

- **Modbus functions F03 and F16 are supported**
- **it is possible to read maximum 20 words at a time (i.e. 40 bytes)**
- **default values are shown in parentheses in the type column**
- **the whole memory area is mirrored from register 0x101 (i.e. 257 dec) as a read-only area (register 1 corresponding to the register 257, etc.)**

| name | register | type | description | Note |
|---------------------------|----------------|-------------------------|--|---|
| modbus ID | 1 LSB 1 MSB | R | module ID | the module ID is: mw240 ... 0A24hex mw241 ... 0A25hex |
| firmware | 2 LSB | R | firmware version lower byte | FW version |
| status LSB | 3 LSB | R, W RAM | module status lower byte bit 0 – EEPROM write enable bit 1 – SW reset enable bit 4 – EEPROM init | EEPROM init is performed if the INIT switch was ON at start, and when setting bit 4 to 1 the switch must be off (indicated by bit 2 in status MSB); SW reset by writing to the register SW reset (addr. 1002) |
| status MSB | 3 MSB | R | module status upper byte bit 0 - 0 normal mode - 1 init mode bit 1 - 1 at the next EEPROM write attempt all data will be saved to EEPROM - 0 at the next write attempt received data will be written to RAM only bit 2 – 1 – EPROM initialised bit 3 – 0 bit 4 – 0 bit 5 - SW reset enable bit 6 – 0 bit 7 – 1 | |
| address | 4 LSB | R,W EEPROM (0x01) | module address | !! Attention !! The changes will become active only after module restart (the register is written immediately, but the new address is effective after restart) |
| baud rate (comm speed) | 4 MSB | R,W EEPROM (0x0d) | communication, no parity 10dec ... 1 200bps 11dec ... 2 400bps 12dec ... 4 800bps 13dec ... 9 600bps 14dec ... 19 200bps 15dec ... 38 400bps 16dec ... 57 600bps 17dec ... 115 200bps | !! Attention !! The changes will become active only after module restart (the register is written immediately, the new baud rate is effective after restart) |



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|------------------|-------|---|--|--|
| SW config 1 | 5 LSB | R,W EEPROM (0x00) | <p>with edge on the input, the relay toggles (edge) bit 0 – input 0 relay 0 bit 1 – input 1 relay 1 bit 2 – input 0 relay 1 bit 3 – input 1 relay 0</p> <p>copies the input state, but writing on the relay follows only if the input changes its state (state change) bit 4 – input 0 relay 0 bit 5 – input 1 relay 1 bit 6 – input 0 relay 1 bit 7 – input 1 relay 0</p> | <p>log. 0 the function is inactive log. 1 function activated for this input and relay</p> <p>See also below, Diagrams...</p> <p>Edge on inputs is equivalent to writing on modbus.</p> <p>State change on inputs is equivalent to change on modbus.</p> |
| SW config 2 | 5 MSB | R,W EEPROM (0x03) state of the inputs is copied to relay | <p>copies input state to the relay (input copying) (relay status is written periodically) bit 0 – input 0 relay 0 bit 1 – input 1 relay 1 bit 2 – input 0 relay 1 bit 3 – input 1 relay 0 bit 7 – blinds function active</p> | <p>log. 0 the function is inactive log. 1 function activated for this input and relay</p> <p>Input copying on inputs is equivalent to state on modbus.</p> <p>blinds convention: input0/output0 UP input1/output1 DOWN</p> |
| SW / MB config 1 | 6 LSB | R,W EEPROM (0x00) | <p>bit 0 – when reacting on pulse, the module reacts on rising or falling edge? bit 1 – relay 0 priority in state mode (see MB config 1) bit 2 – relay 1 priority in state mode (see MB config 1)</p> | <p>bit 0 log. 0 reaction on rising edge bit 0 log. 1 reaction on falling edge bit 1,2 log. 0 button has higher priority bit 1,2 log. 1 Modbus has higher priority</p> |



