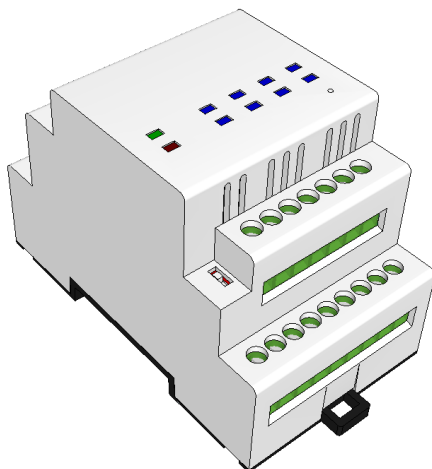




## CS-8 Central switch

This document contains tables with parameter register address and data registers for the MODBUS RTU protocol with data communication over serial interface of the ION CS-8 module (technical name – D3M-8DI1XD18RO-MB, D3M-8DI1XD18RO-MBS)



[www.smart-ion.com](http://www.smart-ion.com)

Document version: **1.74**

**12.05.2026**

## CONTENT

Table of parameter register addressees .....	3
Control.....	3
Initial settings .....	4
Discrete input settings (DI).....	5
Discrete output settings (RO/WO/TO) .....	6
Additional inputs (XDI) .....	7
Example .....	8
Table of data register addresses .....	9
General data .....	9
Input states and statuses .....	10
Note.....	10

The description of functions for reading and writing output states, as well as for modifying parameter registers, is provided in the 'Modbus RTU Functions and protocol description' document.

## TABLE OF PARAMETER REGISTER ADDRESSEES

The data is available for reading and writing.

Functions:

0x03 – Read parameter registers (READ\_HOLDING\_REGISTERS)

0x06 – Write a single parameter register (WRITE\_REGISTER)

0x10 – Write multiple parameter registers (WRITE\_MULTIPLE\_REGISTERS)

## CONTROL

Addresses (hex)	Parameter	Range of values / description
0x00AA	Reboot the module Supports a broadcast query with the FC_WRITE_REGISTER function	The writing of any value reboots the module
0x00AB	Reset to default settings Supports a broadcast query with the FC_WRITE_REGISTER function	
0x00AC	Reset event counters (number of queries, error counters – data registers 0x020A-0x0210) Supports a broadcast query with the FC_WRITE_REGISTER function Counters are also reset when the module is rebooted	The writing of any value resets the counters (without rebooting the module)
0x00E0 ... 0x00E9	<b>Version 1.74+</b> User-defined device name Used to facilitate the identification of a certain module when there are several identical modules in the system Maximum 10 characters Default setting – (blank)	10 registers with 2 bytes per register (ASCII)

## INITIAL SETTINGS

Addresses (hex)	Parameter	Range of values / description
0x0100	Module address (default setting – 0x0007) A reboot is required after changing this value	0x0001 ... 0x00F7 (1 ... 247)
0x0101	Baud rate Default setting – 0x0003 (9,600 bps) A reboot is required after changing this value	0x0001 – 2,400 bps 0x0002 – 4,800 bps 0x0003 – 9,600 bps 0x0004 – 14,400 bps 0x0005 – 19,200 bps 0x0006 – 28,800 bps 0x0007 – 38,400 bps 0x0008 – 57,600 bps 0x0009 – 115,200 bps ( <b>Version 1.62+</b> )
0x0102	Data transmission format Default setting – 0x0002 (8N2 – 8 data bits + 2 stop bits) A reboot is required after changing this value	0x0001 – 8N1 (8 data bits + 1 stop bits) 0x0002 – 8N2 (8 data bits + 2 stop bits) 0x0003 – 8E1 (8 data bits + 1 even bit + 1 stop bits) 0x0004 – 8O1 (8 data bits + 1 odd bit + 1 stop bits)
0x0103	Debounce filter time, ms Default setting – 50 ms Inputs that require enabled debouncing are set at the address 0x0301; additional inputs – 0x0501	0x0001 ... 0x01F4 (1 ... 500)
0x0104	Input activation interval above which the 'long press' event is triggered, ms With a short input activation – the usual response to a change in the input state Default setting – 1,500 ms (1.5 s) Inputs that require the detection of the activation interval are set at 0x0303... 0x0306 (for devices with additional inputs) and/or 0x0603 (for devices with PWM outputs)	0x01F4 ... 0x1388 (500 ... 5000)

