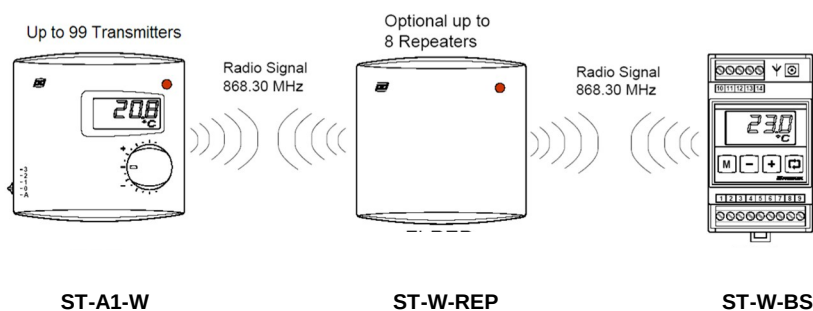


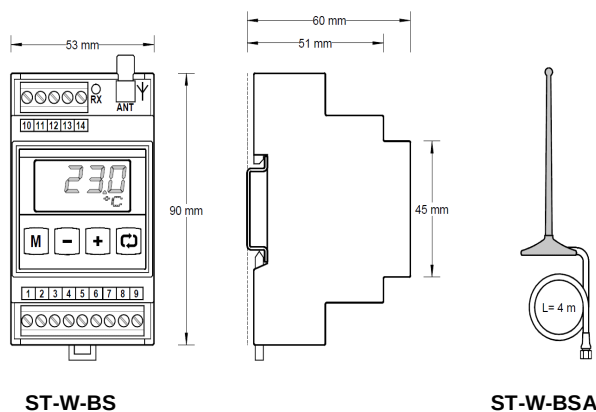
Application Note

ST-W-BS(-BSA) is a base station for wireless transmitters. Controls and measurements can be transmitted via the base station to a MODBUS communication interface for sensor readings. Furthermore, 8 controls or measurements are possible to set ST-W-BS(-BSA) analog outputs (0..10Vdc).

Typical set-up, with optional repeaters:



The range of radio signal in free space (indoor / outdoor) is about 500 meters, but constructions can reduce it to 20..100 meter. One or more repeater(s) is used to increase range of radio signal correspondingly. It is possible to use up to 8 repeaters in one wireless net.



ST-W-SER

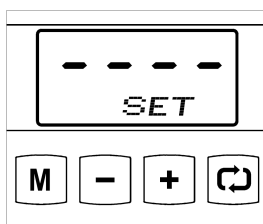
Wireless sensors are connected to the base station via the ST-W-SER wireless configuration tool.

ST-W-REP

When wider signal range is needed, up 8 repeaters can possibly be used in one wireless net in more difficult circumstances.

Setting up the base station ST-W-BS(-BSA)

After switching power on at first time, displays ST-W-BS(-BSA) version number shortly and after that blinks "SET". ST-W-BS(-BSA) has its default settings and must be configured. Push **[M]** -button about 5s to proceed and do all needed settings in menu. The ST-W-BS(-BSA) base station saves settings after exiting menu.

