



Modbus RTU protocol for EFAN-24 controller

Introduction

Modbus RTU is a popular master–slave communication protocol used in building automation systems. The EFAN-24 can operate as a slave device in a Modbus network, allowing remote reading and control of the controller's basic functions.

Modbus RTU Protocol – Operating Principle

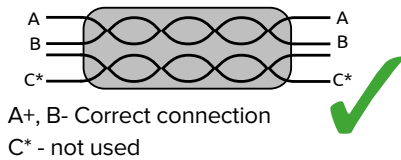
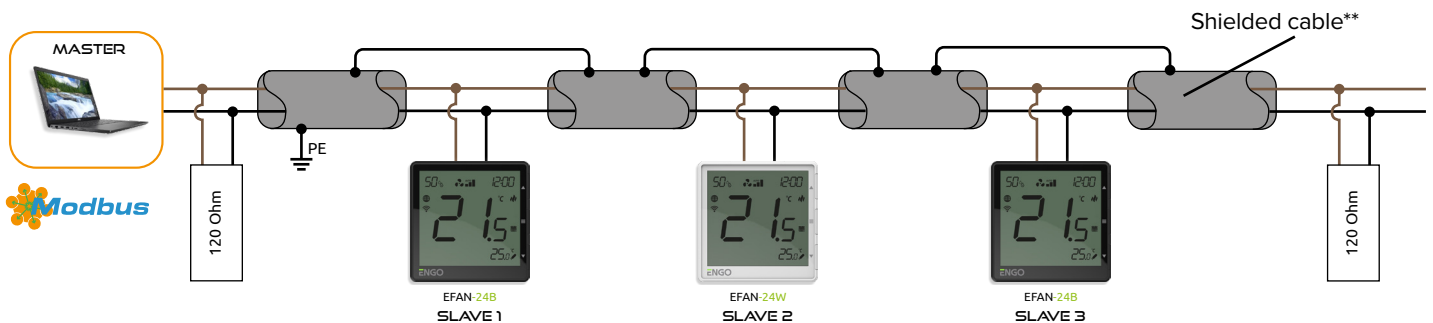
- **Master–slave** system – only the master device (e.g. PLC, computer) initiates requests
- Serial communication via **RS-485 interface (2-wire)**
- Up to **247 slave devices** supported
- Each slave device must have a unique address
- No communication between slave devices

Physical connections

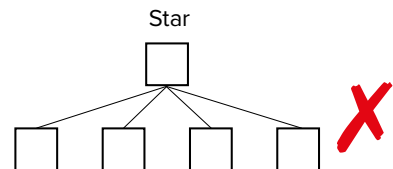
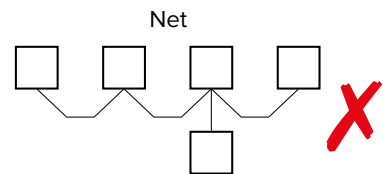
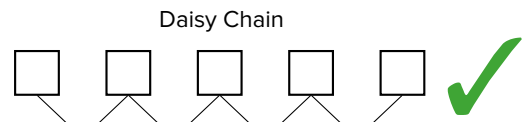
Data lines

- **A+ (DATA+)**
- **B- (DATA-)**

Despite the absence of a dedicated communication ground, proper operation is possible when using appropriately shielded cables and a correct network topology.



Bus topology – linear (serial) type,
avoid star connections.
Maximum length: up to **1200 m at 9600 bps**



Recommended Cables**

- Shielded twisted pair with 120 Ω impedance, e.g.:
- Belden 3105A (2x24 AWG, shielded)
- LIYCY 2x0.5 mm²
- FTP/STP Cat5e (1 pair + shield)

Termination (End-of-Line Resistors)

- 120 Ω between A+ and B-
- Install at both ends of the bus (first and last device)

Cable Shield Connection:

- Connect the shield only on the master side (to PE or GND)
- Do not connect the shield on the slave side (leave unconnected)

Additional Recommendations:

- Use **RS-485 converters with galvanic isolation** in industrial or distributed installations
- Avoid ground loops and potential differences – proper cable shielding is usually sufficient

RS-485 communication settings



WARNING:

Before connecting the controller to the RS-485 network, it must be properly configured.

