

# EVSS

ELECTRONIC FAN SPEED  
CONTROLLER WITH TK

## Mounting and operating instructions



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## SAFETY AND PRECAUTIONS

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Read all the information, the datasheet, Modbus 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 contents before installing, using or maintaining this product.



For safety and licensing (CE) reasons, unauthorised conversion and /or modifications of the product are inadmissible.



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; avoid condensation.



All installations shall comply with local health and safety regulations and 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 safety precautions.



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



Always verify that you apply appropriate power supply to the product and use appropriate wire size and characteristics. 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.



In case there are any questions that are not answered, please contact your technical support or consult a professional.

## PRODUCT DESCRIPTION

EVSS1 is an electronic speed controller which controls the speed of single-phase (230 VAC / 50–60 Hz) voltage controllable electric motors. It is equipped with Modbus RTU (RS485) communication, an alarm relay output and thermal contacts to provide overheating protection of motors with cut-out contacts. The EVSS controller provides 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]
EVSS1-15-DM	1,5	(5*20 mm) F 3,15 A H 250 VAC
EVSS1-30-DM	3,0	(5*20 mm) F 5,0 A H 250 VAC
EVSS1-60-DM	6,0	(5*20 mm) F 10,0 A H 250 VAC
EVSS1100-DM	10,0	(6,3*32 mm) F 16,0 A H 250 VAC

## INTENDED AREA OF USE

- Fan speed control in ventilation systems
- For indoor use only

## TECHNICAL DATA

- Power supply: 230 VAC  $\pm$ 10 % / 50–60 Hz
- Analogue input:
  - ▶ voltage: 0–10 VDC / 10–0 VDC
  - ▶ current: 0–20 mA / 20–0 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
- Unregulated output, L1: 230 VAC (50 / 60 Hz) / max. 2 A
- Alarm output (230 VAC / 1 A)
- Min. output voltage setting,  $U_{min}$ : 30–70 %  $U_s$  (69–161 VAC), selectable by trimmer or via Modbus
- Max. output voltage setting,  $U_{max}$ : 75–100 %  $U_s$  (175–230 VAC), 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
- Thermal inputs for motor overheating protection
- Motor overheating indication
- Enclosure: plastic R-ABS, UL94-V0; grey colour (RAL 7035)
- Protection standard: IP54 (according to EN 60529)
- Operating ambient conditions:
  - ▶ temperature: -20–40 °C
  - ▶ relative humidity: < 95 % rH (non-condensing)
- Storage temperature: -40–50 °C

## STANDARDS

- Electromagnetic compatibility (EMC) Directive 2014/35/EU: CE
  - ▶ EN 60730-1:2011 Automatic controls for household and similar use - Part:1 General requirements
  - ▶ EN 61000-6-2:2005 Electromagnetic compatibility (EMC). Generic standards - Immunity for industrial environments (+AC:2005)
  - ▶ EN 61000-6-3:2007 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standards for residential, commercial and light-industrial environments Amendments A1:2011 and AC:2012 to EN 61000-6-3
- Low voltage (LVD) Directive 2014/35/EU:
  - ▶ EN 60335-1:2012 Household and similar electrical appliances - Safety - Part:1 General requirements. Amendment A11:2014 and AC: 2014 to EN 60335:12012
  - ▶ EN 61558-1:2005 Safety of power transformer, power supplies, reactors and similar products - Part 1: General requirements and tests. Amendment AC:2006 and A1:2009 to EN 61558-1:2005
- RoHs Directive 2011/65/EU

## WIRING AND CONNECTIONS

L	Supply voltage 230 VAC $\pm 10\%$ / 50–60 Hz
N	Neutral
PE	Earth terminal
L1	Unregulated output (230 VAC / max. 2 A)
U1, U2	Regulated output to the motor
TK, TK	Thermal contact
N	Neutral
AL	Alarm output (230 VAC / 1 A)
SW	Remote control switch
A	Modbus RTU (RS485) signal A
/B	Modbus RTU (RS485) signal /B
+V	Supply output +12 VDC / 1 mA
Ai	Analogue input (0–10 VDC / 0–20 mA) or (10–0 VDC / 20–0 mA)
GND	Ground
Connections	Cable cross section: max. 2,5 mm <sup>2</sup> ; Cable gland clamping range: 3–6 mm / 5–10 mm

