IMPAC SERIES 600
Multi Analog Box ICB 600-8A

Quick-Start-Guide

Multi-Analog Box (ICB 600-8A)

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1 Preliminary Technical Data

Power Supply:	*24 V DC (18 ... 30 V DC), ripple < 0.5V* *(no supply via USB)*
Power consumption:	*Max. 1.5 W (all outputs as voltage outputs)* *Max. 5 W (all outputs as current output, max. load)*
Analog outputs:	*0 ... 20 mA or 4 ... 20 mA (linear),* *0 … 5V or 0 … 10V (linear), short-circuit proof*
Load:	*Current output:0 ... 500 Ω* *Voltage output: > 30 K*
Resolution:	*0.1°C at USB-interface* *< 0.1% of set sub temperature range at analog output*
Digital interface:	*USB 2.0*
Number of sensor heads:	*Max. 8 sensor heads on one analog box.* *2 sensors directly onr analog box, 8 sensors with 2 Multi-Sensor Boxes*
Isolation:	All 8 outputs (together as a block) are galvanically separated from other circuits

Protection class:	*IP 65 (DIN 40 050) with closed lid*
Mounting orientation:	*any*
Operating temperature:	*0 ... 60°C on housing*
Storage temperature:	*-20 ... +70°C*
Rel. humidity:	*Non-condensing conditions*
Weight:	*0.4 kg*
Housing:	*Aluminum*
Connection power supply/relais:	*7-pin terminal block with common contact of relays*
Connection outputs:	*9-pin terminal block: 8 outputs, 1 common ground*

CE-Mark:	*According to EU directives for electromagnetic compatibility*

Relay contact:	*4 foto relay outputs, galvanically separated*
Hysteresis:	*Negative Hysteresis, 2 … 20°C, adjustable*
Switching capacity	*50 VDC; 0.2 A*

Part number:	*3 917 170*

IMPAC SERIES 600
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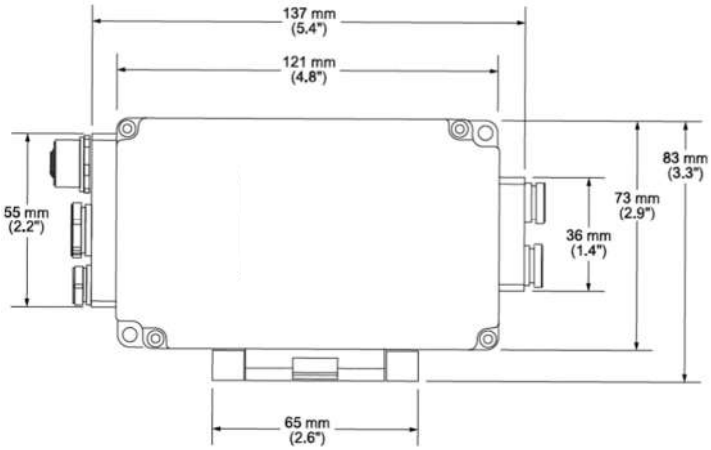
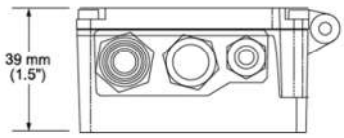
2 Unit Dimensional Drawings

