DDACM

DIN RAIL MOUNTED MODBUS TO ANALOGUE CONVERTER

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.

DDACM | DIN RAIL MOUNTED MODBUS TO ANALOGUE CONVERTER

SENTERA CONTROLS

PRODUCT DESCRIPTION

The DDACM series are intended for converting Modbus RTU data into analogue / modulating output signal (0—10 VDC / 0—20 mA / PWM). They feature 3 outputs and are Power over Modbus supplied. The series needs a master unit, such as the Sentera RDPU or any BMS or master module that is able to write a value in Modbus Holding registers. The I3 version has a galvanic isolation between the supply input and the outputs. This protects the analogue inputs of your controlled devices (EC fans, actuator powered dampers and etc.) from receiving other currents than the control signal on their analogue inputs. All parameters are accessible via Modbus RTU.

ARTICLE CODES

Article code	Supply	Galvanically isolated outputs and input	Number of analogue / modulating outputs	Imax
DDACM-03	24 VDC (PoM)	No	3	50 mA
DDACM-I3		Yes	3	85 mA

INTENDED AREA OF USE

- BMS and controlled ventilation systems
- Modbus signal conversion

TECHNICAL DATA

- Power supply: 24 VDC, Power over Modbus
- 3 selectable analogue / modulating output types:
  - 0—10 VDC mode: min. load 50 kΩ (R_L ≥ 50 kΩ)
  - 0—20 mA mode: max. load 500 Ω (R_L ≤ 500 Ω)
  - PWM mode: PWM Frequency: 1—8 kHz (selectable via Modbus RTU), min. load 50 kΩ (R_L ≥ 50 kΩ), external pull-up resistor: 3,3 or 12 VDC, internal pull-up resistor: 2,2 kΩ to 12 VDC
- Accuracy of the outputs:
  - 0—10 VDC mode: ±0,1V
  - 0—20 mA mode: ±0,2 mA
  - PWM mode: PWM frequency: ±1%; Pulse width: <0,1%
- DDACM-i3 only: Galvanically insulation between the three outputs and the input
- Working isolation voltage: 630 VDC peak
- Maximum isolation voltage: 1.000 VDC for 1 min
- Nominal power consumption:
  - Version 03: 15 mA*
  - Version I3: 50 mA*
- Maximum power consumption:
  - Version 03: 50 mA*
  - Version I3: 85 mA*

*If the supply voltage is lower than 24 VDC, then the power consumption will be higher*

- 3 RGB LEDs for status indication of the outputs
- Modbus RTU communication and 24 VDC power supply via RJ45 connector (PoM connection)
- 3 independent analogue / modulating outputs with 3 modes
- DIN rail mounted
- Protection class: IP20
- Enclosure: plastic ABS, UL94-V0, grey RAL 7035
- Operating ambient conditions:
  - Temperature: -10—60 ºC
  - Rel. humidity: 5—85 % rH (non-condensing)
- Storage temperature: -30—85ºC

STANDARDS

- Low Voltage Directive 2014/35/EU
  - ▶ EN 60529:1991 Degrees of protection provided by enclosures (IP Code) Amendment AC:1993 to EN 60529
- EMC directive 2014/30/EU:
  - ▶ EN 61000-6-1:2007 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
  - ▶ EN 61000-6-3:2007 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments Amendments A1:2011 and AC:2012 to EN 61000-6-3
  - ▶ EN 61000-6-4:2007 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments Amendment A1:2011 to EN 61000-6-4
- WEEE Directive 2012/19/EC
- RoHs Directive 2011/65/EC

CE

OPERATIONAL DIAGRAM

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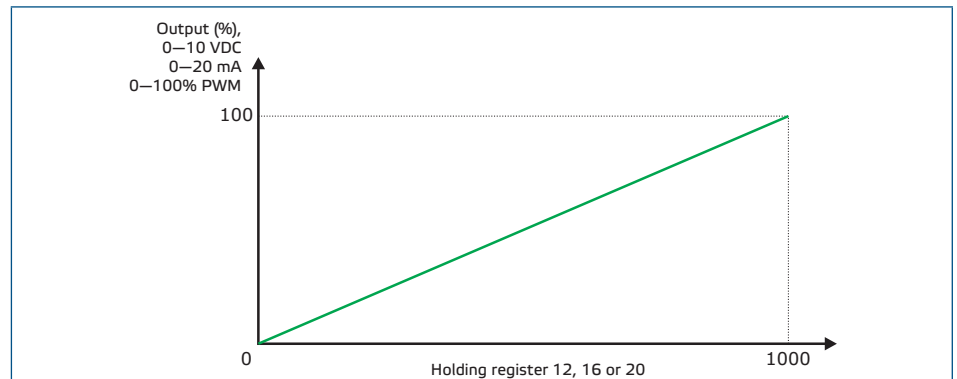
WIRING AND CONNECTIONS