## DISCRETE INPUT SETTINGS (DI)

Addresses (hex)	Parameter	Range of values / description
0x0301	Enable/disable debouncing inputs (the duration is set at 0x0103) Default setting – 0xFFFF (all inputs enabled)	0 or 1 in a 16 bit value (disabled – 0 / enabled – 1) Bit 0 – for input 1 ... Bit 15 – for input 16
0x0302	Input operation mode Default setting – 0x0000 (all trigger inputs) Trigger mode – input type «push button» (non-locking switch) Synchronous mode – toggle switch	0 or 1 in a 16 bit value (trigger mode – 0 / synchronous mode – 1) Bit 0 – for input 1 ... Bit 15 – for input 16
0x0303	<b>Version 1.70+</b> Input type: Normally Open (NO) or Normally Closed (NC) Default setting – 0x0000 (all NO)	0 or 1 in a 16 bit value (NO – 0 / NC – 1) Bit 0 – for input 1 ... Bit 15 – for input 16
0x0311 ... 0x0320	<b>Version 1.40+</b> Using the «long enable» input function (for trigger inputs only). - If an input is assigned to additional input – long activation of this input forces programmed switching of the additional input to ON status. - If an input is assigned to a virtual group – long activation of this input changes the state of all outputs assigned to this group in accordance with the set mode.  Activation interval (time after which the function is activated) is set at 0x0104  Default setting for all inputs – 0x0000 (do not use)	Low word (bits 0...7) – assignment data: 0xXX05...0xXX08 – virtual groups 1...4 0xXX09...0xXX0C – virtual groups 5...8* * When the number of inputs is more than 8  High word (bits 8...15) – assignment output mode (for virtual groups): 0x00XX – do not change state 0x01XX – ON 0x02XX – OFF 0x03XX – toggle state

## DISCRETE OUTPUT SETTINGS (RO/WO/TO)

Addresses (hex)	Parameter	Range of values / description
0x0401	Retain state of discrete outputs (on/off) (after restoration of power). Default setting – 0x0000 (do not retain for all) Valid only for outputs: - with unassigned inputs (see address 0x0402); or - with assigned inputs in the trigger mode (see address 0x0302)	0 or 1 in a 16 bit value (do not retain – 0 / retain –1) Bit 0 – for output 1 ... Bit 15 – for output 16
0x0402	Assign outputs to discrete inputs Default setting – 0xFFFF (all outputs assigned) When an output is assigned to an input, the output changes its state as the status of the corresponding input changes	0 or 1 in a 16 bit value (not assigned – 0 / assigned – 1) Bit 0 – for input and output 1 ... Bit 15 – for input and output 16
0x0403	Invert outputs with an assigned output in synchronous mode Default setting – 0x0000 (no inversion: input ON status – output ON status) Activation of the inversion function set the output ON status when the input is OFF status	0 or 1 in a 16 bit value (no inversion – 0 / inversion – 1) Bit 0 – for output 1 ... Bit 15 – for output 16
0x0404	<b>Version 1.60+</b> Initial state of outputs when the device is turned on (when power is resumed). Valid only for outputs that do not retain their state when power is resumed (see address 0x0401): – with unassigned inputs (see address 0x0402) or – with assigned inputs in the trigger mode (see address 0x0302) Default setting – 0x0000 (all outputs enabled)	0 or 1 in a 16 bit value (disabled – 0 / enabled –1) Bit 0 – for output 1 ... Bit 15 – for output 16
<b>Automatic deactivation of a discrete output (RO/WO/TO) after a preset time</b>		
0x0421	Limit closed output duration for output 1	High word (bits 8...15) – units of measurement 0x01XX – seconds 0x02XX – minutes 0x03XX – hours  Low word (bits 0...7) – value 0xXX00 ... 0xXX3C (0 ... 60)
0x0422	Limit closed output duration for output 2	
0x0423	Limit closed output duration for output 3	
0x0424	Limit closed output duration for output 4	
0x0425	Limit closed output duration for output 5	
0x0426	Limit closed output duration for output 6	
0x0427	Limit closed output duration for output 7	
0x0428	Limit closed output duration for output 8	

