

# NVSS8 | ELECTRONIC FAN SPEED CONTROLLER

## Mounting and operating instructions



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## SAFETY AND PRECAUTIONS



Read all the information in this manual, in the datasheet and in the Modbus Register Map before working with the product. For personal and equipment safety and for optimum product performance, make sure you fully understand the content before installing, using or servicing this product.



For safety and licensing (CE) reasons, unauthorised conversions 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 vapors in high concentration can affect the product performance. Make sure the work environment is as dry as possible and avoid condensation.



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



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



Always check that you are connecting the correct power supply to the product and use wires of the correct characteristics and cross-section. Make sure all screws and nuts are properly tightened and fuses (if any) are in place.



Consideration should be given to recycling the equipment and packaging. These should be disposed of in accordance with local and national laws and regulations.



If there are questions that are not answered, contact your technical support or consult a professional.

## PRODUCT DESCRIPTION

The NVSS8 series consists of electronic fan speed controllers, designed to provide both precise fan speed control and motor protection. The fan speed controllers from this series have a wide range of supply voltage 110–230 VAC  $\pm 10\%$  / 50–60 Hz, making them suitable for various HVAC installations.

Thanks to Modbus RTU communication, fan speed is regulated effortlessly via SenteraWeb when the device is connected to a [Sentera internet gateway](#). All device parameters can be accessed and adjusted via SenteraWeb.

These fan speed controllers feature a digital input for remote switching on and off of the device, which guarantees full control of motor operation.

## ARTICLE CODES

| Article code | Rated output current (A) |
|--------------|--------------------------|
| NVSS8-30-DM  | 0,2–3                    |
| NVSS8-60-DM  | 0,2–6                    |

## INTENDED AREA OF USE

- Building and controlled ventilation

## TECHNICAL DATA

- Supply voltage: 110 – 230 VAC  $\pm 10\%$  / 50 – 60 Hz
- Regulated output voltage: 20–100 % of supply voltage (Us)
- Current rating (depending on the version):
  - ▶ 3 A
  - ▶ 6 A
- Phase angle control with zero-cross detection
- Unregulated output voltage / current: supply voltage (Us) / I<sub>max</sub> 2 A
- Overheating, overvoltage and overcurrent protection
- Modbus RTU communication
- Free selectable output voltage adjustment via Modbus RTU communication
  - ▶ Minimum: 20–70 % of supply voltage
  - ▶ Maximum: 75–100 % of supply voltage
- Automatic 50 / 60 Hz supply voltage frequency detection
- Start-up type (2–20 s):
  - ▶ Kickstart
  - ▶ Soft start
- TK — Thermal protection Input (Enabled via Modbus RTU)
- DI — Remote ON / OFF input (Enabled via Modbus RTU)
- RGB LED status indication
- Operating conditions
  - ▶ Temperature: -10–40 °C
  - ▶ Relative humidity: 5–90 % rH, non-condensing
- Storage temperature: -10–50 °C
- Enclosure
  - ▶ Colour: Grey (RAL 7035)
  - ▶ Ingress protection: IP54

## STANDARDS

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Commission Delegated Directive (EU) 2015/863 (RoHS 3) of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances
- WEEE Directive 2012/19/EU



## WARNINGS AND ATTENTION POINTS

- The controller is to be used only with voltage controllable fans / motors. Several motors can be connected to the controller as long as the current limit is not exceeded.
- The motor used should be protected internally against overheating.
- The minimum voltage must be set so that the motor does not stop due to mains voltage variations. The controller restarts after power failure.

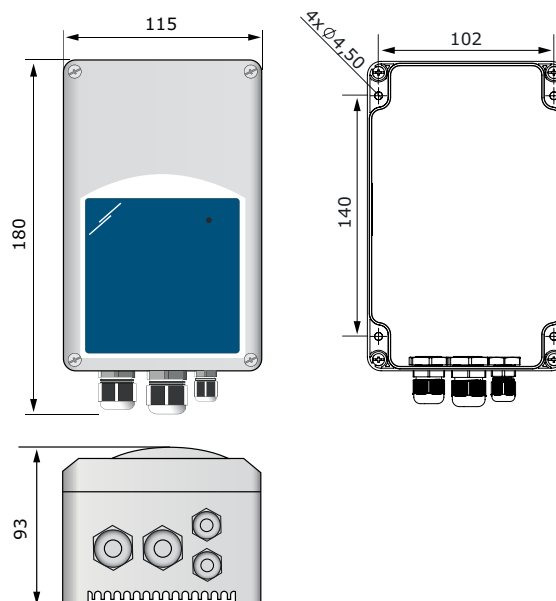
## MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully **"Safety and Precautions"**.

