voltage selectable	8 mm 400 Vac, higher voltages dependent on wire insulation dependent on wire cross-section
Output voltage	0 ... 10 V
Offset voltage	0 ... 20 mA
Load resistance	4 ... 20 mA
Output signal limit	0 ... 10V
Output current	max. 0.08 V
Offset current	≥ 1 kW
Load resistance	approx. 13 V and. 24 mA
Status LED	0/4 ... 20 mA
Temperature coefficient	max.150 µA
Response time (10 ... 90%)	£ 600 W
Coordination of insulation according to DIN EN 50178, 04/98	
(safe separation)	green LED
Rated voltage	ON-> OK; blinks -> signal out of range; OFF -> Error
Rated surge voltage	£ 650 ppm/K
Overvoltage category	type 700 ms
Contamination class	
Clearance and creepage distance	300 V
Test voltage	6 KV
General Data	
Supply	III
Supply voltage	2
Power consumption at rated voltage	≥ 5.5 mm
Reverse polarity protection	4 kV eff
Operating temperature range	
Storage/transport	21.6 Vdc...24 Vdc...26.4 Vdc
Factory setting	50 mA at I _{out} = 20 mA
Dimensions L/H/W	yes
Weight	
Approvals	0 ... 50°C
* T _U = 23 °C single module	-20 ... +70°C
	0 ... 50 A uc; 4 ... 20 mA
	92.4 / 112.4 / 22.5 mm (3.63 / 4.42 / 0.88 in.)
	150 g (0.33 in.)
	CE, cULus

Voltage monitoring with analog output

WAVECONTROL

- 3-way-isolation
- Max. measuring voltage 450 Vac_{eff}
- Output range selection by DIP-Switches
- No adjustment required

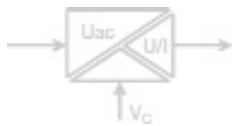
VMA Vac



Approvals:



Schematic circuit diagram



Ordering data

Screw connection
Tension clamp connection

Technical data*

Input

Input voltage / input impedance

Input frequency

Accuracy

Maximum overvoltage (short term)

Output

Current-/voltage output (by DIP-Switches)

Output voltage

Output offset voltage

Load resistance

Output current

Output offset current

Load resistance

Status indication

Temperature coefficient

Response time (0...90%)

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

Rated voltage

Rated surge voltage

Overvoltage category

Contamination class

Clearance and creepage distance

Test voltage

General Data

Supply voltage

Rated current consumption

Polarization protection

Cross connection above

Cross connection below

Operating temperature

Storage temperature

Factory setting

Dimensions L/H/W

Weight

Approvals

* Tu 23°C, single module

Type

WAS2 VMA Vac

WAZ2 VMA Vac

Part No.

8581220000

8581230000

Connection 1: 0 V GND

Connection 2: 0...30 Vac / 30 kW

Connection 3: 0...70 Vac / 70 kW

Connection 4: 0...130 Vac / 130 kW

Connection 5: 0...250 Vac / 250 kW

Connection 6: 0...450 Vac / 450 kW

40 Hz...400 Hz wave

1.3 % (40 Hz...60 Hz) typ. 1 %

2.0 % (70 Hz...400 Hz) typ. 1.5 %

45 Vac with 0...30 Vac

100 Vac from 0...100 Vac

180 Vac from 0...180 Vac

270 Vac from 0...250 Vac

475 Vac from 0...450 Vac

0...10 V

0...20 mA

4...20 mA

0...10 V

max. 0.02 V

≥ 1 kW

0/4...20 mA

max. 40 µA

E 600 W

LED green

E 250 ppm/K

300 ms

Supply / Output

300 V

4 kV

III

2

3 mm

3 kV_{eff}

Input / Output Supply / Input

600 V

6 kV

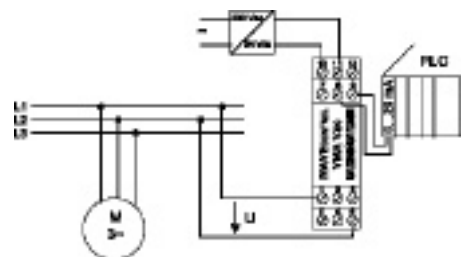
III

2

5.5 mm

4 kV_{eff}

Application



Power supplies

WAVEPOWER

The WAVEPOWER power supply is specially designed for use with WAVESERIES Analog signal conditioners. The modules could be supplied by using the pluggable cross connection, which reduces the installation time. Especially in decentralized Automation systems the required place will be reduced.



