

MVS

DIN RAIL MOUNTED
ELECTRONIC FAN SPEED
CONTROLLER

Mounting and operating instructions

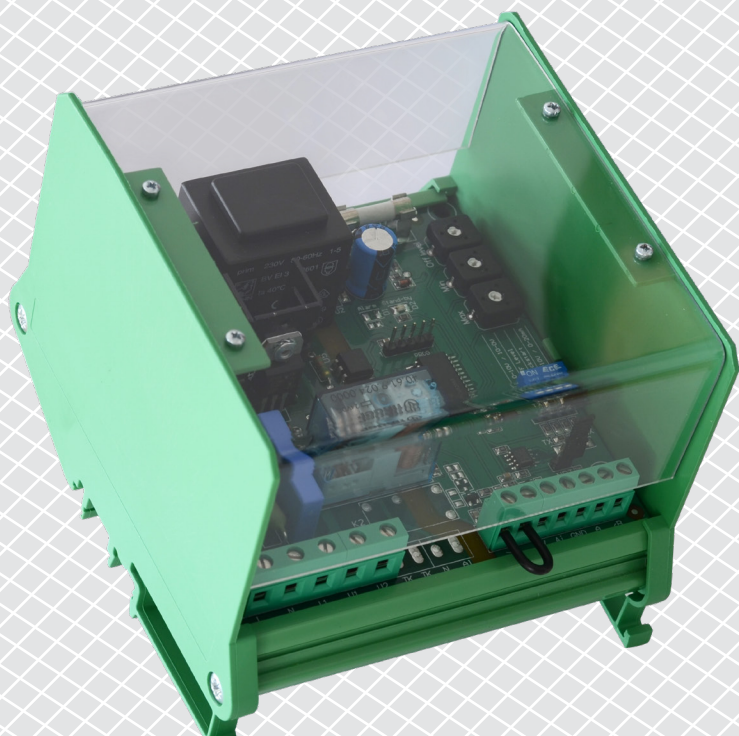


Table of contents

SAFETY AND PRECAUTIONS	3
PRODUCT DESCRIPTION	4
ARTICLE CODES	4
INTENDED AREA OF USE	4
TECHNICAL DATA	4
STANDARDS	5
WIRING AND CONNECTIONS	5
OPERATIONAL DIAGRAMS	5
MOUNTING INSTRUCTIONS IN STEPS	7
VERIFICATION OF INSTALLATION INSTRUCTIONS	9
OPERATING INSTRUCTIONS	10
TRANSPORT AND STORAGE	11
WARRANTY AND RESTRICTIONS	11
MAINTENANCE	11

SAFETY AND PRECAUTIONS



Read all the information, the datasheet, Modbus Register map, mounting and operating instructions and study the wiring and connection diagram before working with the product. For personal and equipment safety, and for optimum product performance, make sure you entirely understand the content before installing, using or maintaining this product.



Unauthorised conversion and/or modification of the product is not permitted for safety and licensing (CE) reasons.



The product should not be exposed to abnormal conditions, such as extreme temperatures, direct sunlight or vibrations. Long-term exposure to chemical vapours in high concentration can affect the product performance. Make sure the work environment is as dry as possible and avoid condensation.



All installations shall comply with local health and safety regulations, local electrical standards and approved codes. This product can only be installed by an engineer or a technician who has expert knowledge of the product and of the safety precautions.



Avoid contact with energised electrical parts. Always disconnect the power supply before connecting, servicing or repairing the product.



Always ensure that the product is powered properly and that the wire size and characteristics are appropriate. Make sure that all the screws and nuts are well tightened and fuses (if any) are fitted well.



Recycling of equipment and packaging should be taken into consideration and these should be disposed of in accordance with local and national legislation / regulations.



If you have any further questions, please contact your technical support or consult a professional.

PRODUCT DESCRIPTION

The MVS series control the speed of single-phase voltage controllable electric motors (230 VAC / 50–60 Hz) according to a standard input control signal. They are equipped with Modbus RTU communication and provide a wide range of functionalities: remote control options, adjustable off level, min. and max. output voltage settings, and time-limited motor operation initiated by a logic or switch signal.