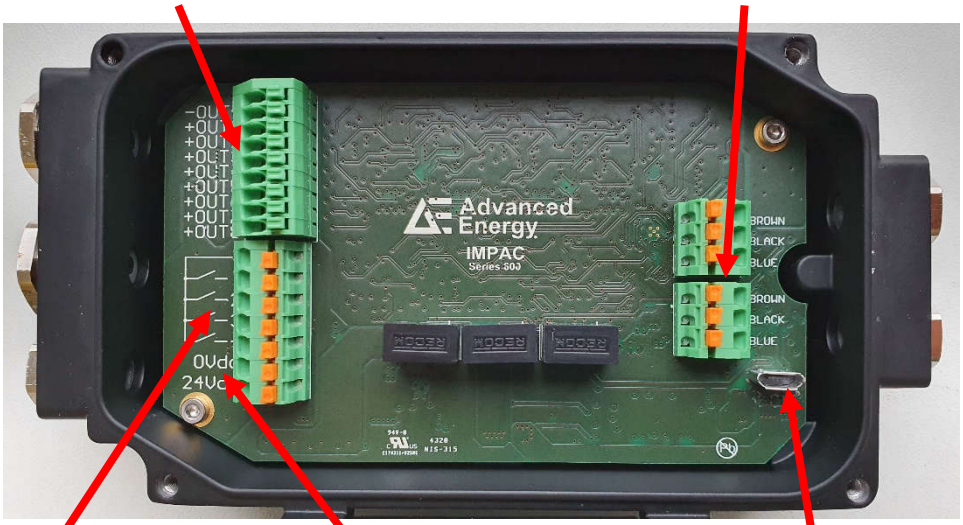




3 Connection

8 Analog outputs

2 connectors for sensor heads



4 Relay contacts

Power supply 24VDC

USB connection

Connection and installation: see manual 57010228-00B

IMPAC SERIES 600
Multi Analog Box ICB 600-8A

Wiring of the analog outputs of the Multi Analog Box

The Multi Analog Box has a 9-pin terminal block for 8 analog outputs and 1 common analog ground. As the analog ground is also the return line for all outputs, it is possible that the analog signals affect each other. The reason lies in the ohmic resistance of the wires of the used cable on which a disturbing voltage drop might occur due to the flowing signal current. This voltage drop can lead to measuring error on the voltage inputs. As an example, the resistance of a 100 m long wire with 0.25 mm² wire cross section is already approx. 7 Ω.

The following scenarios are possible:

- **All outputs are configured as voltage outputs:**

Due to the high-resistance voltage inputs (> 100 kΩ) only a very low reverse current is flowing - a mutual interference is not expected.
Example: With 8 x 0...10 V at 100 kΩ each → max. 8 x 0.1 mA = 0.8 mA in ground wire → 8 mV voltage drop at 10 Ω wire resistance → < 0.1 % measurement error at 0…10 V

- **All outputs are configured as current outputs:**

The currents are independent of voltage drops on the wiring - a mutual interference is not expected. On each current input the current flowing through the load is measured. The voltage drop on the ground wire does not play a role. However, the resistance of the ground wire should be lower than 10 Ω as the voltage drop on the ground wire needs to be compensated by the current outputs.
Example: With 8 x 20 mA, 160 mA are flowing in the ground wire → 1.6 V voltage drop at 10 Ω wire resistance → the current outputs need to additionally provide these 1.6 V in order to push the signal current.
Corrective action: At long cables multiple wires can be wired in parallel in order to minimize the ground resistance.

- **The outputs are configured differently as current and voltage outputs:**

In this case, it is important to follow the separate hints on the wiring. Otherwise, the voltage inputs will be significantly influenced by the flowing signal currents due to the reverse currents in the ground wire based on a voltage drop.
Corrective action: In the cable 2 separate ground wires need to be routed: one wire for the current inputs only and one wire for the voltage outputs only. Doing so will help to avoid that the reverse current of the current inputs runs through the ground wire for the voltage inputs. A disturbing voltage drop at the voltage inputs will be avoided.
Please see the hints on the next pages.

