



FUEL DISPENSER PULSE READER

Difference T4

V 1.02

OPERATION MANUAL

CONTENTS

1	Safety Requirements	4
2	Description and Operation of eurosens Fuel Dispenser Pulse Readers	5
2.1	Purpose	5
2.2	Installation Kit Contents	5
2.3	Technical Specifications	5
3	Installation Recommendations	5
3.1	General Installation Instructions	6
3.2	Electrical Connection	7
	Electrical Connection (Central Connector)	7
	Electrical Connection (IN1, IN2 Connector)	8
	Electrical Connection (IN3, IN4 Connector)	8
4	Reader Setup	12
5	Data Transfer Protocol Description	16
5.1	LLS-compatible Protocol (Command 06h)	16
5.2	ModBus Protocol	17
5.3	Difference T4 Remote Configuration Protocol via Terminal	17
6	Additional Information	19
6.1	Technical Support	19
6.2	Contacts	19

This manual applies to all modifications of the eurosens Difference T4 fuel dispenser pulse readers manufactured by CJSC Mechatronics (Vileyka, Republic of Belarus).

This document contains information on the design, operating principle, functional and technical characteristics of eurosens fuel dispenser pulse readers, as well as recommendations and requirements for their operation and installation.

The manufacturer guarantees that the fuel dispenser pulse readers comply with the requirements of applicable technical regulations, provided that the storage, transportation, and operating conditions, as well as the instructions and recommendations in this operation manual, are followed.



The manufacturer reserves the right to change the technical characteristics of the fuel dispenser pulse readers without prior agreement with the customer, provided that such changes do not impair their consumer properties.

1 SAFETY REQUIREMENTS

Installation, maintenance, and operation of the fuel dispenser pulse readers may be performed only by persons with the required qualifications who have received safety training and are familiar with the operating documentation.

To ensure proper installation and operation, installers are recommended to undergo training at the manufacturer or at specialized training centers. The installer and the person responsible for operating the sensors must understand the design and operating features of fuel dispensers.

Electric current is the source of hazard during installation and operation of the fuel dispenser pulse readers.

Installation and dismantling of the fuel dispenser pulse readers must be carried out with the power supply disconnected.

When installing and servicing the fuel dispenser pulse readers, the Rules for Operation of Consumer Electrical Installations and the Safety Rules for Operation of Consumer Electrical Installations must be observed.

2 DESCRIPTION AND OPERATION OF EUROSENS FUEL DISPENSER PULSE READERS

2.1 PURPOSE

eurosens fuel dispenser pulse readers are designed to register pulses received from fuel dispensers. The number of pulses is used to calculate the current fuel flow rate and the total volume of dispensed fuel. Data exchange is carried out via the RS485 interface using a specialized protocol.

2.2 INSTALLATION KIT CONTENTS

Fig. 1. Installation kit contents

Item	Qty.
M8x24 bolt	4 pcs.
M8 washer	4 pcs.
M8 spring washer	4 pcs.
M8 nut	4 pcs.

2.3 TECHNICAL SPECIFICATIONS

Table 2.1. General technical specifications

Parameter name and unit of measurement	Value
Supply voltage	10-60 V
Input signal	Pulse signal (4 channels)
Temperature range	-40...+85 degrees C
Output interface	RS 485
Data output protocol	LLS, MODBUS RTU
Ingress protection rating	IP 67
Overall dimensions (without cable), mm	180x85x58

3 INSTALLATION RECOMMENDATIONS

3.1 GENERAL INSTALLATION INSTRUCTIONS

The sensor is mounted inside the fuel dispenser, for example in the housing of the control and display unit (Fig. 1), and is connected to the fuel dispenser pulse generator connector (Fig. 4).

