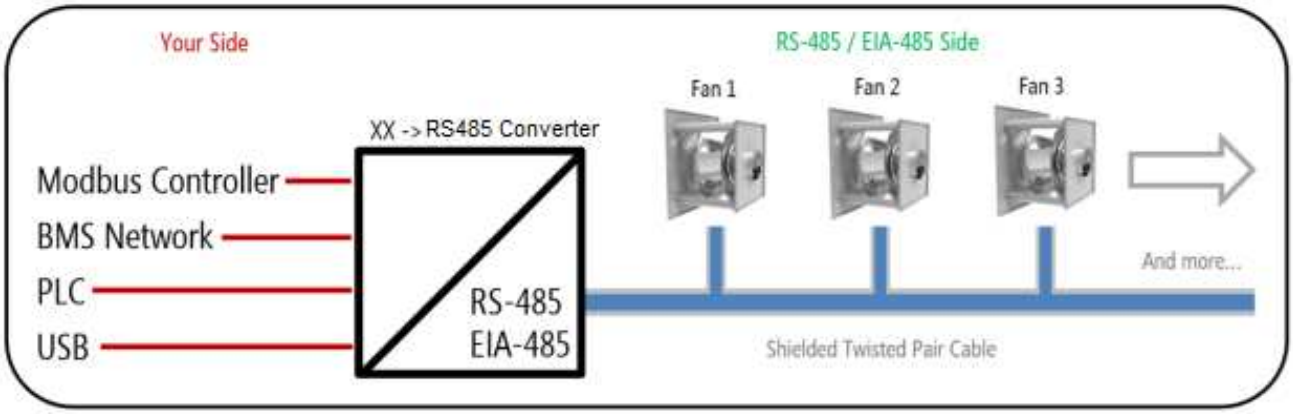
Technical documentation Modbus Rosenberg
ID: BA604

- Manual for the installation of a Modbus system for Rosenberg EC-motors with integrated electronic.



This is the detailed instruction guide for the ID: BA604.
For a quick guide with examples use the **Quick-Start-Guide** for type BA604.

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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 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 on 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.

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
Discrete Input	Read	02	1 bit
Holding	Read	03	16 bit
Holding	Write	06	16 bit
Input	Read	04	16 bit

1.2.3 Writing coils

Write coils data like shown below:

0 = 0x0000

1 = 0xFF00

1.2.4 Restrictions

Attention all parameters are only saved non-volatile every 10s. So, changing registers with direct following powercycle result into loss of the data.

An excessive change of the values (except the setpoint and the on/off function) can harm the memory of the microprocessor.

2 Operation parameters

2.1 Modbus table overview

2.1.1 Coils

register type	register Dez Hex	name	unit	resolution	description	Read/ Write
coil	1000 0x03E8	*Reset Alarm*	1 = Reset Alarm	0-1	1 = Reset Alarm	**R/W**
coil	1001 0x03E9	*motor on / off*	1 = motor is on; 0 = motor is off	0-1	1 = motor is on ; 0 = motor is off	**R/W**
coil	1002 0x03EA	*rotation*	0 = CCW; 1 = CW	0-1	set the fan rotation direction	**R/W**
coil	1050 0x041A	*control mode setpoint*	0 = setpoint via modbus; 1 = setpoint via 0-10V	0-1	control possibility of the fan	**R/W**
coil	1051 0x041B	*control mode Enable*	0 = Enable via modbus; 1 = Enable via DigInput	0-1	control possibility of the fan	**R/W**
coil	1052 0x041C	*Invert analog speed input*	0 = input normal; 1 = input inverted	0-1	Fan controlled between 0V-10V or 10V-0V Only possible in GD150 Motorsize 6	**R/W**
coil	1053 0x041D	*Non volatile setpoint*	0 = Setpoint volatile; 1 = Setpoint non volatile	0-1	1= Setpoint safed also after Power cycle (only in Modbus) Only possible in GD150 Motorsize 6	**R/W**

2.1.2 Discrete inputs

register type	register Dez Hex	name	unit	resolution	description	Read/ Write
Discrete input	1000 0x03E8	*internal stop*	0/1	0-1	0 = no failure; 1 = failure For more details connect with ECParam	**R**
Discrete input	1001 0x03E9	*DigIn Status*	0/1	0-1	Status of the digital Input (Enable)	**R**