0x0429 ... 0x0430	Limit closed output duration for output 9-16 (if available)	For example, disable after 5 minutes: 0x0205 disable after 7 hours: 0x0307  Default setting: 0 for all outputs (not limited)
Delay deactivation of the output (RO/WO/TO) after a preset time		
0x0431 ... 0x0440	Delay deactivation for output 1 ... Delay deactivation for output 16	Similarly, 0x0421-0x0430  Default setting: 0 for all outputs (without delay)

## ADDITIONAL INPUTS (XDI)

Default settings:

- all additional inputs in the trigger mode with debouncing enabled (the duration is set in the register 0x0103);
- additional input 1 is assigned to outputs 1...16 (only the ON status; the OFF status is not assigned): when the additional input closes, all outputs are disabled; when the additional input opens – the outputs do not respond (no events occur)

Addresses (hex)	Parameter	Range of values / description
0x0501	Debouncing of additional inputs 1...4 (the duration is set at 0x0103) Default setting – 0x000F (all inputs enabled)	4 bit value, where significant bits are 0 (enabled) or 1 (disabled) Bit 0 – for additional input 1 ... Bit 3 – for additional input 4
0x0502	Operation mode for additional inputs 1...4 Default setting – 0x000F (all inputs in synchronous mode)	0 (trigger mode) or 1 (synchronous mode) in 4 low-order bits
0x0503	Additional input 1	Assign the ON status of additional input 1 to outputs 1...16 Default setting – 0xFFFF (all outputs assigned)
0x0504		Change the state of outputs 1...16 when additional input 1 is switched to the ON status Default setting – 0x0000 (set all outputs to the OFF) If no assignment is set (see 0x0503) – the outputs do not change the status
0x0505		Assign the OFF status of additional input 1 to outputs 1...16 Default setting – 0x0000 (all outputs not assigned)
0x0506		Change the state of outputs 1...16 when additional input 1 is switched to the OFF status Default setting – 0xFFFF (set all outputs to the ON status) If no assignment is set (see 0x0505) – the outputs do not change the status

## EXAMPLE

Module with address 0x01: 8 relay outputs (RO) and 8 digital inputs (DI) with one additional input (XDI).

Objective: Implement a "master switch" functionality on the additional input (XDI). When this input is turned ON, all relays must open (turn OFF). When the input is turned OFF, only relays 2 and 3 must close (turn ON).

This example includes only master requests (without responses). Function 0x06 (Write Single Holding Register) is used to save the module settings. Once configured, the module can be disconnected from the network to operate in standalone mode (without a connection to the RS-485 interface).

1. Address 0x0401: Enables power-on state recovery for relays 1–8 (restores relay states after a module reboot or power outage):

```
0x01  0x06  0x0401  0x00FF*  0x_CRC
```

\* Relays 1–8 in binary format: 0000 0000 1111 1111, which in hexadecimal representation is 0x00FF.

2. Address 0x0402: Maps all corresponding outputs to inputs:

```
0x01  0x06  0x0402  0x00FF  0x_CRC
```

3. Address 0x0302: Sets toggle (momentary switch) mode for inputs 1–8:

```
0x01  0x06  0x0302  0x0000  0x_CRC
```

4. Address 0x0301: Sets debounce mode for inputs 1–8:

```
0x01  0x06  0x0301  0x00FF  0x_CRC
```

5. Address 0x0502: Sets synchronous (toggle switch) mode for additional input 1:

```
0x01  0x06  0x0502  0x0001  0x_CRC
```

6. Address 0x0501: Sets debounce mode for additional input 1:

```
0x01  0x06  0x0501  0x0001  0x_CRC
```

7. Address 0x0503: Maps the ON status of additional input 1 to outputs 1–8:

```
0x01  0x06  0x0503  0x00FF  0x_CRC
```

8. Address 0x0504: Deactivates (turns OFF) relays 1–8 when the additional input transitions to ON status:

```
0x01  0x06  0x0504  0x0000  0x_CRC
```

9. Address 0x0505: Maps the OFF status of additional input 1 to relays 2 and 3:

```
0x01  0x06  0x0505  0x0006*  0x_CRC
```

\* Relays 2 and 3 in binary format: 0000 0000 0000 0110, which in hexadecimal representation is 0x0006.