### Follow these steps:

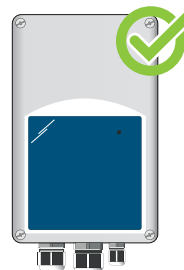
1. Make sure the device is not powered.
2. Unscrew the front cover and open the enclosure.
3. Fix the unit to the wall or panel using the provided screws and dowels. Mind the correct mounting position and unit mounting dimensions — see **Fig. 1** and **Fig. 2**.

**Fig. 1 Mounting dimensions**

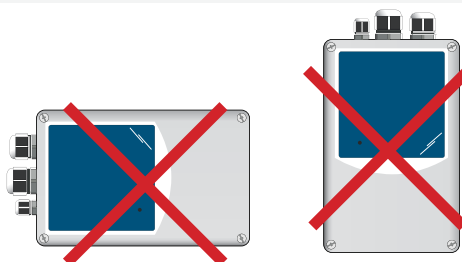


**Fig. 2 Mounting position**

Correct



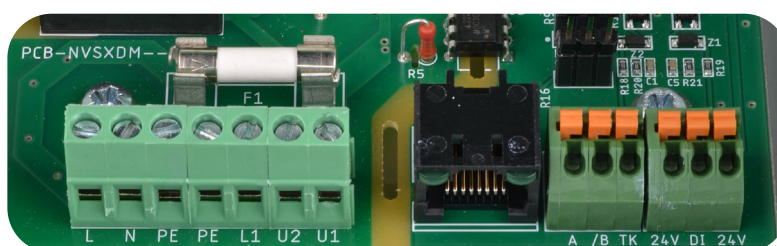
Incorrect



4. Insert the cables through the cable glands and do the wiring according to the wiring diagram (see **Fig.3**) while adhering to the information from section "Wiring and connections".
5. Put back the cover and secure it with the screws. Tighten the cable glands.
6. Power the device.

## WIRING AND CONNECTIONS

**Fig. 3 Wiring diagram**



### Screw terminal block

Supply voltage

|    |                               |
|----|-------------------------------|
| L  | 110–230 VAC ± 10 % / 50–60 Hz |
| N  | Neutral                       |
| PE | Protective earth              |

Unregulated output

|    |                                           |
|----|-------------------------------------------|
| PE | Protective earth                          |
| L1 | 110–230 VAC ± 10 % / I <sub>max</sub> 2 A |

Regulated output

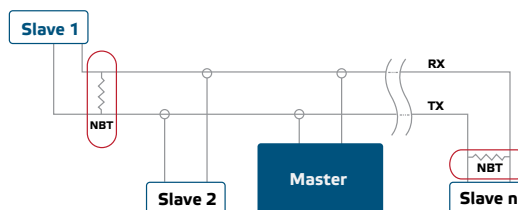
|           |                                                   |
|-----------|---------------------------------------------------|
| U2(N), U1 | 20–100 % of supply voltage<br>Adjustable via HR13 |
|-----------|---------------------------------------------------|

|                                    |                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------|
| Connector type                     | Cable cross section: 1,5 mm <sup>2</sup> , pitch: 5 mm<br>Wire strip length max: 5 mm |
| <b>RJ45: Modbus RTU</b>            |                                                                                       |
| A                                  | Signal A RJ45, pins 3 and 4                                                           |
| /B                                 | Signal /B, RJ45, pins 5 and 6                                                         |
| <b>Spring clamp terminal block</b> |                                                                                       |
| A                                  | Modbus RTU (RS485), signal A                                                          |
| /B                                 | Modbus RTU (RS485), signal /B                                                         |
| TK, 24V                            | Thermal protection input (normally closed)                                            |
| DI, 24V                            | Remote ON / OFF input (normally open)                                                 |
| Connector type                     | Cable cross section: 1,5 mm <sup>2</sup> ; pitch: 3,5 mm                              |

