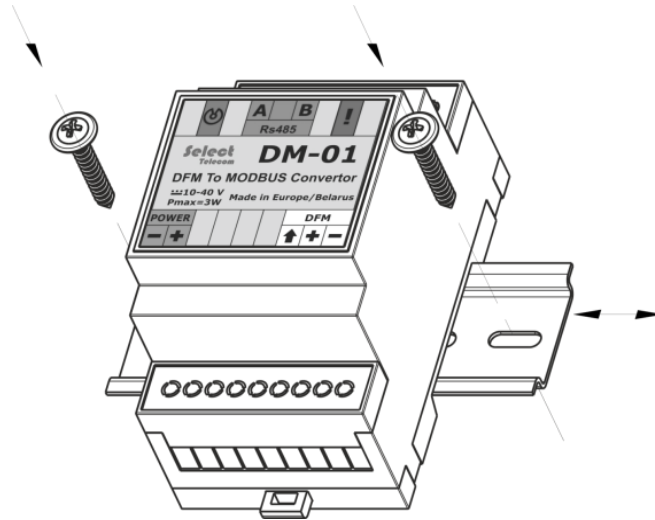


## DM-01 Communication protocol. HW 2.0

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**DM-01**  
**Communication protocol.**  
**HW 2.0**  
**Version 1.2.**

## 1. Introduction

This document covers communication protocol for DM-01 Converter, designed for Fuel Flow Meters with pulse interface systems, which can be connected to the equipment of industrial automation.

The Communication protocol is designed to read the registers on the protocol MODBUS devices DM-01 produced by Select Telecom LLC. Annex A describes the registers maps.

DM-01 converter (slave) uses standard Modbus protocol to communicate with Terminal (master) via RS-485.

Baud rate is adjusted by writing to the register with location 3901. By default, the speed is 19200. No parity, 8 bits, 1 stop bit. Supported Bauds are 4800, 9600, 19200.

Device bus address is an available in the register with location 3900. The address value is specified in the range from 1 to 247. By default, the bus address is equal to the last two digits of the serial number.

## 2. Request to read registers. Function 3.

This request is used to read DM-01 identification data, settings or data registers.

### Request to read.

Name	Size	Example
Bus address	1 byte	
Function	1 byte	=0x03
Register address	2 bytes	
Registers count	2 bytes	
CRC16	2 bytes	

### Positive response

Name	Size	Example
Bus address	1 byte	
Function	1 byte	=0x03
Data size	1 byte	
Data	N byte	
CRC16	2bytes	

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### 2.1 Request to read identification data.

This request is used to read DM-01 identification data.

#### Request to read.

Example: 0x01 0x03 0x0b 0xb8 0x00 0x29 0x06 0x15

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Register address	2 byte	0x0bb8 (from address 3000)
Registers count	2 byte	0x0029 (count 41)
CRC16	2 byte	0x06 0x15

#### Positive response

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Data size	1 byte	0x52
Data	82 byte	0x6F 0x43 0x76 0x6E 0x72 0x65 0x65 0x74 0x20 0x72 0x4D 0x44 0x30 0x2D 0x00 0x31 0x00 0x00 0x00 0x00 0x30 0x31 0x2D 0x31 0x2D 0x31 0x30 0x30 0x31 0x30 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x36 0x30 0x32 0x2F 0x31 0x30 0x00 0x34 0x00 0x00 0x00 0x01 0x65 0x56 0x20 0x72 0x2E 0x30 0x2E 0x31 0x00 0x32 0x65 0x56 0x20 0x72 0x2E 0x30 0x2E 0x31 0x00 0x38 0x65 0x56 0x20 0x72 0x2E 0x31 0x00 0x30 0x00 0x00
CRC16	2 byte	0x3E 0xA1

### 2.2 Request to read settings.

This request is used to read DM-01 settings.

#### Request to read.

Example: 0x01 0x03 0x0fa0 0x00 0x06 0xc6 0xfe

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Register address	2 byte	0x0fa0 (from address 4000)
Registers count	2 byte	0x0006 (count 6)
CRC16	2 byte	0xC6FE

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### Positive response

#### Example:

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Data size	1 byte	0x0C
Data	12 byte	0x00 0xC8 // pulse per litre = 200 0x03 0xE8 0x00 0x0A 0x00 0x32 0x01 0x2C 0x02 0x58
CRC16	2 byte	0x48 0x73

### 2.3 Request to read Communication settings.

This request is used to read DM-01 Communication settings.

#### Request to read.

Example: 0x01 0x03 0x0F 0x3C 0x00 0x03 0xC6 0xD3

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Register address	2 byte	0x0f3c (from address 3900)
Registers count	2 byte	0x0003 (count 3)
CRC16	2 byte	0xc6d3

### Positive response

#### Example:

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Data size	1 byte	0x06
Data	6 byte	0x00 0x01 //Bus address = 1 0x4B 0x00 //Baud rate = 19200 0x00 0x00 // Parity = None
CRC16	2 byte	0x0B 0x51

### 3. Request to write registers. Function 6.

This request used to write DM-01 settings registers.

