



## Operating Instructions

**Analog Signal Isolators**  
**WAVESERIES**  
**WAVE<sub>ANALOG</sub> PRO DC/DC**

### **Model**

Screw terminal connection

WAS4 PRO DC/DC

Tension clamp connection

WAZ4 PRO DC/DC

### **Order Number**

8560740000

8560750000

Please read these instructions before using the product and retain for future information.

## 1. General instructions

**Warning!** The analog signal isolators of the WAVE<sub>ANALOG PRO</sub> series may only be installed by qualified personnel. Be sure not to connect the unit to power supply before appropriate installation. Do not select ranges during operation, because live parts are exposed during this process. Only use a screwdriver which is properly insulated against the voltage applied to the input when fine adjusting the potentiometers on the front.

Be sure to observe the national regulations for installation and selection of cables.

A 2-pole disconnecting device must be inserted between instrument and main supply.



Appropriate safety measures against electrostatic discharge (ESD) should be taken during assembly and adjustment work on the WAVE<sub>ANALOG PRO</sub>.

## 2. Application

The analog signal isolators are used for galvanic isolation and conversion of signals in the range from  $\pm 20$  mV to  $\pm 200$  V and  $\pm 0.1$  mA to  $\pm 100$  mA.

Depending on the model, input and output signals are permanently set or you can select calibrated ranges by means of DIP switches. The preset measuring ranges do not have to be fine adjusted. Other transmission ranges are infinitely adjustable within the ranges mentioned above using potentiometers. Signal transmission is linear.

By means of the broad-range mains adapter, the units can be powered by voltages from 22 to 230 V AC/DC.

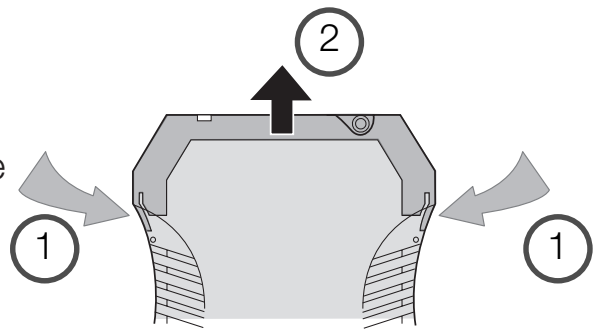
### 3. Configuration

#### 3.1 Equipment

A screwdriver with a width of 2.5 mm is required to adjust the unit and to connect the wires to the terminals.

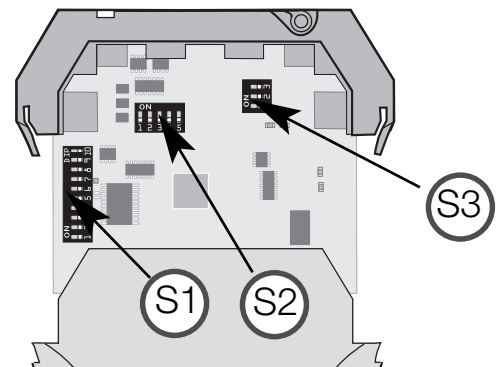
#### 3.2 Opening the unit

Disconnect the plugs. Disengage the top part of the housing by carefully pressing the latches on both sides (1). Pull out the top part of the housing and the electronics section until they lock (2).

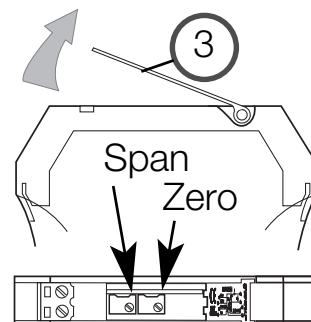


#### 3.3 Settings

Set the input and output ranges, offset and bandwidth using DIP switches S1, S2 and S3 as indicated in the following tables. When selecting a variable amplification or offset setting, an additional adjustment can be made using the Span (amplification) or Zero (offset) potentiometers located under the top cover (3).