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|-----------------------|--------|--|--|--|
| MB config 1 | 6 MSB | R,W EEPROM (0x0a) status change in the MB relay to change state relays for relay 0 and relay 1 | bits 1,0 – Modbus configuration for relay 0 bits 3,2 – Modbus configuration for relay 1 See also Diagrams... below. | bits 1,0 – relay 0 00 – no action 01 (state) – <i>modbus</i> <i>relay</i> state is copied to output periodically 10 (change) – relay changes on <i>modbus</i> <i>relay</i> change 11 (writing) – relay is written on <i>modbus</i> <i>relay</i> writing bits 3,2 – relay 1 00 – no action 01 (state) – <i>modbus</i> <i>relay</i> state is copied to output periodically 10 (change) – relay changes on <i>modbus</i> <i>relay</i> change 11 (writing) – relay is written on <i>modbus</i> <i>relay</i> writing |
| latch state | 7 LSB | R,W EEPROM (0x00) | state to be caught at digital inputs 0 – will catch log. 0 1 – will catch log. 1 | bit 0 is button 0 bit 1 is button 1 |
| relay com | 7 MSB | R,W EEPROM (0x00) | 0 – on the corresponding bit means that there is no action at no communication 1 – on the corresponding bit means that the output is set to the relay state value at no communication | bit 0 is relay 0 bit 1 is relay 1 |
| relay state | 8 LSB | R,W EEPROM (0x00) | the relays go on or off (according to the settings here) if the module has not been requested over Modbus for a defined time and the relay com is set to 1 for the particular bit | bit 0 is relay 0 bit 1 is relay 1 |
| relay time | 8 MSB | R,W EEPROM (0x00) | timeout [s] which is considered as communication failure and relays go to predefined states | if set to 0, no action is taken on comm. failure |
| relay start enable | 9 LSB | R,W EEPROM (0x00) | startup relay settings enable 0 – on the corresponding bit means that there is no action until the first Modbus writing or input command comes 1 – on the corresponding bit means that the output is set to the relay start at startup | bit 0 is relay 0 bit 1 is relay 1 |
| relay start | 9 MSB | R,W EEPROM (0x00) | relay status after startup | bit 0 is relay 0 bit 1 is relay 1 |
| modbus relay | 10 LSB | R, W RAM | relay state set over Modbus | bit 0 is relay 0 bit 1 is relay 1 |

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|--------------------------|--------|----------|---|---|
| not used | 10 MSB | R,W RAM | | |
| latch enable | 11 LSB | R,W RAM | latch function enable for each input – if set to 1 the latched value bit goes to 0 and stays so until the latched value is detected; after RESET the register is set to 0 | reset the latched value register bits to 0 by changing the value of latch enable bits from 0 to 1 (= disable and enable latching for individual bits) bit 0 is button 0 bit 1 is button 1 |
| not used | 11 MSB | R, W RAM | | |
| inputs | 12 LSB | R RAM | reading of the inputs (DI0-DI1) | bit 0 is input 0 bit 1 is input 1 |
| latched value | 12 MSB | R RAM | atched values 0 – if the latched state has not been detected at the input since latch enable 1 - if the latched state has been detected at the input since latch enable | reset of individual bits: disable and enable the corresponding bits – see register latch enable bit 0 is button 0 bit 1 is button 1 |
| relay | 13 LSB | R RAM | actual status of relay outputs | bit 0 is relay 0 bit 1 is relay 1 |
| buttons | 13 MSB | R RAM | requested state of relays by the buttons | bit 0 is button 0 bit 1 is button 1 |
| up button short pushes | 14 LSB | R | number of short pushes for the UP button, after overflow starts at 0 | |
| up button long pushes | 14 MSB | R | number of long pushes for the UP button, after overflow starts at 0 | |
| down button short pushes | 15 LSB | R | number of short pushes for the DOWN button, after overflow starts at 0 | |
| down button long pushes | 15 MSB | R | number of long pushes for the DOWN button, after overflow starts at 0 | |
| actual position | 16 LSB | R, RAM | actual position of the blinds (updated once per second when moving) | in %, range 0 .. 100 % 0% = up, 100% = down |
| | 16 MSB | | reserved | |