ARTICLE CODES

Code	Nominal current [A]	Fuse rating [A]	
		Fuse 1	Fuse 2
MVS-1-15CDM	1,5	F 0,315 A H 250 V (5*20 mm)	F 3,15 A H 250 V (5*20 mm)
MVS-1-30CDM	3,0		F 5,0 A H 250 V (5*20 mm)
MVS-1-60CDM	6,0		F 10,0 A H 250 V (5*20 mm)
MVS-1-100CDM	10,0		F 16,0 A H 250 V (6,3*32 mm)

INTENDED AREA OF USE

- Fan speed control in ventilation systems
- Applications where Modbus communication or a timer function is needed
- For indoor use only

TECHNICAL DATA

- Power supply: 230 VAC \pm 10 % / 50–60 Hz
- Analogue input:
 - ▶ voltage: 0–10 VDC
 - ▶ current: 0–20 mA
- Analogue input modes: ascending or descending
- Analogue input functionality: Normal mode / Logic mode
- Remote control input: normal or timer functionality
- Regulated output: 30–100 % U_s
- Max. output load: depends on the version (see the table above)
- Unregulated output, L1: 230 VAC / 50–60 Hz / max. 2 A
- Min. output voltage setting, U_{min} : 30–70 % U_s , selectable by trimmer or via Modbus
- Max. output voltage setting, U_{max} : 75–100 % U_s , selectable by trimmer or via Modbus
- Off level, adjustable by trimmer or via Modbus:
 - 0–4 VDC / 0–8 mA for ascending mode
 - 10–6 VDC / 20–12 mA for descending mode
- Kick start or soft start
- Low voltage supply output: + 12 VDC / 1 mA for external potentiometer
- Modbus communication
- Operating indication:
 - ▶ continuous green: normal operation
 - ▶ blinking green: stand-by
- Overvoltage and overcurrent protection
- Enclosure:
 - ▶ DIN rail interface module: polyamide - PA UL94V0; green colour (RAL 6017)
 - ▶ cover: plexiglas, transparent
- Protection standard: IP20 (according to EN 60529)
- Operating ambient conditions:
 - ▶ temperature: -20–40 °C
 - ▶ rel. humidity: < 80 % rH (non-condensing)
- Storage temperature: -40–50 °C

STANDARDS

- Low Voltage Directive 2014/35/EC
- EMC Directive 2014/30/EC
- RoHs Directive 2011/65/EU