**Caution!** Only use a screwdriver which is properly insulated against the voltage applied to the input when fine adjusting the potentiometers on the front.



### **3.4 WAVE<sub>TOOL</sub> 1.1 setting tool**

Our software tool WAVE<sub>TOOL</sub> 1.1 is available to simplify equipment setting.  
Download from the internet at [www.weidmueller.de](http://www.weidmueller.de), topic: Downloads.

Input	Switch								Terminals	
	S1				S2					
Input range	1	2	3	4	1	2	3	4	+	-
0 to $\pm 60$ mV								ON	2	4
0 to $\pm 100$ mV	ON							ON	2	4
0 to $\pm 150$ mV		ON						ON	2	4
0 to $\pm 300$ mV	ON	ON						ON	2	4
0 to $\pm 500$ mV			ON					ON	2	4
0 to $\pm 1$ V	ON		ON			ON		ON	3	4
0 to $\pm 5$ V		ON	ON			ON		ON	3	4
0 to $\pm 10$ V	ON	ON	ON			ON		ON	3	4
0 to $\pm 100$ V				ON			ON	ON	3	4
0 to $\pm \sim 0.3$ mA	ON			ON	ON			ON	2	4
0 to $\pm 1$ mA		ON		ON	ON			ON	2	4
0 to $\pm 5$ mA	ON	ON		ON	ON			ON	2	4
0 to $\pm 10$ mA			ON	ON	ON			ON	1	4
0 to $\pm 20$ mA	ON		ON	ON	ON			ON	1	4
0 to $\pm 50$ mA		ON	ON	ON	ON			ON	1	4
4 to 20 mA*	ON	ON	ON	ON	ON			ON	1	4

	Switch S2	4
Calibrated ranges		ON
Span potentiometer: input range x 0.33 ... x 3.30		

\* Offset switch-over not calibrated

			Switch				
Output			S1			S3	
Output range	OS	EV	5	6	7	1	2
0 to $\pm 10$ V	10 V	10 V				ON	ON
2 to 10 V	8 V	10 V	ON			ON	ON
0 to $\pm 5$ V	5 V	5 V		ON		ON	ON
1 to 5 V	4 V	5 V	ON	ON		ON	ON
0 to $\pm 20$ mA	20 mA	20 mA			ON		
4 to 20 mA	16 mA	20 mA	ON		ON		
Offset (in % of output span)			S1			S2	
			8	9	10	5	
0 %						ON	
-100 %			ON			ON	
-50 %				ON		ON	
+50 %			ON	ON		ON	
+100 %					ON	ON	
Zero potentiometer: additional $\pm 25$ %							
Switch S3						3	
Bandwidth 10 kHz							
Bandwidth 10 Hz						ON	

Selected range can be documented on enclosure side.

Factory setting: 0 to  $\pm 10$  V / 0 to  $\pm 10$  V, 0 % offset, bandwidth 10 Hz

### 3.5 Setting examples

1.: Input  $-150\text{ mV}$  to  $+150\text{ mV}$ , output  $-20\text{ mA}$  to  $+20\text{ mA}$

<b>Input</b>	<b>S1</b>				<b>S2</b>			
Input range	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
0 to $\pm 150\text{ mV}$		ON						ON

<b>Output</b>	<b>S1</b>			<b>S3</b>	
Output range	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
0 to $\pm 20\text{ mA}$			ON		

<b>Offset</b> (in % of output span)	<b>S1</b>			<b>S2</b>
	<b>8</b>	<b>9</b>	<b>10</b>	<b>5</b>
+ 0 %				ON

2.: Input  $+10\text{ mV}$  to  $+165\text{ mV}$ , output  $0\text{ mA}$  to  $+20\text{ mA}$

- a. Switch on input range 0 to  $\pm 150\text{ mV}$ , activate Span potentiometer.  
Switch on output range 0 to  $\pm 20\text{ mA}$  and offset 0 %

<b>Input</b>	<b>S1</b>				<b>S2</b>		
Input range	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>2</b>	<b>3</b>
0 to $\pm 150\text{ mV}$		ON					
<b>Switch S2 4</b>							
Span potentiometer: input range $\times 0.3$ to $\times 3.33$							

<b>Output</b>	<b>S1</b>			<b>S3</b>	
Output range	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
0 to $\pm 20\text{ mA}$			ON		

<b>Offset</b> (in % of output span)	<b>S1</b>			<b>S2</b>
	<b>8</b>	<b>9</b>	<b>10</b>	<b>5</b>
0 %				ON

- b. Set input to 155 mV, set output to 20 mA with Span potentiometer
- c. Activate Zero potentiometer.