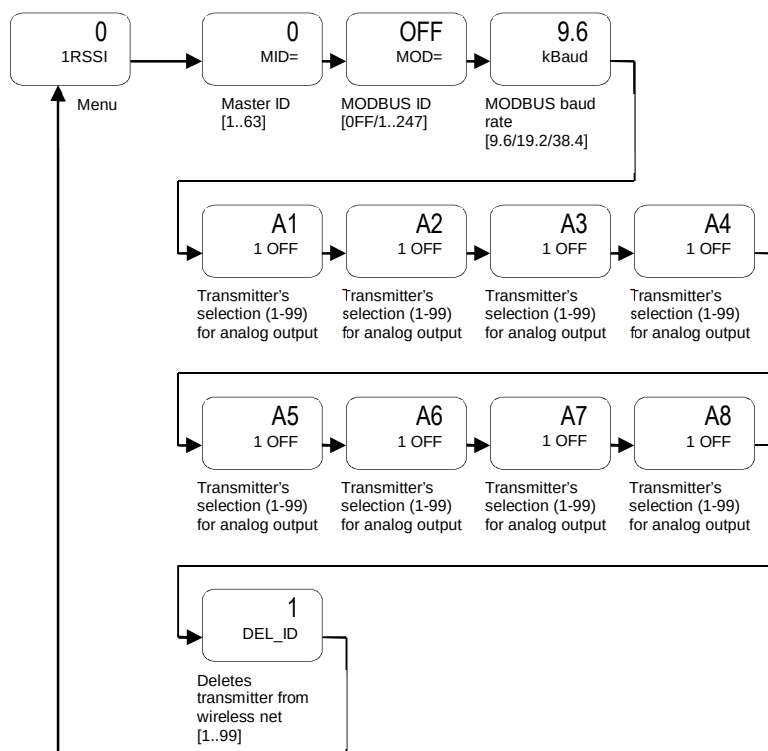


In display ST-W-BS(-BSA) shows any chosen measurement.

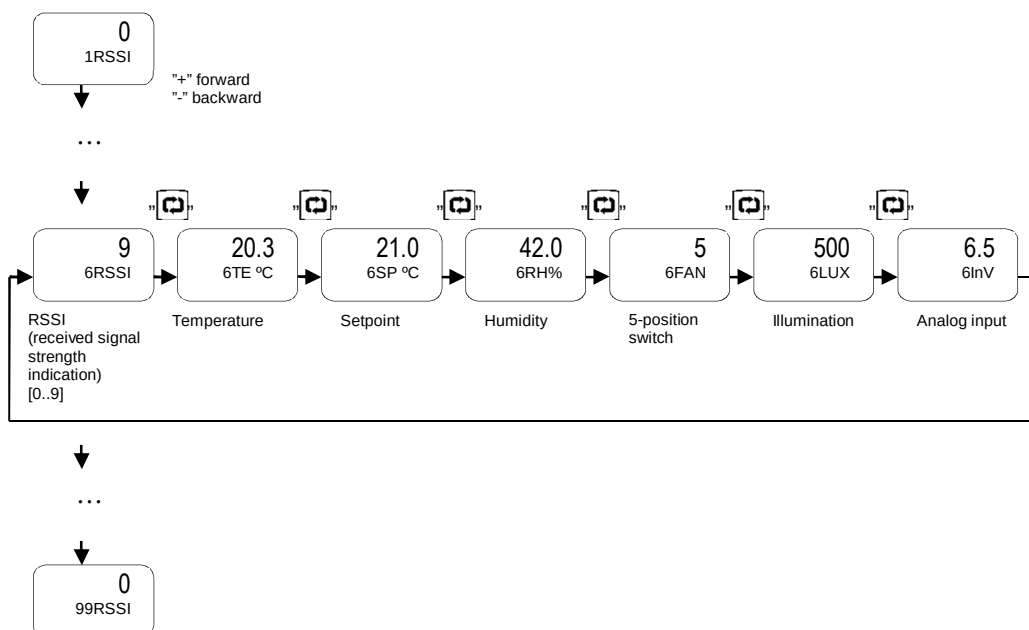
There are four (4) touch sensitive buttons:

- "+" - buttons are for browsing transmitters 1 .. 99
- **[M]** -button is for browsing sensor's individual measurements

Menu

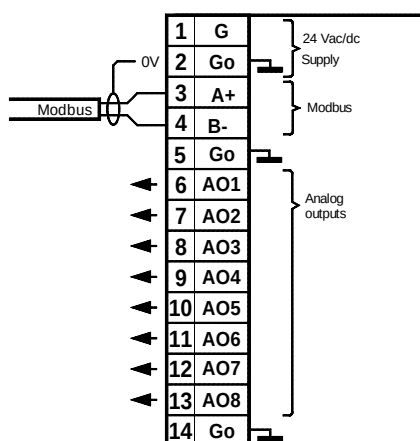


User mode



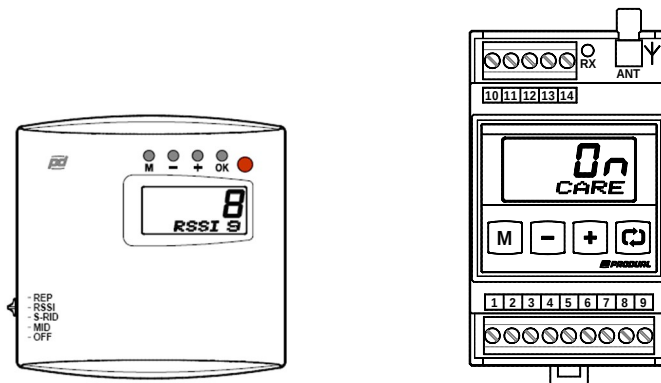
Electrical wiring ST-W-BS(-BSA)

WARNING: The electrical installation, device connection and commissioning can only be carried out by qualified professionals and according to the local wiring regulations!