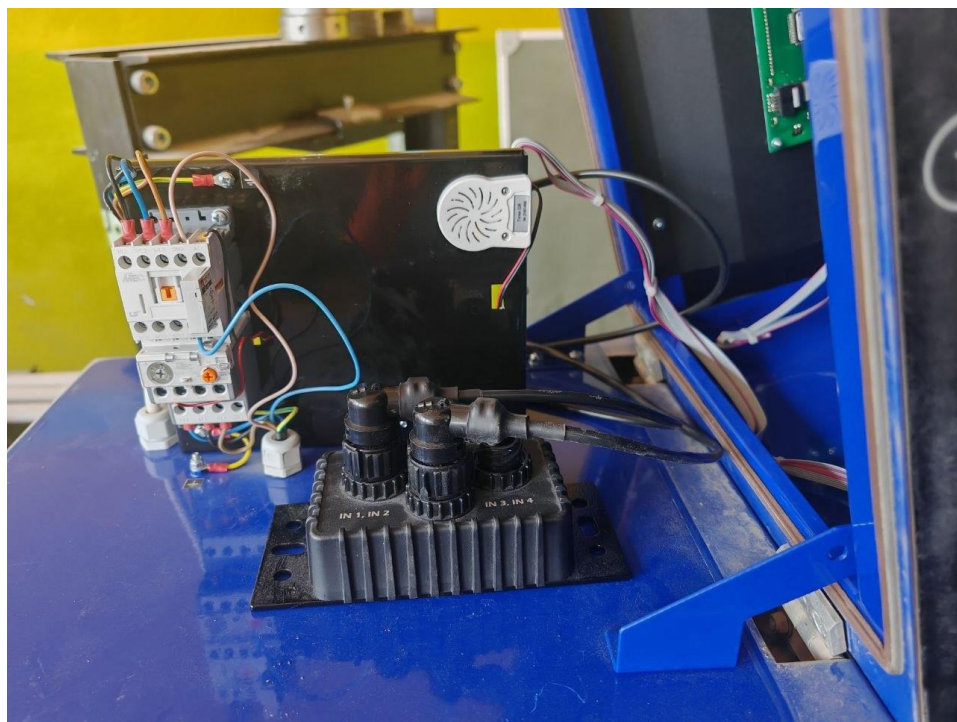


Fig. 1

In most cases, the pulse generator looks like the device shown in Fig. 2 and Fig. 3. A cable exits the device and goes to the connector on the fuel dispenser display and control unit.



Fig. 2



Fig. 3

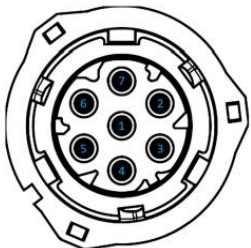
3.2 ELECTRICAL CONNECTION

The reader is equipped with three cable connectors:

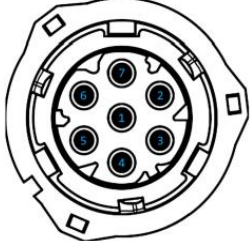
- the two side connectors are intended to receive signals from the fuel dispenser (two signals per connector);
- the central connector is used to connect to the terminal, supply power, and connect to the configurator.

The device can receive up to four signals simultaneously.

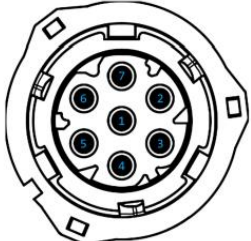
ELECTRICAL CONNECTION (CENTRAL CONNECTOR)

	Pin	Signal	Wire color in cable
	1	VBAT +	red
	2	GND -	brown
	3	K-LINE	blue
	6	RS 485 A	yellow
	7	RS 485 B	green

ELECTRICAL CONNECTION (IN1, IN2 CONNECTOR)

	Pin	Signal	Wire color in cable
	2	GND -	black
	4	IN1	green
	5	IN2	blue

ELECTRICAL CONNECTION (IN3, IN4 CONNECTOR)

	Pin	Signal	Wire color in cable
	2	GND -	black
	4	IN3	green
	5	IN4	blue

The pinout of the pulse generator can be determined using a voltmeter. Pulse generators usually have a 5 V or 12 V power supply.

In many cases, the connector contains power wire 1 (red), pulse signal 1 (blue), pulse signal 2 (green), power wire 2 (black), and protective shielding (gray) (Fig. 4). The two pulse signals from the pulse generator are used by the fuel dispenser controller to determine the rotation direction of the generator shaft. When connecting the reader, use only one of these signals (either one).