<b>Offset</b>				<b>S2</b>
(in % of output span)				<b>5</b>
Zero potentiometer: additional $\pm 25$ %				

Set input to 10 mV, set output to 0 mA with Zero potentiometer

### 3.6 Setting tool for all input and output values

Definitions:

$In_{min}$  = smallest input value

$In_{max}$  = largest input value

$Out_{min}$  = smallest input value

$Out_{max}$  = largest input value

OS = output span (take from table on Pg 22)

EV = upper end value (take from table on Pg 22)

1. Select output range of unit (according to table on Pg 22) so that  $Out_{min}$  and  $Out_{max}$  are within the output range.
2. Calculate the following auxiliary quantities:

$$\text{Factor } F = \frac{Out_{max} - Out_{min}}{In_{max} - In_{min}} \quad \text{Input range} \quad IR = \frac{OS}{F}$$

$$\text{Offset } OF = \frac{Out_{min} - (In_{min} \times F) - EV + OS}{OS} \times 100\%$$

3. Set all DIP switches to OFF.
4. Calculate input range IR, set output range and offset OF with DIP switches.
  - 4a. If the calculated offset OF does not correspond with an offset which can be set with the DIP switches, set the closest offset (see table on page 22) and activate the zero potentiometer (switch 2-5 OFF), short-circuit input and adjust output to value  $Out_{min} - (In_{min} \times F)$ .
  - 4b. If the calculated input range IR does not correspond with a range which can be set with the DIP switches set the largest range within  $0.33 \times IR \dots 3.30 \times IR$  (see table on page 21) and activate the span potentiometer (switch 2-4 OFF), modulate input with value  $\neq 0$  (see table on page 21 for terminals) and adjust output to required value (e.g. set  $In_{max}$ , adjust to  $Out_{max}$ ).

## 4. Mounting

The analog signal isolators are mounted on standard TS 35 rails.

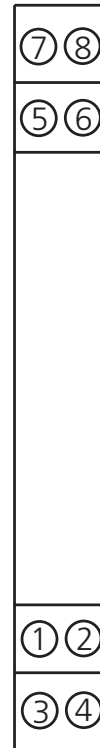
## 5. Electrical connection

### Terminal assignments

- 1 Input + > 5 mA
- 2 Input +  $\leq 500$  mV /  $\leq 5$  mA
- 3 Input + > 500 mV
- 4 Input -
  
- 5 Output +
- 6 Output -
- 7 Power supply  $\approx$
- 8 Power supply  $\approx$

Wire cross-section max. 2.5 mm<sup>2</sup>

Multi-wire connection max. 1 mm<sup>2</sup>  
(two wires with same cross-section)



