MANUAL

CONNECT TO BETTER

Wavin Sentio Modbus manual

Contents

Requierments

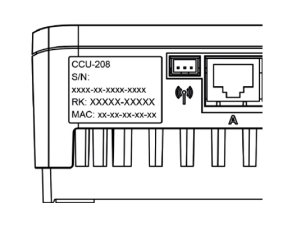
This manual covers the Modbus specification for Sentio control unit with firmware version from TM60002.b41 up to version TM60006.6.

Bus parameters

Parameter	Values
Transmission mode	RTU
Supported baud rates	9600,19200(default),38400, 57600 bps
Default address	1(default) - 247
Data bits	8
Parity	None
Stop bit	1
Possible modes	Disabled (Default), Read only, Read/write
Physical interface	RS-485
Reply time limit	Timeout = 500 mS ???
Max reading volume at once:	max 32 pcs register or 256 bits ???

Modbus connection on Sentio control unit

The Modbus shall be connected to the most left RJ-45 connector at the bottom of the Sentio Control unit. The RJ-45 connector is marked with an “A”.



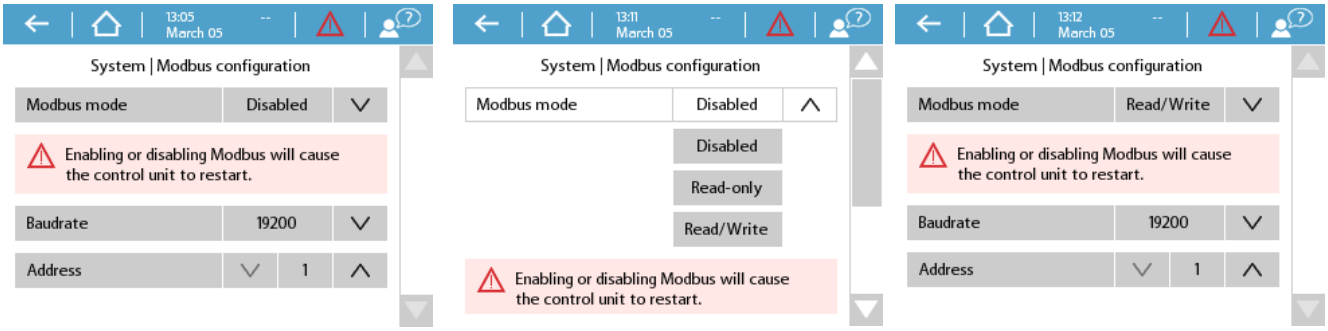
RJ-45 pin layout in Wavin Sentio control unit

Pin no.	
1	GND
2	GND
3	B
4	Not connected
5	Not connected
6	A
7	+ 24 V
8	+ 24 V

Activating and setup of the Modbus

As standard is the Modbus connection deactivated. It is only possible to activate the Modbus port by using a Sentio Display. To activate the Modbus, go to System | Installer settings | Modbus configuration and select the desired mode. After selection of Modbus mode, the Sentio control unit is restarted.

Remark: After activating the Modbus mode it not possible to use the RJ-45 A connector for the Sentio display.



Modbus values

List of values

The complete list of values is described appendix 1 in this manual.

Versioning

The list of Modbus values is not stable. As new features are implemented, new values are added. If you want to know exactly which values are offered by your system:

a. Read following Modbus registers

Modbus address	Value name	Description
00001	Address space major version	Incremented on incompatible change E.g. when changing format or removing values.
00002	Address space minor version	Incremented on compatible change E.g. when adding new values.

b. Find the FW-version in the 2right most columns in Appendix 1

c. The values marked as Yes in this column are supported by your system

Modbus registers

The Modbus offers several types of registers. Following types are supported by Sentio.

Area name	Access width	Access type	Usage
Discrete inputs	1-bit	Read only	Read system alarms and warnings
Input registers	16-bit registers	Read only.	Read state values
Holding registers	16-bit registers	Read / Write	Read/write configuration

Modbus commands

The registers described in the previous chapter can be accessed using following commands.