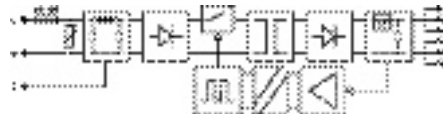
CP-SNT 12W



Approvals:



Diagramm/Schematic circuit diagram



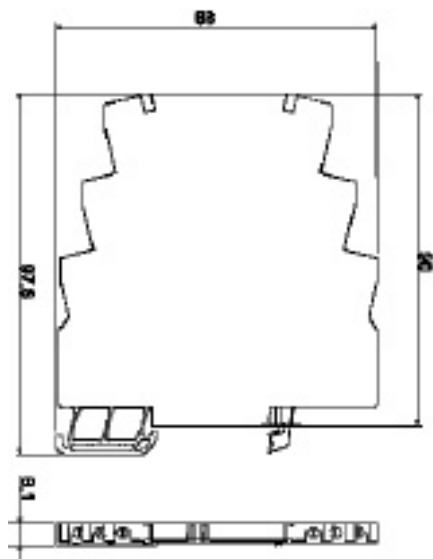
– secondary through plug-in jumpers ZQV cross-connectable to other WAVE-modules

Ordering data		Type	Part No.
Output voltage/max. current		CP-SNT 12 W 24 Vdc / 0.5 A	9918840024
Input voltage	Minimum	85 Vac, 120 Vdc	
	Typical	115-230 Vac $\pm 10\%$, 50/60 Hz	
	Maximum	265 Vac, 300 Vdc	
Input current (Average values for references only)	at 115 Vac	260 mA RMS $\pm 20\%$	
	at 230 Vac	180 mA RMS $\pm 20\%$	
	at 125 Vdc	125 mA $\pm 20\%$	
	at 250 Vdc	65 mA $\pm 20\%$	
Input protection		2 A slow fuse (internal)	
Overvoltage protection		Varistor	
Switching frequency		100 kHz PWM	
Efficiency at maximum load		80%	
Maximum ripple		0.1% RMS	
Regulation	Load (10-100% load)	0.6%	
	at input voltage	0.2% 85 Vac - 265 Vac on	
Overload protection		Overcurrent shutdown with automatic restart plus thermal shutdown	
Maximum capacity at output		8,000 μ F	
Hold time		30 ms	
(Maximum output current following input loss)		80 ms	
Storage temperature		-40 °C...+85 °C	
Operating temperature		-20 °C...+50 °C max. full rated load	
		Derating: 33% at 60 °C	
Humidity	Operating temperature	20 - 85% RH non-condensing	
	Storage temperature	20 - 90% RH	
Galvanic isolation	Input-output	3 kV RMS	
	Input/output to mounting rail	4 kV RMS	
	Input to earth	1.5 kV RMS	
	Output to earth	500 V RMS	
Wire size		26-12 AWG (0.1-4.0 mm ²)	
Dimensions L/H/W		90 / 18 / 112.5 mm (3.54 / 0.71 / 4.43 in.)	
Weight		110 g (0.24 in.)	
Mounts on mounting rail		TS 35	
Approvals/certifications		CE, cULus, CSA	

