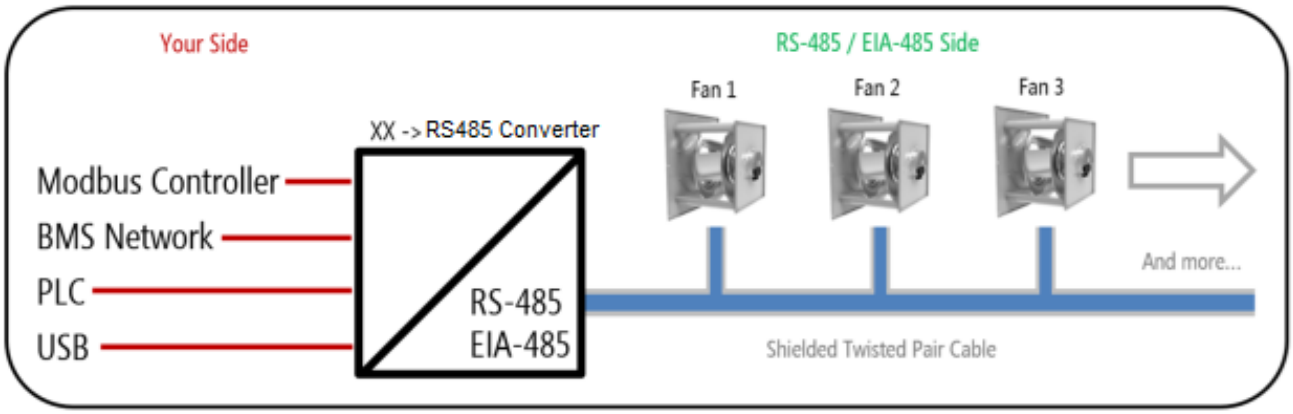
Technical documentation Modbus motor size 6 Gen3
ID: BA602

- Manual for the installation of a Modbus system for EC-motors with integrated electronic GD150 of the type BA602.



This is the detailed instruction guide for the ID: BA602.
For a quick guide with examples use the **Quick-Start-Guide** for type BA602.

Rosenberg Ventilatoren GmbH · Maybachstraße 1 · 74653 Künzelsau-Gaisbach
Tel.: +49(0)7940/142-0 · Fax.: +49(0)7940/142-125 · Email: info@rosenberg-gmbh.com · www.rosenberg-gmbh.com

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1 Description

- This manual implements only the installation and commissioning of a Rosenberg EC-fan with integrated electronic with the Modbus® RTU system.
- The Modbus RTU protocol is based on the “Modbus application protocol specification” of the Modbus Organization, inc. www.modbus.org

  The hardware specification is based on the standards of the serial interface “ANSI/TIA/EIA-485-A-1998 Electrical characteristics of generators and receivers for use in balanced digital multipoint systems”.

1.1 Hardware description

1.1.2 Cable

A Modbus® RTU Cable **must** be shielded if the length exceeds 20m. The shield of the cable must be connected to protective ground on master side. For the connection a balanced pair (RSA/RSB) **and** a third wire (GND) must be used.

1.1.3 Cable length

The maximum length is 1000m with the right wire dimension. CAT5 cables can reach the maximum length of 600m.

The length is depending on the values from cables, used baudrate and external distortions.

Too long cables can lead to communication errors and unknown bus behaviour.

The length can be increased with the use of repeaters.

1.1.4 Grounding arrangements

The GND must be connected directly at the protective ground (preferably at one point). We recommend making it at the master side.

1.2 Software description

1.2.1 Address

The address is the name of the device in the Modbus system. This address **must** be unique to the device.

If multiple devices have the same address in one system this will lead to a communication fault, and a breakdown of the Modbus system.

The Address 0 is reserved for a broadcast and is not allowed to be written.

The factory default of Rosenberg fans is address 1.

Broadcast = send data to all devices in one Modbus system.

1.2.2 Function code

The function code is a fixed specification in Modbus.

The Rosenberg EC-fan supports the following "data access codes".