Communication settings are defined in the controller's service parameters.

Connecting unconfigured controllers to the RS-485 network may result in improper operation.

Pxx	Function	Value	Description	Default value
Addr	MODBUS Slave device address (ID).	1 - 247	MODBUS Slave device address (ID).	1
BAUD	Baud	4800	Bitrate (Baud)	9600
		9600		
		19200		
		38400		
PARI	Parity bit - sets data parity for error detection	None	None	None
		Even	Even	
		Odd	Odd	
STOP	StopBit	1	1 stop bit	1
		2	2 stop bit	

Supports the following function codes:

#03 - reading n registers (Holding Registers)

#04 - reading n registers (Input Registers)

#06 - write 1 register (Holding Register)

INPUT registers - read only

Address		Access	Description	Value range	Means	Default
Dec	Hex					
0	0x0000	R (#03)	Engo MODBUS Model ID	1-247	MODBUS Slave (ID)	1
1	0x0001	R (#03)	Firmware-Version	0x0001-0x9999	0x1110=1.1.10 (BCD code)	
2	0x0002	R (#03)	Working-state		0b00000010=Idle, switch OFF 0b00000000=Idle, room meet temperature 0b10000001=Heating 0b10001000=Cooling 0b00001000=Idle, sensor error	
3	0x0003	R (#03)	Value of the Integrated temperature sensor, °C	50 - 500	N-> temp=N/10 °C	
5	0x0005	R (#03)	Value of the External temperature sensor S1, °C	50 - 500	0 = Open (sensor break)/ contact open 1=Closed (sensor short circuit)/ contact closed N-> temp=N/10 °C	
6	0x0006	R (#03)	Value of the External temperature sensor S2, °C	50 - 500	0 = Open (sensor break)/ contact open 1=Closed (sensor short circuit)/ contact closed N-> temp=N/10 °C	
7	0x0007	R (#03)	Fan state	0b00000000 - 0b00001111	0b00000000= OFF 0b00000001= I Fan stage low 0b00000010= II Fan stage medium 0b00000100= III Fan state high 0b00001000= Auto - OFF 0b00001001= Auto - I low 0b00001010= Auto - II medium 0b00001100= Auto - III high	
8	0x0008	R (#03)	Valve 1 stat	0 - 1000	0 = OFF (valve closed) 1000 = ON / 100% (valve open)	
9	0x0009	R (#03)	Valve 2 state	0 - 1000	0 = OFF (valve closed) 1000 = ON / 100% (valve open)	
10	0x000A	R (#03)	Humidity measurement (with 5% indication accuracy)	0 - 100	N-> humidity=N %	