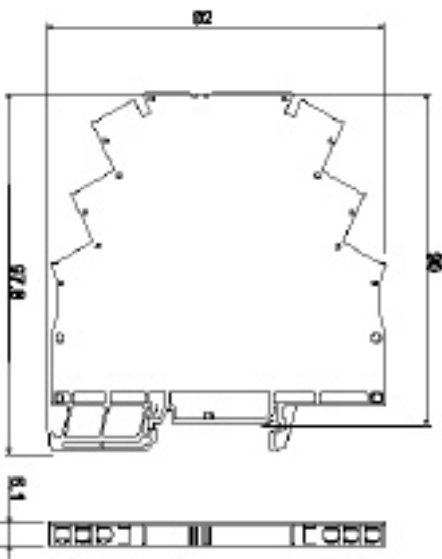
Dimensions and accessories

MICROANALOG

Screw connection

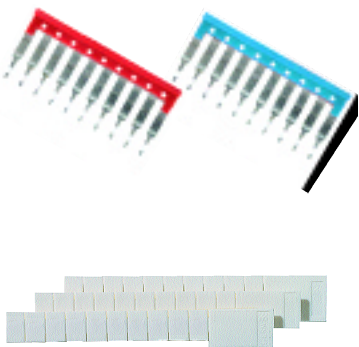


Tension clamp connection

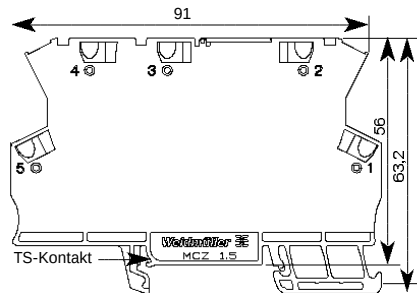


Accessories
Cross-connection, 2-pole, red
Cross-connection, 3-pole, red
Cross-connection, 4-pole, red
Cross-connection, 10-pole, red
Cross-connection, 41-pole, red
Cross-connection, 2-pole, blue
Cross-connection, 3-pole, blue
Cross-connection, 4-pole, blue
Cross-connection, 10-pole, blue
Cross-connection, 41-pole, blue
Terminal marker

Type	Part No.
ZQV 4N/2 red	1793950000
ZQV 4N/3 red	1793980000
ZQV 4N/4 red	1794010000
ZQV 4N/10 red	1794040000
ZQV 4N/41 red	1794070000
ZQV 4N/2 blue	1793960000
ZQV 4N/3 blue	1793990000
ZQV 4N/4 blue	1794020000
ZQV 4N/10 blue	1794050000
ZQV 4N/41 blue	1794080000
WS10/6	1060960000

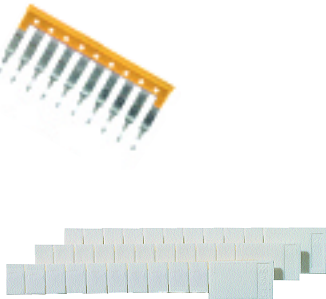


MCZ



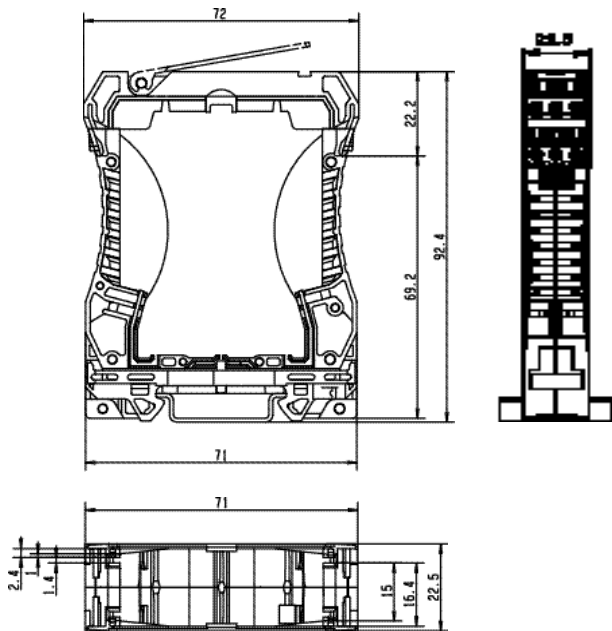
Accessories
Cross-connection , 2-pole, yellow
Cross-connection , 3-pole, yellow
Cross-connection , 4-pole, yellow
Cross-connection , 5-pole, yellow
Cross-connection , 6-pole, yellow
Cross-connection , 7-pole, yellow
Cross-connection , 8-pole, yellow
Cross-connection , 9-pole, yellow
Cross-connection , 10-pole, yellow
Terminal marker