SIGNAL STRENGTH TESTING

1. After setting up ST-W-BS(-BSA) base station, put switch of ST-W-SER on RSSI position.
2. "On CARE" text appears in ST-W-BS(-BSA) display and RX (receive) led blinks rapidly.
3. Now it is suitable to test signal strength in planned installation places.
NOTE! It's not recommended to hold the device in hand under testing, because of free radio way.
4. ST-W-SER displays base stations (small number) and transmitter's (big number) signal strengths (1-2 = poor, 3-5 = acceptable and 6-9 = good).
5. After test, put ST-W-SER's switch on OFF position and ST-W-BS(-BSA) is ready for use - "On CARE" text disappear.



NOTE! If signal strength is not good enough, install a repeater ST-W-REP.

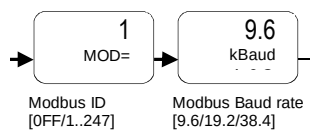
MASTER ID (MID)

Each wireless net has its own identification number (MID). The master ID is the way how the base station, repeaters and transmitters recognize each others. MID can be 1 .. 63 and theoretically one wireless net includes one ST-W-BS(-BSA), up to 8 ST-W-REP and up to 99 transmitters.

MODBUS

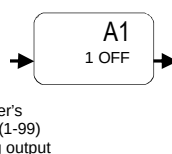
Supports RS485 Modbus RTU, 9600/19200/38400 bps, 8 data bits, Parity None, 1 Stop Bit (Up to 128 devices per segment). MODBUS is "Off" mode as default.

NOTE! MODBUS "Off" mode has an effect to alarm functions (See ALARM).



ANALOG OUTPUT

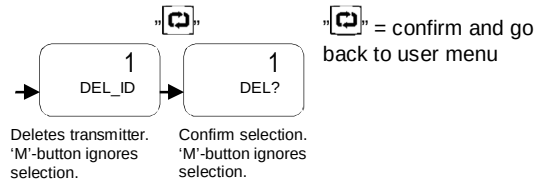
Analog output sets up via user menu by selecting transmitter input [1 .. 99] to output [A1 .. A8] and [C]-button selected measurement. One transmitter can be connected more than one analog output.



REMOVING UNNECESSARY TRANSMITTER FROM WIRELESS NET

First, remove the battery or power supply from the unnecessary transmitter. Second, remove the chosen transmitter from the ST-W-BS(-BSA) database because of the alarms.

NOTE! The unnecessary transmitter must remove from the wireless net.



ALARM

Alarm types:

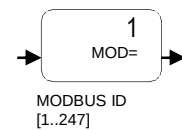
- alarm
- information of alarms (Low Battery, Lost)

The alarm can come from:

- lost (no connection to transmitter) or
- low battery (about 5 % capacities left)

1. MODBUS "ON". Alarms only via MODBUS

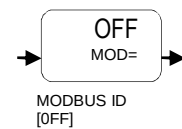
- Alarm
- Node 1 Low Battery
- Node 1 Lost



NOTE! No Alarm in display only in MODBUS

2. I/O Alarm (MODBUS"OFF")

MODBUS connector 4 B- (5 V = ALARM). State information is connectable to an existing BMS with auxiliary relay (e.g. T-PD-RY1-U auxiliary relay module).



NOTE! Alarm in display.

Alarm reset is done via MODBUS or pushing -button during 5s.

VER.2.2 The controller supports the following MODBUS registers and function codes.

