

CALEC® ST III

RS 485 Modbus RTU



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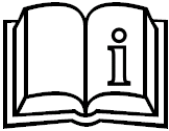
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1 General information

Content

In this operating manual are only Modbus specific information on CALEC® ST III, for more details, the technical documentation of CALEC® ST III is necessary.

REFERENCE!



You will find **further documentation** on our websites.

International clients: <https://integra-metering.com/product/calec-st-iii-standard-smart/>

German clients: <https://aquametro.de/product/calec-st-iii-standard-smart/>

Swiss clients (DE): <https://aquametro.com/product/calec-st-iii-standard-smart/>

Swiss clients (FR): <https://aquametro.com/fr/product/calec-st-iii-standard-smart/>

General information to Modbus: www.modbus.org.

CALEC® ST III: Overview of supported functions

Function	Parameter	Description	More information
Addressing range	Slave: 1-247	Factory setting: 1	See chapter: Configuration of the Modbus interface on CALEC® ST III
Baud rate	300, 2400, 9600, 19200, 38400	Factory setting: 19200	See chapter: Configuration of the Modbus interface on CALEC® ST III
Broadcast	Yes	Address 0	
Parity	Even, Odd or None	Factory setting: Even	See chapter: Configuration of the Modbus interface on CALEC® ST III
Function code	03	Read Holding Register Reads one or more registers of the Modbus slave. 1 to a maximum of 125 consecutive registers (1 register = 2 byte) can be read with a telegram.	
Modbus Unit Codes		All the values are always transmitted via Modbus in the basic units.	See chapter: Modbus register

2 Commissioning

Line termination

A termination resistor must be connected to each end of the segments. The modbus specification recommends a 120 Ohm resistor. If the CALEC® ST III is at the end of a segment, the internal termination resistor can be used.

Operating menu: Bus ⇌ Modbus ⇌ TRN.

Configuration of the Modbus interface on CALEC® ST III

After connecting the RS 485 to terminal A11 (+) and B11 (-) Modul #1 or A21 (+) and B21 (-) Modul# 2, the default parameters can be adapted. Set the necessary Modbus parameter in the CALEC® ST III operating menu, e.g. bus address from 1 to a valid address.

The parameters:

- Bus address
- Baud rate
- Parity

are changeable in the menu structure under :

Modbus ⇌ 1 ⇌ Address
⇌ 2 ⇌ Baud
⇌ Parity

The relevant bus number for the configuration results from the assembly of the Modbus interface in socket # 1 or socket # 2.

3 RS 485 Modbus RTU technology

Modbus is an open, standardized field bus system which is used in the areas of manufacturing automation, process automation and building automation. RS 485 Modbus RTU (Remote Terminal Unit) allows the heat calculator CALEC® ST III to be easily integrate to DDC, BMS, PLC or SCADA systems .

The Modbus RS 485 distinguishes between master and slave devices. The CALEC® ST III of Aquametro AG works as a slave station.

- **Master devices:**

Master devices determine the data traffic on the field bus system. They can send request telegram to one (Standard) or all (only Broadcast Address = 0) slaves.

- **Slave devices:**

Slave devices are able to send their data only in response to a request of a master.

4 Modbus protocol

The protocol defines the way in which messages will be transmitted between CALEC® ST III and a Modbus master.

Modbus telegram

The data is transferred between the master and slave by means of a telegram. A request telegram from the master contains the following telegram fields:

- **Slave Address:**

The bus address of the CALEC® ST III has to be in an address range from 1 to 247. The master talks to all the slaves simultaneously by means of the slave address 0 (Broadcast Message).

- **Function Code:**

The function code determines which read, write and test operations should be executed by means of the Modbus protocol.

- **Data:**

Depending of the function code, the following values are transmitted in this data field:

- Register start address (from which data are transmitted)
- Number of registers
- Read Data
- Data length

- **Check sum:**

The telegram check sum forms the end of the telegram.

If an error occurs during data transfer or if the slave cannot execute the command from the master, the slave returns an error telegram to the master.

Modbus register

In general a device parameter has its own register address. The master uses follow register addresses to access the data of CALEC® ST III.