See Modbus specification for packet format - http://modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

Code	Command	Area
0x02	Read discrete inputs	Discrete inputs
0x03	Read holding registers	Holding registers
0x04	Read input registers	Input registers
0x06	Write single register	Holding register
0x10	Write multiple registers	Holding registers

Error handling and return codes

Modbus error codes

Exception code	Command	Area
01	Illegal function	Returned when unknown command is used. See Modbus Commands for list of supported commands
02	Illegal data address	Returned when reading or writing to register, which does not exist. Note: This is also the case when multiple registers are accessed in a function and one or more registers don't exist and some registers might exist
03	Illegal data value	Returned when writing register by a value, which is not supported. See appendix 1 for list of supported values
04	Slave device failure	Returned when reading of writing register, which contains values from a peripheral, which is disconnected - e.g. the Calefa controller
06	Server device busy	Returned during device start-up, or when data integrity cannot be guaranteed.

Device booting

Device returns exception code SERVER DEVICE BUSY (06) during start-up, because data integrity cannot be guaranteed during start-up.

Invalid value

If a measured value is not initialized -e.g. due to failure or long response time from wireless peripherals -then INVALID_VALUE is returned as a response to read command. INVALID_VALUE is described in paragraph Data types.

Data validation

When a configuration data is set, then it is validated and can be modified by system to meet the system requirements or it can be rejected.

- If value is lower than minimum, then it is set to minimum
- If value is higher than maximum, then it is set to maximum
- If value is not aligned to step, it is aligned (e.g. temperature 15.2 is aligned to 15.0)
- If a string value (val_utf8) is longer than the device can store, the string is shortened

Data types

All Modbus registers consist of 16 bits of data. The meaning of this data can be different and multiple registers can be combined to hold more data. Following data types are supported:

Type	Length	Range	Invalid value
val_enum	1B	0..255	0xFF
val_u	1B	0..255	0xFF
val_u2	2B	0..65535	0xFFFF
val_u4	4B	0..4294967295	0xFFFFFFFF
val_utf8	2b LEN + UTF8	Utf8. max 256B	LEN= 0xFFFF, no data
val_d2_fp100	2B	Fixed-point (-327,68..327,67)	0x7FFF

Reading and writing text values (datatype val_utf8)

val_utf8 is composed by multiple 16 bits holding registers, but the data itself is an array of bytes. When for instance the string “Hello” is stored in the array the first byte is placed first in the packet etc. This results in a read response of:

Command

Command code	Byte count	Reg X Hi	Reg X Lo	Reg X+1 Hi	Reg X+1 Lo	Reg X+2 Hi	Reg X+2 Lo	Reg X+3 Hi	Reg X+3 Lo
0x03	0x08	“H”	“e”	“l”	“l”	“o”	“0x00”	“0x00”	“0x00”

It is also possible to store UTF-8 strings – e.g. **“Blå Værelse”**. In this case, the national characters are encoded into multiple bytes. We see that 13 bytes will be needed to save the entire text.

Character	Value
B	0x42
l	0x6c
å	0xc3
	0xa5
V	0x56
æ	0xc3
	0xa6
r	0x72
e	0x65
l	0x6c
s	0x73
e	0x65

Bilag 1

						Address space version	
Object	**Parameter**	**R/W**	**Modbus Table**	**Modbus Address**	**Description**	1.0 FWPKG 4.x	2.0 FWPKG 6.x
LOCATION							
Location				000xx			
	Aggregated warning	R	Discrete Inputs	00001	A problem is pending in whole system (Location)	YES	YES
	Aggregated error	R	Discrete Inputs	00002	A critical problem is pending in whole system (Location)	YES	YES
	Address space major version	R	Input Register	00001	= 3 (Incremented on incompatible change)	YES	CHANGED
	Address space minor version	R	Input Register	00002	= 0 (Incremented on compatible change)	YES	YES
	-	R	Input Register	00003-00009	reserved for modbus related things	YES	YES
	Dev type	R	Input Register	00010	1 - CCU-208 2 - DHW-201 (Calefa)	YES	YES
	Dev hw version	R	Input Register	00011		YES	YES
	Dev sw version	R	Input Register	00012		YES	YES
	Dev sw version minor	R	Input Register	00013		YES	YES
	Dev serial number prefix	R	Input Register	00014	= 1530	YES	YES
	Dev serial number	R	Input Register	00015-00016		YES	YES
	-	R	Input Register	00017-00019	reserved for additional device descriptors	YES	YES
	Address space major version	R/W	Holding register	00001	= 3 (Incremented on incompatible change)	YES	CHANGED
	Address space minor version	R/W	Holding register	00002	= 0 (Incremented on compatible change)	YES	YES
	Modbus slave address	R/W	Holding register	00003	Allowed values: 1 to 247 Default: 1	YES	YES
	Modbus baudrate	R/W	Holding register	00004	Allowed values: 9600, 19200, 38400, 57600 Default:19200	YES	YES
	Modbus mode	R/W	Holding register	00005	0 DISABLED 1 READ_ONLY 2 READ_WRITE 3 WRITE_WITH_PASSWORD Default: 0	YES	YES
	Location name	R/W	Holding register	00010-00025	Placeholder for 32 bytes of location description. See “working with strings” chapter for more info.	YES	YES
	Standby	R/W	Holding register	00026	0 OFF 1 ON	YES	YES
	Vacation	R/W	Holding register	00027	0 OFF 1 ON	YES	YES

