

# Relay control module type PMS-11/\*/\*.

## Modbus communication protocol.

Operation Manual no. BP/IOM/02/20

# EXPROTEC



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# 1 Introduction

This Operation Manual specifies the Modbus communication protocol applied in the PMS-11/\*/\* relay control module, which is designed to test continuity and earth resistance of a receiver or can act as a control relay..

The PMS-11/\*/\* multifunctional relay is designed for interfacing with external control and monitoring systems via RS-485 over Modbus. This feature enables reading the operating status, the actual measured resistance, the failure statuses, and the active lockouts of the PMS-11/\*/\*. The units of the register values are shown in square brackets.

The operating manual of the PMS-/\*/\* relay is a separate document titled „Relay control module type PMS-/\*/\*”, no. BP/IO/16/08.

## 2 Modbus

The PMS-11/\*/\* relay control module supports remote access to its measurement and configuration setting data via RS-485 over Modbus RTU.

For the technical aspects of the communication protocol outside of this manual, follow the official Modbus protocol documentation available on the official website of the Modbus custodian organisation: <http://www.modbus.org>.

### 2.1 Supported commands

- Read Holding Registers (0x03)
- Read Input Registers (0x04)
- Write Single Register (0x06)
- Diagnostics (0x08)
  - Return Query Data (0x00)
  - Restart Communications Option (0x01)
  - Return Diagnostic Register (0x02)
  - Force Listen Only Mode (0x04)
  - Clear Counters and Diagnostic Register (0x0A)
  - Return Bus Message Count (0x0B)
  - Return Bus Communication Error Count (0x0C)
  - Return Bus Exception Error Count (0x0D)
  - Return Slave Message Count (0x0E)
  - Return Slave No Response Count (0x0F)
  - Return Slave NAK Count (0x10)
  - Return Slave Busy Count (0x11)
  - Return Bus Character Overrun Count (0x12)
- Get Comm Event Counter (0x0B)
- Get Comm Event Log (0x0C)
- Write Multiple Registers (0x10)

## 3 Input data

### 3.1 Input registers

Table 1: Input registers

Address	Data type	Description
[0:7]		<i>Measurement data of channel 1</i>
[0]	uint 16	Series resistance [1Ω]
[1]	uint 16	Parallel resistance [1Ω]
[2]	uint 16	Status: Bit 0-1: Diode state A diode can be in one of the four states: 0: Short circuit 1: Diode wired in right direction 2: Diode wired in left direction 3: No diode (open circuit) Bit 10: Logical state of the input Bit 11: Lock from incorrect polarity of the diode Bit 12: Lock from serial resistance Bit 13: Lock from parallel resistance Bit 14: Executive relay status Bit 15: Error Other bits are reserved.
[3:7]		Reserved
[8:15]		<i>Measurement data of channel 2 (see channel 1)</i>
[16:23]		<i>Measurement data of channel 3 (see channel 1)</i>
[24:31]		<i>Measurement data of channel 4 (see channel 1)</i>
[32]	uint 16	Consecutive bits, starting from the least significant, the states correspond to driven states of the relays Other bits are reserved.
[33:127]		Reserved

## 3.2 Device ID

The PMS-11/\*/\* relay allows reading the device ID saved in ASCII format. The device ID comprises the device type, firmware version, hardware version, and the Modbus register data version. The entries begin with the base address 2048 (0x800). The addresses listed here are offsets from the base address.