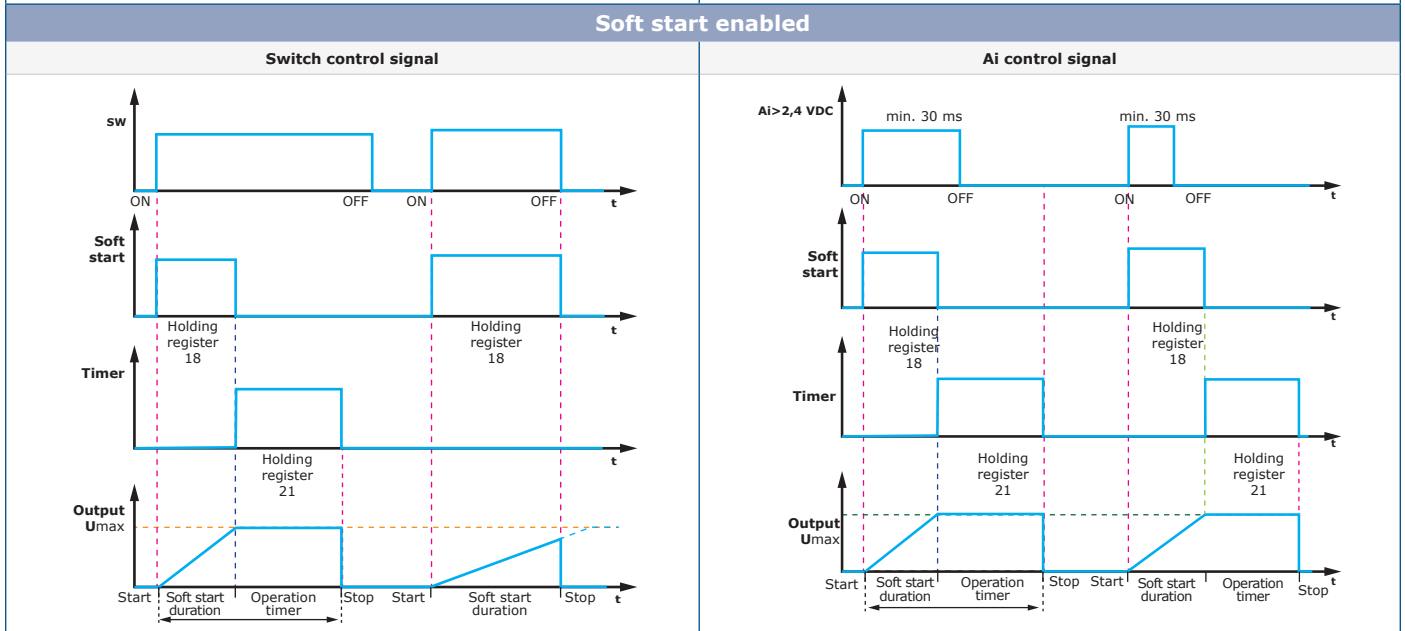
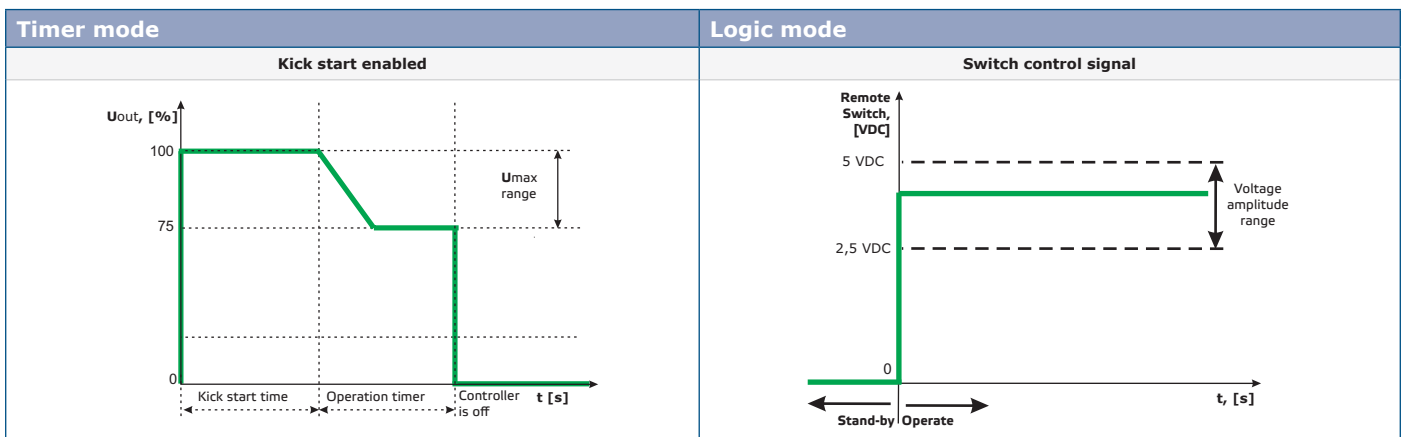