Type	Part No.
ZQV 4N/2 yellow	1608950000
ZQV 4N/3 yellow	1608960000
ZQV 4N/4 yellow	1608970000
ZQV 4N/5 yellow	1608980000
ZQV 4N/6 yellow	1608990000
ZQV 4N/7 yellow	1609000000
ZQV 4N/8 yellow	1609010000
ZQV 4N/9 yellow	1609020000
ZQV 4N/10 yellow	1609030000
WS10/6	1060960000

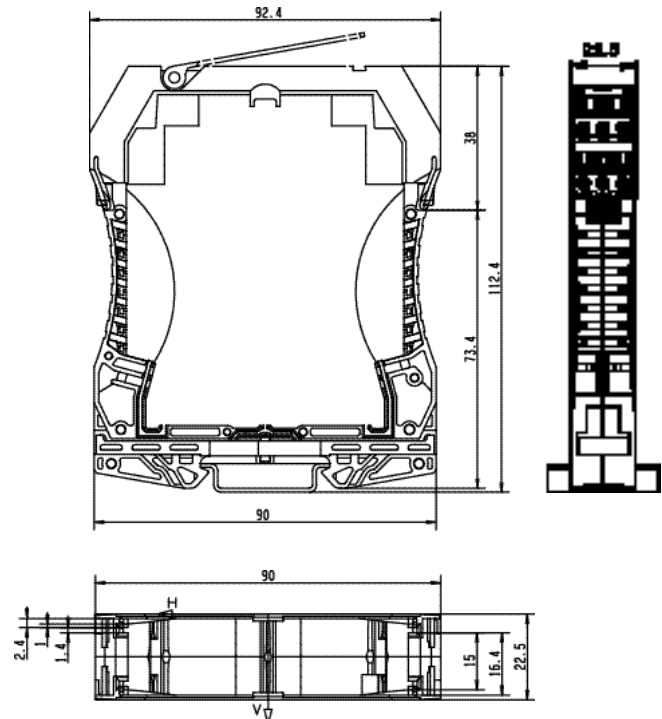


Dimensions and accessories

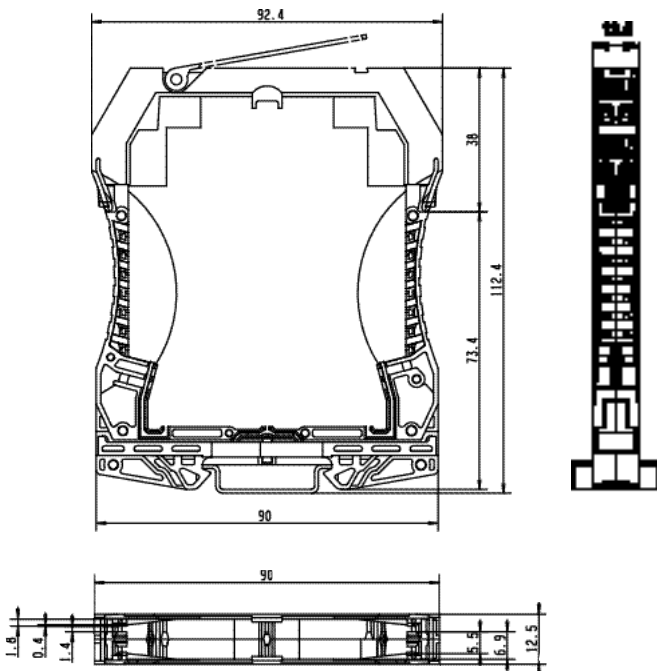
WAVEBOX S 22.5



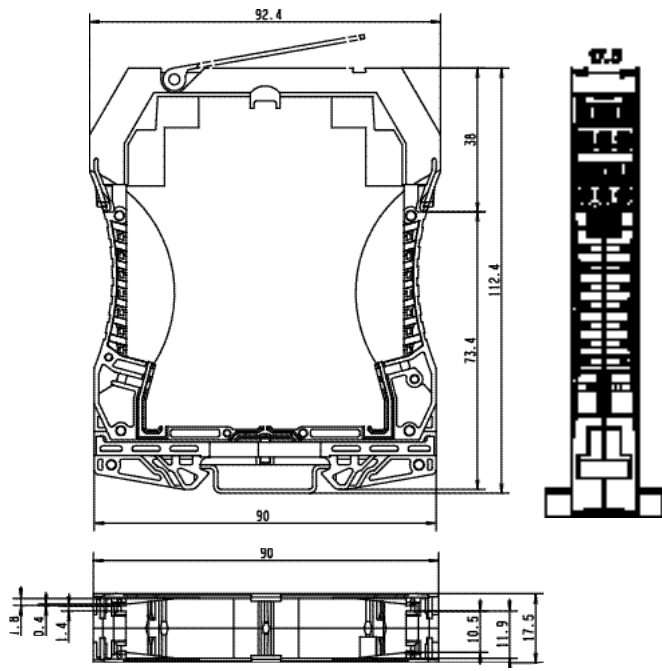
WAVEBOX L 22.5



WAVEBOX 12.5



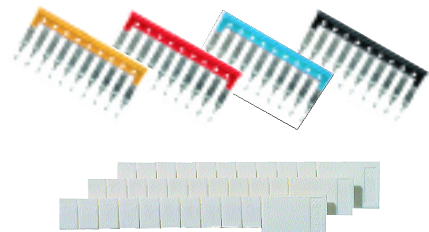
WAVEBOX 17.5



Dimensions in mm

Accessories	Type	Part No.
Cross-connection ZQV 2.5N/2 black	ZQV 2.5N/2 black	1718080000
Cross-connection ZQV 2.5N/2 red	ZQV 2.5N/2 red	1717900000
Cross-connection ZQV 2.5N/2 blue	ZQV 2.5N/2 blue	1717990000
Cross-connection ZQV 2.5N/2 yellow	ZQV 2.5N/2 yellow	1693800000

Terminal marker		
WS 10/5 Multicard for Plotter print	WS10/5	1061160000
WS 10/5 Blank	WS10/5 neutral	1060860000



Argentina	Malaysia
Australia	Mexico
Austria	Morocco
Bahrain	Netherlands
Belarus	New Zealand
Belgium	Nicaragua
Brazil	Norway
Bulgaria	Oman
Canada	Pakistan
Chile	Panama