HOLDING registers – for reading and writing

Adress		Access	Description	Value range	Means	Default
Dec	Hex					
0	0x0000	R/W (#04)	Enco MODBUS Model ID	1-247	MODBUS Slave (ID)	1
234	0x00EA	R/W (#06)	Fancoil type	1 - 6	1 = 2 pipe - only heating 2 = 2 pipe - only cooling 3 = 2 pipe - heating & cooling 4 = 2 pipe - underfloor heating 5 = 4 pipe - heating & cooling 6 = 4 pipe - underfloor heating & cooling by fancoil	0
235	0x00EB	R/W (#06)	S1-COM input configuration (Installer Parameters -P01)	0	Input inactive. Change between heating and cooling with the buttons.	0
				1	Input used to change heating/cooling via external contact connected to S1-COM: - S1-COM open --> HEAT mode - S1-COM shorted --> COOL mode	
				2	Input used to AUTOMATICALLY change heating/cooling based on PIPE TEMPERATURE in a 2-pipe system. The controller switches between heating and cooling modes based on the pipe temperature set in parameters P17 and P18.	
				3	Allow fan operation dependent on the temperature measurement on the pipe. For example, if the temperature on the pipe is too low, and the controller is in heating mode - the pipe sensor will not allow the fan to run. The change of heating/cooling is done manually - using the buttons. Values for fan control based on pipe temperature are set in parameters P17 and P18.	
236	0x00EC	R/W (#06)	S2-COM input configuration (Installer Parameters -P02)	4	Activation of the floor sensor in the floor heating configuration.	0
				0	Input disabled	
				1	Occupancy sensor (when contacts are opened, activate ECO mode)	
237	0x00ED	R/W (#06)	Selectable ECO mode (Installer Parameters -P07)	2	External temperature sensor	0
				0	NO - Disabled	
238	0x00EE	R/W (#06)	ECO mode temperature value for heating (Installer parameters -P08)	1	YES - Active	150
				50 - 450	N-> temp=N/10 °C	
239	0x00EF	R/W (#06)	ECO mode temperature value for cooling (Installer parameters -P09)	50 - 450	N-> temp=N/10 °C	300
240	0x00F0	R/W (#06)	ΔT of 0-10V valve operation This parameter is responsible for the modulated 0-10V output of the valve. - In heating mode: If the room temperature drops, the valve opens proportionally to the delta size. - In cooling mode: If the room temperature increases, the valve opens in proportion to the size of the delta. Valve opening starts from the room set temperature. (Installer parameters -P17)	1-20	N-> temp=N/10 °C	10
241	0x00F1	R/W (#06)	Fan on temperature for heating The fan will start working if the temperature in the room drops below the preset by the value of the parameter (Installer parameters -P15)	0 - 50	N-> temp=N/10 °C	50

Address		Access	Description	Value range	Means	Default
Dec	Hex					
242	0x00F2	R/W (#06)	Control algorithm (TPI or hysteresis) for the heating valve (Installer parameters -P18)	0 - 20	0 = TPI 1 = $\pm 0,1C$ 2 = $\pm 0,2C...$ N-> temp=N/10 °C ($\pm 0,1... \pm 2C$)	5
243	0x00F3	R/W (#06)	FAN delta algorithm for cooling The parameter determines the width of the temperature range in which the fan operates in cooling mode. If the room temperature increases then: 1. when a small value of Delta FAN, the faster the response of the fan to a change in temperature - faster increase in speed. 2. when large value of Delta FAN, the slower the fan increases speed. (Installer parameters -P16)	5 - 50	N-> temp=N/10 °C	20
244	0x00F4	R/W (#06)	Fan on temperature for cooling. The fan will start working if the temperature in the room rises above the the setpoint by the value of the parameter. (Installer parameters -P19)	0 - 50	N-> temp=N/10 °C	50
245	0x00F5	R/W (#06)	Hysteresis value for the cooling valve (Installer parameters -P20)	1 - 20	N-> temp=N/10 °C ($\pm 0,1... \pm 2C$)	5
246	0x00F6	R/W (#06)	Dead zone of switching heating/cooling In a 4-pipe system. The difference between the Set temperature and room temperature, at which the controller will automatically change the heating/cooling operation mode. (Installer parameters -P21)	5 - 50	N-> temp=N/10 °C	20
247	0x00F7	R/W (#06)	The switching temperature value from heating to cooling - 2-pipe system. In a 2-pipe system, below this value the system switches to cooling mode and allows the fan to start. (Installer parameters -P22)	270 - 400	N-> temp=N/10 °C	300
248	0x00F8	R/W (#06)	The value of the switching temperature from cooling into heating - 2-pipe system. In a 2-pipe system, above this value the system switches to heating mode and allows the fan to start. (Installer parameters -P23)	100 - 250	N-> temp=N/10 °C	100
249	0x00F9	R/W (#06)	Cooling ON delay. A parameter used in 4-pipe systems with automatic switching between heating and cooling. This avoids too frequent switching between heating and cooling modes and oscillation of the room temperature. (Installer parameters -P24)	0 - 15 min		0
250	0x00FA	R/W (#06)	Maximum floor temperature To protect the floor, heating will be turned off, when the floor sensor temperature rises above the maximum value. (Installer parameters -P25)	50 - 450	N-> temp=N/10 °C	350
251	0x00FB	R/W (#06)	Minimum floor temperature To protect the floor, heating will be switched on, when the floor sensor temperature drops below the minimum value. (Installer parameters -P26)	50 - 450	N-> temp=N/10 °C	150
254	0x00FE	R/W (#06)	PIN code for installer settings (Installer Parameters -P28)	0 - 1	0 = disabled 1 = PIN (First default code 0000)	0

