# General Description

The module features 16 independent outputs consisting of solid-state relays (SSR). This device is intended to serve as a programmable switch with very low resistance in the switched channel. It can operate up to 16 devices at a time. The device is advantageous for switching small loads and is destined for long life due to the absence of mechanical parts.

# Functions and Benefits

* 16 individual outputs
* RS-485 communication
* Remote firmware update over Modbus

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | | |
| **Minimum** | **Typical** | **Maximum** |
| Mounting | 35/7.5 (DIN 46277, EN 50022) | | |
| Width (board) | 165 mm | | |
| Height (board) | 72 mm | | |
| Number of inputs | 1 RS-485 bus | | |
| Number of outputs | 16 SSR outputs | | |
| Ambient temperature | -20 °C |  | 60 °C |
| Power supply voltage | 6 V | 12 V | 36 V |
| Power supply consumption @ 12 V | 25 mA | 80 mA | 200 mA |
| Output channel resistance |  | 0,18 mΩ | 0,25 mΩ |
| Output channel maximum current | 1 A | | |
| Output channel maximum voltage | +- 30 V | | |
| Modbus communication | 19200 baud/s, 8 data bits, even parity, 1 stop bit | | |
| Modbus address | 32 + DIP value | | |

# Parameters

Obsah obrázku elektronika, obvod, Elektronická součástka, Obvodoví součástka

Popis byl vytvořen automaticky OptoMOS Relay Module

# Pin Description

## Pin Placing

Obsah obrázku text, diagram, Písmo, snímek obrazovky

Popis byl vytvořen automaticky

Outputs 1-16

Reset and factory reset push button

RS-485 bus address selection.

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RS-485 bus.

Power and connector.

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## Pinout Table

|  |  |  |
| --- | --- | --- |
| **PIN** | **Type** | **Description** |
| +VIN | Power supply pin | Power supply pin for external power supply |
| GND | Power supply pin | Power pin for supply ground |
| RS485+ A | RS-485 bus output | Positive RS-485 bus differential output |
| RS485- B | RS-485 bus output | Negative RS-485 bus differential output |
| OPM1 | OptoMOS port 1 | Output port 1. Both pins are interchangeable. Voltage at either pin must not exceed working range 0 – 60 V |
| OPM2 | OptoMOS port 2 | Output port 2. |
| OPM3 | OptoMOS port 3 | Output port 3. |
| OPM4 | OptoMOS port 4 | Output port 4. |
| OPM5 | OptoMOS port 5 | Output port 5. |
| OPM6 | OptoMOS port 6 | Output port 6. |
| OPM7 | OptoMOS port 7 | Output port 7. |
| OPM8 | OptoMOS port 8 | Output port 8. |
| OPM9 | OptoMOS port 9 | Output port 9. |
| OPM10 | OptoMOS port 10 | Output port 10. |
| OPM11 | OptoMOS port 11 | Output port 11. |
| OPM12 | OptoMOS port 12 | Output port 12. |
| OPM13 | OptoMOS port 13 | Output port 13. |
| OPM14 | OptoMOS port 14 | Output port 14. |
| OPM15 | OptoMOS port 15 | Output port 15. |
| OPM16 | OptoMOS port 16 | Output port 16. |
| ADDRESS 0  –  ADDRESS 3 | Switch | Set Modbus RTU protocol address that will be added to **base value 64**. Individual address switches represent numerical values:  ADDRESS 0: 1  ADDRESS 1: 2  ADDRESS 2: 4  ADDRESS 3: 8  If given switch is turned on, related numerical value is effective. RS-485 Modbus protocol address is determined as sum of all numerical values enabled by switches. If all switches are ON, address is equal to 15 (1 + 2 + 4 + 8) + **64** = **79**. |

# Modbus RTU Protocol

The device implements Modbus RTU slave supporting the following function codes 3, 4, 16.