	RJ45 connection
Pin 1	Supply voltage, 24 VDC
Pin 2	
Pin 3	Modbus RTU communication, signal A
Pin 4	
Pin 5	Modbus RTU communication, signal /B
Pin 6	
Pin 7	Ground, supply voltage
Pin 8	

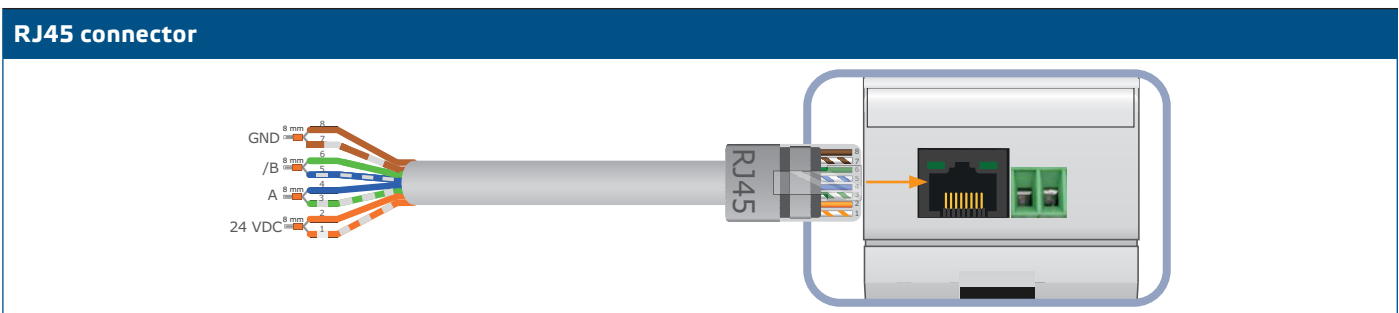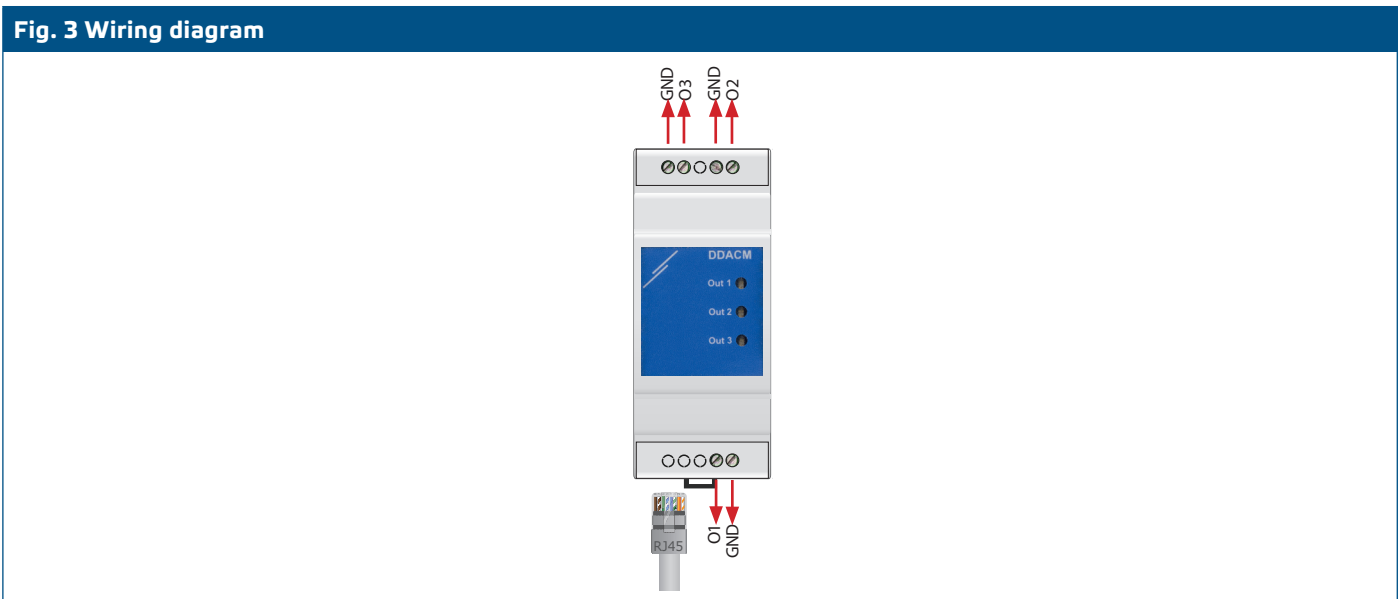|	Terminal block connection
AO1	Analogue / modulating output 1 (0—10 VDC / 0—20 mA / PWM)
GND	Ground, AO1
AO2	Analogue / modulating output 2 (0—10 VDC / 0—20 mA / PWM)
GND	Ground, AO2
AO3	Analogue / modulating output 3 (0—10 VDC / 0—20 mA / PWM)
GND	Ground, AO3

MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully **"Safety and Precautions"** and follow these steps:

1. Switch off the power supply.

2. Slide the unit along the guides of a standard 35 mm DIN rail and fix it to the rail by means of the black locking clip on the enclosure. Mind the correct position and mounting dimensions shown in **Fig. 1** *Mounting dimensions* and **Fig. 2** *Mounting position.*

Fig. 1 Mounting dimensions

35 mm
94 mm
94 mm
66 mm

Fig. 2 Mounting position


DIN rail

Locking clip — Locked / Unlocked
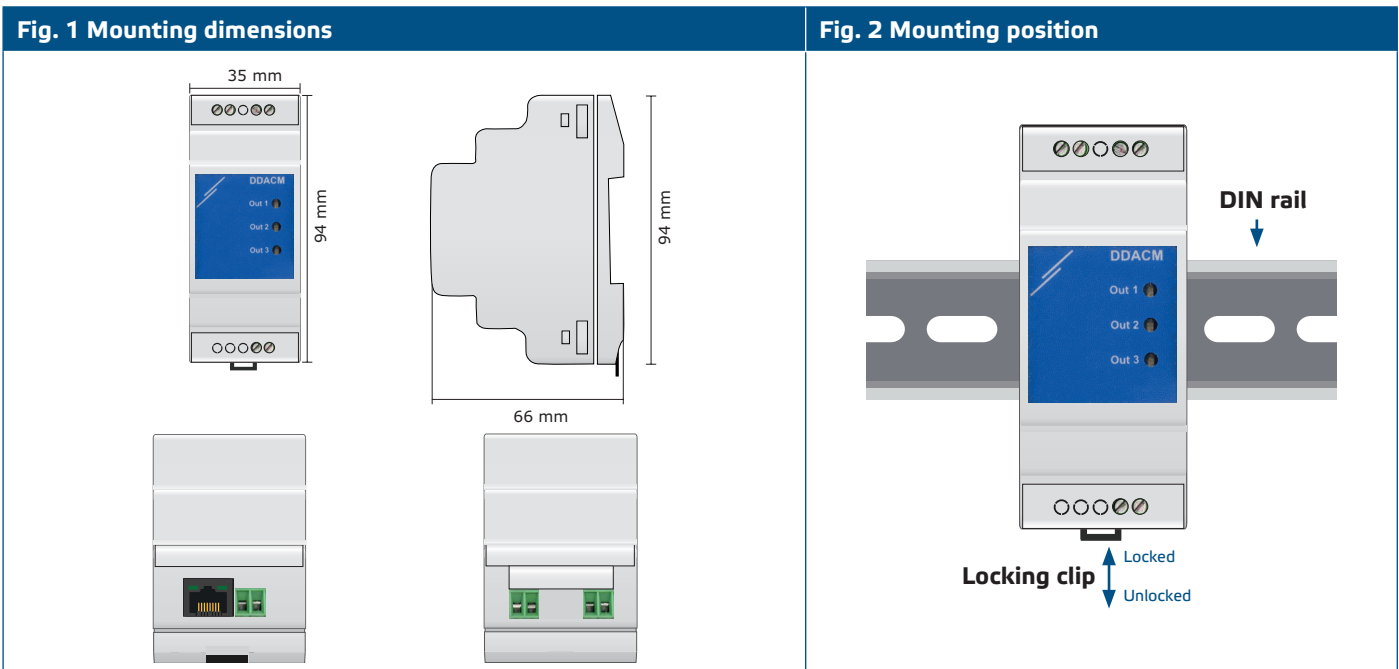
3. Connect the devices to the corresponding outputs as indicated in **Fig. 3** adhering to the information in section "**Wiring and connections**".

Fig. 3 Wiring diagram

GND O3 GND O2

DDACM
Out 1
Out 2
Out 3

RJ45

O1 GND

RJ45 connector

GND — 8 mm
/B — 8 mm
A — 8 mm
24 VDC — 8 mm

RJ45

4. Crimp the RJ45 cable and plug it into the socket (see **Fig. 3**).
5. Switch on the power supply.

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Optional settings

To assure correct communication, the NBT needs to be activated in only two devices on the Modbus RTU network. If necessary, enable the NBT resistor via 3SModbus or Sensistant (*Holding register 9*).