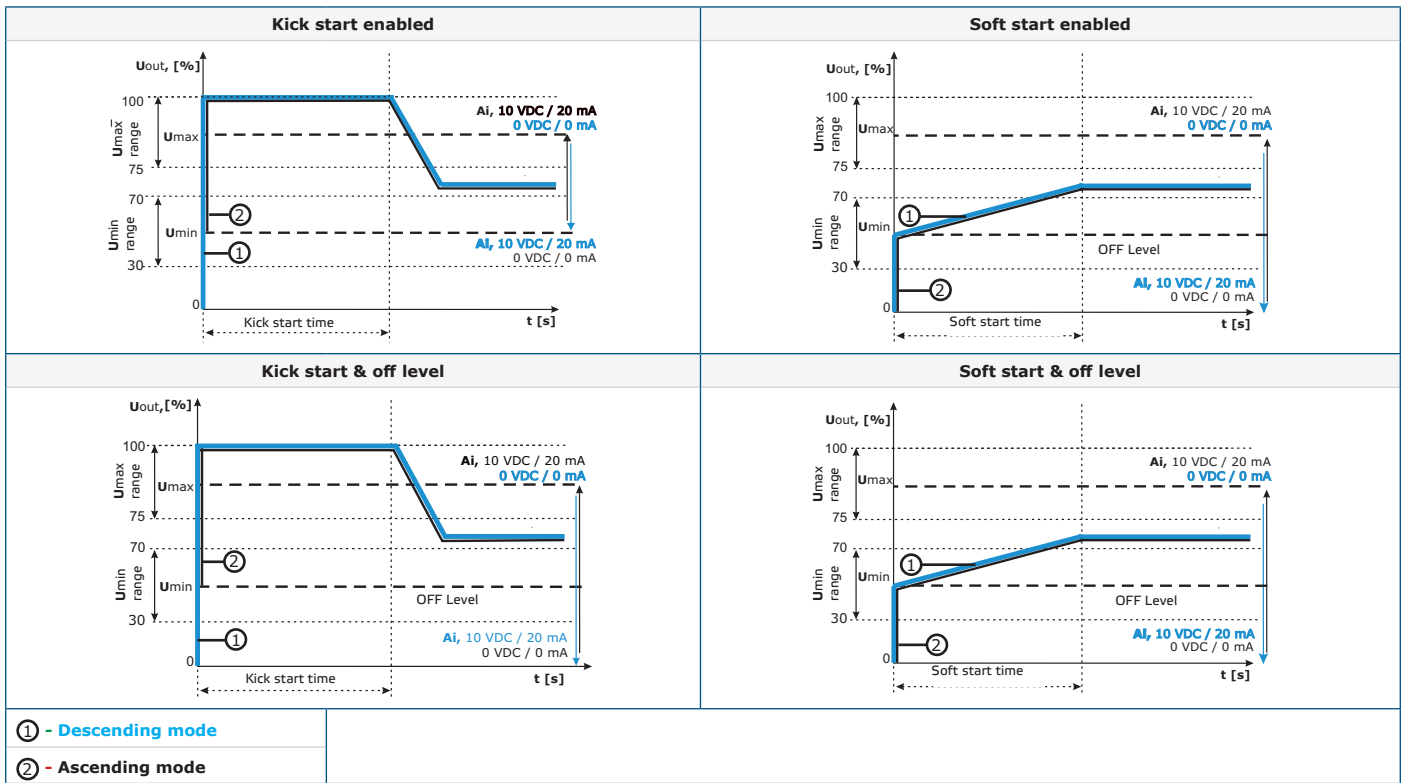
WIRING AND CONNECTIONS

