



## Modbus communication with SCC-T1-Tp2

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### Communication specifications Modbus RTU/ASCII

- RS485 2-wire MODBUS standard in accordance with EIA/TIA 485
- Slave type of communication
- Supports up to 127 nodes on one network
- Selectable transmission types:
  - **RTU** with CRC16 checksum
  - ASCII with LRC checksum
  - Baud rates: 4800, 9600, **19200**, 38400
  - Parity: No parity, odd or **even parity**.

Default: RTU with 8 data bits, 1 even parity bit, 1 stop bit. Baud rate 19200.

### Standards

Communication standard:	Modbus ( <a href="http://www.modbus.org">www.modbus.org</a> )
Default setting:	19200 Baud rate, RTU 8 data bits, 1 even parity bit, 1 stop bit
Communication speed:	4800, 9600, 19200, 38400
Protocol:	Modbus RTU with CRC16 checksum, Modbus ASCII with LRC checksum
Parity – stop bit:	no parity – 2 stop, even parity or odd parity – 1 stop, no parity – 1 stop (RTU mode only)

“No Parity” mode: In these cases, a 2<sup>nd</sup> stop bit is used to keep the byte length (11bit for RTU and 10 bit for ASCII, including the Start and Stop bits) unchanged in accordance with the Modbus specification. Other possible serial port modes like Odd Parity or baud rates other than listed ones are not supported.

### Supported Modbus commands

- 03 (0x03): Read multiple registers
- 06 (0x06): Write single register
- 16 (0x10): Write multiple registers

In commands 03 and 16 the allowed number of registers ranges from 1 to 32. Although Modbus specification would allow more registers to be read and written, a maximum of 32 Modbus registers are supported in one packet. One Modbus register is 16 bits wide. The Modbus slave transmits the values as signed 16 bit integers.

In an event of an out-of-range command addressing or an unsupported command, the Modbus slave responds with an exception message according to the Modbus specification.

## Configuration of SCC-MOD devices

Communication parameters can be set using the optional built-in operation terminal OPC-S V2, an external operation terminal OPA-S / OPU-S or via Modbus.

The OPA-S uses IP parameters to adjust communication settings.

### Configuration with OPA-S

1. Press UP/DOWN buttons simultaneously for three seconds.
2. Select 009 using UP/DOWN buttons.
3. Press OPTION after selecting the correct code.
4. Once logged in with Code 009, IP and OP parameters are displayed. Select IP and press option to select.
5. Select the parameters with the UP/DOWN buttons. Change a parameter by pressing the OPTION button. Use UP/DOWN buttons to adjust the value.
6. After you are done, press OPTION to save the new value and return to the selection level. Pressing left hand POWER button without pressing OPTION will discard the value and return without saving.
7. Press the POWER to leave the menu. The unit will return to normal operation if no button is pressed for more than 5 minutes.

### Input configuration

#### IP parameters for Modbus settings

Parameter	Description	Range	Standard
IP 00	Unit 0 = SI units 1 = Imperial units	0-1	0
IP 08	Communication address	1-127	1
IP 09	Baud rate: 0 = 19200 1 = 4800 2 = 9600 3 = <b>19200</b> 4 = 38400	0-4	3
IP 10	Communication mode: 0 = Modbus RTU, No parity, 2 stop bits 1 = <b>Modbus RTU, Even parity, 1 stop bit</b> 2 = Modbus RTU, Odd parity, 1 stop bit 3 = Modbus RTU, No parity, 1 stop bit 4 = Modbus ASCII, No parity, 2 stop bits 5 = Modbus ASCII, Even parity, 1 stop bit 6 = Modbus ASCII, Odd parity, 1 stop bit	0-6	1
IP 11	Allow parameter change via Modbus 0 = No change allowed 1 = Change allowed 37 = Change allowed including OE parameters (expert only)	0-1 (37)	1



#### **Changing address register through broadcast message**

It is not possible to change network address register through broadcast message.