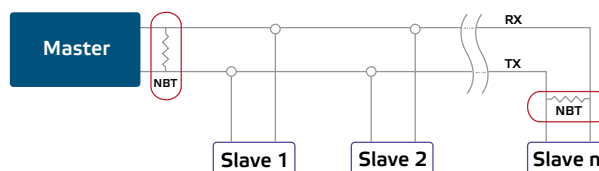
### Optional settings

The Network Bus Termination (NBT) Resistor is controlled via Modbus RTU and is disconnected by default. For correct communication, the NBT needs to be activated only in the two furthest devices on the Modbus RTU network. If necessary, enable the NBT resistor through SenteraWeb via Holding register 9.

#### Example 1



#### Example 2

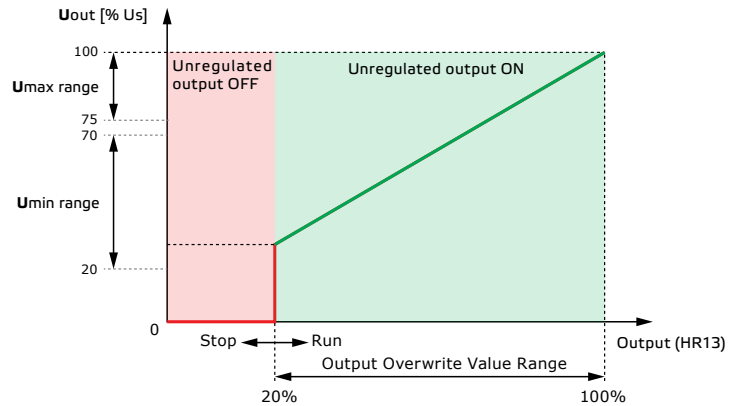


### NOTE

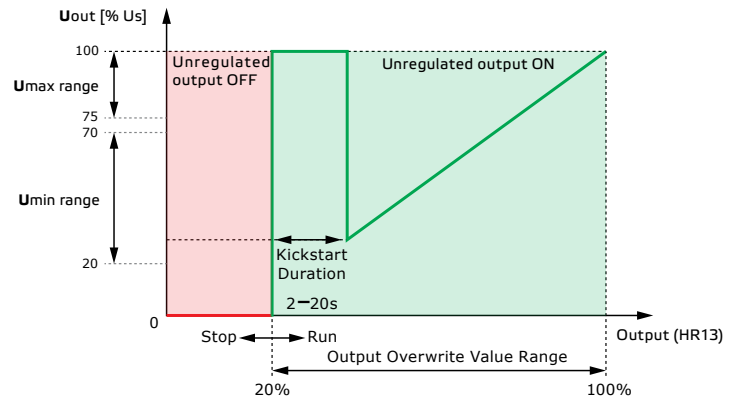
*On a Modbus RTU network, two bus terminators (NBTs) need to be activated!*

## OPERATIONAL DIAGRAMS

### Operational Diagram — Soft Start



### Operational Diagram — Kickstart



## OPERATING INSTRUCTIONS

When turned on, NVSS8 is directly in Run mode (depending the Operating Mode set in HR20, default = Run mode):

- Operating mode Run – The regulated output is turned on.
- Operating mode Stop – The regulated output is turned off.

In Run mode there are two parameters to be set for controlling the output:

- Output Overwrite Value (HR13) – The regulated output is controlled by the value written in Output Overwrite Value between Umin (Minimum Output Value Limit) and Umax (Maximum Output Value Limit).