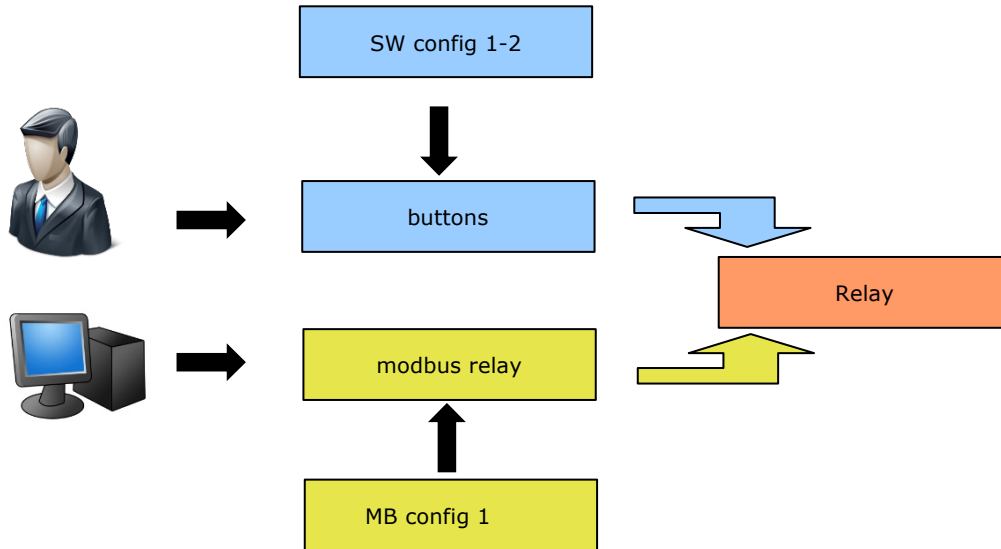


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|------------------|--------|----------|--|--|
| manual control | 17 LSB | R, W RAM | <p>manual blinds control: if the bit 0 is 1, blinds are controlled over the bus and local user intervention is blocked (see position command)</p> <p>Note:</p> <p>If rising edge (0->1) is detected on bit0, there are three possible actions:</p> <p>Position command (17MSB) is same as actual position (16LSB) and position command is not 0 or 100 %. In this case the blinds do not change position.</p> <p>Position command (17MSB) is 0 or 100 %. In this case blinds travel to the minimum / maximum position for the whole position time (19LSB)! This is because of synchronization. Other position command, without detection of rising edge on bit0, move blinds just for difference between 17MSB and 16LSB.</p> <p>Position command (17MSB) is not the same as actual position (16LSB). In this case blinds move to the position command value.</p> <p>These functions have lower priority than functions triggered by bit 1, 2 and 3. Blinds preferably stop/rotate and do not move to the position command value.</p> <p>changes in the manual control mirror reg. 25 are copied to this register.</p> | <p>bit 0 ... blinds</p> <p>bit 1 ... stop blinds – can be set if bit 0 is on; stops blinds movement immediately when moving; bit is set to 0 automatically</p> <p>bit 2 ... short push button1 – blinds rotate one step up; bit is set to 0 automatically</p> <p>bit 3 ... short push button2 – blinds rotate one step down; bit is set to 0 automatically</p> |
| position command | 17 MSB | R, W RAM | <p>manual blinds position setting, action follows only on value change (only if corresponding bit in manual control is set)</p> <p>changes in the position command mirror reg. 26 are copied to this register.</p> | <p>in %, range 0 .. 100% (meaning: 0% upper end position)</p> |



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|-------------------------|--|------------------------------|--|--|
| sunblind settings | 18 LSB | R,W EEPROM (no action, 0x00) | blinds configuration | bits 0 to 1 ... command for blinds after restart (0 - no action, 1 - up, 2 - down) |
| rotation time | 18 MSB | R,W EEPROM (1.2 s, 0x0C) | time to change the position of the slats between end positions (0 -> 100 % or 100 -> 0 %) | in [0.1 s] |
| whole position time | 19 LSB | R,W EEPROM (70 s, 0x46) | time to travel the blinds between end positions (UP - DOWN) | in [s], range 1 to 255 |
| switch short time | 19 MSB | R,W EEPROM (0.5 s, 0x05) | time to discriminate between short and long push (short - slat rotation of move short time , long - travel to end position (up / down)) | in [0.1 s] |
| move short time | 20 LSB | R,W EEPROM (0.2 s, 0x02) | time to rotate the slats at short push | in [0.1 s], range 1 to 255 |
| waiting time up/down | 20 MSB | R,W EEPROM (0.7 s, 0x07) | time delay on travelling direction change (up / down), motor protection | in [0.1 s], range 6 to 30 |
| serial num mirror | 21 LSB 21 MSB 22 LSB 22 MSB | R, W EEPROM | module serial number (read-only mirror, see reg. serial num) | |
| Manual control mirror | 25 LSB | R, W RAM | changes in this register are copied to manual control reg. 17 LSB | |
| Position command mirror | 26 LSB | R, W RAM | changes in this register are copied to position command reg. 17 MSB | |
| uptime | 1000 LSB 1000 MSB 1001 LSB 1001 MSB | R, RAM | Module uptime (since power-up or reset) | [s] |
| SW reset | 1002 LSB 1002 MSB | R, W RAM | Writing a non-zero value performs a software reset if it has been allowed, see status LSB bit1 | |
| serial num | 1003 LSB 1003 MSB 1004 LSB 1004 MSB | R, W OTP | module serial number (written in factory; one time programmable only if the value is 0, writing must be made in a single Modbus telegram) | |

