

Modbus
Programming Manual

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1. HM 5001 E CS Modbus

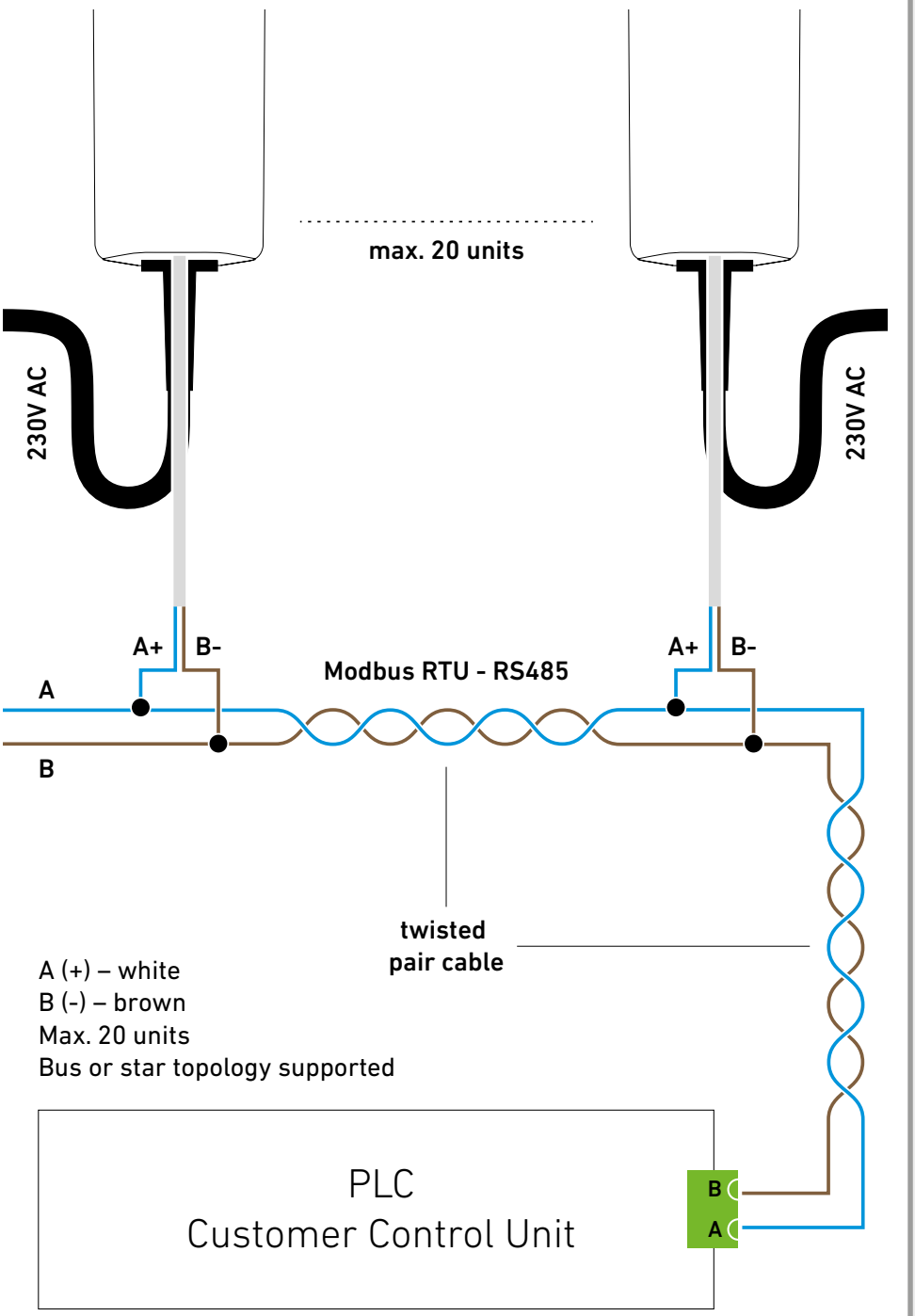
The HM 5001 E CS communicates using Modbus RTU protocol over RS485 half duplex.
The HM 5001 E CS acts as an addressable slave device. Multiple HM 5001 E CS can be connected to one ModBus RTU Line.