Register no.	Register Name	Description	R / W	Data Type
General device parameters				
0	Device	0xC0 = CALEC® ST 0xC1 = CALEC® ST MASSE 0xC2 = CALEC® ST Flow 0xC4 = CALEC® ST BDE 0xC7 = CALEC® ST TGR 0xC8 = CALEC® ST BDV 0xC9 = CALEC® ST DTF	Read Only	16 Bit Integer
1	Status	OK = 0 ERROR = 1 ALARM = 2	Read Only	16 Bit Integer
2	Medium (mounting-side)	Cold = 0x04 Heat = 0x0C Water = 0x07 Unknown = 0x0F	Read Only	16 Bit Integer
4, 5	Serial Number	0...99999999	Read Only	32 Bit Integer
6, 7	Operating hours	0...99999999	Read Only	32 Bit Integer
8, 9	Error hours	0...99999999	Read Only	32 Bit Integer
10, 11	Alarm hours	0...99999999	Read Only	32 Bit Integer
12, 13	Firmware Version	z.B. 10500	Read Only	32 Bit Integer
14, 15	Hardware Version	z.B. 1011010	Read Only	32 Bit Integer
20	Address	1 - 247	Read Only	16 Bit Integer
21	Baud rate	0 = 300 1 = 2400 2 = 9600 3 = 19200 4 = 38400	Read Only	16 Bit Integer
22	Parity	0 = even 1 = add 2 = none		
Energy Counter				
100, 101	Value Energy 1		Read Only	IEEE754 Float
102	Unit Energy 1*		Read Only	16 Bit Integer
110, 111	Value Energy 2 (BDE, BDV, DTF, TGR)		Read Only	IEEE754 Float
112	Unit Energy 2*		Read Only	16 Bit Integer
120, 121	Value Energy 3 (BDE, BDV, DTF, TGR)		Read Only	IEEE754 Float
122	Unit Energy 3*		Read Only	16 Bit Integer
*	Unit Energy:	0: [KWh]		
Volume Counter				
200, 201	Value Volume 1		Read Only	IEEE754 Float
202	Unit Volume 1*		Read Only	16 Bit Integer
210, 211	Value Volume 2 (BDE, BDV, DTF)		Read Only	IEEE754 Float
212	Unit Volume 2*		Read Only	16 Bit Integer
*	Unit Volume:	1: [m³]		
Mass Counter				
300, 301	Value Mass		Read Only	IEEE754 Float
302	Unit Mass	2: [t]	Read Only	16 Bit Integer

Register no.	Register Name	Description	R / W	Data Type
Auxiliary Counter				
Counter 1				
400, 401	Value auxiliary		Read Only	IEEE754 Float
402	Unit auxiliary*		Read Only	16 Bit Integer
Counter 2				
410, 411	Value auxiliary		Read Only	IEEE754 Float
412	Unit auxiliary*		Read Only	16 Bit Integer
Counter 3				
420, 421	Value auxiliary		Read Only	IEEE754 Float
422	Unit auxiliary*		Read Only	16 Bit Integer
*	Units auxiliary:	0: [kwh] 1: [m ³] 2: [t] 3: without unit [1]		
Power Values				
500, 501	Value Power		Read Only	IEEE754 Float
502	Unit Power	10: [KW]	Read Only	16 Bit Integer
Volume Counter				
600, 601	Value Flow		Read Only	IEEE754 Float
602	Unit Flow	11: [m ³ /h]	Read Only	16 Bit Integer
Mass flow Values				
700, 701	Value Mass flow		Read Only	IEEE754 Float
702	Unit Mass flow	12: [t/h]	Read Only	16 Bit Integer
Temperature Values				
800, 801	Value Temperature Hot		Read Only	IEEE754 Float
802	Unit Temperature Hot	13: [°C]	Read Only	16 Bit Integer
810, 811	Value Temperature Cold		Read Only	IEEE754 Float
812	Unit Temperature Cold	13: [°C]	Read Only	16 Bit Integer
820, 821	Value Temperature difference		Read Only	IEEE754 Float
822	Unit Temperature difference	14: [K]	Read Only	16 Bit Integer
Values Density				
900, 901	Value Density		Read Only	IEEE754 Float
902	Unit Density	15: [kg/m ³]	Read Only	16 Bit Integer

Modbus status messages

Also the status messages are linked to Modbus registers. INTEGRA Metering AG will differentiate between follow types of status messages:

- **Device status „Error“:**

All important device errors , like „System Error“ must be checked.

- **Measurement value status „Alarm“:**

Specific messages like „dt Alarm“ must be checked.

(For more information please see error messages in the operating manual of CALEC® ST III).

5 Troubleshooting

No communication

If no communication via Modbus possible, please check the following:

- Are the connections to clamp A11 (+) and B11 (-) Modul #1 or A21 (+) and B21 (-) Modul #2, O.K.?
- Is the polarity „+“ / „-“ O.K.?
- Menu „MODBUS“ available?
- Is the Modbus setup at CALEC® ST III (Address, Baud rate and Parity) O.K.?
- Please check the address and baud rate of all Modbus slaves in the network.