#### Request to read.

Name	Size	Example
Bus address	1 byte	
Function	1 byte	0x06
Register address	2 bytes	
New value	2 bytes	
CRC16	2 bytes	

#### Positive response

Name	Size	Example
Bus address	1 byte	
Function	1 byte	=0x06
Register address	2 bytes	
New value	2 bytes	
CRC16	2 bytes	

### 3.1 write settings examlpe.

This request used to write DM-01 settings (for example Pulse per liter).

#### Request to write setting register (Pulse per liter).

Example: 0x01 0x06 0x0F 0xA0 0x00 0xB4 0x8A 0x8B

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x06
Register address	2 byte	0x0FA0 (to address 4000)
Data	2 byte	0x00B4 (new value = 180)
CRC16	2 byte	0x8A 0x8B

#### Positive response

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x06
Register address	2 byte	0x0FA0 (to address 4000)
Data	2 byte	0x00B4 (new value was saved)
CRC16	2 byte	0x8A 0x8B

#### 4 DM-01 Exception codes.

##### 4.1 Request to read with Illegal data address.

Example: 0x01 0x03 0x1B 0x58 0x00 0x06 0x42 0xFF

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x03
Register address	2 byte	0x1B 0x 58(from address 7000)
Registers count	2 byte	0x00 0x 06 (count 6)
CRC16	2 byte	0x42 0xFF

##### Response with exception.

Example: 0x01 0x83 0x02 0xC0 0xF1

Name	Size	Example
Bus address	1 byte	0x01
Function	1 byte	0x83 (Exception to function 3)
Exception	1 byte	0x02 (Exception code 2, illegal data address)
CRC16	2 byte	0xC0 0xf1

##### 4.2 DM-01 Exception codes table.

Code	Description
0x01	Illegal function.
0x02	Illegal data address
0x03	Illegal data value.
0x05	Acknowledge.
0xF0	ERR_PROG_WRONG_IMAGE_SIZE.
0xF1	ERR_PROG_WRITE.
0xF2	ERR_PROG_CRC32.
0xF3	ERR_PROG_DESTINATION.
0xFF	TEST_ERROR.

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### Annex A. DM-01 Registers map.

Address	Date/ Tune	Size, byte	Name	Description
3000	Ident	20	Device Name	= «Converter DM-01»
	Ident	20	Serial #	for example= «101-1-1001»
	Ident	10	Manufacture date	for example= «06/2014»
	Ident	2	Part#	for example =1
	Ident	10	LSW version	for example = «Ver 1.»
	Ident	10	SW version	for example = «Ver 1.»
Ident	10	HW version	for example = «Ver 1.»	
3900	Tune	2	Bus Address	Valid value: 1-247
3901	Tune	2	Band rate	4800;9600; <b>19200-default;</b>
3902	Tune	2	Parity	<b>0-none; 1- odd; 2- even</b>
4000	Tune	2	Pulse per liter	for example= 200 is a 200 pulse per liter
4001	Tune	2	Correction coefficient	for example =500 is a 0.5 (divider 1000)
4002	Tune	2	Minimal fuel rate	for example=20 is a 2.0 L/H
4003	Tune	2	Upper limit for «Idle» mode	for example=25 is a 2.5 L/H
4004	Tune	2	Upper limit for mode 2	for example=270 is a 27.0 L/H
4005	Tune	2	Upper limit for mode 3	for example=450 is a 45.0 L/H
4241	data reg	2	Alarm indicator 1	bit 16..8 device error bits 3..0 current mode current mode: 0 - no flow 1- Idle 2-Mode 2 3-Mode 3 4-Mode 4
4218	data reg	4	Pulse count	for example=1345 is a 1345 pulse
4220	data reg	2	Fuel Rate	for example=164 is a 16.4 L/H
4221	data reg	4	Fuel used	for example=975 is a 0.975 L
4223	data reg	4	Engine Time	for example=360 is a 0.1 H
4225	data reg	4	Fuel used in "Idle" mode	for example=1345 is a 1.345 L
4227	data reg	4	Fuel used in mode 2	for example=9895 is a 9.895 L
4229	data reg	4	Fuel used in mode 3	for example=2135 is a 2.135 L
4231	data reg	4	Fuel used in mode 4	for example=10000 is a 10.000 L
4233	data reg	4	Work Time in "Idle" mode	for example=360 is a 0.1 H
4235	data reg	4	Work Time in mode 2	for example=360 is a 0.1 H
4237	data reg	4	Work Time in mode 3	for example=360 is a 0.1 H
4239	data reg	4	Work Time in mode 4	for example=360 is a 0.1 H
5000	data reg	2	Fuel volume in liter	for example=1358 is 135.8 L
5001	data reg	2	Fuel volume in %	for example 67 is 67%
5002	data reg	2	fuel level in Hz	for example 1000 is 1000 Hz

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5003	data reg	2	Alarm indicator 2	bit 15 is red indicator bit 14 is yellow indicator bits 7-0 Fuel sensor error cod. If error code=0, then normal operation.
5100	Tune	2	Tank volume in liter	for example=500 is 500L
5101	Tune	2	Red level in liter	for example=58 is 58 L
5102	Tune	2	Yellow level in liter	for example=135 is 135 L
5103	Tune	2	The number of calibration points, max 20 points	for example 2 is 2 calibration points
5014,5016...5034	Tune	2	Fuel Level in Hz Point N, where N is number of point	see reg. 5002
5015,5015...5035	Tune	2	Fuel Volume in liter Point N, where N is number of point	see reg. 5000