IMPAC SERIES 600
Multi Analog Box ICB 600-8A

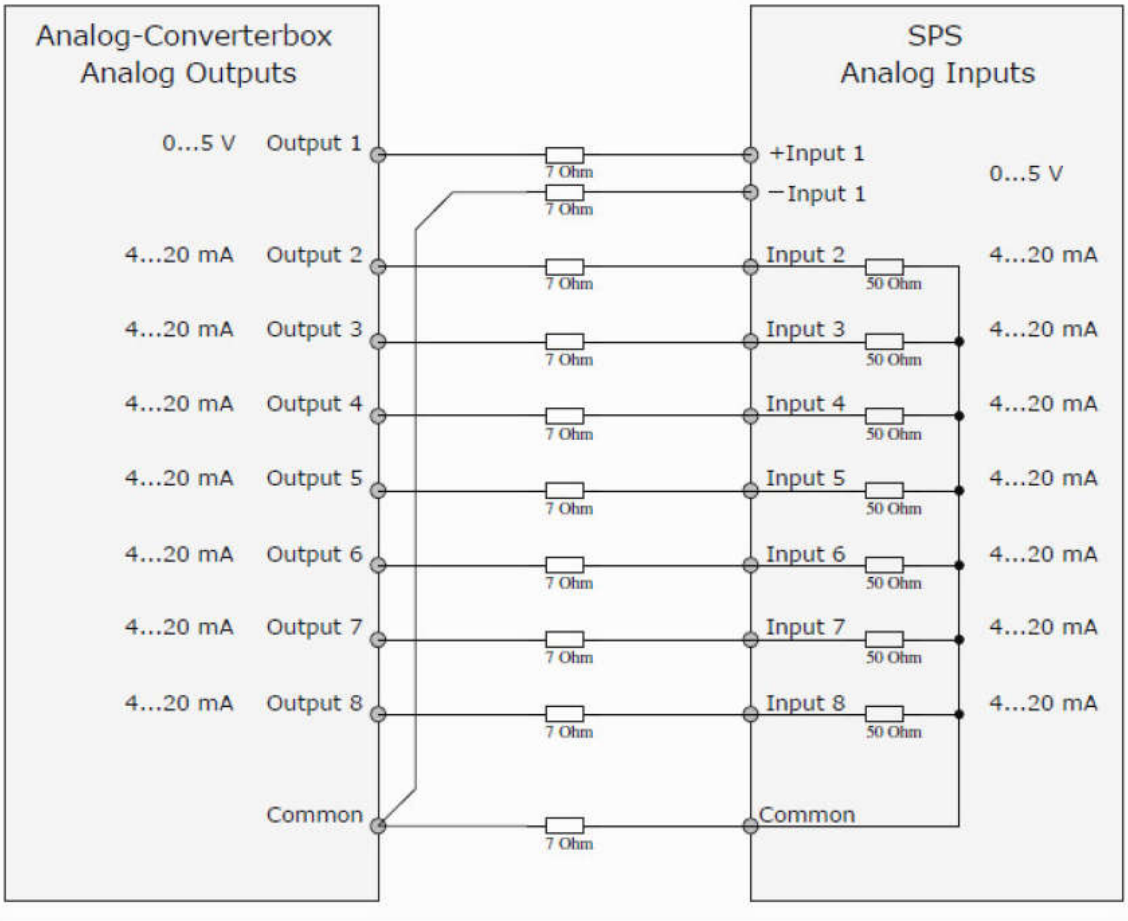
Hints on the wiring for different output configurations

Example 1 – Possible wiring for differential voltage inputs

In many cases differential voltage inputs are existent. The following example shows a possible wiring of a differential voltage input. Here, a multi-core cable with a resistance of 7 Ω per wire (7 Ω e.g. approx. corresponds to a 100 m cable length with 0.25 mm² wire cross section) is shown between the analog box and the PLC. The separately routed voltage input ground is applied to the (high resistance) minus input of the differential voltage input.

In this example simple, non-differential current inputs are shown. In case of differential current inputs the ground for the current inputs would have to be applied to the minus inputs of the current inputs.

The combination of simple voltage inputs and differential current inputs is also possible. In this case the voltage input ground has to be applied to the accordant ground clamp. The current input ground is applied to the minus inputs of the current inputs. Precondition: the differential current inputs are high resistive enough.

