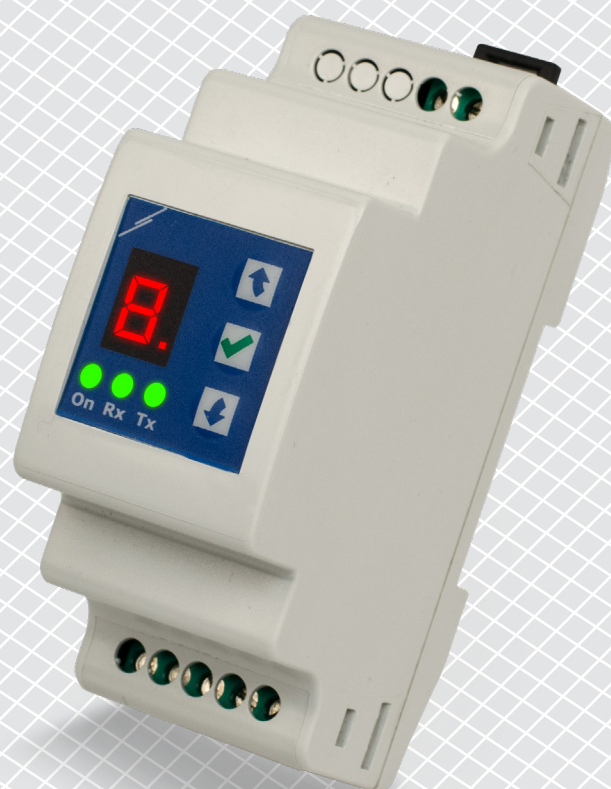# DRE

ELECTRONIC FAN SPEED CONTROLLER, DIN RAIL MOUNTING

Mounting and operating instructions

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SAFETY AND PRECAUTIONS

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.

DRE | ELECTRONIC FAN SPEED CONTROLLER, DIN RAIL MOUNTING

SENTERA
C O N T R O L S

PRODUCT DESCRIPTION

DRE is a digital motor speed controller with a regulated output and unregulated output, minimum and maximum output voltage setting and kick start / soft start selection. It features output overwrite function in Modbus mode.

ARTICLE CODES

Code	Supply	Max. rated current, [A]
DRE-1-25-DT	230 VAC ±10 % / 50—60 Hz	2,5

INTENDED AREA OF USE

- Step speed control of voltage controllable motors in ventilation systems
- For indoor use only

TECHNICAL DATA

- Power supply: 230 VAC ±10 % / 50—60 Hz
- Unregulated output: 230 VAC / max. 0,5 A
- Regulated output to motor / fan: 30—100 % Us
- Max. load: 2,5 A
- Minimum speed: 30—65 % Us* (approx. 70—150 VAC)
- Maximum speed: 75—100 % Us (approx. 170—230 VAC)
- Regulation: Normal or Inverse
- Enclosure:
  - ▶ DIN rail mounting (EN 60715: 2003)
  - ▶ ABS, grey (RAL 7035)
  - ▶ protection standard: IP30 (according to EN 60529)
- Operating ambient conditions:
  - ▶ temperature: 0—35 ºC
  - ▶ rel. humidity: 0—80 % rH (non-condensing)
- Storage temperature: -40—70 ºC

STANDARDS

- Low Voltage Directive 2014/35/EC
- EMC Directive 2014/30/EC: EN 61326
- DIN rail EN 60715:2001
- RoHs Directive 2011/65/EU

CE

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OPERATIONAL DIAGRAMS
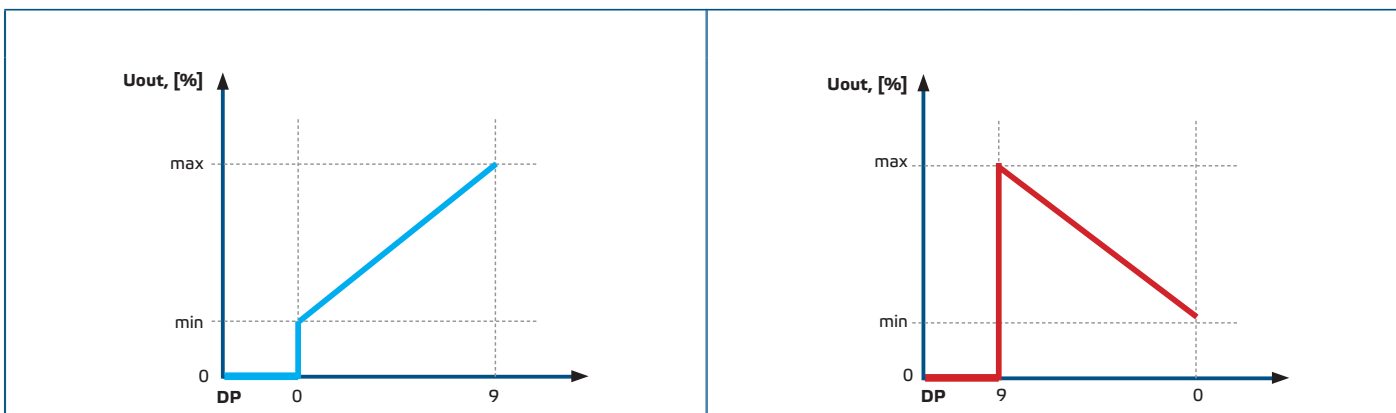
WIRING AND CONNECTIONS