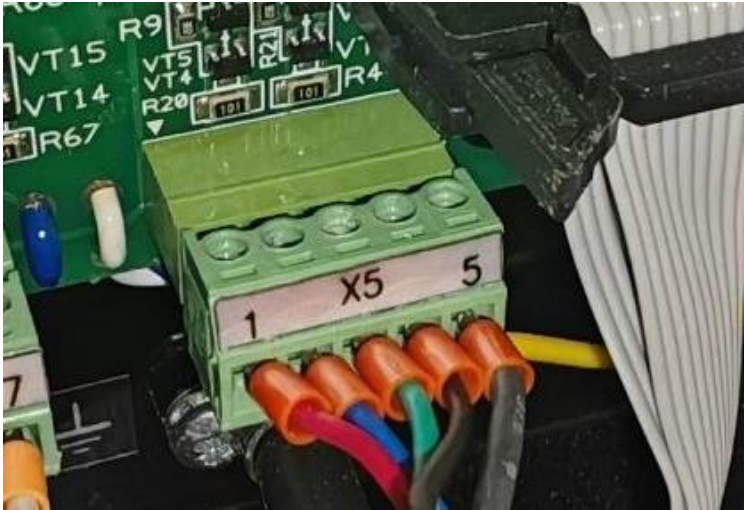


Fig. 4

If it is difficult to identify the required wire, the pinout can be found under the protective cover of the pulse generator (Fig. 5 and Fig. 6).



Fig. 5

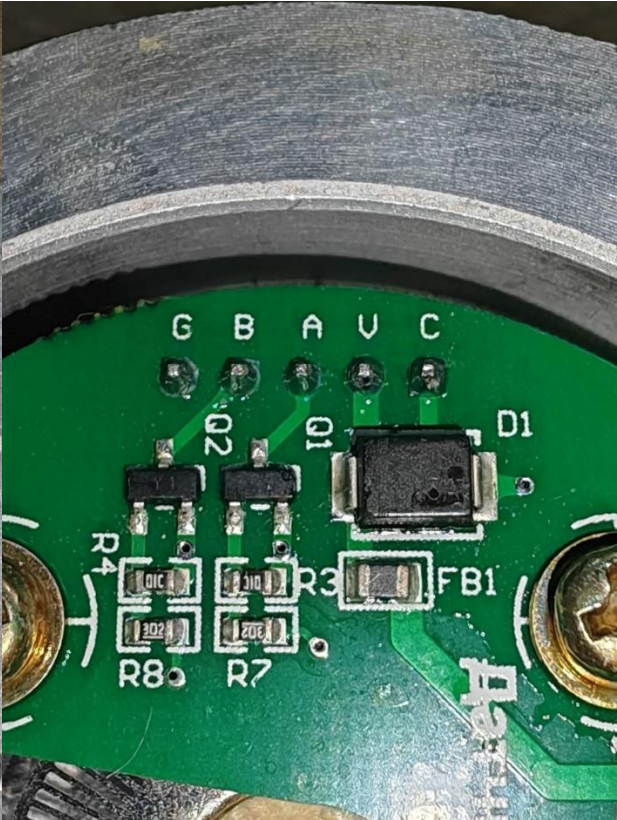


Fig. 6

Markings in Fig. 6:

Fuel Dispenser Pulse Reader Difference T4

OPERATION MANUAL

G corresponds to ground, power supply -5 V

B corresponds to signal B

A corresponds to signal A

V corresponds to voltage, power supply +5 V



Fig. 7. Before connecting the reader (X5 connector: red wire +5 V, blue signal 1, green signal 2, black GND-, gray protective shielding).