General function schema



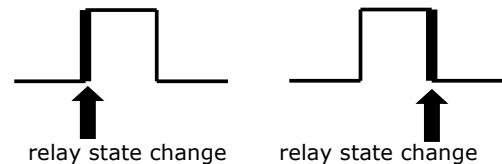
Examples for button 0 relay 0 (button 1, relay 1)

Diagrams for SW config 1, SW config 2 (MB reg. 0x05)

A) Edge

At input edge the relay status changes, the reaction is on rising or falling edge

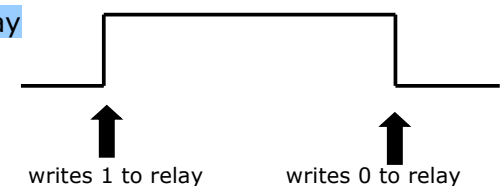
Write **0x05** into **SW config 1 (5LSB)** and **0x00** into **SW config 2 (5MSB)** to get this functionality



B) State change

Copies the input state to the output state, but the relay is written on input state change only

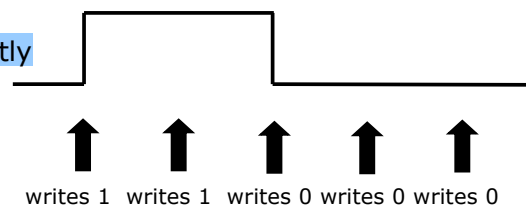
Write **0x50** into **SW config 1 (5LSB)** and **0x00** into **SW config 2 (5MSB)** to get this functionality



C) Input copying

Copies the input state to the output state permanently

Write **0x00** into **SW config 1 (5LSB)** and **0x03** into **SW config 2 (5MSB)** to get this functionality



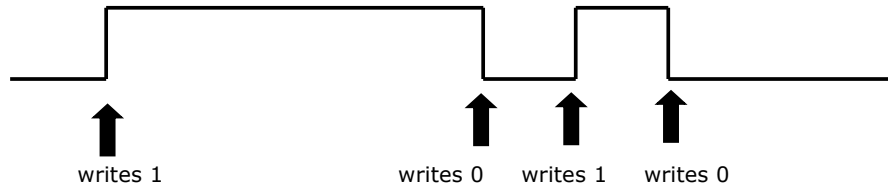


Diagrams for MB config 1

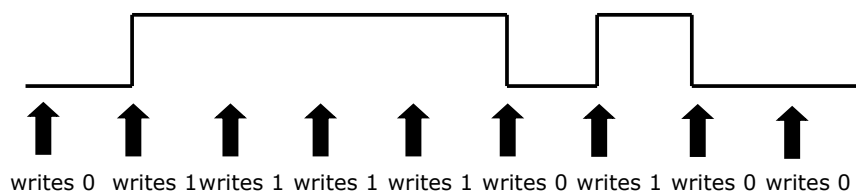
1) State MB

The modbus relay state is copied into relay
Write **0x05** into **MB config 1 (6MSB)**

modbus relay



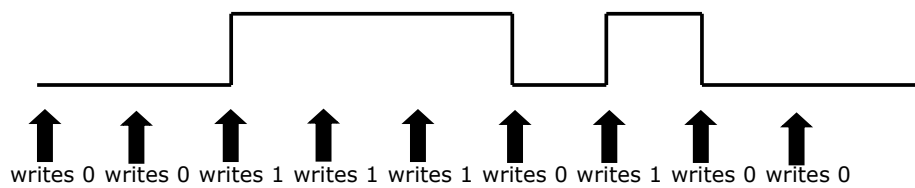
relay



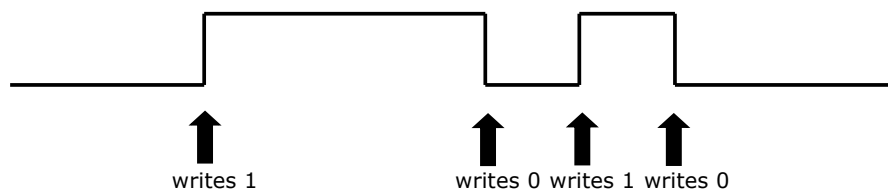
2) Change MB

When **modbus relay** changes, the new state is written into **relay**
Write **0x0A** into **MB config 1 (6MSB)**