L, N	Supply voltage, 230 VAC ±10 % / 50—60 Hz
U2, U1	Regulated output (30—100 % Us)
L1, N	Unregulated output 230 VAC / 0,5 A
A	Modbus RTU (RS485) signal A
/B	Modbus RTU (RS485) signal /B
Connections	Cable cross section: max. 2,5 mm²

MOUNTING & OPERATING INSTRUCTIONS IN STEPS

Before you start mounting the DRE speed controller, read carefully "**Safety and Precautions**". Then proceed with the following mounting steps:

1. Mount the controller on a standard DIN rail. Pull the locking clip before you place the unit onto the rail, and then release the locking clip back to its original position to fix the enclosure to the rail. See **Fig. 1** "*DIN rail locking clip*", **Fig. 2** "*Mounting dimensions*", and **Fig. 3** "*Mounting position*".

Fig. 1 DIN rail locking clip	Fig. 2 Mounting dimensions	Fig. 3 Mounting position
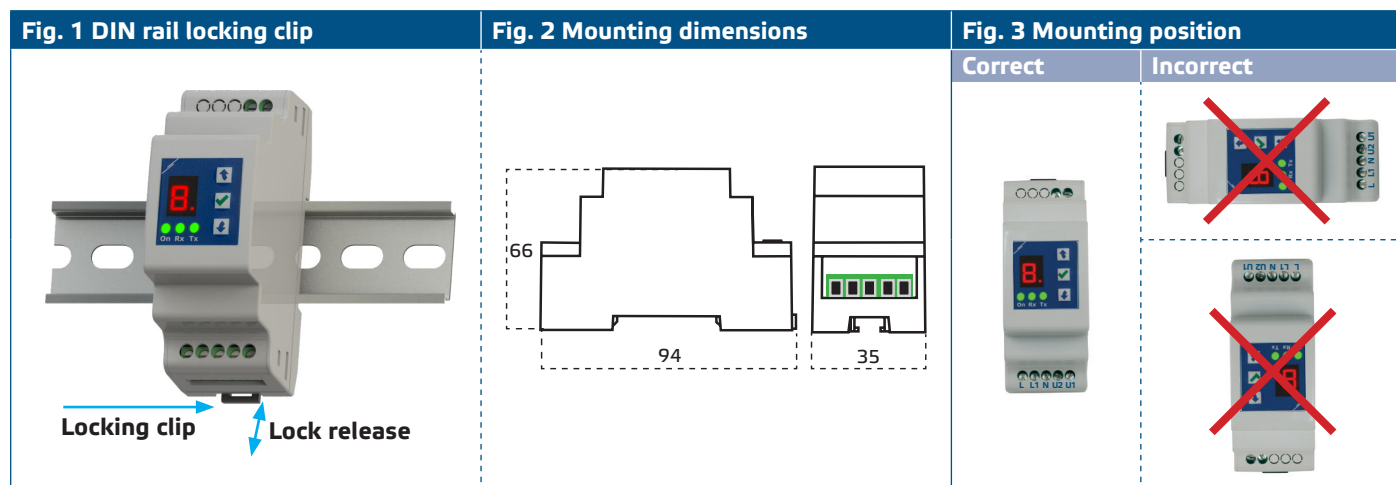
2. Do the wiring according to the wiring diagram (see **Fig. 4**) using the information from section "**Wiring and connections**".
3. Switch on the power supply.