The motor startup mode can be selected via HR18:

- Output Startup Mode (HR18) – The startup mode could be Soft start or Kickstart.



| Remote ON / OFF functionality |                     |                  |                                                   |
|-------------------------------|---------------------|------------------|---------------------------------------------------|
| Remote mode (HR11)            | Remote ON/OFF input | Regulated output | Function description                              |
| Disabled                      | –                   | Running          | Remote ON / OFF input is ignored                  |
| Enabled                       | Closed              | Running          | Closed contact allows motor to run                |
| Enabled                       | Open                | Stopped          | Open contact stops the motor / LED blinking green |

| Thermal protection input functionality |        |                  |                                                  |
|----------------------------------------|--------|------------------|--------------------------------------------------|
| TK input (HR17)                        | TK     | Regulated output | Function description                             |
| Disabled                               | –      | Running          | TK input is ignored                              |
| Enabled                                | Closed | Running          | Closed contact allows motor to run               |
| Enabled                                | Open   | Stopped          | *Open contact stops the motor / LED blinking red |

\* Once the thermal protection is triggered, it can only be reset by disconnecting the power supply.

## VERIFICATION OF INSTALLATION

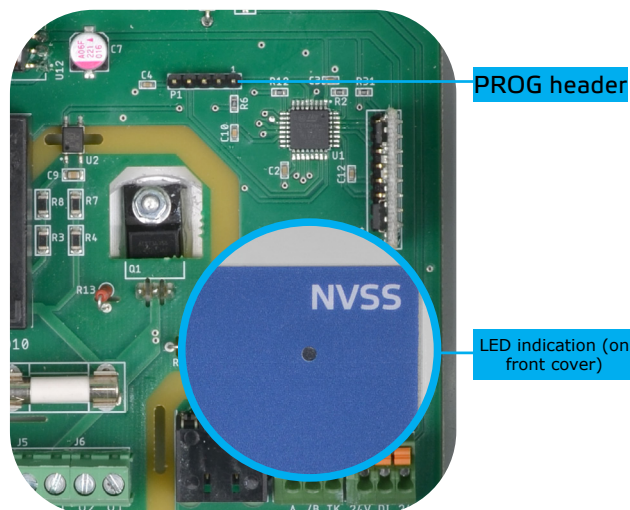
If your unit does not function as expected, please check the connections or refer to the “**Troubleshooting**” section.

## TROUBLESHOOTING

### In case of faulty operations, please check if

- ▶ The right voltage is applied.
- ▶ All connections are correct.
- ▶ The controller is not overheated (check the ‘Controller status’ register).
- ▶ The machine to be regulated is functioning.
- ▶ Modbus communication is working and all setting are accessible via Modbus RTU.

## Settings and indications



|                       |                                                                                   |                                                                                                                                  |
|-----------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| PROG header, P1       |  | Put a jumper onto pins 1 and 2 and wait for at least 5 seconds to reset the Modbus communication parameters                      |
| <b>LED indication</b> |                                                                                   |                                                                                                                                  |
| RGB LED               | Continuous green                                                                  | Device is working properly                                                                                                       |
|                       | Continuous red                                                                    | Overheating                                                                                                                      |
|                       | Blinking green                                                                    | Device stopped by remote ON / OFF                                                                                                |
|                       | Blinking red                                                                      | Thermal protection activated (Once the thermal protection is triggered, it can only be reset by disconnecting the power supply.) |
|                       | Blinking yellow                                                                   | Zero cross detection failure                                                                                                     |

## FREQUENTLY ASKED QUESTIONS (FAQs)

### How are device parameters set?

This controller is designed to be implemented into HVAC applications effortlessly. All device parameters can be set via our online platform SenteraWeb through Modbus RTU communication. It is necessary to connect the controller to a [Sentera internet gateway](#) to gain access to its setting in SenteraWeb.

### How does this controller regulate fan speed?

By reducing the motor voltage, this fan speed controller regulates the speed of AC fans. The device utilises phase angle control (TRIAC technology) to reduce the voltage of the motor. Therefore, it is only suitable for voltage controllable motors. In case you are not sure if your motor is voltage controllable, you should contact the motor manufacturer.

### What is the purpose of the unregulated output?

The unregulated output is active when the motor is enabled. The output is called 'unregulated' since it can be either ON (230 Volt) or OFF (0 Volt). The maximum current of this output is 2 A. It is typically used to control an external run-indicator, to open or close a damper, to switch an external relay, etc. For example, when the fan stops, the damper is closed. When the fan is active, the damper is open.

## TRANSPORT AND STORAGE

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Avoid shocks and extreme conditions; stock in original packaging.

## 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 production date 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.