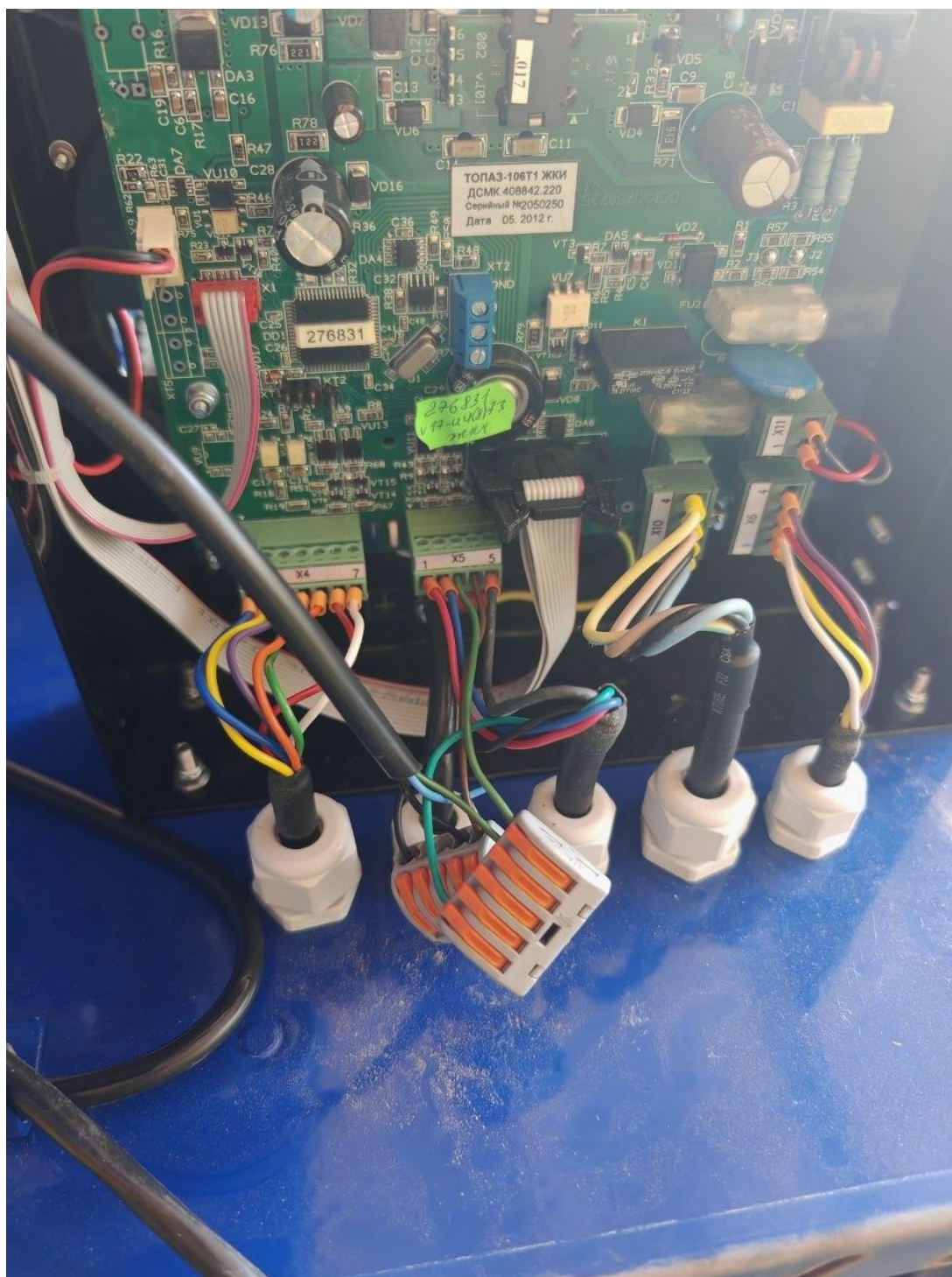


Fig. 8. Connecting one reader channel (GND to the black wire and IN1 to the green wire) using WAGO terminals.

4 READER SETUP

All required settings can be configured using the Difference T4 configurator software.

After launching the software, select the adapter COM port and click "Connect". Click "Search" and wait until all equipment appears in the list (Fig. 9).