Fig. 4 Wiring diagram and settings



- Modbus RTU
- 4a. 1-digit 7-segment display
- 4d. 3-button interface
- 4b. Normal operation LED indication
- 4c. Modbus communication indication
- On Rx Tx
- L L1 N U2 U1
- Power supply
- Regulated output
- Unregulated output

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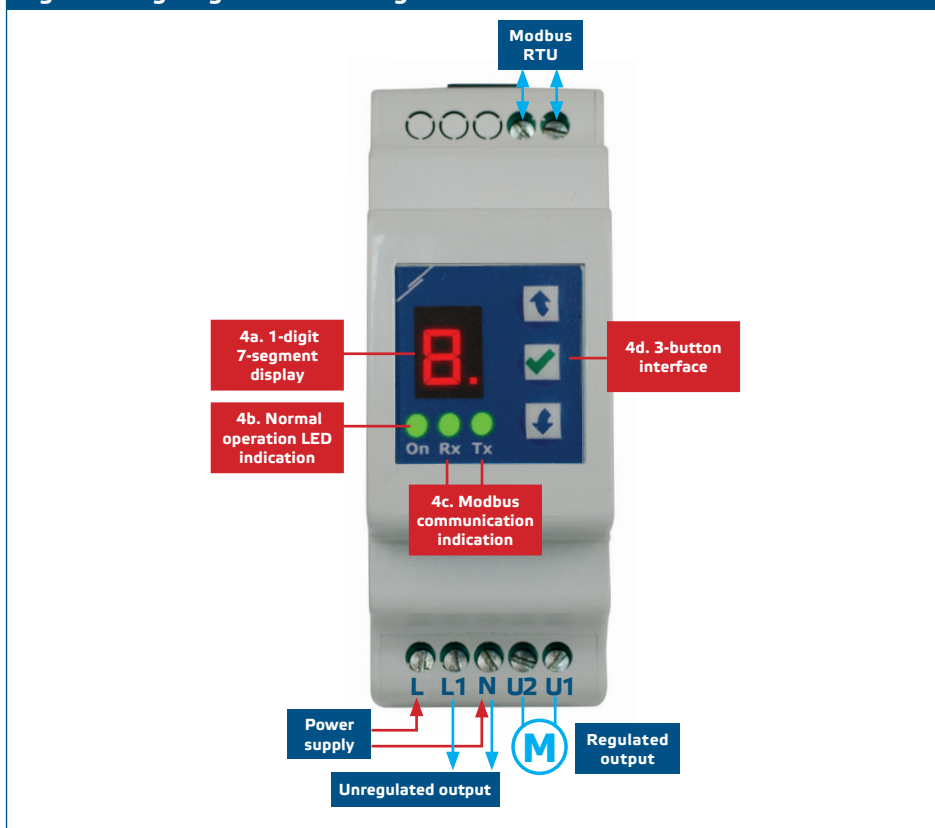
⚠ **ATTENTION**

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.

4. Check if your unit starts or terminates the network (see **Example 1** and **Example 2**). If it does, connect the NRT resistor via Modbus. Otherwise, leave it disconnected (default Modbus setting).
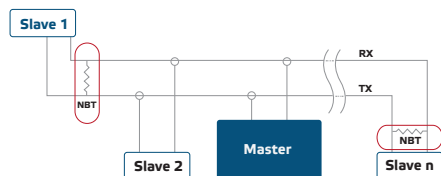
Example 1	Example 2
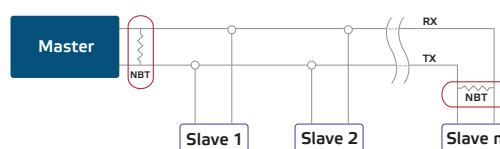
5. Customise the settings (Umin, Umax, regulation type, start type, kick start duration and unit status) to the desired ones. Use either the menu or Modbus. For more details, please refer to **"Operating instructions"** chapter.

VERIFICATION OF THE INSTALLATION INSTRUCTIONS

When you switch on the power supply, the green LED operating indicator shown in **Fig. 4b** "*Normal operation LED indication"* will give out constant green light. A decimal point will appear on the 7-segment LED display showing that the unit is in OFF state. If this is not the case, check the connections.

Check if both LEDs on the front cover (TX and RX) blink after you switch on your unit. (See **Fig. 4c** "*Modbus communication indication"*). If they do, your unit has detected Modbus network. If they do not, check the connections again.