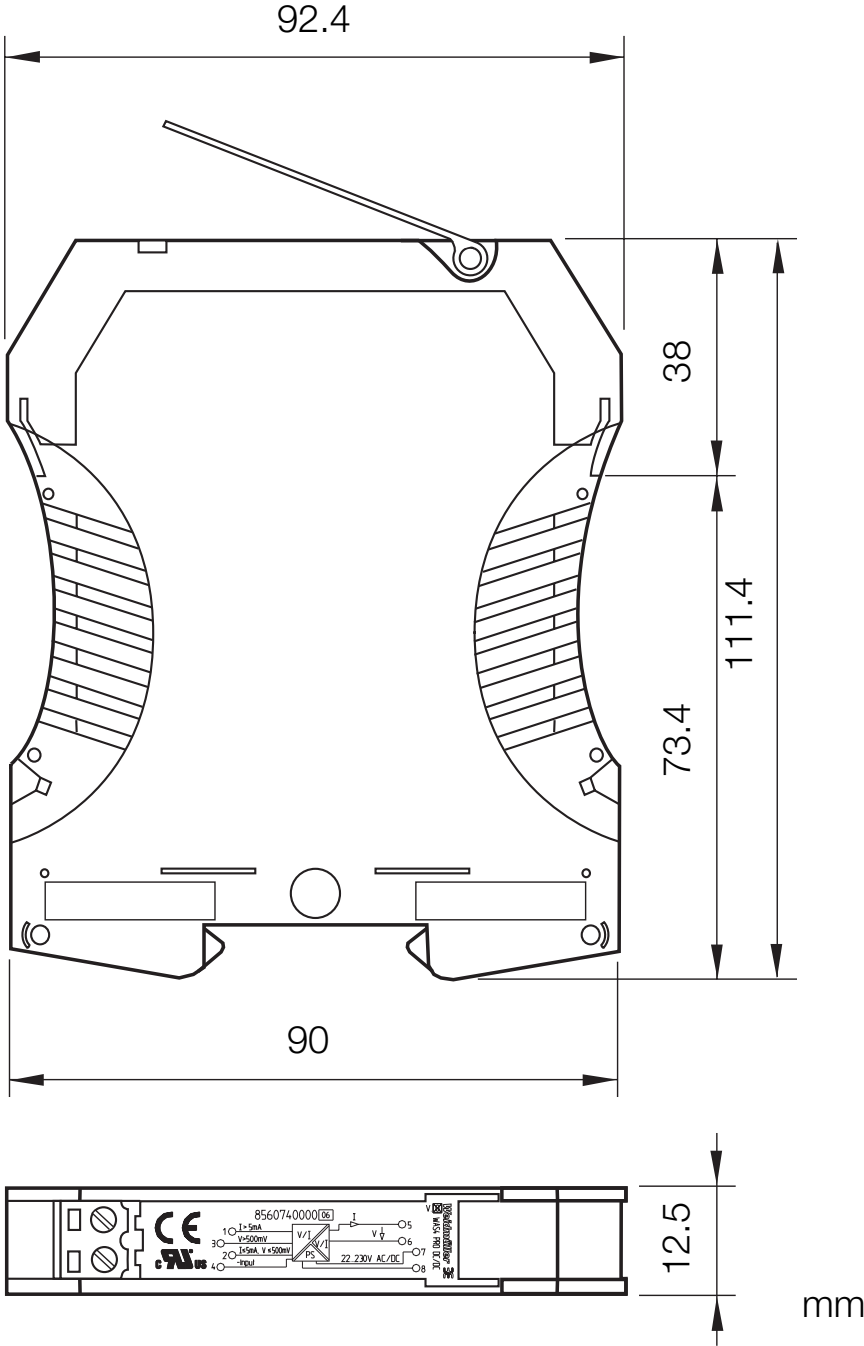
**Warning!** Do not operate inputs for current and voltage simultaneously!

For applications with high isolation voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices!

### 5.1 Power supply

22 to 230 V AC/DC  $\pm 10$  %, approx. 1 W, AC 48 to 62 Hz

# 6. Dimensions



## **7. Notes on CE marking**

The WAS4/WAZ4 PRO DC/DC analog signal isolators are marked CE in accordance with the EU directives 89/336/EEC "Electromagnetic Compatibility" and 73/23/EEC (low-voltage directive) detailing the Harmonized European Standards (EN).

The declarations of conformity are held, according the above mentioned EU directive, article 10, for the authorizing body by:

Weidmüller Interface GmbH & Co.