modbus relay



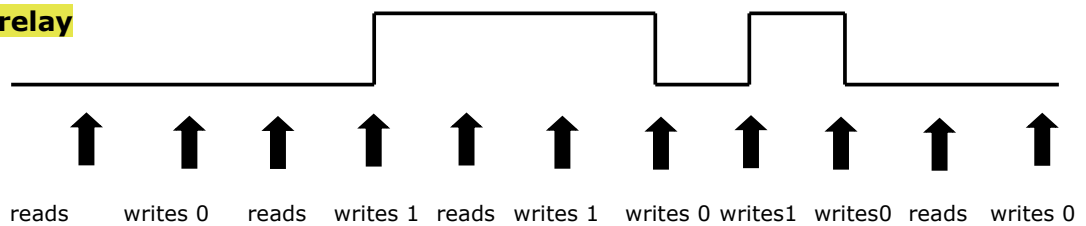
relay



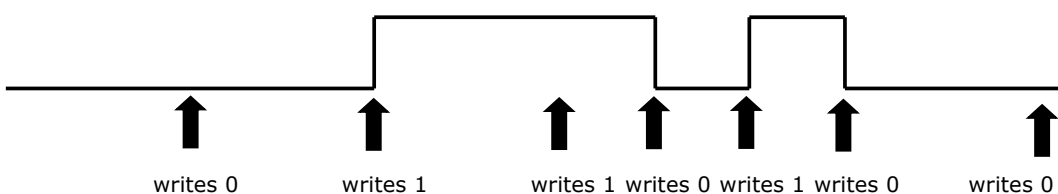
3) Writing MB

When **modbus relay** is written, the value is written to **relay**
Write **0x0F** into **MB config 1 (6MSB)**

modbus relay



relay



Note:

If the **C) Input copying** configuration is selected together with **1) State MB** the priority can be selected in **SW / MB config 1 (6 LSB)**.

SW/MB config table (reg. 5,6)

| Reg. 5/6 | 1, State MB (01) | 2, Change MB (10) | 3, Writing MB (11) |
|-------------------------|-----------------------------|--------------------|--------------------|
| A: Edge | Modbus only | Last written value | Last written value |
| B: State change | Modbus only | Last written value | Last written value |
| C: Input copying | As in SW/MB config 1 | Input only | Input only |

MB config 1 (6MSB)

**Example settings bit combination 0,1 (state) for both relays:
0000 1010**

Release notes

Version 01000 (2. 12. 2014)

Changed registers:

2th – FMW version

5th – Changed default value: MSB bit0, 1 = 1 (instead of LSB bit 3, 4 = 1).

Firmware changes:

The INIT function is not active in this firmware version.

This firmware version could be uploaded just on PCB version v1.2. On the previous PCB version v1.0 and v1.1 could be uploaded firmware till version 00900.

Version 01100 (10. 1. 2015)

Changed registers:

2th – FW version

Firmware changes:

This firmware version could be uploaded just on PCB version D1004_v11.

Version 01200 (30. 3. 2015)

Changed registers:

2th – FW version

17th – Changed function: LSB bit0 function if rising edge (0->1) is detected on bit0.

Description find in register note.

Version 01300 (19. 8. 2015)

Changed registers:

2th – FW version

17th – Fixed bug: LSB bit0 function if rising edge (0->1) is detected on bit0. Position command (17MSB) is not same as actual position (16LSB). In this case blinds move to the position command value. This case is active from this version. In this version is not active function bit 1, 2 and 3.

Version 01400 (14. 12. 2015)

Changed registers:

2th – FW version

17th – Fixed bug: LSB bit1, 2 and 3. From this version on, these functions are active.

Version 01500 (26. 8. 2016)

New features:

- Adding the MW241 (DO type Triac)

Version 01600 (12.9.2016)

New features:

- SW reset feature (enabled - 3LSB bit 1, indication allowed 3MSB bit 5, execution - writing non-zero values to addr. 1002)
- Uptime in seconds (addresses 1000 LSW and 1001 MSW)
- Adding serial number - reg. 1003 to 1004 (+ R-only mirror 21 and 22) OTP write, for manufacturing purposes
- Memory mirroring the 0x101 as R-only area.

Version 02000 (27.4. 2023)

New features:

- Repaired timing (position time)
- Added reg. 25 and reg. 26, mirrored from reg. 17 for better use, int and bit values splitted into separate registers (reg 25 and 26). Added description in reg. 5, 7lsb, 11lsb, 12msb, 17.