MOUNTING INSTRUCTIONS IN STEPS

The DRE controller provides a normal / inverse regulation of the output signal (a percentage of the supply voltage). See section "**Operational diagrams**".
When the regulation is normal, the output voltage increases proportionally to the steps. See section **"Operational diagrams"** - *Normal regulation diagram*.
DP (decimal point) is "OFF" state, step '0' is the selected minimum output voltage, and step '9' is the selected maximum output voltage.
When the regulation is inverse - the output voltage decreases proportionally to the steps. See section **"Operational diagrams"** - *Inverse regulation diagram*.
DP (decimal point) is "OFF" state, step '9' is the selected maximum output voltage, and, step '0' is the selected minimum output voltage.

NOTE

Both diagrams refer to an ideal case of a resistive load. When using inductive loads, the output voltage might be lower. Adjust the steps to set the required voltage!

All control parameters and their default values are shown in Table Adjustable parameters. You can customise them through Modbus (see **Table** "*Modbus register maps"*) or most of them - via the 3-button interface and the menu. See **Fig. 4d** and **Table** "*Adjustable parameters"*.

Adjustable parameters				
Parameter	Minimum	Maximum	Default value	Menu
Umin	30 % Us* (70 VAC)	65 % Us (150 VAC)	30 % Us	ᆈ
Umax	75 % Us (170 VAC)	100 % Us (230 VAC)	100 % Us	u
Regulation type	-	-	Normal	⌐
Start-up type	-	-	Kick start	A
Kick start time	3	9	5 s	ᵗ
NBT resistor			Disconnected	∩
Unit status	-	-	Off	-
Output overwrite value	0 % Us (0 VAC) / 30 % Us (70 VAC)	100 % Us (230 VAC)	0 % Us (0 VAC)	-
L1 output relay **	-		On	-
Baud rate	0	6	2 (19.200 bps)	-
Parity	0	2	1 (8E1)	-

* Us - the mains supply voltage (230 VAC ±10 %)
** Accessible only in Modbus mode with output overwrite enabled (holding registers 7 and 8 are set to '1'.)

Press up ⬆ and down ⬇ buttons at the same time for 3 seconds to switch on or switch off the controller.

Use up ⬆ and down ⬇ buttons to navigate through the menu.

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Use up button ⬆ to select the next item or increase values.

Use down button ⬇ to select the previous item or decrease values.

Use OK button ✅ to access the menu or confirm a selection.

You can switch on / off the controller by pressing up ⬆ and down ⬇ buttons together for 3 seconds.

If there is no action within 10 seconds you exit the menu and the parameter change is disregarded.

DISPLAY AND LIGHT INDICATIONS

The 7-segment display shows all menu items and settings, and the output step as well. The decimal point ('.') shows that the unit is off.
The small letter 'd' indicates that the unit is in Modbus mode. The rest of the letters on the display indicate a settable parameter. See **Table** *Adjustable parameters*.
A digit on the display indicates either the current output step or a parameter setting. See **Table** *7-segment display indication*.

7-segment display indications	
Indication	**Description**
7-segment display indication: a digit or a letter ('n', 't', 'A', 'r', 'u', 'U')	- Current output step (0—9) - Parameter (as indicated in the **Table** *Adjustable parameters*)
Indication: decimal point	The DRE controller is off
Indication: small 'd'	Modbus mode

There are three green LED indicators on the unit front cover. The "On" LED indicates power on. It is always on when the controller is supplied. See **Fig. 4b** "*Normal operation LED indication*".
The "Rx" LED indicates Modbus RTU receiving data. It blinks when the controller receives packages via Modbus. **Fig. 4c** "*Modbus communication indication*".
The "Tx" green LED indicates Modbus RTU transmitting data. It blinks when the controller transmits packages via Modbus. **Fig. 4c.**

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MENU STRUCTURE

NBT — 1 – Connected / 0 – Not connected

Kick start time — 9 – 9 s / 3 – 3 s

Kick start — 1 – Soft start / 0 – Kick start

Regulation type — 1 – Inverse / 0 – Normal

Umin — 4 – 45,6 %, 9 – 65,0 %, 3 – 41,7 %, 8 – 61,1 %, 2 – 37,8 %, 7 – 57,2 %, 1 – 33,9 %, 6 – 53,3 %, 0 – 30,0 % 5 – 49,4 %,

Umax — 4 – 86,1 %, 9 – 100 %, 3 – 83,3 %, 8 – 97,2 %, 2 – 80,6 %, 7 – 94,4 %, 1 – 77,8 %, 6 – 91,7 %, 0 – 75,0 % 5 – 88,9 %,