OPERATIONAL DIAGRAMS

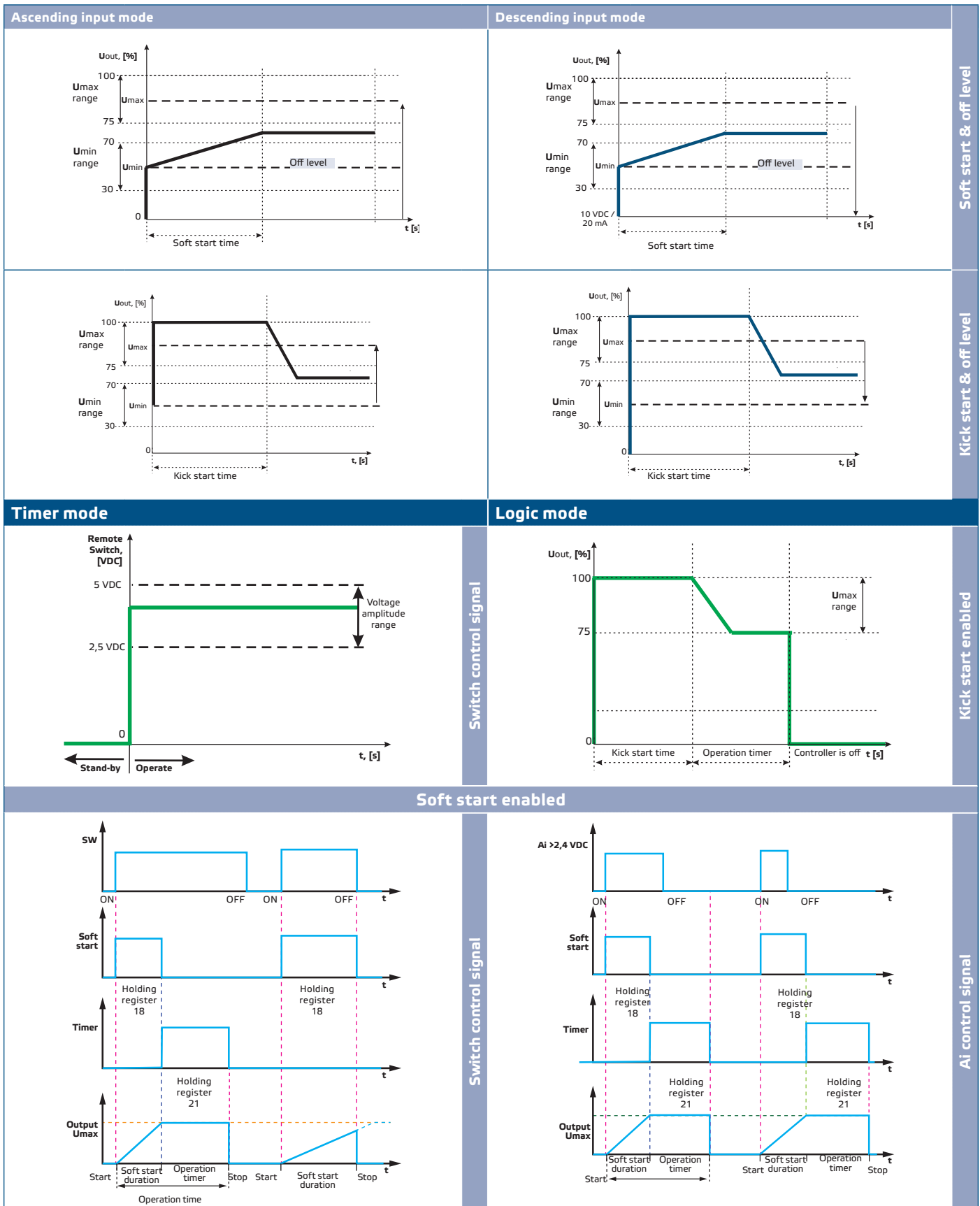
Normal / Remote operating modes			
Ascending input mode		Descending input mode	
Ascending mode calculation formula	$U_{out} = U_{min} + \frac{A_i}{A_{i_{max}}} (U_{max} - U_{min})$	Descending mode calculation formula	$U_{out} = U_{max} - \frac{A_i}{A_{i_{max}}} (U_{max} - U_{min})$
Ascending mode calculation formula	$U_{out} = U_{max} + \frac{A_i - \text{Off level}}{A_{i_{max}} - \text{Off level}} (U_{min} - U_{max})$	Descending mode calculation formula	$U_{out} = U_{max} - \frac{A_i - \text{Off level}}{A_{i_{max}} - \text{Off level}} (U_{max} - U_{min})$