2.1.3 Holding register

register type	register Dez Hex	name	unit	resolution	description	Read/ Write
Holding register	955 0x03BB	*free register*	1	0-65535	Free register for customer data	**R/W**
Holding register	1000 0x03E8	*setpoint*	0,01	0-10000	set the rpm in % for the fan	**R/W**
Holding register	1050 0x041A	*modbus address*	1-247	1-247	unit in the system	**R/W**
Holding register	1051 0x041B	*communication rate*	0 = 9600 ; 1 = 19200 ; 2 = 38400; 3 = 57600; 4 = 115200	0-4	baudrate of the system	**R/W**
Holding register	1052 0x041C	*parity*	0 = none ; 1 = odd ; 2 = even	0-2	parity of the system	**R/W**
Holding register	1053 0x041D	*stop bits*	1 = 1 stoppbit ; 2 = 2 stoppbit	1-2	stoppbit of the system	**R/W**
Holding register	1054 0x041E	*Communication timeout*	1	0-100	Timedelay until error Modbus Timeout in seconds	**R/W**
Holding register	1055 0x041F	*Timeout RPM*	0,01	0-10000	Timeout RPM in %	**R/W**
Holding register	1100 0x044C	*S0 min rpm*	0,01	0-10000	Scaleable analog config	**R/W**
Holding register	1101 0x044D	*S1 start rpm*	0,01	0-10000	Scaleable analog config	**R/W**
Holding register	1102 0x044E	*S2 max rpm*	0,01	0-10000	Scaleable analog config	**R/W**
Holding register	1103 0x044F	*U1 start Voltage*	0,1	0-100	Scaleable analog config	**R/W**
Holding register	1104 0x0450	*U2 maxVoltage*	0,1	0-100	Scaleable analog config	**R/W**
Holding register	1150 0x047E	*ramp up time*	1	5-1000	Ramp up time in seconds	**R/W**
Holding register	1151 0x047F	*ramp down time*	1	5-1000	Ramp down time in seconds	**R/W**

2.1.4 Input register

register type	register Dez Hex	name	unit	resolution	description	Read/ Write
Input register	1000 0x03E8	*Electronic definition*	1	0-65535	*Electronic definition*	**R**
Input register	1001 0x03E9	*firmware version*	firmware	0-65535	get the current firmware of the first controller	**R**
Input register	1002 0x03EA	*firmware version*	firmware	0-65535	get the current firmware of the second controller	**R**
Input register	1003 0x03EB	*Max rpm*	1	0-4500	Maximum possible Speed (100%)	**R**
Input register	1050 0x041A	*speed*	1	0-4500	current speed rpm	**R**
Input register	1051 0x041B	*Analog Input*	0,01	0-1000	current voltage input of the analog input	**R**
Input register	1052 0x041C	*Current temp*	0,01	-32768-32767	Current electronic temperature	**R**
Input register	1053 0x041D	*DC-Link Voltage*	1	0-1000	Current DC-Link Voltage	**R**
Input register	1100 0x044C	*Operation time minutes*	1	0-60	Current operation time	**R**
Input register	1101 0x044D	*Operation time hours*	1	0-24	Current operation time	**R**
Input register	1102 0x044E	*Operation time days*	1	0-65535	Current operation time	**R**
Input register	1103 0x044F	*Current Power*	1	0-15000	Current power use in W	**R**
Input register	1104 0x0450	*Energy consumption kWh*	1	0-1000	Used Energy Only possible in GD150 Motorsize 6	**R**
Input register	1105 0x0451	*Energy consumption MWh*	1	0-65535	Used Energy Only possible in GD150 Motorsize 6	**R**

2.2 Description of all the registers

Alarm Reset:	**Register: 1000 / 0x03E8**	**Type: coil**	**Read and Write**	**Write sequential**

If the fan is locked due to an error, this failure can be reset by switching this value to 1. This value is automatically set to 0 after the failure is reset.

Motor ON/OFF:	**Register: 1001 / 0x03E9**	**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 its minimum RPM which is default 10% of its maximum speed.

Rotation sense:	**Register 1002 / 0x03EA**	**Type: coil**	**Read and Write**	**Write limited**

Direction of rotation. By changing this register the fan will spin in the other direction.
0 = counterclockwise (CCW) / 1=clockwise (CW).

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.

Control mode setpoint:	**Register 1050 / 0x041A**	**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 for setpoint connected to the analog input (0-10V)
When set to Modbus: It will only react to the setpoint register.

Control mode Enable:	**Register 1051 / 0x041B**	**Type: coil**	**Read and Write**	**Write limited**

Control the fan by writing 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
When set to Modbus: It will only react to the motor ON/OFF register.