If there is no action for 10 s the changes are discarded

To exit the settings menu and show the current output step

9 – step. / 0 – step → Output voltage

MODBUS REGISTER MAPS

INPUT REGISTERS						
		Data type	Description	Data	Values	
1	Output value	unsigned int.	Current output value	0, 30—100	0 = 30 = 100 =	0 % Us* (0 VAC) 30 % Us (70 VAC) 100 % Us (230 VAC)
2	Current output step	unsigned int.	Current output step	0—9	0 = ... 9 =	step 0 ... step 9
3	Umin	unsigned int.	Minimum output value	30—65	30 = 65 =	30 % Us (70 VAC) 65 % Us (150 VAC)
4	Umax	unsigned int.	Maximum output value	75—100	75 = 100 =	75 % (170 VAC) 100 % (230 VAC)
5	Regulation type	unsigned int.	Regulation type (Normal / Inverse)	0—1	0 = 1 =	Normal Inverse
6	Start-up type	unsigned int.	Start-up type	0—1	0 = 1 =	Kick start Soft start
7	Kick start time	unsigned int.	Kick start duration	3—9	5 =	5 s
8	Unregulated output state	unsigned int.	Unregulated output state	0—1	0 = 1 =	Off On
9			Reserved, returns 0			
10	Unit status	unsigned int.	Current controller working state	0—2	0 = 1 = 2 =	Off (a decimal point is visible) On (the current step is visible) Modbus connected ('d' is visible)

HOLDING REGISTERS

		Data type	Description	Data	Default	Values	
1	Device slave address	unsigned int.	Modbus device address	1—247	1		
2	Modbus baud rate	unsigned int.	Modbus communication baud rate	0—6	2	0 = 1 = 2 = 3 = 4 = 5 = 6 =	4.800 9.600 19.200 38.400 57.600 115.200 230.400
3	Modbus parity mode	unsigned int.	Parity check mode	0—2	1	0 = 1 = 2 =	8N1 8E1 8O1
4	Device type	unsigned int.	Device type (Read only)	DRE-1 = 3008			
5	HW version	unsigned int.	Hardware version (Read only)	XXXX		0 x 0100 =	HW version 1.0
6	FW version	unsigned int.	Firmware version (Read only)	XXXX		0 x 0120 =	FW version 1.2
7	Operating mode	unsigned int.	Enables Modbus control	0—1	0	0 = 1 =	Standalone mode Modbus mode
8	Output overwrite	unsigned int.	Enables direct control over the output. *Active only if holding register 7 is set to 1.*	0—1	0	0 = 1 =	Disabled Enabled
9-10			Reserved, returns 0				
11	Umin	unsigned int.	Minimum output value selection. *Active only if holding register 7 is set to 1.*	30—65	30	30 = 65 =	30 % Us (70 VAC) 65 % (150 VAC)
12	Umax	unsigned int.	Maximum output value selection. *Active only if holding register 7 is set to 1.*	75—100	100	75 = 100 =	75 % Us (170 VAC) 100 % Us (230 VAC)
13	Regulation type	unsigned int.	Regulation type (Normal / Inverse) selection. *Active only if holding register 7 is set to 1.*	0—1	0	0 = 1 =	Normal Inverse
14	Start-up type	unsigned int.	Start-up type selection. *Active only if holding register 7 is set to 1.*	0—1	0	0 = 1 =	Kick start Soft start
15	Kick start time	unsigned int.	Kick start duration selection. *Active only if holding register 14 is set to 0.*	3—9	5	5 =	5 s
16	NBT	unsigned int.	Sets the network bus termination resistor. *Active only if holding register 7 is set to 1.*	0—1	0	0 = 1 =	Disconnected Connected
17-20			Reserved, returns 0				
21	Output overwrite value	unsigned int.	Output overwrite value. *Active only if holding registers 7 and 8 are set to 1.*	0, 30—100	0	0 = 30 = 100 =	0 % Us (0 VAC) 30 % Us (70 VAC) 100 % Us (230 VAC)
22-30			Reserved, returns 0				

If you want to find out more about Modbus over serial line, please visit: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

COILS

		Data type	Description	Data	Default	Values	
1	L1 output relay	bit.	Unregulated output relay control. *Active only if holding registers 7 and 8 are set to 1.*	0—1	1	0 = 1 =	Off On

* Us - the mains supply voltage (230 VAC ±10 %)

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TRANSPORT AND STOCK KEEPING INFORMATION

Avoid shocks and extreme conditions; stock in original packing.

WARRANTY INFORMATION AND RESTRICTIONS

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

In normal conditions this product is maintenance-free. If soiled, clean with a dry or dampish 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.