Register	Parameter Description	Data Type	Range
FUNCTION CODE 01 - READ COILS			
1	Node 1 DO1	Bit0	On - Off
2	Node 2 DO1	Bit1	On - Off
...			
98	Node 98 DO1	Bit1	On - Off
99	Node 99 DO1	Bit2	On - Off
101	Node 1 DO2	Bit4	On - Off
102	Node 2 DO2	Bit5	On - Off
...			
198	Node 98 DO2	Bit5	On - Off
199	Node 99 DO2	Bit6	On - Off
201	ALARM	Bit8	On - Off
FUNCTION CODE 02 - READ DISCRETE INPUTS			
1	Node 1 Low Battery	Bit0	On - Off
2	Node 2 Low Battery	Bit1	On - Off
...			
98	Node 98 Low Battery	Bit1	On - Off
99	Node 99 Low Battery	Bit2	On - Off
101	Node 1 Lost	Bit4	On - Off
102	Node 2 Lost	Bit5	On - Off
...			
198	Node 98 Lost	Bit5	On - Off
199	Node 99 Lost	Bit6	On - Off
201	Node 1 PIR	Bit8	On - Off
202	Node 2 PIR	Bit9	On - Off
...			
298	Node 98 PIR	Bit9	On - Off
299	Node 99 PIR	Bit10	On - Off
301	Node 1 DI1	Bit12	On - Off
302	Node 2 DI1	Bit13	On - Off
...			
398	Node 98 DI1	Bit13	On - Off
399	Node 99 DI1	Bit14	On - Off
401	Node 1 DI2	Bit0	On - Off
402	Node 2 DI2	Bit1	On - Off
...			
498	Node 98 DI2	Bit1	On - Off
499	Node 99 DI2	Bit2	On - Off

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FUNCTION CODE 03 - READ HOLDING REGISTERS

34	Coils 16 - 01	16 bit	
35	Coils 32 - 17	16 bit	
...			
45	Coils 192 - 177	16 bit	
46	Coils 208 - 193	16 bit	
47	Spare	16 bit	
48	Spare	16 bit	
49	Spare	16 bit	
50	Node 1 AO1	Signed 16	0,0 ... 10,0 (V)
51	Node 1 AO2	Signed 16	0,0 ... 10,0 (V)
...			
246	Node 99 AO1	Signed 16	0,0 ... 10,0 (V)
247	Node 99 AO2	Signed 16	0,0 ... 10,0 (V)

FUNCTION CODE 04 - READ INPUT REGISTERS

2	Discrete Inputs 16 - 01	16 bit	
3	Discrete Inputs 32 - 17	16 bit	
...			
32	Discrete Inputs 496 - 481	16 bit	
33	Discrete Inputs 512 - 497	16 bit	
34	Coils 16 - 01	16 bit	
35	Coils 32 - 17	16 bit	
...			
45	Coils 192 - 177	16 bit	
46	Coils 208 - 193	16 bit	
50	Node 1 AO1	Signed 16	0,0 ... 10,0 (V)
51	Node 1 AO2	Signed 16	0,0 ... 10,0 (V)
52	Node 2 AO1	Signed 16	0,0 ... 10,0 (V)
53	Node 2 AO2	Signed 16	0,0 ... 10,0 (V)
... etc ...			
244	Node 98 AO1	Signed 16	0,0 ... 10,0 (V)
245	Node 98 AO2	Signed 16	0,0 ... 10,0 (V)
246	Node 99 AO1	Signed 16	0,0 ... 10,0 (V)
247	Node 99 AO2	Signed 16	0,0 ... 10,0 (V)
248	Node 1 TE	Signed 16	see Note 2
249	Node 1 SP	Signed 16	see Note 3
250	Node 1 RH	Signed 16	see Note 4
251	Node 1 FAN	Signed 16	see Note 5

252	Node 2 TE	Signed 16	see Note 2
253	Node 2 SP	Signed 16	see Note 3
254	Node 2 RH	Signed 16	see Note 4
255	Node 2 FAN	Signed 16	see Note 5
	... etc ...		
636	Node 98 TE	Signed 16	see Note 2
637	Node 98 SP	Signed 16	see Note 3
638	Node 98 RH	Signed 16	see Note 4
639	Node 98 FAN	Signed 16	see Note 5
640	Node 99 TE	Signed 16	see Note 2
641	Node 99 SP	Signed 16	see Note 3
642	Node 99 RH	Signed 16	see Note 4
643	Node 99 FAN	Signed 16	see Note 5