Invert analog input:	**Register: 1052 /0x041C**	**Type: coil**	**Read and Write**	**Write sequential**

Invert the sense of the analog input, the fan can be controlled between Value=0 ➔ 0V-10V (0%-100%) or Value=1 ➔ 10V-0V (0%-100%)

Attention: Function is only available for fans with Motor GD150 Motorsize 6

Non Volatile setpoint:	**Register: 1053 /0x041D**	**Type: coil**	**Read and Write**	**Write sequential**

It can be activated to save the setpoint also after a powercycle.
Value=0 ➔ setpoint not saved, after powercycle fan remains stopped with 0% setpoint.
Value=1 ➔ last setpoint is saved and fan will directly turn on after a powercycle. (changes are only saved if deviation is more than 10%)

Attention: Function is only available for fans with Motor GD150 Motorsize 6

Internal stop: **Register: 1000 /0x03E8** **Type: discrete input** **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.

DigInStatus: **Register: 1001 /0x03E9** **Type: discrete input** **Read**

Status of the digital input.
Value = 0 ➔ Enable not connected
Value = 1 ➔ Enable connected

Free Register: **Register: 955 /0x03BB** **Type: Holding** **Read and Write** **Write limited**

This is a free register, to save any needed information. Value = 0-65535

Setpoint: **Register: 1000 /0x03E8** **Type: Holding** **Read and Write** **Write sequential**

Set the setpoint for the motor. The resolution is 0,01 in % means Value = 0-10000 ➔ 0-100%
A Value of 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".

Modbus address: **Register 1050 /0x041A** **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 1051 / 0x041B** **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: 0 = 9600, 1 = 19200, 2 = 38400, 3 = 5760, 4 = 115200
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 1052 / 0x041C** **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 1053 / 0x041D** **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

Communication Timeout: **Register 1054 / 0x041E** **Type: Holding** **Read and Write** **Write limited**

Value represents the time in seconds until the fan goes into Communication timeout.

Timeout RPM: **Register 1055 / 0x041F** **Type: Holding** **Read and Write** **Write limited**

Value represents the Setpoint of the fan if fan is in Communication timeout. 0 = fan stops

Scalable input min RPM: **Register 1100 / 0x044C** **Type: Holding** **Read and Write** **Write limited**

Value defines the setpoint before the regulation starts.
The resolution is 0,01 in % means Value = 0-10000 ➔ 0-100%

Attention: See in chapter 2.3 for more details
Value between 0% and 10% is not possible.

Scalable input start RPM:	**Register 1101 / 0x044D**	**Type: Holding**	**Read and Write**	**Write limited**

Value defines the setpoint where the regulation starts.
The resolution is 0,01 in % means Value = 0-10000 ➔ 0-100%

Attention: See in chapter 2.3 for more details
Value between 0% and 10% is not possible.

Scalable input max RPM:	**Register 1102 / 0x044E**	**Type: Holding**	**Read and Write**	**Write limited**

Value defines the setpoint where the regulation ends.
The resolution is 0,01 in % means Value = 0-10000 ➔ 0-100%

Attention: See in chapter 2.3 for more details

Scalable input start voltage:	**Register 1103 / 0x044F**	**Type: Holding**	**Read and Write**	**Write limited**

Value defines the voltage where the regulation starts.
The resolution is 0,1 in V means Value = 0-100 ➔ 0-10V

Attention: See in chapter 2.3 for more details
A Voltage below 7V will not be recognized by the electronic

Scalable input max voltage:	**Register 1104 / 0x0450**	**Type: Holding**	**Read and Write**	**Write limited**

Value defines the voltage where the regulation ends.
The resolution is 0,1 in V means Value = 0-100 ➔ 0-10V

Attention: See in chapter 2.3 for more details

Ramp up time:	**Register 1150 / 0x047E**	**Type: Holding**	**Read and Write**	**Write limited**

Value defines the amount of time in seconds from minRPM to 100% rpm.
Attention: If the time is set lower, than the technical possible time, Fan will ignore this parameter.

Ramp down time:	**Register 1151 / 0x047F**	**Type: Holding**	**Read and Write**	**Write limited**

Value defines the amount of time in seconds from 100% to minRPM rpm.
Attention: If the time is set lower, than the technical possible time, Fan will ignore this parameter.

Firmware version first controller:	**Register 1001 / 0x03E9**	**Type: Input**	**Read**	**read only**

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.

Firmware version second controller:	**Register 1002 / 0x03EA**	**Type: Input**	**Read**	**read only**

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.

Max motor speed:	**Register 1003 / 0x03EB**	**Type: Input**	**Read**	**read only**

Register shows the maximum possible Speed of this fan.

Speed of the motor:	**Register 1050 / 0x041A**	**Type: Input**	**Read**	**read only**

Register shows the current speed.

