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VARIABLE LIST

MR32W

EN

Table of Contents

1 Introduction

1.1 Wireless receiver MR32W

The wireless receiver communicates with up to 32 wireless sensors and detectors. It is a Modbus slave that uses RTU.

The variable list is a compilation of all the variables that can be read and variables that can be changed in the wireless system.

1.2 Modbus protocol in general

The Modbus protocol is a general-purpose protocol for data exchange between for instance control units, SCADA systems, instruments, and electricity meters. It's an asynchronous, serial Master Slave protocol. It's widely used, well documented and simple to understand.

A Modbus master can communicate with up to 247 slave units with the device ID 1-247. A protocol like Modbus consists of several layers (OSI-model). The bottom layer is always the physical layer; the number of wires and signal levels. The next layer describes the communication digits (number of data bits, stop-bits, parity etc.). Next are the layers describing the Modbus-specific functions (number of digits per message, the meaning of different messages, etc.).

1.3 RTU/ASCII modes

The Modbus protocol has two modes: binary (RTU) or character based (ASCII). According to the Modbus standard all devices must have the RTU mode implemented.

The receiver is a Modbus slave that uses RTU. In RTU mode all registers are transferred in binary format with two hexadecimal digits (0x00-0xFF) in each byte.

RTU mode format:

- 1 start bit
- 8 data bits
- Odd, even or no parity bit
- 1 or 2 stop bits. Normally if no parity is used then 2 stop bits should be used.
- Check sum: 16 bits CRC

1.4 Modbus register types

1. Coil Status Register (Modbus function = 1, 5 and 15)
2. Discrete Input (Modbus function = 2)
3. Holding Register (Modbus function = 3, 6 and 16)
4. Input Register (Modbus function = 4)

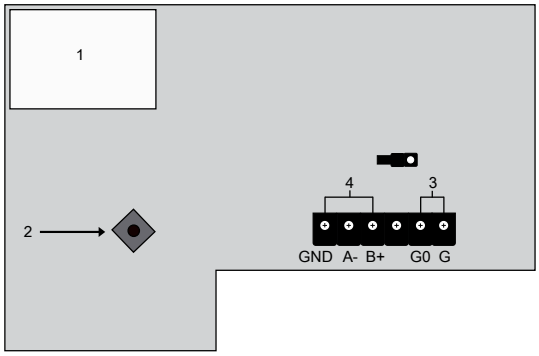
Supported Modbus functions:

- 2 = Read Discrete Input
- 3 = Read Holding Register
- 4 = Read Input Register

- 6 = Write Single Register
- 16 = Write Multiple Registers

2 Display configuration and usage

2.1 Wiring



Number	Description
1	Display
2	Joystick with *Menu button*
3	Supply voltage terminal
4	RS485 terminal

2.2 Settings

The joystick is used to manoeuvre through the channels, see *Table 2-1*. For each selected channel four different values are shown subsequently in the display:

1. Current channel, e.g. `01`
2. Received signal strength indicator (RSSI), `S.1…9`
   `S.` = signal strength, `1` = weak signal, `9` = strong signal
   `S.-` = no sensor is paired on the selected channel
   Note that the signal strength abbreviation `S.` should not be mistaken for number `5`.
3. Value 1 for the sensor or detector (if available), `0…99`. If both value 1 and 2 are available, value 1 always shows the temperature.
4. Value 2 for the sensor or detector (if available), `0…99`. Value 2 can for example show the humidity.

Note! After a power cut of the receiver, the sensor and detector readings will be set to temporary values. The receiver awaits new readings from the sensors before communicating with the controller again.

Table 2-1 Navigating the channels

Description	Manoeuvre	Time
Activate the display	Press the *Menu button*	1 s
Move to the subsequent channel.	Push UP	1 s
Move to the preceding channel.	Push DOWN	1 s
Jump 8 channels forward.	Push RIGHT	1 s
Leave the menu and inactivate the display.	Push LEFT	3 s

Many default settings can be changed via the display. The joystick is used to navigate within the menu as shown in *Table 2-2*. To enter the menu, press the *Menu button* 4 s when the display is inactive. Six levels are available:

1. A: Pair and unpair sensors
2. B: Modbus addresses, as hexadecimal numbers
3. C: Communication speed (baud rate)
4. D: Parity and stop bit
5. E: Selected frequency
6. F: Current software version