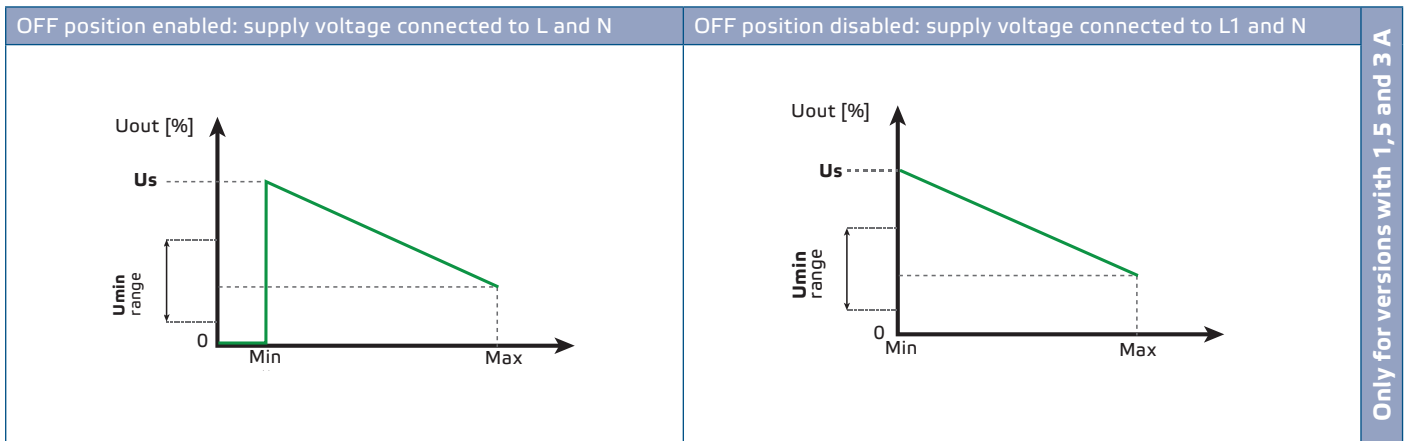
Off level disabled

Off level enabled

Kick start enabled

Soft start enabled





Only for versions with 1,5 and 3 A

## NOTE

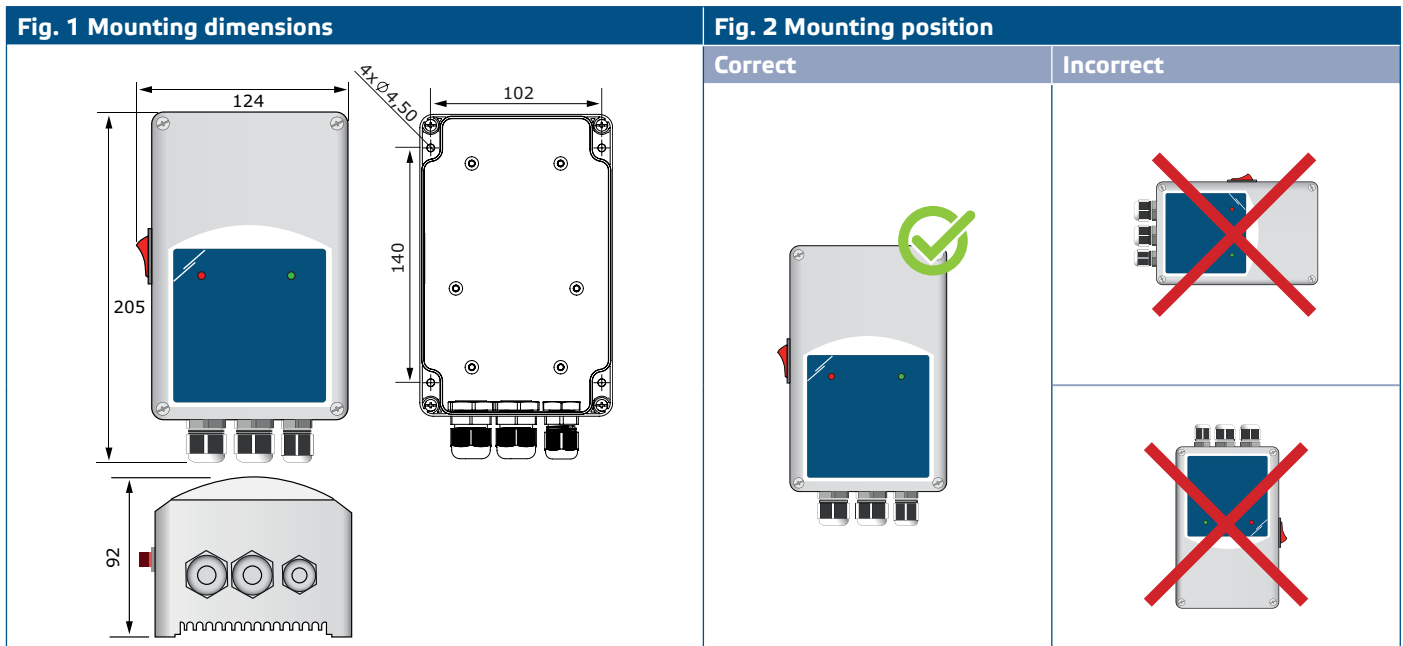
To disable the OFF position (1,5 A and 3,0 A versions ONLY!), connect the 230 VAC supply voltage to the unregulated output (L1). In this case, do not connect the power supply to L.

## MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully **"Safety and Precautions"**. Choose a smooth surface for an installation location (a wall, panel and etc.).