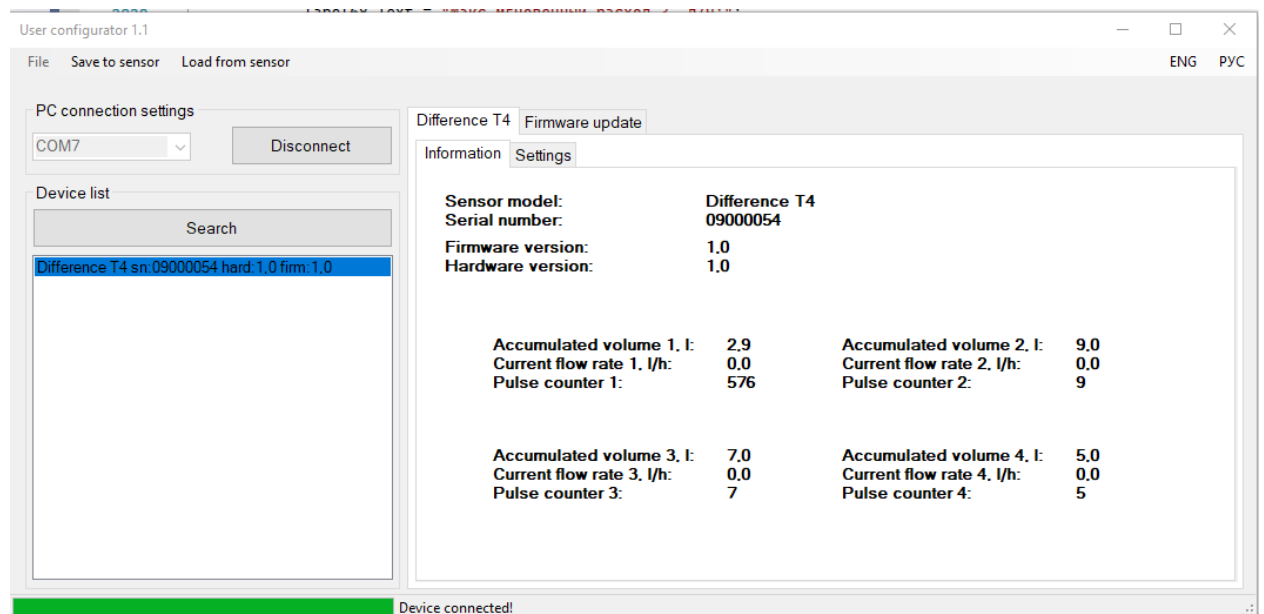


Fig. 9

Next, select the reader with the required serial number and configure it.

The "Information" tab (Fig. 9) displays:

- **Accumulated volume, L** - displays the total fuel volume;
- **Current flow rate, L/h** - displays the fuel flow rate at the current moment;
- **Pulse counter** - displays the number of pulses received at the input.