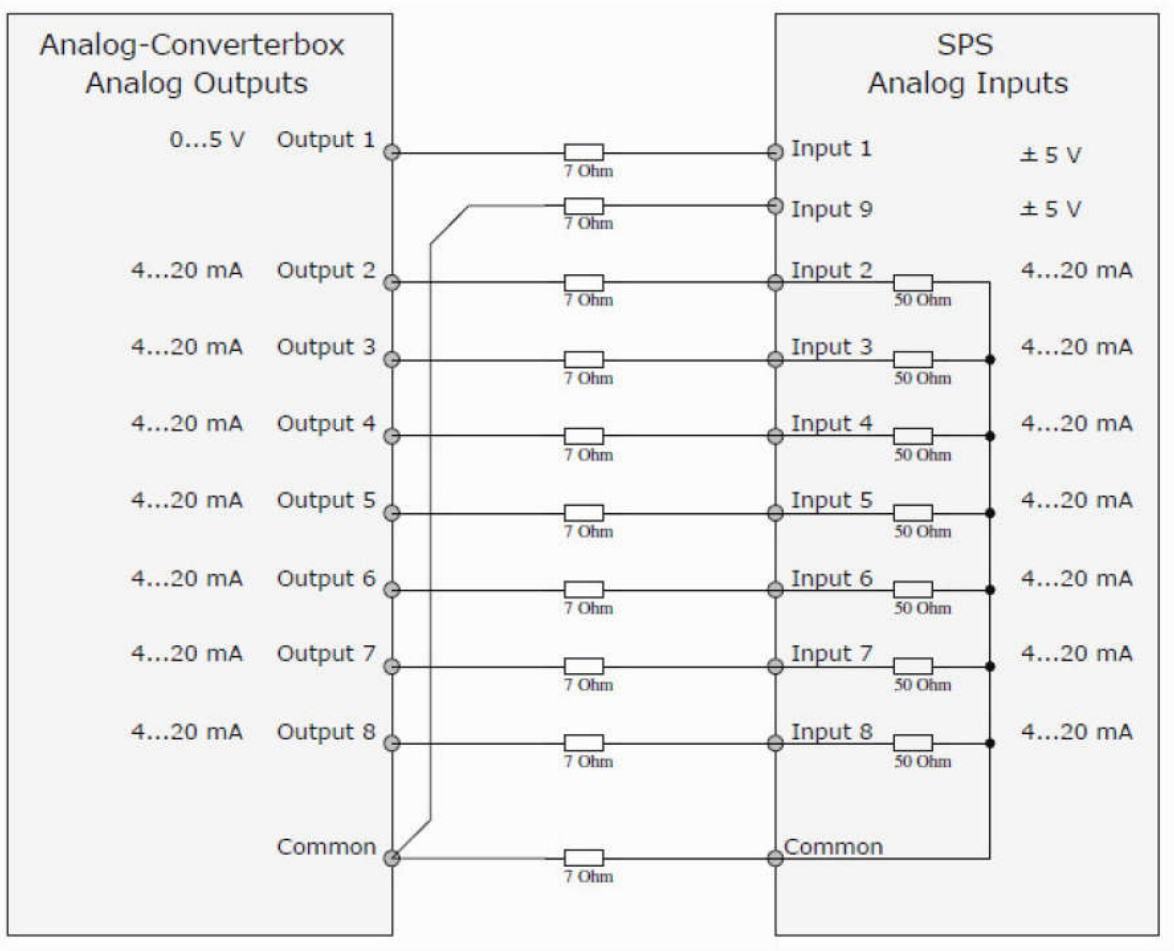


Possible wiring for differential voltage inputs

IMPAC SERIES 600
Multi Analog Box ICB 600-8A

Example 2 – Possible wiring for simple, non-differential inputs

In case only simple, non-differential voltage inputs are in place and the voltage inputs and the current inputs do only have one common ground connection, alternatively an additional voltage input can be used. The separate voltage input ground is then applied to this additional voltage input. In this case, please note that the incoming voltage can become negative in relation to the current input ground. Hence, the voltage inputs also need to be able to measure negative voltages. Moreover, the voltages should be measured as synchronal as possible in order to avoid measuring errors based on signal changes.