Wiring and connections			
MVS-1-15CDM and MVS-1-30CDM		MVS-1-60CDM and MVS-1100CDM	
L	Supply voltage 230 VAC ±10 % / 50–60 Hz	L	Supply voltage 230 VAC ±10 % / 50–60 Hz
N	Neutral	N	Neutral
L1	Unregulated output (230 VAC / max. 2 A)	L1	Unregulated output (230 VAC / max. 2 A)
U1, U2	Regulated output to the motor	U1, U2	Regulated output to the motor
SW	Remote control switch / timer start switch	PE	Protective earth
+V	Supply output +12 VDC / 1 mA	SW	Remote control switch / timer start switch
Ai	Analogue input 0–10 VDC / 0–20 mA	+V	Supply output +12 VDC / 1 mA
GND	Ground	Ai	Analogue input 0–10 VDC / 0–20 mA
A	Modbus RTU (RS485) signal A	GND	Ground
/B	Modbus RTU (RS485) signal /B	A	Modbus RTU (RS485) signal A
		/B	Modbus RTU (RS485) signal /B
Connections	Cable cross section: max. 2,5 mm ²	Connections	Cable cross section: max. 2,5 mm ²

OPERATIONAL DIAGRAMS

Operational diagrams			
Operating modes Ascending / Descending input mode			
Off level disabled		Off level enabled	
Descending mode calculation formula	$U_{out} = U_{max} - \frac{A_i}{A_{i_{max}}}(U_{max} - U_{min})$	Descending mode calculation formula	$U_{out} = U_{max} - \frac{A_i - \text{Off level}}{A_{i_{max}} - \text{Off level}}(U_{max} - U_{min})$
Ascending mode calculation formula	$U_{out} = U_{min} + \frac{A_i}{A_{i_{max}}}(U_{max} - U_{min})$	Ascending mode calculation formula	$U_{out} = U_{min} + \frac{A_i - \text{Off level}}{A_{i_{max}} - \text{Off level}}(U_{max} - U_{min})$

Note: The operational diagrams for Descending mode are mirror images of the diagrams above for Ascending mode.



MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully **“Safety and Precautions”**. Then proceed with the following mounting steps:

1. Switch off the power supply.
2. Remove the transparent cover of the DIN enclosure.
3. Remove the screws on the side walls of the DIN rail module. Slide the module along the guides of a standard DIN rail. Fix the desired unit position on the rail via mounting the side walls of the enclosure. Mind the correct position and mounting dimensions shown in **Fig. 1 Mounting dimensions** and **Fig. 2 Mounting position**.

Fig. 1 Mounting dimensions

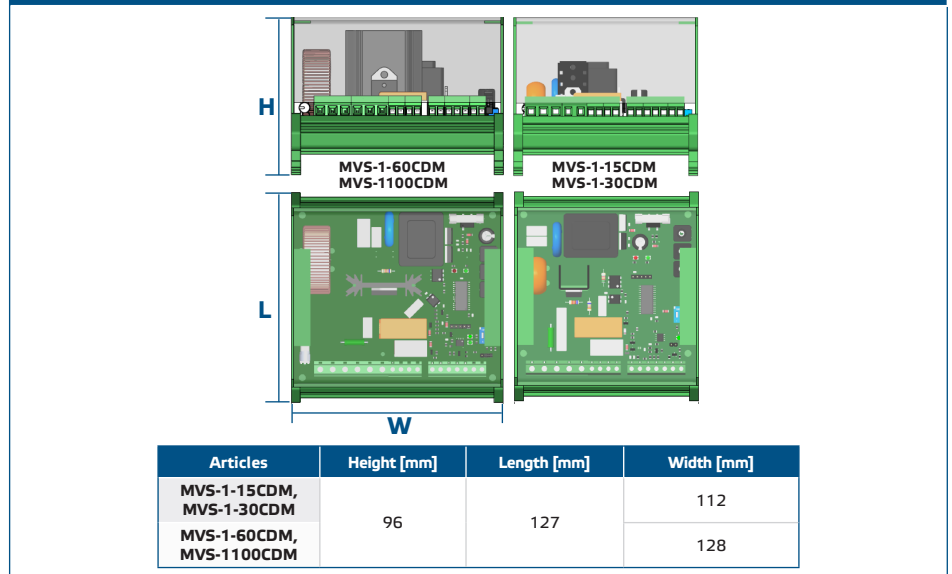
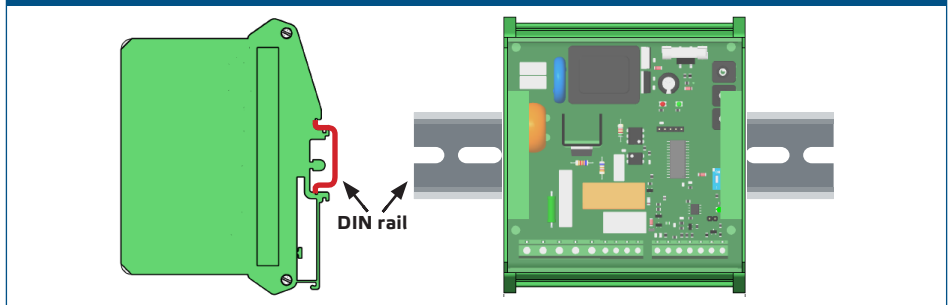