## Modbus addresses for SCC-T1-Tp2

### Table entry description

**Address:** Modbus address to access information

**Access:** Specifies how data can be accessed. R: Read only access, R/W: Read and write access

**Description:** Describes the type of the entry

**Multiplier:** Multiply the value displayed in Modbus with "Multiplier" to compute the real value

**Unit:** Unit of this parameter

### Sensor value addresses

Address	Access	Description	Range	Multiplier	Unit
0	R	Temperature value	-600-4000	0.1	°C
			-760-7520	0.1	°F
1	R	Minimum temperature value	-600-4000	0.1	°C
			-760-7520	0.1	°F
2	R	Maximum temperature value	-600-4000	0.1	°C
			-760-7520	0.1	°F
3	R/W	Reset minimum and maximum temperature value Write "1" to this register to reset the values.	0-1	1	No unit

### Analog output values

Address	Access	Description	Range	Multiplier	Unit
100	Read	Analog Output 1 value	0-1000	0.1	%

### Input configuration parameters

Address	Access	Description	Range	Multiplier	Unit
200	R/W	Temperature unit	0-1	1	No unit
201	R/W	Samples taken for averaging control signal	1-255	1	No unit
202	R/W	Sensor calibration	-100-100	0.1	°C
			-200-200	0.1	°F
203	R/W	Minimum temperature	-40-400	1	°C
			-40-752	1	°F
204	R/W	Maximum temperature	-40-400	1	°C
			-40-752	1	°F

### OP parameters

Address	Access	Description	Range	Multiplier	Unit
300	R/W	Configuration output signal: 0 = Feedback temperature input 1 = Feedback temperature minimum value 2 = Feedback temperature maximum value	0-2	1	No unit
301	R/W	Minimum limitation of output signal	0...Max.	1	%
302	R/W	Maximum limitation of output signal	Min...100	1	%

### Device information parameters

Address	Access	Description	Range	Multiplier	Unit
400	R	Software version	-	1	No unit
401	R	Software revision	-	1	No unit
402	R	Device ID	-	1	No unit
403	R	Error	1-7	1	No unit
404	R	Alarm	1-7	1	No unit
405	R/W	AEC-PM2 copy (Range 0..1, 7 read only) 0: Parameter copy successful; No action 1: Start parameter copy to AEC-PM2 7: Copy fail (no AEC-PM2 or communication error)	0-1 7 Read only	1	No unit

### Modbus configuration parameters

Address	Access	Description	Range	Multiplier	Unit
500	R/W	Modbus device address	<b>1-127</b>	1	No unit
501	R/W	Baud rate Modbus RS485	0-4	1	No unit
		0 = 19200			
		1 = 4800			
		2 = 9600			
		<b>3 = 19200</b>			
4 = 38400					
502	R/W	Communication mode	0-6	1	No unit
		0 = Modbus RTU, No parity, 2 stop bits			
		<b>1 = Modbus RTU, Even parity, 1 stop bit</b>			
		2 = Modbus RTU, Odd parity, 1 stop bit			
		3 = Modbus RTU, No parity, 1 stop bit			
		4 = Modbus ASCII, No parity, 2 stop bits			
		5 = Modbus ASCII, Even parity, 1 stop bit			
6 = Modbus ASCII, Odd parity, 1 stop bit					
503	R/W	Allow parameter change through Modbus	0-1 37 (expert only)	1	No unit
		0 = No change allowed			
		<b>1 = Parameter change allowed</b> 37 = Parameter change allowed including OE (expert only)			

Note: Default value are bold

**OE parameters (expert only)**

Address	Access	Description	Range	Multiplier	Unit
1000	R/W	AO1 voltage calibration	0-255	1	No unit
1001	R	Not used	0-255	1	No unit
1002	R	OPA-S software version	0-255	1	No unit
1003	R	SCC software version	0-255	1	No unit
1004	R/W	AO1 current calibration	0-255	1	No unit
1005	R	Not used	0-255	1	No unit

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Vector Controls GmbH  
Switzerland

[info@vectorcontrols.com](mailto:info@vectorcontrols.com)

[www.vectorcontrols.com](http://www.vectorcontrols.com)