China	Peru
Colombia	Philippines
Costa Rica	Poland
Croatia	Portugal
Czech Republic	Qatar
Denmark	Romania
Egypt	Russia
El Salvador	Saudi Arabia
Estonia	Singapore
Finland	Slovakia
France	Slovenia
Germany	South Africa
Greece	South Korea
Guatemala	Spain
Honduras	Sweden
Hong Kong	Switzerland
Hungary	Syria
India	Taiwan
Indonesia	Thailand
Iran	Turkey
Ireland	Ukraine
Israel	United Arab Emirates
Italy	United Kingdom
Japan	USA
Jordan	Vietnam
Kuwait	Yemen
Lebanon	Yugoslavia
Luxembourg	



www.weidmuller.com www.weidmuller.com **www.weidmuller.com**

W Interconnections, Inc.

821 Southlake Blvd., Richmond, Virginia 23236

Telephone: (800) 849-9343 Facsimile: (804) 379-2593

Email: info@weidmuller.com Website: www.weidmuller.com

W Interconnections Canada, Inc.

10 Spy Court, Markham, Ontario L3R-5H6

Telephone: (800) 268-4080 Facsimile: (905) 475-2798

Email: info1@weidmuller.ca Website: www.weidmuller.ca

W Interconnections, S.A. de C.V.

Ave. Ingenieros Civiles 204-B, Conjunto Industrial Chachapa
Chachapa Amozoc, Puebla, 72990 Pue. Mexico

Telephone: (222) 286 62 47 Facsimilie: (222) 286 62 46