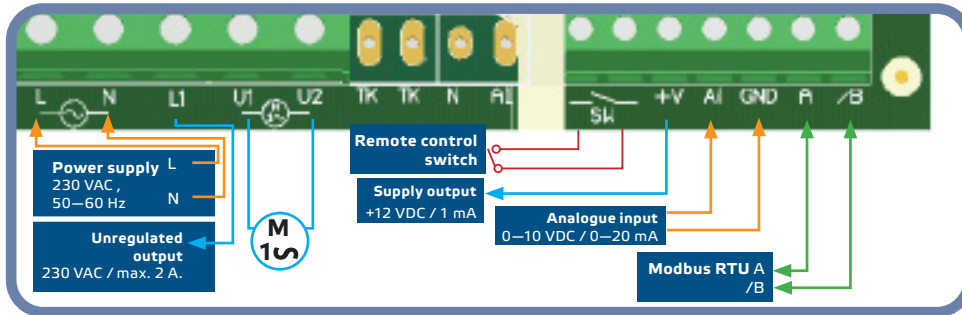
Fig. 2 Mounting position



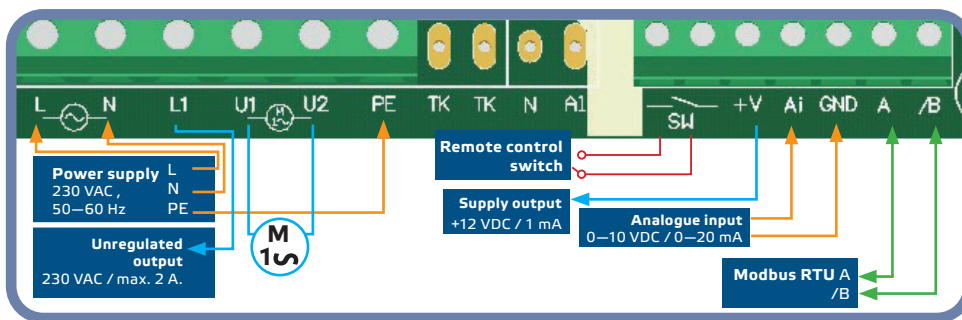
4. Connect the motor / fan.
5. Connect L1 output for a 3-wire connection, controlled valve, etc. (if necessary). See **Fig. 3b 3-wire motor connection**.