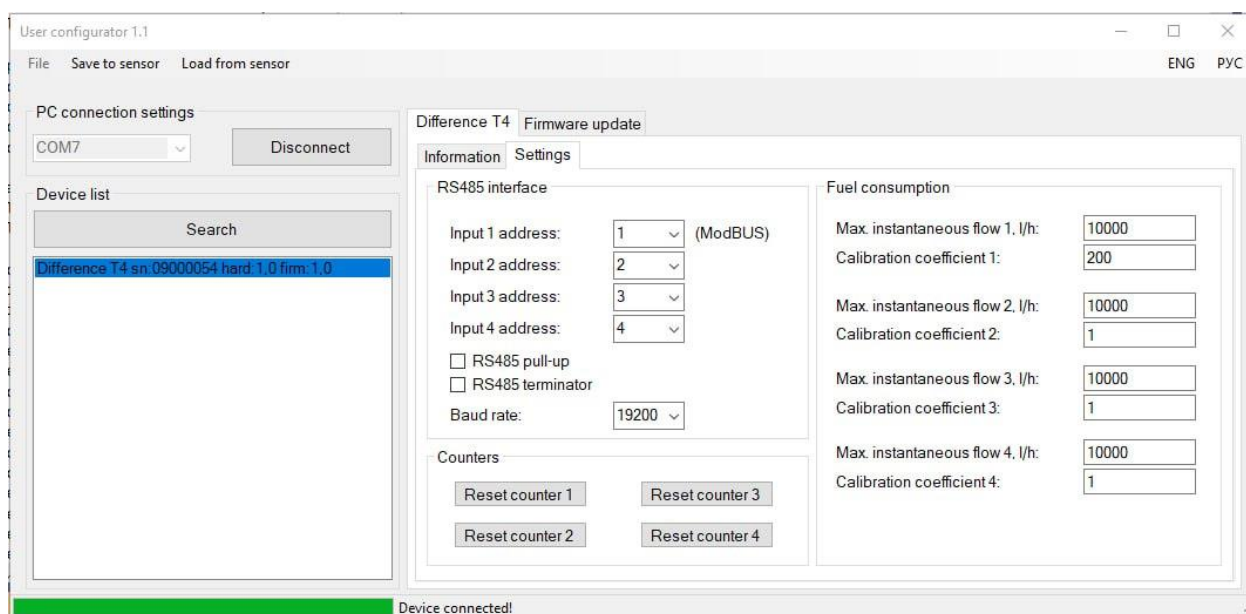


Fig. 10

The "Settings" tab (Fig. 10) contains the following options:

RS485 interface parameters (Fig. 10.1):

RS485 interface

Input 1 address: 1 (ModBUS)

Input 2 address: 2

Input 3 address: 3

Input 4 address: 4

☐ RS485 pull-up

☐ RS485 terminator

Baud rate: 19200

Fig. 10.1. RS485 setup.

- **Address** - the ModBUS address is set for each input;
- **RS485 pull-up** - enable this option if there is no device with pull-up resistors in the device network (if this cannot be determined, we recommend leaving this option unchecked);

- **RS485 terminator** - enables the pull-up resistor; it must be enabled if the device is connected at one end of the physical RS485 bus;
- **Baud rate** - communication speed;

Data processing parameters (Fig. 10.2):

Fuel consumption	
Max. instantaneous flow 1, l/h:	10000
Calibration coefficient 1:	200
Max. instantaneous flow 2, l/h:	10000
Calibration coefficient 2:	1
Max. instantaneous flow 3, l/h:	10000
Calibration coefficient 3:	1
Max. instantaneous flow 4, l/h:	10000
Calibration coefficient 4:	1

Fig. 10.2. Data operation settings.

- **Maximum instantaneous flow rate, L/h** - the threshold value of the current fuel flow rate; when this value is exceeded, the pulse counter stops accumulating.
- **Calibration coefficient** - the number of pulses corresponding to a consumption of 1 liter of fuel.



Under the LLS and MODBUS protocols, the fuel volume is transmitted in whole liters. If values with 0.1 L resolution are required, reduce the calibration coefficient by a factor of 10, then divide the received volume value by 10 in your monitoring software.

Counter reset (Fig. 10.3):

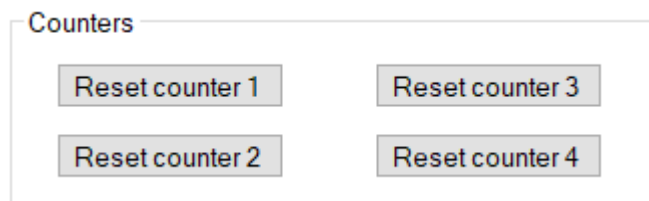


Fig. 10.3. Counter reset.

Allows the accumulated counter readings to be reset.

The configured settings must be saved to the sensor. Use the "Save to sensor" button at the top of the configurator. Settings can also be loaded from the sensor by clicking "Download from sensor".

5 DATA TRANSFER PROTOCOL DESCRIPTION

5.1 LLS-COMPATIBLE PROTOCOL (COMMAND 06H)

This command is intended for reading current data: accumulated volume and current fuel flow rate. Data is transmitted with the least significant byte first.

Command format:

Table 2 - Command structure of the binary data exchange protocol

Offset, byte	Field size, bytes	Value	Description
0	1	31h	Prefix.
+1	1	00h...FFh	Recipient network address.
+2	1	06h	Operation code.
+3	1	00h...FFh	Checksum.