For communication testing can be used any Modbus RTU PC application and USB to RS485 converter:

- STEINEL HM 5001 E CS Modbus Demo App – contact your dealer
- Windows/Linux: QModBus
- Windows: QModMaster

The HM 5001 E CS has a safety feature that ensures shutdown in the event of loss of communication with the ModBus master.

1.1


max. 20 units
230V AC
230V AC
A+
B-
A+
B-
Modbus RTU - RS485
A
B
twisted
pair cable
A (+) – white
B (-) – brown
Max. 20 units
Bus or star topology supported
PLC
Customer Control Unit
B
A

2. Modbus RTU parameters

Parameter	Value
Baurate	9600
Data Bits	8
Stop bits	1
Parity	None
Flow control	None
Default device address	1
Endianess	Little endian
CRC	CRC-16-Modbus / CRC-16-IBM

3. Actual values

Actual values can be read via Read Only Input Registers.

Input register address	Value	Unit	Data format
1	Actual temperature	°C	INT16
2	Actual airflow	RPM	UINT16
3	Required temperature	°C	INT16
4	Required airflow	RPM	UINT16
5	Error bits		UINT16

Error bits
Value 1 on bit position indicates error

Bit position	Error description	Possible reasons
1	Required temperature cannot be reached	Heater disconnected or broken
2	Undervoltage	AC voltage too highlow
3	Overvoltage	AC voltage too high
4	Device fail	Device error that cannot be fixed by user

4. Communication

Query all five Input registers frame example (TX):
0x01 0x04 0x00 0x01 0x00 0x05 0x61 0xC9

Data	Type	Description
0x01	(UINT8)	Slave address
0x04	(UINT8)	Read Input Registers
0x00	(UINT16_H)	Start address
0x01	(UINT16_L)	
0x00	(UINT16_H)	Num of registers
0x05	(UINT16_L)	
0x61	(UINT16_H)	CRC
0xC9	(UINT16_L)	

Answer example (RX):
0x01 0x04 0x0a 0x00 0x53 0x00 0x00 0x00 0xf0 0x3d 0x8e
0x00 0x00 0x14 0x1c

Data	Type	Description
0x01	(UINT8)	Slave Address
0x04	(UINT8)	Read Input Registers
0x0a	(UINT8)	Bytes count
0x00	(UINT16_H)	Actual temperature
0x53	(UINT16_L)	
0x00	(UINT16_H)	Actual airflow
0x00	(UINT16_L)	
0x00	(UINT16_H)	Required temperature
0xf0	(UINT16_L)	

Data	Type	Description
0x3d	(UINT16_H)	Required airflow
0x8e	(UINT16_L)	
0x00	(UINT16_H)	Error code
0x00	(UINT16_L)	
0x14	(UINT16_H)	CRC
0x1c	(UINT16_L)	

5. Controlling

Control values can be set via Read / Write Holding registers.

Holding register address	Value	Unit	Data format	Range
1	Required temper-ature	°C	INT16	0 - 600
2	Required Airflow	RPM	UINT16	10000 - 24000

Values out of range are truncated.
Both values must be written at least once two seconds, otherwise the device will shut down for safety reasons.

Control values set frame example (TX):
0x01 0x10 0x00 0x01 0x00 0x02 0x04 0x00 0xC8 0x3A 0x98 0xA0 0x97

Data	Type	Description
0x01	(UINT8)	Slave Address
0x10	(UINT8)	Write Multiple Registers

Data	Type	Description
0x00	(UINT16_H)	Start Address
0x01	(UINT16_L)	
0x00	(UINT16_H)	Num Of Registers
0x02	(UINT16_L)	
0x04	(UINT8)	Bytes Count
0x00	(UINT16_H)	Temperature req. value
0xC8	(UINT16_L)	
0x3A	(UINT16_H)	Airflow req. value
0x98	(UINT16_L)	
0xA0	(UINT16_H)	CRC
0x97	(UINT16_L)	