Fig. 3 Wiring and connections

3a 2-wire motor connection

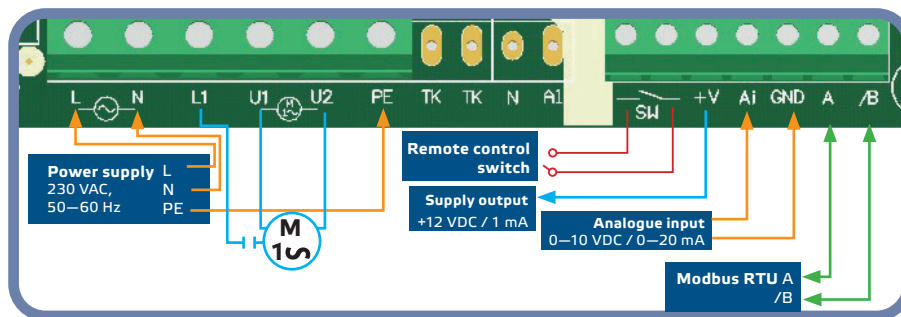


MVS-1-15CDM, MVS-1-30CDM



MVS-1-60CDM, MVS-1100CDM

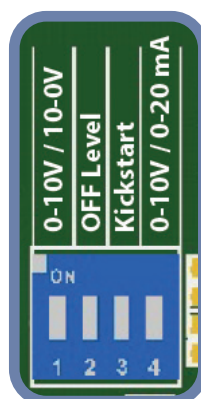
3b 3-wire motor connection



MVS-1-60CDM, MVS-1100CDM

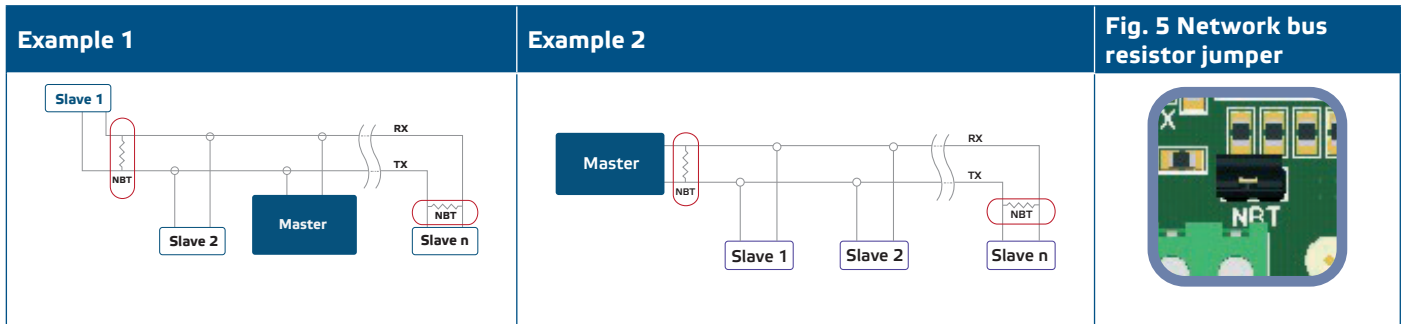
6. Select the required analogue input type and mode, start mode and OFF level mode via the DIP switches (see Fig. 4 DIP switch settings).

Fig. 4 DIP switch settings



Ascending / descending mode selection (DIP switch, position 1)		ON - Descending mode: 10-0 VDC / 20-0 mA OFF - Ascending mode: 0-10 VDC / 0-20 mA
OFF level selection (DIP switch, position 2)		ON - enabled OFF - disabled
Kick start / soft start selection (DIP switch, position 3)		ON - Kick start OFF - Soft start
Input mode selection (DIP switch, position 4)		ON - Current mode (0-20 mA) OFF - Voltage mode (0-10 VDC)

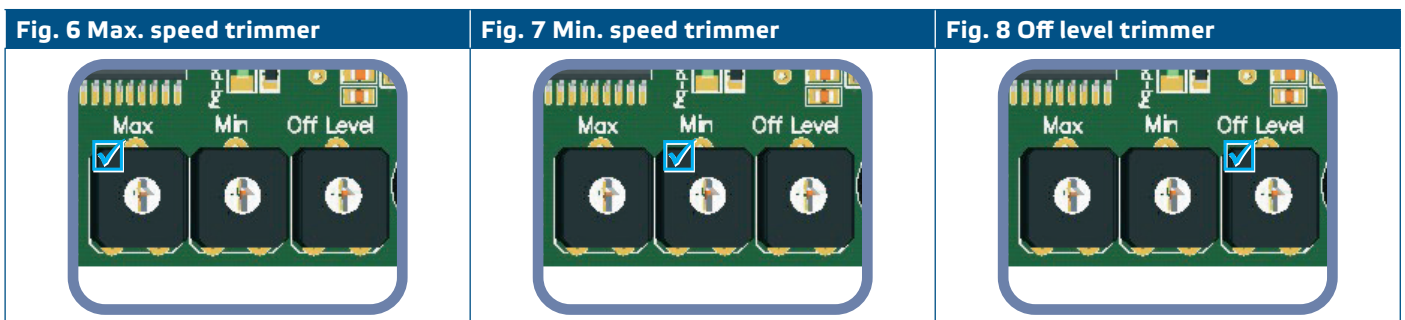
7. Check if your unit starts or terminates the network (see **Example 1** and **Example 2**). If it does, put the NBT jumper onto the pins. If it does not, do not connect the jumper (see **Fig. 5**).



ATTENTION

If an AC power supply is used with any of the units on a Modbus network, the GND terminal should NOT BE CONNECTED to other units on the network or via the CNVT-USB-RS485 converter. This may cause permanent damage to the communication semiconductors and / or the computer!

8. Connect the power supply cable.
9. Adjust the max. speed via the trimmer (if necessary). The default setting is U_s (230 VAC). See **Fig. 6 Max. speed trimmer**.
10. Adjust the min. speed via the trimmer (if necessary). The default setting is 30 % U_s (69 VAC). See **Fig. 7 Min. speed trimmer**.
11. Adjust the OFF level value via the trimmer (if necessary). The default setting is 0 VAC. See **Fig. 8 Off level trimmer**.