## Modbus Registers Mapping – Input Registers

|  |  |  |  |
| --- | --- | --- | --- |
| **Address** | **Name** | **Format** | **Description** |
| 0, 1 | Uptime | INT | Elapsed seconds from device startup Unit: s. |
| 2, 3 | Register map version | INT | Version of register map in format xxxyyy. Xxx - major version of register map. Yyy - minor version of register map. Major version defines compatibility of different register maps. If major version of register map changes, the values previously stored in the flash memory are discarded and factory values are used *Minimum: 1001. Maximum: 5050.* |
| 4, 5 | Status register | BIN | Binary map of different status flags Meaning of respective bits:  Bit 0 - Generic error - Error in the device. Bit 1 - Testing mode - Testing mode is enabled. Bit 2 - Calibrated successfully - Calibration data read successfully. Bit 3 - Modbus timeout - No modbus communication for timeout period. Bit 16 - Configuration flash error - Error when working with configuration memory. Bit 17 - Reset by IWDG - Last reset was caused by Independent watchdog. |
| 6 | Input signals | INT | Set of input signals.  Bits 0-4 - Modbus address offset Bits 5-8 - Bootstrap Bit 9 - Pushbutton *Minimum: 0. Maximum: 1023.* |
| 7, 8 | Serial number | INT | Serial number of product with common device ID in format xxyyzzzz. Xx - year of production Yy - month of production zzzz - serial incremental number of the product |
| 9, 10 | Product number | INT | Unique device ID *Minimum: 9153. Maximum: 9153.* |
| 11, 12 | Hardware version | INT | Hardware revision of the device defined as xxxyyy: xxx - major revision (letter) yyy - minor revision (number) *Minimum: 1001. Maximum: 5099.* |
| 13, 14 | Bootloader version | INT | Firmware revision of the bootloader as number xxxyyy: xxx - major version of bootloader yyy - minor version of bootloader *Minimum: 1001. Maximum: 5099.* |
| 15, 16 | Firmware revision | INT | Firmware revision of the current application image as an incremental number. See list of FW revision or release notes for respective features. *Minimum: 1. Maximum: 999.* |
| 17, 18 | Assembly date | INT | Assembly information of the current application in format xxxxyyzz: xxxx - year of FW build yy - month of FW build zz - day of FW build *Minimum: 20231100. Maximum: 20250330.* |
| 19, 20 | CRC checksum | INT | CRC checksum of the current application |
| 21, 22 | Firmware size | INT | Firmware size of the current application in bytes *Minimum: 10000. Maximum: 32000.* |
| 23, 24 | Configuration writes | INT | Number of writes into internal configuration flash memory (size 4kB, entry 128 B, total endurance 10000 \* 4096 / 128 = 320000) *Minimum: 0. Maximum: 1000000.* Unit: writes. |

## Modbus Registers Mapping – Holding Registers

The table below contains a description of all Holding registers and its function description.

|  |  |  |  |
| --- | --- | --- | --- |
| **Address** | **Name** | **Format** | **Description** |
| 0, 1 | Command | INT | Following commands are supported: Value 9901 - Reset Value 8801 - Factory reset Value 7701 - Testing mode Value 66xx - Invoke error Value 5501 - Invoke watchdog reset **Default: 0.** *Minimum: 0. Maximum: 9901.* |
| 2, 3 | Testing register | INT | Generic system testing register |
| 4 | Modbus baud rate | ENUM | Modbus RTU serial port baud rate Allowed values:  Value 0 - 9600 - 9600 baud/s. Value 1 - 19200 - 19200 baud/s. Value 2 - 38400 - 38400 baud/s. Value 3 - 57600 - 57600 baud/s. Value 4 - 115200 - 115200 baud/s. **Non-volatile, default: 1.** *Minimum: 0. Maximum: 4.* |
| 5 | Modbus parity | ENUM | Modbus RTU serial port parity Allowed values:  Value 0 - NONE - NONE parity. Value 1 - EVEN - EVEN parity. Value 2 - ODD - ODD parity. **Non-volatile, default: 1.** *Minimum: 0. Maximum: 2.* |
| 6 | Modbus stop bits | ENUM | Modbus RTU serial port - number of stop bits Allowed values:  Value 0 - 1 stop bit - 1 stop bit. Value 1 - 2 stop bits - 2 stop bits. **Non-volatile, default: 0.** *Minimum: 0. Maximum: 1.* |
| 7 | Apply modbus parameters | INT | Apply new modbus communication parameters. Value 1 - Apply new settings **Default: 0.** *Minimum: 0. Maximum: 1.* |
| 8 | Modbus timeout | INT | Longer silent period implies connection lost. Zero value disables timeout indication. **Non-volatile, default: 10.** *Minimum: 0. Maximum: 7200.* Unit: s. |
| 9 | Calibration mode | INT | Set calibration resistance values to all channels. **Default: 0.** *Minimum: 0. Maximum: 24.* |
| 10 | Reserved | INT | Reserved for future use |
| 11 | State of all outputs | BIN | Current state of all outputs Meaning of respective bits: |
| 12 | Default output state | BIN | State of all outputs after device start / restart Meaning of respective bits: **Non-volatile, default: 0.** |
| 13 | Set output | BIN | Set outputs by mask Meaning of respective bits: |
| 14 | Clear output | BIN | Clear outputs by mask Meaning of respective bits: |

## RS-485 Communication Settings

RS-485 settings can be changed through Modbus Holding registers. The new settings are applied **only** after writing the “Apply modbus parameters” register. The default configuration is as follows.

|  |  |
| --- | --- |
| Parameter | Value |
| Baud rate | 19200 Baud/s |
| Word length | 8 bits |
| Parity | Even |
| Stop bits | 1 |

# Led Indication

# Push Button

Push button can be used to restart device.

# Functional Description

# Device Limitations

# Norm Compliance

This product was developed and manufactured with the compliance of following European norms (EN):

* EN 61000-4
* EN 55032
* EN 50581:2013

# Document revisions

|  |  |  |
| --- | --- | --- |
| Revision number | Date | Remarks |
| Rev 01.0 |  | Document release |
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