Table 2: Device ID

Address	Data type	Description
[0:31]		Device ID

## 4 Holding Registers

### 4.1 Device configuration

Table 3: Holding registers

Address	Data type	Description
[0:7]		<i>Configuration data of channel 1</i>
[0]	uint 16	Switch off resistance [1Ω]
[1]	uint 16	Switch on resistance [1Ω]
[2]	uint 16	Delay of switching off the relay contact [0.01s]
[2]	uint 16	Configuration bits: Bit 0: Enable bidirectional detection of rectifier diode Other bits are reserved.
[4:7]		Reserved
[8:15]		<i>Configuration data of channel 2 (see channel 1)</i>
[16:23]		<i>Configuration data of channel 3 (see channel 1)</i>
[24:31]		<i>Configuration data of channel 4 (see channel 1)</i>
[32]	uint 16	User interface settings Bits 0-7: Time of inactivity after which the device menu will exit automatically. Setting range: 1 ÷ 10 min. Other values are reserved. Bits 8-11: Choice of interface language, where: 0: Polish 1: English 2: German 3: Spanish 4: Czech 5: Russian 6: Turkish Other values are reserved. Bits 12-15: Display brightness. Setting range: 0 ÷ 4. Other values are reserved.
[33]	uint 16	Configuration of the communication protocol: Bits 0-7: Data exchange speed via Modbus protocol. Transmission rates for individual values are as follows: 1: 300 bps 2: 600 bps 3: 1200 bps 4: 1800 bps 5: 2400 bps 6: 3600 bps 7: 4800 bps 8: 7200 bps 9: 9600 bps 10: 14400 bps 11: 19200 bps 12: 28800 bps 13: 38400 bps 14: 57600 bps

Address	Data type	Description
		15: 115200 bps Other values are reserved. Bity 8-15: Address at which the device is available in the Modbus protocol. Setting range: 1 ÷ 247. Other values are reserved.
[34]	uint 16	Configuration of the communication protocol: Bits 0-3: Parity: 0: Even 1: Odd 2: Zero 3: One 4: None Other values are reserved. Bits 4-7: Number of stop bits: 0: 1 stop bit 1: 1.5 stop bits 2: 2 stop bits Other values are reserved. Other values are reserved.
[35:57]		Reserved
[58]	uint 16	Configuration bits: Bit 0: Reversal of the screen by 180° Other bits are reserved.
[59:62]	uint 16	Access password to remote change of equipment parameters configuration
[63]	uint 16	Register of instruction for saving of remote configuration of the equipment parameters

## 5 Programming the PMS-11/\*/\* relay

### 5.1 Introduction

This section specifies the method for remote programming of the PMS-11/\*/\* multifunctional relay. It is not recommended to modify any data labelled as „reserved”. For bit settings, the unused segments should be filled with zeros or left unmodified. This will prevent erratic and unexpected operation of the product if a newer version introduces new features which use the previously unused data segments.

### 5.2 Programming

Entering of new data should be started from giving an access password. Password should be entered to 4 registers [59:62] in total, in one operation, in form of ASCII characters. For example to enter password „12345678” user should enter the following values:

address [1]: 0x3231,  
 address [2]: 0x3433,



address [3]: 0x3635,  
address [4]: 0x3837.

Then user should perform operation recording data to the registers. In case of attempt to save incorrect configuration, the error code will be returned.

After saving of correct data user should enter operation code to the register [63] to apply new settings. The followings codes are available:

code [0]: do nothing,  
code [1]: test of settings without saving to read-only memory,  
code [2]: applying settings and saving in read-only memory,  
code [4]: restoring settings from read-only memory,  
code [8]: reset to factory settings (without language and communication parameters).

After saving of password and data next operation can be performed only for a short time. In case when address of recorded data is adjacent to address of passwords entering records, then password and data can be save in one operation. Similarly recording of password and instruction can be joined as well as all three operations at the same time. If any abnormalities will be detected during data record – error code will be returned.

## 6 End notes

EXPROTEC is the manufacturer of this product and reserves the right to changes and modifications as a result of technical progress and to use equivalent replacement parts.

This product has been manufactured in compliance with good engineering practices.

## 7 Orders and service

The orders should be sent to the following address:

**EXPROTEC Sp. z o.o.**  
**43-100 Tychy, ul. Graniczna 26A**  
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**Phone/fax:**

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**[www.exprotec.pl](http://www.exprotec.pl)**

The housing components are replaced by the manufacturer or a company authorized by the manufacturer.

The manufacturer is not responsible for the device quality in case of repairs or components replacement made by the customer itself.

The manufacturer reserves the right to make changes in this specification in any time, without the necessity to inform about it.

# EXPROTEC



**EXPROTEC company develops and produces the innovative components and systems which are controlled in accordance with international standards and are applied in areas endangered by explosion as well as in the field of environment protection, radioactive protection and industry.**

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