Register Type	Command	Function Code	Bit Access
Coil	Read	01	1 bit
Coil	Write	05	1 bit
Holding	Read	03	16 bit
Holding	Write	06	16 bit
Input	Read	04	16 bit
Discrete Input	Read	02	1 bit

1.2.3 writing coils

Write coils data like shown below:

0 = 0x0000

1 = 0xFF00

2 Operation parameters

2.1 Modbus table overview

register type	Register Dez Hex	name	unit	resolution	description	Read/ Write
coil	0 0x00	*motor on / off*	0/1	0-1	1 = motor is on ; 0 = motor is off	**R/W**
coil	7 0x07	*control mode* *	0 = modbus ; 1 = 0-10v	0-1	control possibility of the fan	**R/W**
holding	0 0x00	*Setpoint*	0,0001	0-10000	set the rpm in % for the fan	**R/W**
holding	5 0x05	*rotation*	0 = CCW ; 1 = CW	0-1	set the fan rotation direction	**R/W**
holding	16 0x10	*modbus address*	1-247	1-247	unit in the system	**R/W**
holding	22 0x16	*communication rate*	0 = 9600 ; 1 = 19200 ; 2 = 38400 ; 3 = 115200 ; 4 = 57600	0-4	baudrate of the system	**R/W**
holding	23 0x17	*parity*	0 = none ; 1 = odd ; 2 = even	0-2	parity of the system	**R/W**
holding	24 0x18	*stop bits*	0 = invalid 1 = 1 stoppbit ; 2 = 2 stoppbit	0-2	stoppbit of the system	**R/W**
Discrete input	10 0x0a	*internal stop*	0/1	0-1	see failure table	**R**
input	1 0x01	*firmware version* *	firmware	-	get the current firmware	**R**
input	4 0x04	*speed of the motor*	rpm	0-3000	get the current rpm of the fan	**R**
input	8 0x08	*power in*	w	0-15000	get the current power consumption	**R**
input	10 0x0a	*operation minute*	minutes	0-1439	get the current operation minute since the fan is spinning. complete time	**R**
input	11 0x0b	*operation day*	day	0-9999	get the current operation day since the fan is spinning. complete time	**R**
input	32 0x20	*power consumption*	kWh	0-999	get the current performed energy	**R**
input	33 0x21	*power consumption*	MWh	0-999	get the current performed energy	**R**

* If you are using a Firmware of the newest Generation (higher than Firmware 117), please go to instruction manual BA604.

2.2 Description of all the registers

Motor ON/OFF: **Register: 0 / 0x00** **Type: Coil** **Read and Write** **Write sequential**

Set the status of the motor. By setting the register to 1 the fan will start spinning. By setting it to 0 the fan will stop. This register is only active when the control mode is set to Modbus.

Attention: When setting this register to 1 the fan will start spinning even when no setpoint is given. It will run at his minimum RPM which is 10% of its maximum speed.

Control mode: **Register 7 / 0x07** **Type: Coil** **Read and Write** **Write limited**

Control the fan by setting this register. The coil register only allows 0 or 1. Means 0 = Modbus 1 = 0-10V
When set to 0-10V:
it will only react to the digital input (enable) pin of the fan and for setpoint over the analog input (0-10V)
When set to Modbus:
It will only react to the motor ON/OFF register and the setpoint register.
If you are using a Firmware of the newest Generation (higher than Firmware 117), please go to instruction manual BA604. This function has to be handled differently.

Setpoint: **Register: 0 /0x00** **Type: Holding** **Read and Write** **Write sequential**

Set the setpoint for the motor. The resolution is in % means when setting the register to 5000 its about 50%.

Attention: Setting the setpoint to 0 doesn't mean that the fan will stop. To stop the fan, use the register "motor ON/OFF".

Rotation: **Register: 5 /0x05** **Type: Holding** **Read and Write** **Write sequential**

Direction of rotation. By changing this register the fan will spin into the other direction.

Attention: By changing this register, the fan could damage itself. Not every fan can handle the reverse, Direction. In case of ambiguities or deviations, please contact Rosenberg before changing it.

Modbus address: **Register 16/0x10** **Type: Holding** **Read and Write** **Write limited**

Set the address of the fan. Each fan needs his unique address. The range is between 1 and 247.
The address 0 is set as a broadcast.
Broadcast are used to send one command to every device in the system.

Communication rate: **Register 22 / 0x16** **Type: Holding** **Read and Write** **Write limited**

Set the communication speed (baudrate) at which the system works. Each device needs the same speed setting.
Available baudrate: 1 = 9600, 2 = 19200, 3 = 38400, 4 =115200, 5 = 5760
Changing the speed can cause communication problems associated with the wire length. A large cable length needs a slower baudrate. When there is a higher baudrate required and a longer cable is used, a repeater is recommended.

Parity: **Register 23 / 0x17** **Type: Holding** **Read and Write** **Write limited**

Set the parity at which the system works. Each device needs the same parity set.
Available parity: 0 = None, 1 = Odd, 2 = Even
Parity is used to counter wrong transmitted data.