ROOMS (INDOOR ZONES)							
Room 1				001xx			
	Aggregated warning	R	Discrete Inputs	00101	A problem is pending in Room	YES	YES
	Aggregated error	R	Discrete Inputs	00102	A critical problem is pending in Room	YES	YES
	Warning - low battery	R	Discrete Inputs	00103	There are one or more peripherals in the room with low battery.	YES	YES
	Error - peripheral lost	R	Discrete Inputs	00104	There are one or more peripherals in the room which are not responding.	YES	YES
	Desired temp	R	Input Register	00101	Shows the desired temperature in the room.	YES	YES
	General Heating/Cooling state (radiator | underfloor | integration)	R	Input Register	00102	1 IDLE 2 HEATING 3 COOLING 4 BLOCKED_HEATING 5 BLOCKED_COOLING	YES	YES
	General Heating/Cooling blocking source (radiator | underfloor | integration)	R	Input Register	00103	0 NONE 1 UNKNOWN 2 CONTACT 3 FLOOR_TEMP 4 LOW_ENERGY 5 AIR_TEMP 6 DEW_POINT 7 OUTDOOR_TEMP 8 FAULT (general fault, e.g. missing sensors) 9 FAULT_HTCO 10 PERIODIC_ACTIVATION The number of blocking sources is still growing. There can be another values than listed in this documentation.	YES	YES
	Air temperature	R	Input Register	00104	Current air temperature measured in the room.	YES	YES
	Floor temperature	R	Input Register	00105	Current floor temperature measured in the room.	YES	YES
	Relative humidity	R	Input Register	00106	Current humidity measured in the room.	YES	YES
	Room name	R/W	Holding register	00101 - 00116	String description (32 Bytes, UTF8, NULL terminated)	YES	FORMAT CHANGED
	Room mode	R/W	Holding register	00117	0 SCHEDULE 1 MANUAL In SCHEDULE mode, the “Room temperature setpoint” is not used and the room temperature is controlled by scheduler.	YES	YES
	Room mode override	R/W	Holding register	00118	0 NONE 1 TEMPORARY 2 VACATION_AWAY 3 ADJUST In override mode (> NONE), the “Room temperaturesetpoint” is not used. The requested temperature is corrected by user via room thermostat or mobile application. You can disable the override mode by setting this value to 0 (NONE)	YES	YES
	Room temperature setpoint	R/W	Holding register	00119	Temperature requested by user. This values is not used when - Room mode = SCHEDULE (Scheduler temperature is used) - Location.Vacation = ON (Vacation temperature is used) - Location.Standby = ON (Standby temperature is used) - Temporary mode is activated (User defined temperature is used)	YES	YES
Room 2	Same as Room 1			002xx		YES	YES
Room 3	Same as Room 1			003xx		YES	YES
...				...		YES	YES
Room 16	Same as Room 1			016xx		YES	YES
OUTDOOR ZONES							
Outdoor 1				033xx			
	Aggregated warning	R	Discrete Inputs	03301	A problem is pending in Outdoor zone	YES	YES
	Aggregated error	R	Discrete Inputs	03302	A critical problem is pending in Outdoor zone	YES	YES
	Warning - low battery	R	Discrete Inputs	03303	There are one or more peripherals in the Outdoor zone with low battery.	YES	YES
	Error - peripheral lost	R	Discrete Inputs	03304	There are one or more peripherals in the Outdoor zone which are	YES	YES
	Air Temp	R	Input Register	03301	Used for Frost protection, Cooling blocking, H/C mode switching	-	YES
	Air Temp Filtered	R	Input Register	03302	Used in Heat curve calculations, H/C blocking (to be changed)	-	YES
	Air Temp Geometrical	R	Input Register	03303	Not yet used in the code (pending issue)	-	YES
	Name	R/W	Holding Register	03301 - 03316	String description (32 Bytes, UTF8, NULL terminated)	-	YES
	Air Temp BMS Override	R/W	Holding Register	3317	Enables to put artificial externa temperature used for ITC1 INVALID ... it will not be used	-	YES