Analog input:	**Register 1051 / 0x041B**	**Type: Input**	**Read**	**read only**

Register shows the current Voltage input of the analog input.
The resolution is 0,01 in V means Value = 0-100 ➔ 0-10V

Current temperature:	**Register 1052 / 0x041C**	**Type: Input**	**Read**	**read only**

Register shows the current temperature inside of the electronic as an signed16Bit Value.
The resolution is 0,01 in °C means Value = 0-10000 ➔ 0-100°C

DC-Link voltage:	**Register 1053 / 0x041D**	**Type: Input**	**Read**	**read only**

Register shows the current DC-Link voltage.
The resolution is 1 in V means Value = 0-100 ➔ 0-100V

Operation minutes:	**Register 1100 / 0x044C**	**Type: Input**	**Read**	**read only**

Read out the time in minutes the fan was spinning. The range is between 0 and 59 value in minutes.

Operation hours:	**Register 1101 / 0x044D**	**Type: Input**	**Read**	**read only**

Read out the time in hours the fan was spinning. The range is between 0 and 23 value in hours.

Operation days:	**Register 1102 / 0x044E**	**Type: Input**	**Read**	**read only**

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

current power:	**Register: 1103 / 0x044F**	**Type: Input**	**Read**	**read only**

Register shows the current power consumption in Watt.
The resolution is 1 in W means Value = 0-4000 ➔ 0-4000W

Power consumption:	**Register: 1104 / 0x0450**	**Type: Input**	**Read**	**read only**

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

Attention: Function is only available for fans with Motor GD150 Motorsize 6

Power consumption:	**Register: 1105 / 0x0451**	**Type: Input**	**Read**	**read only**

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

Attention: Function is only available for fans with Motor GD150 Motorsize 6

2.3 Description of the writing limitation

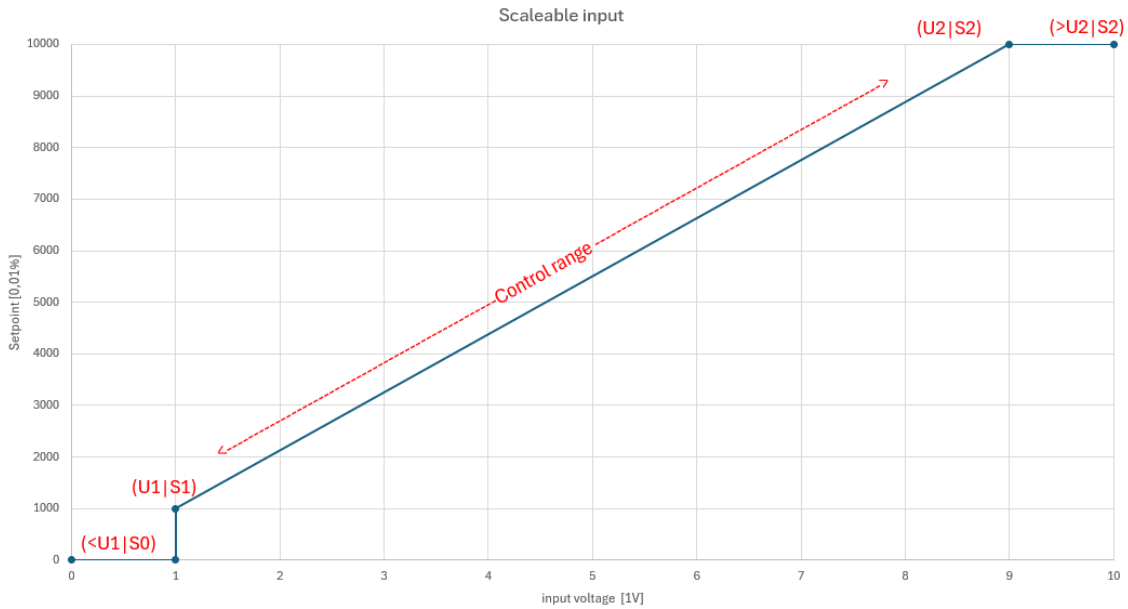
Rosenberg Fans have volatile and non-volatile Registers, which are marked as "Write Limited" or "Write Sequential".

"Write Limited" ==> non-volatile ==> not lost after a powercycel

"Write Sequential" ==> volatile ==> lost after a powercycel

The "Write Limited" - Registers are directly written in the EEPROM which has a Limit of 100.000 write cycles.

2.4 Description of scaling



The speed is changing relatively to the setpoint between the points (U1|S1) and (U2|S2). Before the regulation the fan runs with the speed configured at S0. After the regulation it remains at the speed S2.

S0 ➔ Setpoint before the control range
S1 ➔ Setpoint where the control range starts U1 ➔ Voltage where the control range starts
S2 ➔ Setpoint where the control range ends U2 ➔ Voltage where the control range ends

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

4 Manufacturer

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:

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:**

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