Postfach 30 30

D-32720 Detmold

Tel. (05231) 14-0

Fax (05231) 14-2083



## 8. Technical Data

Input data	
Inputs	
Voltage max. 200 V	configurable from 20 mV to 200 V and adjustable to calibrated values: 60 mV, 100 mV, 150 mV, 300 mV, 500 mV, 1 V, 5 V, 10 V, 100 V, uni-/bipolar
Current max. 100 mA	configurable from 0.1 mA to 100 mA and adjustable to calibrated values: 1 mA, 5 mA, 10 mA, 20 mA, 50 mA, uni-/bipolar and 4 to 20 mA <sup>1)</sup>
Input resistance	
Current input:	
Ranges $\leq 5$ mA	approx. 100 $\Omega$
Ranges $> 5$ mA	approx. 5 $\Omega$
Voltage input	approx. 1 M $\Omega$
Input capacitance	
Current input:	approx. 1 nF
Voltage input:	
Ranges $\leq 500$ mV	approx. 1 nF
Ranges $> 500$ mV	approx. 500 pF
Overload	
Current input:	
Ranges $\leq 5$ mA	$\leq 75$ mA
Ranges $> 5$ mA	$\leq 300$ mA
Voltage input:	
Ranges $\leq 500$ mV	limiting by suppressor diode 36 V, max. permissible permanent current $\leq 20$ mA
Ranges $> 500$ mV	limiting by suppressor diode 250 V, max. permissible permanent current $\leq 3$ mA

<b>Output data</b>	
Output	20 mA, 5 V, 10 V uni- / bipolar as well as 4 ... 20 mA, 1 ... 5 V und 2 ... 10 V calibrated selection
Offset	-100%, -50 %, 0 %, 50 %, 100 % of output span of selected output range
Load	
For output current	$\leq 12 \text{ V}$ (600 $\Omega$ at 20 mA)
For output voltage	$\leq 10 \text{ mA}$ (1 k $\Omega$ at 10 V)
Offset error	$< 20 \mu\text{A}$ / $< 10 \text{ mV}$
Residual ripple	$< 10 \text{ mV}_{\text{rms}}$
<b>Further data</b>	
Adjustment range ZERO pot	$\pm 25 \%$ in addition to adjusted offset
Adjustment range SPAN pot	0.33 ... 3.30 x final value of selected input range (max. $V_{\text{in}} = 200 \text{ V}$ )
Gain error	$< 0.1 \%$ of final value
Temperature coefficient <sup>2)</sup>	$< 60 \text{ ppm/K}$ of final value
Bandwidth	$> 10 \text{ kHz}$ , $< 10 \text{ Hz}$ selectable
Test voltage	4 kV~ input against output against power supply
Rated isolation voltage (basic insulation)	600 V for overvoltage category III and pollution degree 2 to DIN EN 50178. For applications with high isolation voltages, take measures to prevent accidental contact and make sure that there is sufficient distance to adjacent devices or sufficient insulation between them.

Protection against electrical shock	Reinforced insulation and protective separation to DIN EN 50178 for isolation voltages up to 300 V between input and output and power supply for overvoltage category III and pollution degree 2. For applications with high isolation voltages, take measures to prevent accidental contact and make sure that there is sufficient distance to adjacent devices or sufficient insulation between them.
EMC <sup>3)</sup>	Product standard DIN EN 61326, DIN EN 61326/A1 Generic standards DIN EN 50081-2 and DIN EN 61000-6-2
Surge withstand	5 kV, 1.2/50 $\mu$ s, to IEC 255-4
Ambient temperature	Operation -10 to +70 °C Transport and storage -40 to +85 °C
Power supply	22 to 230 V AC/DC $\pm$ 10 %, approx. 1 W AC 48 to 62 Hz
Construction	Modular case, for dimensions see dimension drawings <ul style="list-style-type: none"> <li>• pluggable screw clamp terminals</li> <li>• pluggable tension clamp terminals</li> </ul>
Protection	IP 20
Weight	approx. 100 g

1) Input 4 to 20 mA: Offset selection not calibrated

2) Average TC in specified operating temperature range -10 °C to +70 °C.

3) Minor deviations possible during interference.