The remaining relays will not be mapped (will not respond) when additional input 1 transitions to OFF status.

10. Address 0x0506: Activates (turns ON) relays 2 and 3 when the additional input transitions to OFF status:

```
0x01  0x06  0x0506  0x0006  0x_CRC
```

If you only need to turn off specific relays instead of all of them when additional input 1 is turned ON (for example, turning off all relays except relay 5), you must map only the required relays and replace step 7 with the following:

7. Address 0x0503: Maps the ON status of additional input 1 to outputs 1–4 and 6–8:

```
0x01  0x06  0x0503  0x00EF*  0x_CRC
```

\* Relays 1–4 and 6–8 in binary format: 0000 0000 1110 1111, which in hexadecimal representation is 0x00EF.

## TABLE OF DATA REGISTER ADDRESSES

Read-only data: function 0x04 – Read data registers (READ\_INPUT\_REGISTERS)

### GENERAL DATA

Addresses (hex)	Parameter	Range of values / description
0x00BB	Serial number of the module	5 registers with 2 bytes per register * <sup>1</sup>
0x00C0	Module name	10 registers with 2 bytes per register (ASCII)
0x00CA	Module version	2 registers with 2 bytes per register (ASCII)
0x00CC	Soft version	2 registers with 2 bytes per register (ASCII)
0x00CE	Reserved	2 registers with 2 bytes per register
0x00CF		
0x00D0	Number of discrete inputs	0x0000 ... 0x0010 (max 16)
0x00D1	Number of additional inputs	0x0000 ... 0x0004 (max 4)
0x00D2	Number of analog inputs	0x0000 ... 0x0008 (max 8)
0x00D3	Reserved	
0x00D4	Number of discrete outputs	0x0000 ... 0x0020 (max 16)
0x00D5	Number of PWM outputs for LED strip lights	0x0000 ... 0x0004 (max 4)
0x0200 ... 0x0204	Reserved	
0x0205	Uptime, s	4 bytes (2 registers)
0x0207 ... 0x0209	Reserved	
0x020A	Number of queries addressed to the device * <sup>2</sup>	4 bytes (2 registers)
0x020C	Number of unresponded queries addressed to the device * <sup>2</sup>	4 bytes (2 registers)
0x020E	Number of queries with errors addressed to the device * <sup>2</sup>	4 bytes (2 registers)
0x0210	Number of queries with a CRC error addressed to the device * <sup>2</sup>	4 bytes (2 registers)

\*<sup>1</sup> The serial number of the module is written from left to right, i.e. the lowest bit first.

Example (s/n: 57-38-32-C7-36-32-FF-5-20-7):

Value (hex)	57	38	32	C7	36	32	FF	5	20	7
Register address	0x00BB		0x00BC		0x00BD		0x00BE		0x00BF	

\*<sup>2</sup> Event counters are reset when rebooting the module

## INPUT STATES AND STATUSES

Addresses (hex)	Parameter	Range of values / description
0x1000	State of discrete inputs Whether a button/switch at the input is closed at the time of a query	0 or 1 Bit 0 – for input 1 ... Bit 15 — for input 16
0x1001	Status of discrete inputs In the synchronous mode, the input status is equal to the input state. In the trigger mode, each time you press a non-locking button, the input status switches to the opposite.	0 or 1 Bit 0 – for input 1 ... Bit 15 — for input 16
0x1002	State of additional inputs 1 ... 4	0 or 1 (opened or closed) in 4 low-order bits
0x1003	Status of additional inputs 1 ... 4	0 or 1 (disabled or enabled) in 4 low-order bits

### NOTE

The difference between the input state and input status is the physical position of the closing contact of the button (switch). If you use a non-locking push button, the state changes depending on the position of the contacts (closed or opened), and the status changes after each press (enabled or disabled). This can be schematically described as follows:

	Action	Status	State
0.	The button is released (initial state)	0	0
1.	The button is pressed (contact closes)	0	1
2.	The button is released (contact opens) and the button press action is complete	1	0
3.	The button is pressed	1	1
4.	The button is released and the button press action is complete	0	0