DHW CONTROLLERS							
DHW Calefa				065xx			
	Aggregated warning	R	Discrete Inputs	06501	A problem is pending in DHW	YES	YES
	Aggregated error	R	Discrete Inputs	06502	A critical problem is pending in DHW	YES	YES
	Warning - Retentive Low Energy	R	Discrete Inputs	06503		YES	YES
	Error - DHW temp high	R	Discrete Inputs	06504		YES	YES
	Error - Motor failure	R	Discrete Inputs	06505		YES	YES
	Error - DHI sensor failure (source inlet)	R	Discrete Inputs	06506		YES	YES
	Error - DHO sensor failure (source return)	R	Discrete Inputs	06507		YES	YES
	Error - DHW sensor failure	R	Discrete Inputs	06508		YES	YES
	Error - DCW sensor failure	R	Discrete Inputs	06509		YES	YES
	Desired DHW temp	R	Input Register	06501	Shows the desired temperature of the domestic hot water.	YES	YES
	State	R	Input Register	06502	1 IDLE 2 HEATING (hot water is consumed by user) 3 BYPASS (keeping heat exchanger hot for circulation) 4 BLOCKED_HEATING 5 BLOCKED_BYPASS Shows, whether the system wants to heat or to have bypass activated.	YES	YES
	Blocking source	R	Input Register	06503	Same as Heating/Cooling blocking source	YES	YES
	Circulation state	R	Input Register	06504	0 NONE (disabled) 1 IDLE 2 ON	YES	YES
	Name	R/W	Holding Register	06501 - 06516	String description (32 Bytes, UTF8, NULL terminated)	YES	FORMAT CHANGED
	Mode	R/W	Holding Register	06517	0 SCHEDULE 1 SCHEDULE_ADAPTIVE 2 ECO 3 COMFORT Eco = circulation and hot bypass are disabled Comfort = circulation and hot bypass are enabled	YES	YES
	User interface access level (calefa display lock)	R/W	Holding Register	06518	< 40 USER (user menu) >= 40 INSTALLER (inst. menu)	YES	YES
	Block request	R/W	Holding Register	06519	0 NONE 1 BLOCK_REQUEST When BLOCK_REQUEST is set, then the system blocks heating and bypass to eliminate consumption from heat supplier.	YES	YES
	Power consumption limit	R/W	Holding Register	06520		YES	YES
	DHW temp set	R/W	Holding Register	06521	Requested temperature of domestic hot water.	YES	YES
	DHW bypass temp	R/W	Holding Register	06522		YES	YES
	Circulation - Pump present	R/W	Holding Register	06523	0 DISABLED 1 ENABLED (scheduler)	YES	YES
	Circulation - Inlet temp	R/W	Holding Register	06524	When circulation is enabled and there is NO dhw consumption, then the DHW temperature is regulated to this value.	YES	YES
HCC CONTROLLERS							
HCC1				077xx			
	Aggregated warning	R	Discrete Inputs	07701	A problem is pending in ITC	-	YES
	Aggregated error	R	Discrete Inputs	07702	A critical problem is pending in ITC	-	YES
	Error - inlet sensor failure		Discrete Inputs	07703		-	YES
	Error - High temp cut-off activated	R	Discrete Inputs	07704	Safety mechanism "high temp cut-off" is activated	-	YES
	State	R	Input Register	07701	1 IDLE 2 HEATING 3 COOLING 4 BLOCKED_HEATING 5 BLOCKED_COOLING	-	YES
	Blocking source	R	Input Register	07702	Same as Heating/Cooling blocking source	-	YES
	Pump - Demand	R	Input Register	07703	1 IDLE 2 ON	-	YES
	Pump - State	R	Input Register	07704	1 IDLE 2 ON	-	YES
	Measured inlet temperature	R	Input Register	07705	Measured temperature of the inlet heating/cooling water.	-	YES
	Desired inlet temperature	R	Input Register	07706	Desired temperature of the inlet heating/cooling water. The value which the ITC regulator wants to meet.	-	YES
	Name	R/W	Holding Register	07701-07716	String description (32 Bytes, UTF8, NULL terminated)	-	YES
	Heat curve - type	R/W	Holding Register	07717	0 MANUAL 1 CALCULATED 2 UNDERFLOOR 3 RADIATORS	-	YES
	Heat curve - manual slope	R/W	Holding Register	07718	Curve slope.Used only in MANUAL	-	YES
	Heat curve - parallel displacement	R/W	Holding Register	07719	Shifts calculated temperature up/down	-	YES
	Heat curve - min inlet	R/W	Holding Register	07720	Lowest possible temperature	-	YES
	Heat curve - max inlet	R/W	Holding Register	07721	Highest possible temperature	-	YES
	Heat curve - gain	R/W	Holding Register	07722	Static gain of desired temperature calculation	-	YES
	High Temp Cut-Off - Mode	R/W	Holding Register	07723	Heating is blocked, when inlet temperature exceeds the limit. Alarm is raised, pump is switched off (ignoring all pump delay). 0 DISABLED 1 ENABLED	-	YES
	High Temp Cut-Off - Temp	R/W	Holding Register	07724	Limit temperature for High Temp Cut-Off	-	YES
HCC2	same as HCC1			078xx		-	YES