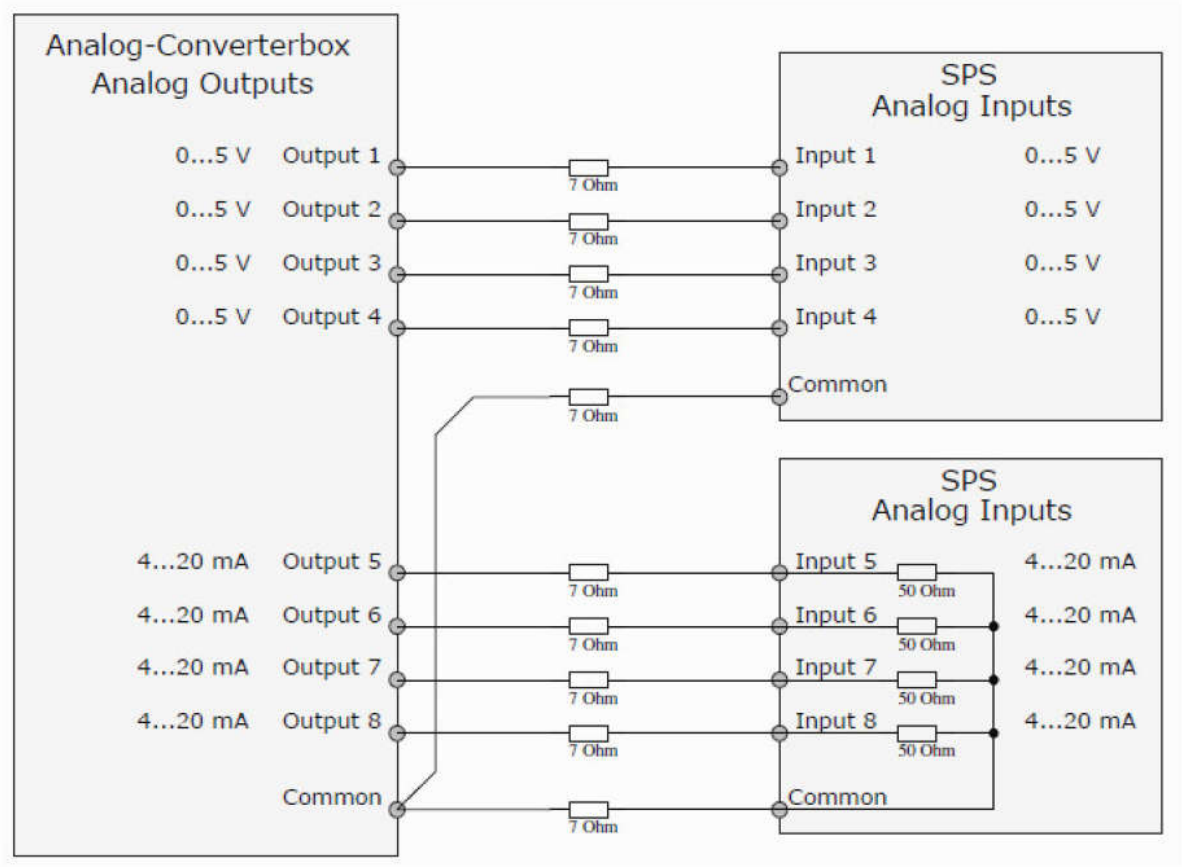


Possible wiring for simple voltage inputs

IMPAC SERIES 600
Multi Analog Box ICB 600-8A

Example 3 – Possible wiring for galvanically separated analog inputs

In case the PLC does only have simple (non-differential) voltage and current inputs but voltage input module and current input module are galvanically separated, false measurements can be avoided by applying the separate ground wires to the accordant galvanically separated ground clamps.