12. Close the enclosure and fix the transparent cover.
13. Switch on the power supply.
14. Customise the factory settings to the desired ones, through 3SModbus software (if necessary). For the default factory settings see **Table Modbus register maps**.

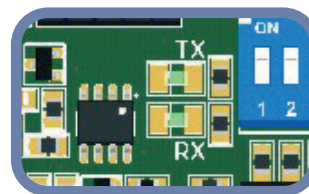
VERIFICATION OF INSTALLATION INSTRUCTIONS

Follow the instructions below:

1. Switch on the mains supply.
2. Set the NBT jumper, DIP switch, Max. trimmer, Min. trimmer and OFF level trimmer to desired positions / values. The factory settings are as follows:
 - ▶ NBT jumper is open (Network bus termination resistor is disconnected);
 - ▶ Ascending mode: 0–10 VDC / 0–20 mA
 - ▶ Off level - OFF;
 - ▶ Kick start disabled;
 - ▶ Input voltage mode (0–10 VDC);
 - ▶ Min. setting of the Min. speed trimmer
 - ▶ Max. setting of the Max. speed trimmer;
 - ▶ Min. setting of the Off level trimmer.

3. Set the analogue input signal to the maximum value of 10 VDC or 20 mA.
4. The connected motor will run at maximum speed or minimum speed depending on the analogue input mode (ascending / descending).
5. If OFF level is enabled and descending analogue input mode is selected, the motor will stop running.
6. Set the analogue input signal to the maximum value of 0 VDC or 0 mA.
7. The connected fan will run at minimum speed or maximum speed depending on the analogue input mode (ascending / descending).
8. If OFF level is enabled and ascending analogue input mode is selected, the motor will stop running.
9. If OFF level is enabled and the input signal is equal to the value of the OFF level, the speed of the motor will be the minimum speed in ascending mode or the maximum speed in descending mode.
10. If the controller does not work according to the instructions above, the wiring connections and settings need to be checked.
11. Check if both LEDs (**Fig. 9**) blink after you switch on your unit. If they do, your unit has detected a Modbus network. If they do not, check the connections again.

Fig. 9 Communication detection indication



ATTENTION

The status of the LEDs can be checked only when the unit is energised. Take the relevant safety measures!

OPERATING INSTRUCTIONS

OPERATION MODES

In Modbus mode you control the parameters: Umax, Umin, Kick start / Soft start, Off level enable / disable and Off level value through Modbus registers.

In Standalone mode you control the parameters: Umax, Umin, Kick start / Soft start, Off level enable / disable and Off level value by means of the hardware settings (DIP switch, trimmers, jumpers).

In Normal mode if Off level is disabled, Soft start / Kick start is executed only once - after the controller is supplied; otherwise Soft start / Kick start is executed every time the controller is switched on.

When **Timer mode** is selected, the controller receives a pulse control signal from the remote control switch. When Logic mode is selected, the controller receives a pulse control signal from the Ai input.

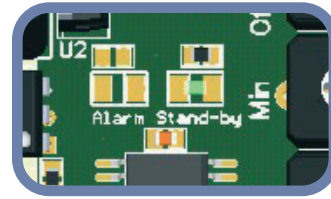
In both modes - **Timer mode** and **Logic mode** - the pulse width is to be more than 30 ms; otherwise the signal is filtered.

OPERATING LED INDICATION

When the green LED on **Fig. 10** is solid on, the controller operates in normal mode. When it blinks:

- ▶ the controller operates in remote control mode, or
- ▶ OFF level is enabled and the analogue input signal is below the OFF level value.

Fig. 10 Operation indication



TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packing.

WARRANTY AND RESTRICTIONS

The warranty against manufacturing flaws is valid for two years starting from the date of delivery. Any alterations or adjustments to the product absolve the manufacturer of all liability. The manufacturer disclaims all liability for typographical or other errors in this document.

MAINTENANCE

In normal conditions this product is maintenance-free. If soiled, clean with a dry or damp cloth. In case of heavy pollution, clean with a non-aggressive product. In these circumstances the unit should be disconnected from the supply. Pay attention that no fluids enter the unit. Only reconnect it to the supply when it is completely dry.