### Follow these steps:

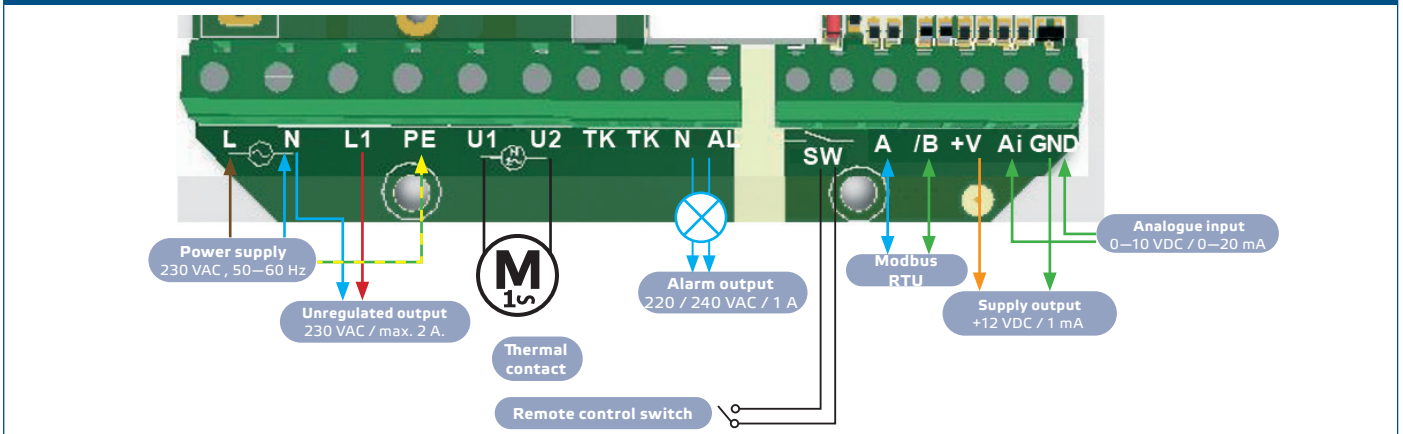
1. Switch off the power supply.
2. Open the enclosure cover and fix the unit to the wall or panel using the provided dowels and screws. Mind the correct mounting position and unit dimensions – see **Fig. 1** and **Fig. 2**



3. Connect the motor / fan.
4. The unregulated output (L1, N) can be used to connect a light indicator or to control a damper actuator, a valve, etc. (if necessary). See **Fig. 3**.