Response format:

Table 3 - Response structure of the binary data exchange protocol

Offset, byte	Field size, bytes	Value	Description
0	1	3Eh	Prefix.
+1	1	00h...FFh	Sender network address.
+2	1	06h	Operation code.
+3	1	00h...FFh	Accumulated volume (t).
+4	2	0000h...FFFFh	Accumulated volume (N) - when the value exceeds 65535, the value (t) is increased by one.
+6	2	0000h...FFFFh	Current flow rate (F), L/h.
+8	1	00h...FFh	Checksum.

5.2 MODBUS PROTOCOL

No.	ModBus address	Storage location	Data type	Description
1	30001	Input register (high 16 bits)	unsigned 32-bit	Accumulated fuel volume, L (input 1)
2	30002	Input register (low 16 bits)		
3	30003	Input register (high 16 bits)	unsigned 32-bit	Accumulated fuel volume, L (input 2)
4	30004	Input register (low 16 bits)		
5	30005	Input register (high 16 bits)	unsigned 32-bit	Accumulated fuel volume, L (input 3)
6	30006	Input register (low 16 bits)		
7	30007	Input register (high 16 bits)	unsigned 32-bit	Accumulated fuel volume, L (input 4)
8	30008	Input register (low 16 bits)		
9	30009	Input register	unsigned 16-bit	Current fuel flow rate, L/h (input 1)
10	30010	Input register	unsigned 16-bit	Current fuel flow rate, L/h (input 2)
11	30011	Input register	unsigned 16-bit	Current fuel flow rate, L/h (input 3)
12	30012	Input register	unsigned 16-bit	Current fuel flow rate, L/h (input 4)
13	30013	Input register (high 16 bits)	unsigned 32-bit	Device serial number
14	30014	Input register (low 16 bits)		
15	30015	Input register	unsigned 16-bit	Device type

5.3 DIFFERENCE T4 REMOTE CONFIGURATION PROTOCOL VIA TERMINAL

Basic parameter settings, such as maximum instantaneous fuel flow rate in liters per hour, calibration coefficient for calculating consumption in liters, bus address, and bus speed, are configured using separate commands similar to the LLS protocol.

Table 4 - Basic setup commands for Difference T4

Parameter	Parameter designation	Preamble byte	Input number byte	Low byte of the main parameter value	High byte of the main parameter value	Low byte of the additional parameter value	High byte of the additional parameter value	Response
Maximum instantaneous fuel flow rate	F0	AA	1 -4	0-255	0-255	-	-	E0 AB (1-4) (00-FF) (00-FF)
Calibration coefficient	F1	AA	1 -4	0-255	0-255	-	-	E1 AB (1-4) (00-FF) (00-FF)
RS485 bus address	F2	AA	1 -4	0-255	FF	-	-	E2 AB (1-4) (00-FF) (00-FF)
RS485 bus speed	F3	AA	1 -4	1,2,3,4,5*	FF	-	-	E3 AB (1-4) (01-05) FF
Maximum instantaneous fuel flow rate (with correction coefficient, additional parameter)	F6	AA	1 -4	0-255	0-255	0-255	0-255	E6 AB (1-4) (00-FF) (00-FF) (00-FF) correction coefficient is set with a resolution of 0.1
Get all parameters	F7	AA	1 -4	FF	FF	-	-	E7 AB (1-4) (maximum instantaneous flow rate, 2 bytes) (calibration coefficient, 2 bytes)

* - baud rate values:

1 - 9600 bps

2 - 19200 bps

3 - 38400 bps

4 - 57600 bps

5 - 115200 bps

6 ADDITIONAL INFORMATION

6.1 TECHNICAL SUPPORT



+37525-691-87-76; +37533-634-15-38



+37525-691-87-76; +7499-404-08-10



support@mechatronics.by

6.2 CONTACTS

CJSC Mechatronics

222416, Republic of Belarus, Vileyka

Tel.: +375 (1771) 71300

Fax: +375 (1771) 24190

E-mail: office@mechatronics.by

www.mechatronics.by



CJSC Mechatronics

Republic of Belarus, Vileyka, Tel.: +375 (1771) 33011, Fax: +375 (1771) 24190

E-mail: office@mechatronics.by

www.eurosenstelematics.com