Table 2-2 Navigating the menu

Description	Manoeuvre	Time
Enter into the menu	Press the *Menu button* when the display is inactive	4 s
Move between the different levels in the menu (A-F)	Push UP or DOWN	1 s
Enter into one level	Press the *Menu button*	1 s
Move between different values within one level	Push UP or DOWN	1 s
Leave the menu and inactivate the display.	Push LEFT	3 s

2.2.1 Menu A: Pair and unpair sensors

The receiver can pair up to 32 sensors and detectors. This can be done either manually via the settings menu or via the Modbus communication. To pair and unpair via Modbus communication, see chapter *3.3* and *3.4*.

Manual pairing:

1. Enter into the menu as described above and select level A.
2. Press the *Menu button* until channel 01 is displayed.
3. Push UP and navigate to the correct channel.
4. Press the *Menu button* until A+ is displayed.
5. Press the *Menu button* until ** is displayed. A sound is heard.
6. Press the *Test button* on the sensor or detector until you hear a short beep from the receiver.
7. Press the *Menu button* to save the pairing.

To unpair sensors and detectors manually, follow the steps above until A+ is displayed. At that moment push DOWN and R- will be displayed. Confirm by pressing the *Menu button.*

Note! A paired channel first needs to be unpaired before pairing it again.

2.2.2 Menu B: Modbus address, as hexadecimal numbers

Enter into the menu as described in *2.2.1* and select level B. Push UP and navigate to the desired Modbus address for the unit. The address is shown as hexadecimal numbers. Press the *Menu button* to save the selected setting.

2.2.3 Menu C: Communication speed (baud rate)

Enter into the menu as described in *2.2.1* and select level C. Push UP and navigate to the correct setting:

- 12 = 1200 bps
- 24 = 2400 bps
- 96 = 9600 bps

- 19 = 19200 bps
- 38 = 38400 bps
- 57 = 57600 bps

Press the *Menu button* to save the selected setting.

2.2.4 Menu D: Parity and stop bit

Enter into the menu as described in *2.2.1* and select level D. Push UP and navigate to the correct setting:

- N1 = 1 stop bit, no parity
- N2 = 2 stop bit, no parity
- E1 = 1 stop bit, even parity
- E2 = 2 stop bit, even parity
- O1 = 1 stop bit, odd parity
- O2 = 2 stop bit, odd parity

Press the *Menu button* to save the selected setting.

2.2.5 Menu E: Selected frequency

Enter into the menu as described in *2.2.1* and select level E. Push UP and navigate to the correct frequency:

- F1 = 868.6375 MHz (used in Europe)
- F2 = 868.2375 MHz (used in China)

2.2.6 Menu F: Current software version

Enter into the menu as described in *2.2.1* and select level F. The current software version is shown, e.g. 11.

3 Configuration via Modbus

3.1 Introduction

The available functions are shown in the variable list, see chapter *4*.

3.2 Sensor device ID (register 37101-37132)

Every sensor and detector has a label on which the device ID can be found. In the Modbus register the device ID is displayed and entered in decimal code. On the unit the device ID is displayed in two different ways:

1. On newer models the device ID is shown after the serial number, within brackets. It is shown as decimal code (see *Figure 3-1*).

Figure 3-1 Device ID in decimal code

2. On older models the device ID is imbedded in the serial number, as hexadecimal code. Therefore it can either be recalculated to its decimal value or, if your Modbus tool supports it, be kept as hexadecimal code. The 4-digit hexadecimal ID is located after the first two digits in the serial number (see *Figure 3-2*).

Figure 3-2 Device ID in hexadecimal code

3.3 Pairing with test button

Up to 32 sensors and/or detectors can be paired to one receiver. Pair one device at the time. Note that a paired channel first needs to be unpaired before pairing it again.

3.3.1 Pairing (register 47001-47032)

1. Set “Holding register” 47001 to 1 to pair a sensor to channel 1.
2. Press the *Test button* on your sensor. If the pairing was successful and the display is activated, you will hear a short beep from the receiver. The sensor is now paired to channel 1.