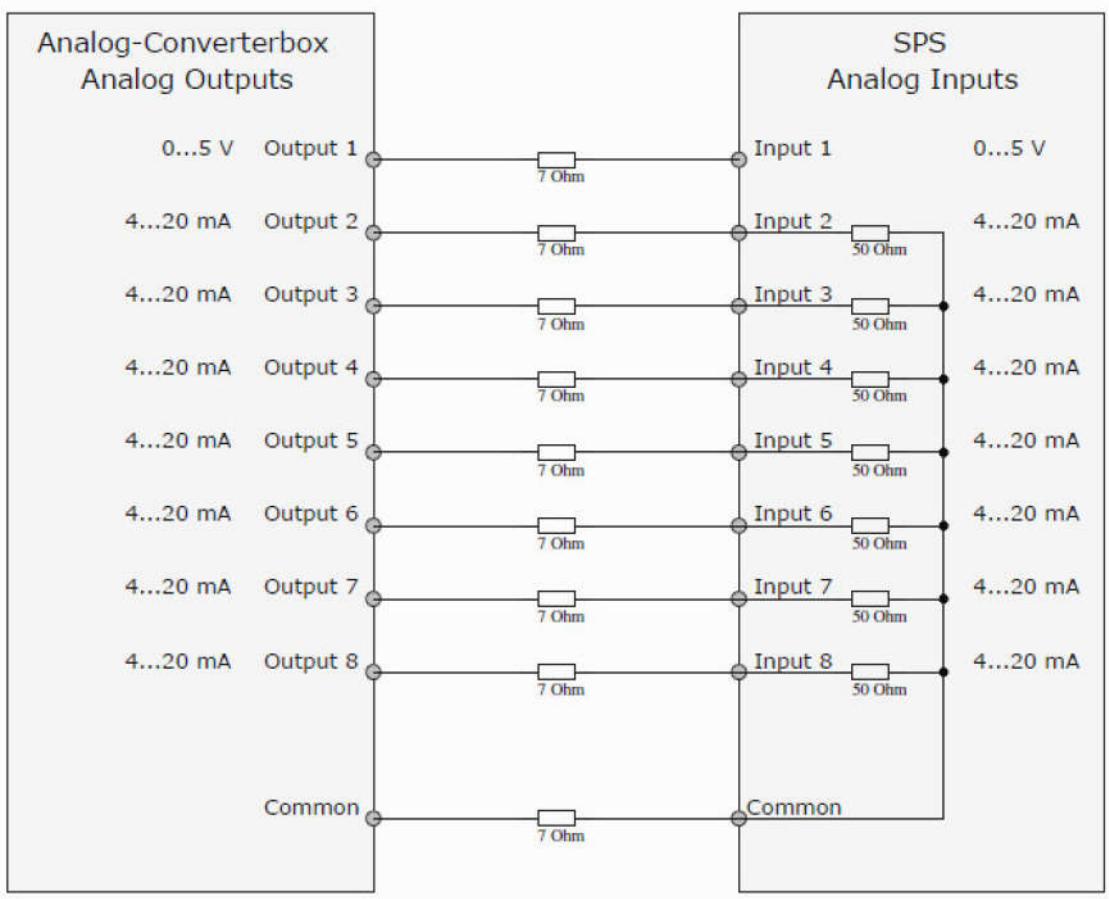


Possible wiring for galvanically separated input modules

IMPAC SERIES 600
Multi Analog Box ICB 600-8A

Example 4 – Not recommended wiring

The next example shows how the wiring should not look like. In this example 7 outputs are configured as current outputs while one output is configured as voltage output. There is only one common ground wire. The PLC inputs in this example are all referred to one common ground.



Not recommended wiring for differently configured outputs.

This configuration (as worst case scenario) shows that a noticeable potential drop appears on the ground wire as the summarized reversed current of up to approx. 150 mA from all 7 current outputs applies.

At a wire resistance of 7 Ω up to approx. 1 V will drop on the ground wire. The voltage reaching the voltage input is lowered accordingly. If the voltage output is set to 0…5 V in worst case only -1…4 V are measurable at the voltage input, if all current have maximum current in this moment. The deviation of measuring voltage compared to the complete range will be 20% due to the influences of the current outputs.