Address		Access	Description	Value range	Means	Default
Dec	Hex					
255	0x00FF	R/W (#06)	Requiring a PIN code to unlock the keys (Installer Parameters -P29)	0 - 1	0 = NIE 1 = TAK	0
256	0x0100	R/W (#06)	Fan operation (Installer parameters -FAN)	0 - 1	0 = NO - Inactive - output contacts for fan control are completely disabled 1 = YES	1
257	0x0101	R/W (#06)	Power on/off - switching off the regulator	0,1	0=OFF 1=ON	1
258	0x0102	R/W (#06)	Operation mode	0,1,3	0=Schedule 1=Manual 3=FROST - anti-freeze mode	0
260	0x0104	R/W (#06)	Fan speed setting		0b0000000= OFF - fan off 0b000000001= I (low) fan gear 0b0000010= II (medium) fan gear 0b00000100= III (high) fan gear 0b000001000= Automatic fan speed - OFF 0b000001001= Automatic fan speed - 1st gear 0b000001010= Automatic fan speed - 2nd gear 0b000001100= Automatic fan speed - 3rd gear	
262	0x0106	R/W (#06)	Key lock	0,1	0=unlocked 1=Locked	0
263	0x0107	R/W (#06)	Display brightness (Installer Parameters -P27)	0-100	N-> Brightness =N%	30
268	0x010C	R/W (#06)	Clock - minutes	0-59	Minutes	0
269	0x010D	R/W (#06)	Clock - hours	0-23	Hours	0
270	0x010E	R/W (#06)	Clock - Day of the week (1=Monday)	1~7	Day of the week	3
273	0x0111	R/W (#06)	Set temperature in schedule mode	50-450	N-> temp=N/10 °C	210
274	0x0112	R/W (#06)	Set temperature in manual mode	50-450	N-> temp=N/10 °C	210
275	0x0113	R/W (#06)	Set temperature in FROST mode	50	N-> temp=N/10 °C	50
279	0x0117	R/W (#06)	Maximum setpoint temperature	50-450	N-> temp=N/10 °C	350
280	0x0118	R/W (#06)	Minimum setpoint temperature	50-450	N-> temp=N/10 °C	50
284	0x011C	R/W (#06)	Accuracy of displayed temperature	1, 5	N-> temp=N/10 °C	1
285	0x011D	R/W (#06)	Correction of displayed temperature	-30... 30	N-> temp=N/10 °C (-3,0 do 3,0 °C in steps of 0,1 °C)	0
288	0x0120	R/W (#06)	Selection of system type - heating / cooling (dependent on the setting of input S1)	0,1	0 = Heating 1 = Cooling	0
291	0x0123	R/W (#06)	Minimum fan speed (Installer Parameters-P10)	0-100	N-> speed=N %	10
292	0x0124	R/W (#06)	Maximum fan speed (Installer Parameters-P11)	0-100	N-> speed=N %	90
293	0x0125	R/W (#06)	Speed of fan 1st gear in manual mode (Installer parameters-P12)	0-100	N-> speed=N %	30
294	0x0126	R/W (#06)	Speed of fan 2nd gear in manual mode (Installer parameters-P13)	0-100	N-> speed=N %	60
295	0x0127	R/W (#06)	Speed of fan 3rd gear in manual mode (Installer parameters-P14)	0-100	N-> speed=N %	90