3. To pair a sensor to channel 2, set Modbus register 47002 to 1 and so on (up to 47032).

3.3.2 Pairing using the device ID (register 47201-47232)

1. Set "Holding register" 47201 to the sensor device ID to pair the sensor on channel 1.
2. Press the *Test button* on your sensor. If the pairing was successful and the display is activated, you will hear a short beep from the receiver. The sensor is now paired to channel 1.
3. To pair a sensor on channel 2, set Modbus register 47202 to the sensor device ID and so on (up to 47232).

3.4 Pairing without test button

3.4.1 Pairing using the device ID (register 47101-47132)

1. Set "Holding register" 47101 to the sensor device ID to pair the sensor on channel 1. If the pairing was successful and the display is activated, you will hear a short beep from the receiver. The sensor is now paired to channel 1.
2. To pair a sensor on channel 2, set Modbus register 47102 to the sensor device ID and so on (up to 47132).

Note! A paired channel will be overwritten without warning when a new pairing is made without using the test button.

3.5 Unpairing

3.5.1 Unpairing (register 47001-47032)

1. Set “Holding register” 47001 to 3 to unpair the sensor on channel 1.
2. To unpair a unit on channel 2, set Modbus register 47002 to 3 and so on (up to 47032).

3.5.2 Unpairing using the device ID (register 47251-47282)

1. Set "Holding register" 47251 to the sensor device ID to unpair the sensor on channel 1.
2. To unpair a sensor on channel 2, set Modbus register 47252 to the sensor device ID and so on (up to 47282).

3.6 Device type (register 37001-37032)

Name	Description	Device type
CFW	Wireless door contact	10
SIR-PW	Wireless IR detector	21
SIR-SW	Wireless IR detector	23
SAW	Wireless room temperature sensor	100
SAUW	Wireless room temperature and humidity sensor	101
SEW-PT1000 / SEW	Wireless outdoor temperature sensor	120

3.7 Wake up time (register 40101-40132)

The wake up time for a sensor, i.e. the time interval when the sensor collects information from the surroundings, can be set via Modbus. The factory setting is 2 minutes.

Note! Changing the wake up time will affect the battery life.

3.8 Reboot (register 49101)

The receiver is rebooted when register 49101 is set to 0000. Since it is a preset single register (F06) the procedure depends on the used Modbus master application. Register 49010 (48h RSSI cycle time) is reset at reboot, thus the cycle restarts.

3.9 Alarms (register 10101-10132, 10201-10232, 10301-10332)

Alarms are available for different functionalities according to the variable list, see chapter *4.1*. All alarms are reset automatically after the cause has been resolved.

4 Variable list

4.1 Discrete input

Modbus register	Device	Description	Available modbus function
10001-10032	CFW / SIR-PW	CFW/SIR-PW condition (on/off)	F02
10101-10132	All	Sensor low battery alarm.	F02
10201-10232	CFW / SIR-PW / SIR-SW	Sensor tamper alarm. Is activated when the sensor is removed or tampered with.	F02
10301-10332	All	Sensor supervision alarm. Is activated when the sensor has not been communicating with the receiver during preset time span (49002-49004). Default is 240 min.	F02

4.2 Input registers

Modbus register	Device	Description	Unit	Scale	Available modbus function
30001-30032	SEW / SAW / SEW-PT1000 / SAUW	Temperature	°C	100	F04
30301-30332	-	Spare for CO_2 value	ppm	-	F04
30401-30432	SAUW	Humidity	% RH	-	F04
37001-37032	All	Device type (see chapter *3.6*)	-	-	F04
37101-37132	All	Device ID of paired device given as decimal code (see chapter *3.2*)	-	-	F04
37201-37232	All	RSSI signal strength	dB	-	F04
37301-37332	All	RSSI minimum signal strength during a cycle of 48 hours (worst level the last 48 hour cycle)	dB	-	F04

4.3 Holding registers

Modbus register	Device	Description	Unit	Scale	Default	Available modbus function
40001-40032	CFW / SIR-PW / SIR-SW	Counter for DI. max count = 65535	nbr	-	-	F03 / F06 / F16
40101-40132	SEW / SAW / SAUW / SEW-PT1000	Wake up time min = 10 s, max = 300 s	s	10	12 (=120 s)	F03 / F06 / F16
47001-47032	All	Pairing and unpairing sensor or device, one at a time. See chapter *3.3.1* and *3.5.1*. 1=pair/connect, 3=unpair/disconnect	-	-	-	F06
47101-47132	All	Pairing sensor or device using the device ID, without using the *Test button*. See chapter *3.4.1*	-	-	-	F03 / F06 / F16
47201-47232	All	Pairing sensor or device using the device ID and the*Test button*. See chapter *3.3.2*	-	-	-	F03 / F06 / F16
47251-47282	All	Unpairing sensor or device using the device ID, without using the *Test button*. See chapter *3.5.2*	-	-	-	F06 / F16