FUNCTION CODE 05 - WRITE SINGLE COIL

			see Note 1
1	Node 1 DO1	Bit0	On - Off
2	Node 2 DO1	Bit1	On - Off
3	Node 3 DO1	Bit2	On - Off
4	Node 4 DO1	Bit3	On - Off
	... etc ...		
97	Node 97 DO1	Bit0	On - Off
98	Node 98 DO1	Bit1	On - Off
99	Node 99 DO1	Bit2	On - Off
101	Node 1 DO2	Bit4	On - Off
102	Node 2 DO2	Bit5	On - Off
103	Node 3 DO2	Bit6	On - Off
104	Node 4 DO2	Bit7	On - Off
	... etc ...		
197	Node 97 DO2	Bit4	On - Off
198	Node 98 DO2	Bit5	On - Off
199	Node 99 DO2	Bit6	On - Off
201	ALARM	Bit8	On - Off

FUNCTION CODE 06 - WRITE SINGLE REGISTER

34	Coils 16 - 01	16 bit	
35	Coils 32 - 17	16 bit	
	...		
45	Coils 192 - 177	16 bit	
46	Coils 208 - 193	16 bit	
			see Note 1
50	Node 1 AO1	Signed 16	0,0 ... 10,0 (V)

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51	Node 1 AO2	Signed 16	0,0 ... 10,0 (V)
52	Node 2 AO1	Signed 16	0,0 ... 10,0 (V)
53	Node 2 AO2	Signed 16	0,0 ... 10,0 (V)
	... etc ...		
244	Node 98 AO1	Signed 16	0,0 ... 10,0 (V)
245	Node 98 AO2	Signed 16	0,0 ... 10,0 (V)
246	Node 99 AO1	Signed 16	0,0 ... 10,0 (V)
247	Node 99 AO2	Signed 16	0,0 ... 10,0 (V)

FUNCTION CODE 16 - WRITE MULTIPLE REGISTERS

34	Coils 16 - 01	16 bit
35	Coils 32 - 17	16 bit
	...	
45	Coils 192 - 177	16 bit
46	Coils 208 - 193	16 bit

50	Node 1 AO1	Signed 16	0,0 ... 10,0 (V)
51	Node 1 AO2	Signed 16	0,0 ... 10,0 (V)
52	Node 2 AO1	Signed 16	0,0 ... 10,0 (V)
53	Node 2 AO2	Signed 16	0,0 ... 10,0 (V)
	... etc ...		
244	Node 98 AO1	Signed 16	0,0 ... 10,0 (V)
245	Node 98 AO2	Signed 16	0,0 ... 10,0 (V)
246	Node 99 AO1	Signed 16	0,0 ... 10,0 (V)
247	Node 99 AO2	Signed 16	0,0 ... 10,0 (V)

FUNCTION CODE 22 - MASK WRITE REGISTER

34	Coils 16 - 01	16 bit	AND 0 ... 0xFFFF
35	Coils 32 - 17	16 bit	OR 0 ... 0xFFFF
	...		
45	Coils 192 - 177	16 bit	
46	Coils 208 - 193	16 bit	

Notes

Note 1 Digital Output Coil Node n DOx = On disables (overrides) Analog Output Node n AOx Digital Output Coil Node n DOx = Off enables Analog Output Node n AOx			
Note 2	ST-A1-W and LAFL: TE	Signed 16	0,0 ... 50,0 (C)
	SHT-E2-W and SHTL-E2-W: TE	Signed 16	-50,0 ... 150,0 (C)
	RYFL: AI1	Signed 16	0,0 ... 10,0 (V)
Note 3	ST-A1-W: SP	Signed 16	24,0 ... 28,0 (C)
	SHT-E2-W:		
	Uin	Signed 16	0,0 ... 27,0 (V)
	SHTL-E2-W: LUX	Signed 16	0 ... 1000 (lux)
	LAFL: LUX	Signed 16	0 ... 2000 (lux)
Note 4	RYFL: AI2	Signed 16	0,0 ... 10,0 (V)
Note 4	ST-A1-W and SHTL-E2-W and LAFL: RH	Signed 16	0,0 ... 100,0 (%)
	SHT-E2-W and RYFL: not used	Signed 16	0
Note 5	SHT-E2-W: FAN	Signed 16	1 - 2 - 3 - 4 - 5
	ST-E2-W and SHTL-E2-W and RYFL: not used	Signed 16	0
	LAFL: PIR	Signed 16	0 (OFF) - 1 (ON)