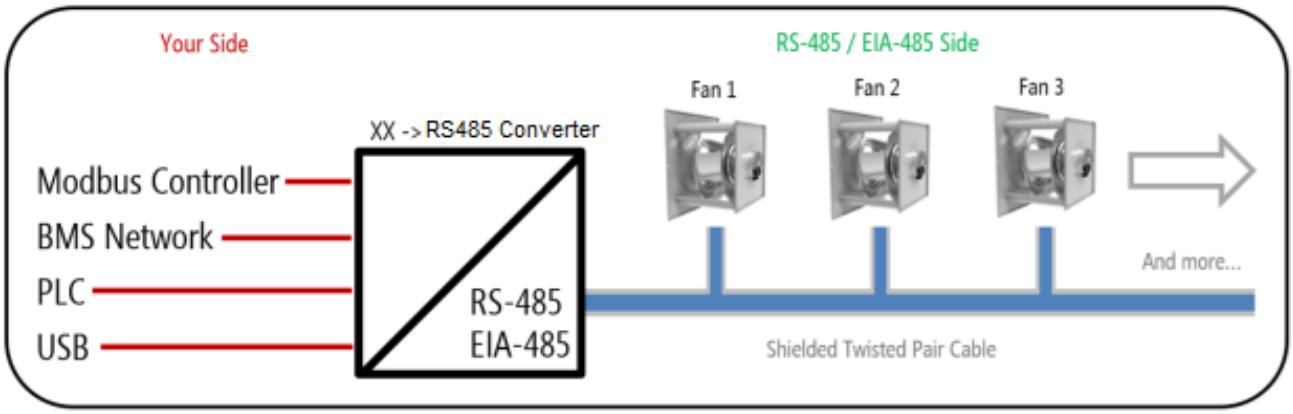
Technical documentation Modbus motor size 4&5 Gen3
ID: BA601

- Manual for the installation of a Modbus system for EC-motors with integrated electronic GD84 & GD112 of the type BA601



This is the detailed instruction guide for the ID: BA601.
For a quick guide with examples use the **Quick-Start-Guide** for type BA601.

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Content

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

The maximum cable length can be affected by the used cables, baudrate and external distortions.

To long cables can lead to communication errors and unknow bus behaviour.

The length can be increased with the use of repeaters.

1.1.4 Grounding arrangements

The GND must be connected directly to the protective ground (preferably at one point). We recommend connecting it on 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 for each 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 fix specification in Modbus.

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

register type	command	function code	bit access
input	read	01	16 bit
single register	write	05	16 bit

2 Operation parameters

2.1 Modbus table overview

register type	register Dez Hex	name	unit	resolution Dez	description	Read/ Write
input	5 0x05	*operation houre*	hour	0-9999	get the current operation day since the fan is spinning. complete time	**R**
input	6 0x06	*operation minute*	minutes	0-1439	get the current operation minute since the fan is spinning. complete time	**R**
input	14 0x0e	*maximal rpm*	rpm	0-3000	get the maximum rpm the is possible	**R/W**
input	17 0x11	*rotation*	0 = cw ; 1 = ccw	0-1	set the fan rotation direction	**R/W**
input	33 0x21	*firmware version*	firmware	-	get the current firmware	**R**
input	38 0x26	*control mode enable*	0 = modbus ; 1 = ignore; 2 = digital input	0-1	control possibility of the fan	**R/W**
input	39 0x27	*control mode setpoint*	0 = modbus ; 1 = analog input	0-1	control possibility of the fan	**R/W**
input	41 0x29	*motor on / off*	0/15	0-15	15 = motor is on ; 0 = motor is off	**R/W**
input	43 0x2b	*setpoint*	4096 = 100%	0-4096	set the rpm in % for the fan	**R/W**
input	78 0x4e	*modbus address*	1-247	1-247	unit in the system	**R/W**
input	79 0x4f	*communication rate*	0x 0 x x 0 parity , baudrate baudrate: 0 = 9600 1 = 19200 2= 38400 3 = 57600 parity: 0 = even 1 = odd 2 = none	0-4	baudrate of the system **modbus parameter is only possible with FW > 224**	**R/W**
input	82 0x52	*speed of the motor*	rpm	0-3000	get the current rpm of the fan	**R**
input	85 0x55	*internal stop*	0 = no failure ; >0 = failure	0-65535	see failure table	**R**
input	86 0x56	*power in*	w	0-15000	get the current power cunsumption **modbus parameter is only possible with FW > 224**	**R**

2.2 Desription of all the registers

Operation hour: **Register 5 / 0x05** **Type: Input** **Read** **Only Read**

Total time in hour the fan was running. The range is between 0 and 9999_{dez}.

Operation minute: **Register 6 / 0x06** **Type: Input** **Read** **Only Read**

Total time in minutes the fan was running. The range is between 0 and 1439_{dez}.

Maximal RPM: **Register: 14 / 0x0E** **Type: Input** **Read** **Only Read**

Maximum allowed RPM for the fan. It is recommended to read out this value for the setpoint.

Rotation: **Register: 17 / 0x11** **Type: Input** **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.