Variable list

Modbus register	Device	Description	Unit	Scale	Default	Available modbus function
47301-47332	SEW-PT1000 / SAUW	Smallest temperature change required for registration[1] min = 0. 2 °C, max = 5 °C	°C	0.1	Room: 2 (= 0.2 °C) Outdoor: 10 (= 1 °C)	F03 / F06 / F16
47401-47432	SAUW	Smallest humidity change required for registration[1] min = 2 % RH, max = 10 % RH	% RH	-	2	F03 / F06 / F16

Modbus register	Device	Description	Unit	Scale	Default	Available modbus function
49001	SIR-PW / SIR-SW	Time for active on-signal	s	-	5	F03 / F06 / F16
49002	CFW / SIR-PW / SIR-SW	Time before alarm when sensor is unavailable[1] min = 7200 s	s	-	14400	F03 / F06 / F16
49004	SEW / SAW / SAUW / SEW-PT1000	Time before alarm when sensor is unavailable[1] min = 7200 s	s	-	14400	F03 / F06 / F16
49005	-	Spare for repeater supervisor	-	-	-	F03 / F06 / F16
49006	SAW / SAUW	Default wake up time. Changes only applies to sensors or devices paired after the change has been implemented.[1]	s	10	12 (= 120 s)	F03 / F06 / F16
49010	All	The time left of 48 h. Used for RSSI (37301-37332). Will be reset to default value at the end of the cycle. max = 2880 min	min	-	2880	F03 / F06 / F16
49012	MR32W	Frequency select[2] 0 = 868.6375 MHz (Europe), 1 = 868.2375 MHz (China)[3]	-	-	0 (= 868.6375 MHz)	F03 / F06 / F16
49013	MR32W	Baud Rate[2] 0 = 1200 bps, 1 = 2400 bps, 2 = 9600 bps, 3 = 19200 bps, 4 = 38400 bps, 5 = 57600 bps	-	-	2	F03 / F06 / F16
49014	MR32W	Parity/Stop bits[2] • 0 = 1 stop bit, no parity • 1 = 2 stop bit, no parity • 2 = 1 stop bit, even parity • 3 = 2 stop bit, even parity • 4 = 1 stop bit, odd parity • 5 = 2 stop bit, odd parity	-	-	0	F03 / F06 / F16
49015	MR32W	Modbus address[2]	-	-	1	F03 / F06 / F16
49016	SAUW	Smallest indoor temperature change required for registration. Changes only applies to devices paired after the change has been implemented.[1] min = 0. 2 °C, max = 5 °C	°C	0.1	2 (= 0.2 °C)	F03 / F06 / F16
49017		Smallest outdoor temperature change required for registration. Changes only applies to devices paired after the change has been implemented.[1] min = 0. 2 °C, max = 5 °C	°C	0.1	10 (= 1 °C)	F03 / F06 / F16

1. *Changing the default value will affect the battery life*
2. *Reboot (49101) is required after changing the default*
3. *Only works with SAUW and SEW-PT1000*

Modbus register	Device	Description	Unit	Scale	Default	Available modbus function
49018	SAUW	Smallest humidity change required for registration. Changes only applies to devices paired after the change has been implemented.[1] min = 2 % RH, max = 10 % RH	% RH	-	2	F03 / F06 / F16
49101	MR32W	Reboot unit 0000 = reboot	-	-	-	F06
49201-49203	MR32W	Delete and reset[4] • Reset system parameters (49001-49018, except 49010) to default: *register* | *input* 49201 | 21093 49202 | 26473 49203 | 28209 • Delete all sensors: *register* | *input* 49201 | 21093 49202 | 26473 49203 | 28210 • Delete all sensors & reset system parameters (49001-49018, except 49010) to default: *register* | *input* 49201 | 21093 49202 | 26473 49203 | 28211	-	-	0	F16
49501-49502	MR32W	RF MAC Address (2 registers/channel)	-	-	-	F03 / F16

4. *As a safety measure, all three registers have to be set*

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