Example 1	Example 2
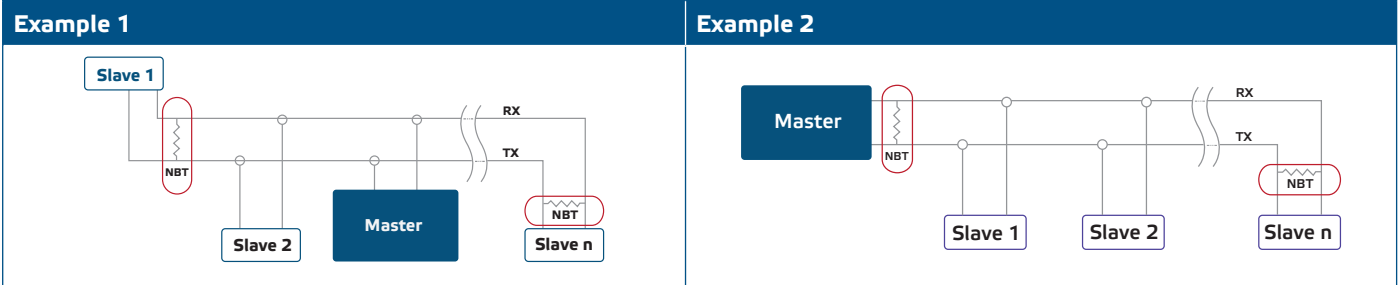
> **NOTE**
>
> *On a Modbus RTU network, two bus terminators (NBTs) need to be activated.*

OPERATING INSTRUCTIONS

The DDACM is operated via Modbus RTU. To monitor and configure its settings, you can either download the free 3SModbus software from Sentera's website or use the Sensistant tool. Refer to the **Modbus Register Maps** for more information.

Bootloader

Thanks to the bootloader functionality, the unit firmware can be updated via Modbus RTU communication. With 3SM boot Application (part of 3SM Center software suite), 'boot mode' is automatically activated and the firmware can be updated.

> **NOTE**
>
> *Make sure the power supply does not get interrupted during "bootload" procedure, otherwise you risk losing unsaved data.*

VERIFICATION OF THE INSTALLATION INSTRUCTIONS

After switching on the 24 VDC PoM supply, the three LEDs should blink successively in green, red and blue. Afterwards, the LEDs indicate the current status of the outputs (refer to the *Settings and indications* section in the product datasheet). The three LEDs are factory set to yellow.

After powering the unit, the LED on the left of the RJ45 socket (**Fig. 6 - 1**) should indicate that the unit is supplied. Then it should blink to indicate that data is transmitted via Modus RTU.

The LED on the right of the RJ45 socket (**Fig. 6 - 2**) indicates that data is received via Modus RTU.

If your unit does not function as expected, please check the connections.

LED indications:

- Green LED: indicates normal operation (output > 0);
- Blinking green LED: indicates change in channels register;
- Red LED: indicates hardware problem in the device;
- Yellow LED: indicates corresponding output OFF (output=0);
- Blinking yellow LED: indicates output OFF (output=0) and change in corresponding register;
- Blinking yellow of three LEDs: indicates communication timeout;
- Blinking blue LED1 and LED2: indicates bootloader mode;
- Blinking blue LED1, LED2 and LED3: indicates firmware uploading;
- Blinking blue LED1: indicates change of Modbus device address;

- Blinking blue LED2: indicates change of Modbus communication baud rate;
- Blinking blue LED3: indicates change of Parity check mode;
- Blinking blue LED2 and LED3: indicates change of Reset outputs timeout (Holding register 8).

Fig. 6 Indications
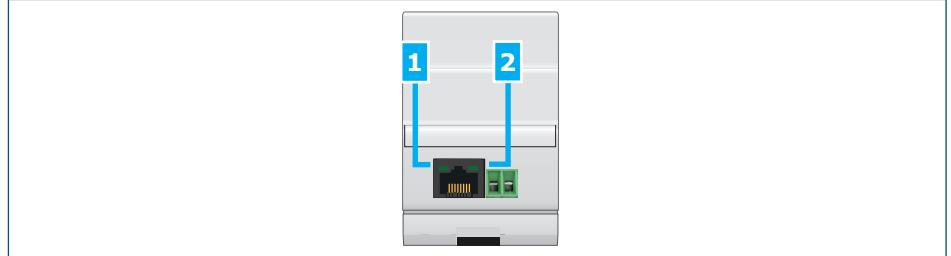
⚠ **ATTENTION**

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

TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packing.

WARRANTY 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 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.