HCC CONTROLLERS							
HCC1				077xx			
	Aggregated warning	R	Discrete Inputs	07701	A problem is pending in ITC	-	YES
	Aggregated error	R	Discrete Inputs	07702	A critical problem is pending in ITC	-	YES
	Error - inlet sensor failure		Discrete Inputs	07703		-	YES
	Error - High temp cut-off activated	R	Discrete Inputs	07704	Safety mechanism "high temp cut-off" is activated	-	YES
	State	R	Input Register	07701	1 IDLE 2 HEATING 3 COOLING 4 BLOCKED_HEATING 5 BLOCKED_COOLING	-	YES
	Blocking source	R	Input Register	07702	Same as Heating/Cooling blocking source	-	YES
	Pump - Demand	R	Input Register	07703	1 IDLE 2 ON	-	YES
	Pump - State	R	Input Register	07704	1 IDLE 2 ON	-	YES
	Measured inlet temperature	R	Input Register	07705	Measured temperature of the inlet heating/cooling water.	-	YES
	Desired inlet temperature	R	Input Register	07706	Desired temperature of the inlet heating/cooling water. The value which the ITC regulator wants to meet.	-	YES
	Name	R/W	Holding Register	07701-07716	String description (32 Bytes, UTF8, NULL terminated)	-	YES
	Heat curve - type	R/W	Holding Register	07717	0 MANUAL 1 CALCULATED 2 UNDERFLOOR 3 RADIATORS	-	YES
	Heat curve - manual slope	R/W	Holding Register	07718	Curve slope.Used only in MANUAL	-	YES
	Heat curve - parallel displacement	R/W	Holding Register	07719	Shifts calculated temperature up/down	-	YES
	Heat curve - min inlet	R/W	Holding Register	07720	Lowest possible temperature	-	YES
	Heat curve - max inlet	R/W	Holding Register	07721	Highest possible temperature	-	YES
	Heat curve - gain	R/W	Holding Register	07722	Static gain of desired temperature calculation	-	YES
	High Temp Cut-Off - Mode	R/W	Holding Register	07723	Heating is blocked, when inlet temperature exceeds the limit. Alarm is raised, pump is switched off (ignoring all pump delay). 0 DISABLED 1 ENABLED	-	YES
	High Temp Cut-Off - Temp	R/W	Holding Register	07724	Limit temperature for High Temp Cut-Off	-	YES
HCC2	same as HCC1			078xx		-	YES