Answer / ACK example (RX):
0x01 0x10 0x00 0x01 0x00 0x02 0x10 0x08

Data	Type	Description
0x01	(UINT8)	Slave Address
0x10	(UINT8)	Write Multiple Registers
0x00	(UINT16_H)	Start Address
0x01	(UINT16_L)	
0x00	(UINT16_H)	Registers Count
0x02	(UINT16_L)	
0x10	(UINT8)	CRC
0x08	(UINT16_H)	

6. Broadcast Address Assignment

Writing UINT 8 value to Device address 250 and holding register address 250 sets device address to the written value.
Only one device must be connected to the bus during address setting. This function is used, for example, when the address of a specific device is unknown and needs to be reset.

Address set frame example (TX):
0xfa 0x06 0x00 0xfa 0x00 0x03 0xbd 0x6d

Data	Type	Description
0xfa	(UINT8)	Slave Address
0x06	(UINT8)	Write Single Register
0x00	(UINT16_H)	Start Address
0xfa	(UINT16_L)	
0x00	(UINT16_H)	Required Address
0x03	(UINT16_L)	
0xbd	(UINT8)	CRC
0x6d	(UINT16_H)	

7. Address Assignment by Unique ID

1. Read UID from input registers 901 - 906
2. Write UID to holding registers 901 - 906 and new address to holding register 900

Example changing address from 1 to 2:
Read UID example (TX):
0x01 0x04 0x03 0x85 0x00 0x06 0x61 0xa5

Data	Type	Description
0x01	(UINT8)	Slave Address
0x04	(UINT8)	Read Input Registers
0x03	(UINT16_H)	Start Address (901)
0x85	(UINT16_L)	
0x00	(UINT16_H)	Registers Count (6)
0x06	(UINT16_L)	
0x61	(UINT16_H)	CRC
0xa5	(UINT16_L)	

Answer example (RX):
0x01 0x04 0x0c 0x00 0x75 0x00 0x21 0x50 0x18 0x46 0x33 0x34 0x52 0x20 0x34 0x9a 0x82

Data	Type	Description
0x01	(UINT8)	Slave Address
0x04	(UINT8)	Read Input Registers
0x0c	(UINT8)	Bytes count
0x00	(UINT16_H)	UID
0x75	(UINT16_L)	

Data	Type	Description
0x00	(UINT16_H)	UID
0x21	(UINT16_L)	
0x50	(UINT16_H)	UID
0x18	(UINT16_L)	
0x46	(UINT16_H)	UID
0x33	(UINT16_L)	
0x34	(UINT16_H)	UID
0x52	(UINT16_L)	
0x20	(UINT16_H)	UID
0x34	(UINT16_L)	
0x9a	(UINT16_H)	CRC
0x82	(UINT16_L)	

Write UID and new address example (TX):
0x01 0x10 0x03 0x84 0x00 0x07 0x0e 0x00 0x02 0x00 0x75
0x00 0x21 0x50 0x18 0x46 0x33 0x34 0x52 0x20 0x34
0x21 0x85

Data	Type	Description
0x01	(UINT8)	Slave Address
0x10	(UINT8)	Write Multiple Registers
0x03	(UINT16_H)	Start Address
0x84	(UINT16_L)	
0x00	(UINT16_H)	Registers Count
0x07	(UINT16_L)	
0x0e	(UINT16)	Bytes count

Data	Type	Description
0x00	(UINT16_H)	New address (2)
0x02	(UINT16_H)	
0x00	(UINT16_H)	UID
0x75	(UINT16_L)	
0x00	(UINT16_H)	UID
0x21	(UINT16_L)	
0x50	(UINT16_H)	UID
0x18	(UINT16_L)	
0x46	(UINT16_H)	UID
0x33	(UINT16_L)	
0x34	(UINT16_H)	UID
0x52	(UINT16_L)	
0x20	(UINT16_H)	UID
0x34	(UINT16_L)	
0x21	(UINT8)	CRC
0x85	(UINT16_H)	

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