Firmware version: **Register 33 / 0x21** **Type: Input** **Read** **Only Read**

This register contains the current FW (Firmware) of the fan. An update can be performed by using the ECParam software and an USB to RS485 interface converter.

The value depends on the current FW the fan got.

Attention: For the connection with the software ECParam the fan needs to be disconnected from the Modbus system (Because only one master is allowed per network).

Control mode enable: **Register 38 / 0x26** **Type: Input** **Read and Write** **Write limited**

Set when the fan should start spinning.

Available options:

0 = Enable via Modbus

2 = Enable via digital input

1 = Ignore (always enabled)

Enable via digital input:

The motor will only react to the digital Input (DIN) pin on the terminal board.

When a voltage of 24V is present (and setpoint is given) fan starts spinning

When set to Modbus:

It will only react to the motor ON/OFF register and the setpoint register.

Control mode setpoint: **Register 39 / 0x27** **Type: Input** **Read and Write** **Write limited**

Setting for the Setpoint option.

Available options:

0 = Modbus control

1 = Analog control (0-10V)

Analog control:

The motor will only react to the Analog Input (0-10V) on the terminal board.

Setpoint is generated by 0-10V (0-100% speed) | 0V = 0% | 9,5V = 100% speed

Modbus control:

The fan reacts to the setpoint register.

Motor ON/OFF: **Register: 41 / 0x29** **Type: Input** **Read and Write** **Write sequential**

Set the status of the motor. By setting the register to 15_{dez} 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 control.

Setpoint: **Register: 43 / 0x26** **Type: Input** **Read and Write** **Write sequential**

Set the setpoint for the motor. The resolution is in % means when setting the register to 2048_{dez} 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".
This register is only active when the control mode setpoint is set to Modbus control.

Modbus address: **Register 78 / 0x4E** **Type: Input** **Read and Write** **Write limited**

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

Communication rate: **Register 79 / 0x4F** **Type: Input** **Read and Write** **Write limited**

Bit 15....12	Bits 11....8		Bits 7....4		Bit 3....0
Not allowed to be changed, Must remain 0x0	Parity		Baudrate		**Not allowed to be changed, Must remain 0x0**
	Value	Meaning	Value	Meaning	
	0	Even	0	9600	
	1	Odd	1	19200	
	2	None	2	38400	
			3	57600	

This parameter is only available on firmware > 224.

This parameter receives data from a 16Bit transfer. The most and least significant 4 bits needs to be 0x0.
The only change is the 2 bits in between. In Hex it should look like that:
8bit 8bit
0X X0
The green is for the Parity bits and the red is for the Baudrate bits.
Writing the wrong data in the last 4 and first 4 bits can cause the fan to stop working.
Attention: The change of the parameters requires a restart of the electronic. The power supply must be switched off for at least 10 seconds.

Speed of the motor: **Register 82 / 0x52** **Type: Input** **Read** **Only Read**

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

Internal stop: **Register 85 / 0x55** **Type: Input** **Read** **Only Read**

Internal stop is a failure register. If the value is >0, the fan stopped because a critical failure has been generated.
If this happens, the fan needs to be reset by a reset of the power supply.
If a failure can't be reset or occurring again, please read out the failure with the Rosenberg software ECParam.
Attention: For the connection with the software ECParam the fan needs to be disconnected from the Modbus system (Because only one master is allowed per network).

Power In: **Register: 86 / 0x56** **Type: Input** **Read** **Only Read**

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

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 > 0. The software ECParam can be used to check what could have caused the internal stop.

Nr.	Failure	Description	What to do
1	Power stage failure	Control of the motor doesn’t work.	Contact Rosenberg
2	Phase loss supply	One phase is missing on a 3-phase fan.	Check input phases L1 L2 L3
3	Overvoltage	Input voltage of the fan is too high.	Check the supply voltage
4	Undervoltage	Input voltage of the fan is too low.	Check the supply voltage
5	Phase loss motor	One of the internal motor phases is missing.	Contact Rosenberg
6	Over temperature electronic	Temperature of the electronic is too high.	Shut the power off and let the motor cooldown Check for the right airflow
7	Loss of rotor lock	Motor losses his position.	Contact Rosenberg
8	Overcurrent	The current consumption to the motor is too high.	Check the airflow of the fan. Does it spin in the right direction?
9	Over temperature motor	The internal thermal contact of the motor got triggered.	Shut the power off and let the motor cooldown Airflow temperature within the allowed rage?
10	Wrong direction	The motor was spinning in the wrong direction.	Check if the fan was driven by an external airflow.
11	Overspeed/underspeed	The motor is below the min RPM setting.	Check the speed setpoint
12	Blocked rotor	The electronic is not able to run the motor.	Check if the impeller is spinning freely. Check for any mechanical blockade.
13	Fan limited	Internal power reduction is active.	Contact Rosenberg
14	Non-compensable	Fan is not able to reach the setpoint in the right time.	Contact Rosenberg

4 Manufacture

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

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:

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5 Notes

This overview should be a compendium of the own facility. It can be ripped out and stored with the documentation of the Modbus-master.

General Settings:

Baudrate =	
parity check =	
stopp bit =	

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