Fig. 3 Wiring and connections



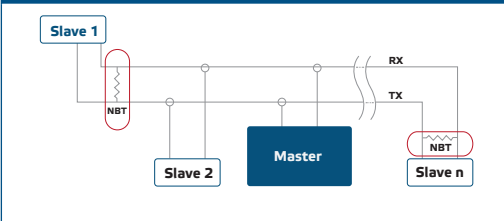
5. Select the required analogue input type and mode, start mode and OFF level mode by the DIP switch on the board (see Fig. 4).

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)

6. The Network Bus Terminator (NBT) is used to set the device as an end device and by default the NBT is disconnected. It is put manually onto the pins to be connected (see Fig. 5). To assure correct communication, the NBT jumper needs to be activated in only two devices on the Modbus RTU network (see Example 1 and Example 2).

Example 1



Example 2

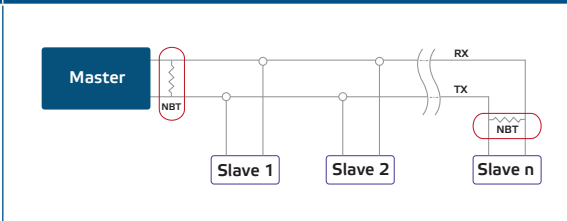
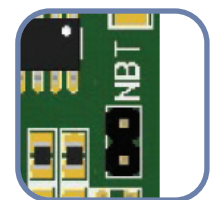


Fig. 5 Network bus resistor jumper



**ATTENTION**

On a Modbus RTU network, two bus terminators (NBTs) need to be activated.

 **ATTENTION**

If an AC power supply is used with any of the units in 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!

7. Connect the power supply cable.
8. Adjust the max. speed by trimmer (if necessary). The default setting is Us (230 VAC). See Fig. 6.
9. Adjust the min. speed by trimmer (if necessary). The default setting is 30 % Us (69 VAC). See Fig. 7.
10. Adjust the OFF level value by trimmer (if necessary). The default setting is 0 VAC. See Fig. 8.

Fig. 6 Max. speed trimmer



Fig. 7 Min. speed trimmer

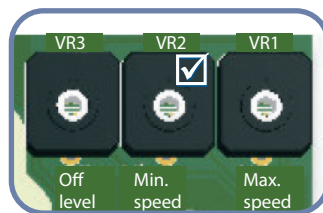


Fig. 8 Off level trimmer



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

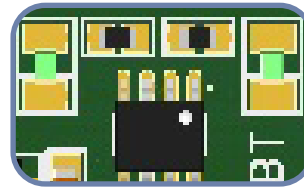
## VERIFICATION OF INSTALLATION INSTRUCTIONS

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 the 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.

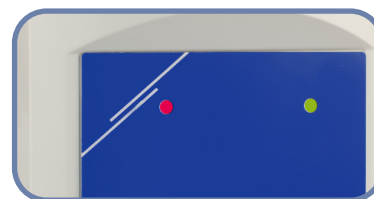
### FRONT PANEL LED INDICATION

When the green LED on the front cover (**Fig. 10**) gives out a continuous light, 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.

The red LED on the front cover (**Fig. 10**) indicates overheating of the motor. When it is on, the controller stops the motor. To restart operation after eliminating the cause for overheating, disconnect the unit from the mains supply for a few seconds and then connect it again.

**Fig. 10** Operation indication



## TRANSPORT AND STORAGE

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Avoid shocks and extreme conditions; stock in original packing.

## WARRANTY AND RESTRICTIONS

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Two years from the delivery date against defects in manufacturing. Any modifications or alterations to the product after the date of publication relieve the manufacturer of any responsibilities. The manufacturer bears no responsibility for any misprints or mistakes in this data.

## MAINTENANCE

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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.