Stop bits: **Register 24 / 0x18** **Type: Holding** **Read and Write** **Write limited**

Set the stop bits at which the system works. Each device needs the same amount of stop bits.
Available stop bits: 0 = Invalid, 1 = 1 Stoppbit, 2 = 2 Stoppbit

Internal stop: **Register 10 / 0x0A** **Type: discrete Input** **Read** **Only read**

Internal stop is a failure register. It gets set to 1 if the fan has stopped spinning because of failure.
When this happens, the fan needs to be reset by powering off and restarting the fan.
When the register gets set again after a reset, the software ECParam and a USB to RS485 interface converter is required to see the exact failure the fan has.

Attention: When connecting with the software ECParam the fan needs to be disconnected from your Modbus system because multiple masters are not allowed.

Firmware version: **Register 1 / 0x01** **Type: Input** **Read** **Only read**

This register contains the current Firmware the fan has. An update can be performed if necessary, by using the ECParam software with a USB to RS485 interface converter. The range depends on the current Firmware the fan got.

Attention: When connecting with the software ECParam the fan needs to be disconnected from your Modbus system because multiple masters are not allowed.

If you are using a Firmware of the newest Generation (higher than Firmware 117), please go to instruction manual BA604.

Speed of the motor: **Register 4 / 0x04** **Type: Input** **Read** **Only read**

Read out the current motor speed in RPM. The range is between 0 and 3000_{dez}.

Power in: **Register: 8 / 0x08** **Type: Input** **Read** **Only read**

Read out the current power the fan needs to spin. The range is between 0 and 15000_{dez} value in Watts.

Operation minute: **Register 10 / 0x0A** **Type: Input** **Read** **Only read**

Read out the time in minutes the fan was spinning. The range is between 0 and 1439_{dez} value in minutes.

Operation day: **Register 11 / 0x0B** **Type: Input** **Read** **Only read**

Read out the time in days the fan was spinning. The range is between 0 and 9999_{dez} value in days.

Power consumption: **Register: 32 / 0x20** **Type: Input** **Read** **Only read**

Read out the overall performed power of the fan in kWh: The range is between 0 and 999 in kWh

Power consumption: **Register: 33 / 0x21** **Type: Input** **Read** **Only read**

Read out the overall performed power of the fan in MWh: The range is between 0 and 999 in MWh.

3 Failurecodes

In case of a communication error the Rosenberg EC-fan will give out a failure code regarding to the Modbus specification. Here the higher bit of the function code is set on „1“

Failure code	Description
01	illegal function
02	illegal address
03	illegal value

Trouble shooting

When the fan stopped, and the internal stop register is set to 1, the software ECParam can be used to check what could have caused the internal stop.

Nr.	failure	description	what to do
1	Undervoltage	The mains voltage is too LOW for the motor.	check your power supply.
2	Overvoltage	The mains voltage is too HIGH for the motor.	check your power supply.
3	Overcurrent	The output current is too HIGH.	check the impeller and the airflow.
4	temperature HIGH	The temperature of the electronic head is too HIGH.	check the temperature of the motor and airflow.
5	input phase error	the mains voltage is not correct installed	check the wiring from the motor to the power supply
6	rotor blocked	the impeller can’t be rotated	check the impeller shut the power off and try to spin the impeller by hand.
7	rotor direction	wrong direction of the impeller CCW or CW	check the correct direction of the impeller
8	internal stop	motor stops turning	check for other alarms.
9	motor phase error	electronic can’t power the motor.	try to check the impeller for damage.
10	24V overload	the 24V output is overloaded	check your wiring with the 24V for shorts or too much current consumption. 24V max current: 100mA
11	motor overheat	the motor internal thermal contact is triggered	shut the power off and let the motor cool down.
12	Windmilling	Motor spins, from other air sources	Check for different controlling of the fan and airflow.
13	low speed	the motor is below the set min RPM	check your speed setpoint
14	Com Error MOC	Communication Error Internal	Power cycle the fan with 2min Power off
15	MOC in Bootloader	Communication Error Internal	Power cycle the fan with 2min Power off

4 Manufacturer

Rosenberg-products are subject to a continuing quality control and meet applicable standards.

Rosenberg Ventilatoren GmbH
Maybachstraße 1
D-74653 Künzelsau-Gaisbach
Telefon: 07940/142-0
Telefax: 07940/142/125
Email: EC-Support@rosenberg-gmbh.com
Internet: www.rosenberg-gmbh.com

For all questions related to our products please refer to the contact the originator of your ventilating system one of our branch office or direct to:

5 Notes

The following overview can be used for the documentation of the modbus settings on side. It can be stored by the documentation of the modbus master.

General Settings:

baud =	
parity check =	
stopp bit =	

device:	**address:**	**comment:**