

# MC controller over electromechanical fuel dispensers

## TECHNICAL GUIDE

(PCB board modification: MC-4)

*Review date: 21 March, 2020*

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**REVISION HISTORY**

REV	DATE	BY	SECTION	DESCRIPTION
1.05	2020.03.21	Evgeniy Vasyliev	All	Regular document review
1.04	2014.10.22	Evgeniy Vasylie	Installation requirements for petrol station	Requirements to power supply, requirements to grounding, requirements to laying of cable communications
1.03	02014.01.08	Evgeniy Vasylie	All	New hardware version of the controller MC-4-V5
1.02	2013.01.03	Evgeniy Vasylie	All	All sections reviewed and updated
1.01	2011.01.10	Evgeniy Vasylie	All	First release

## PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of MC controller for fuel dispensers for petrol stations. It contains basic information regarding its

- technical characteristics
- board interfaces and connectors
- configuration
- schemes of connection to fuel dispensers
- cabling

Information regarding connection to specific fuel dispensers and correspondent configuration of MC controller can be received upon request to Technotrade LLC company.

During the system development process given Technical Guide is also expanded and updated and new chapters are added. Latest version of this Technical Guide can be downloaded from the MC controller web-page: <http://www.technotrade.ua/mechanical-controller.html>.

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In case if you find any mistakes, omissions in this document or have any suggestions on improvements to this document, please feel free to e-mail them to our support mailbox: [support\\_1a@technotrade.ua](mailto:support_1a@technotrade.ua). We will be grateful to you for this valuable information.

All technical questions regarding the MC controller are welcome to be asked on support mailbox: [support\\_1a@technotrade.ua](mailto:support_1a@technotrade.ua). Our support team will be glad to help you.

*Also, you can call to us or visit us on:*

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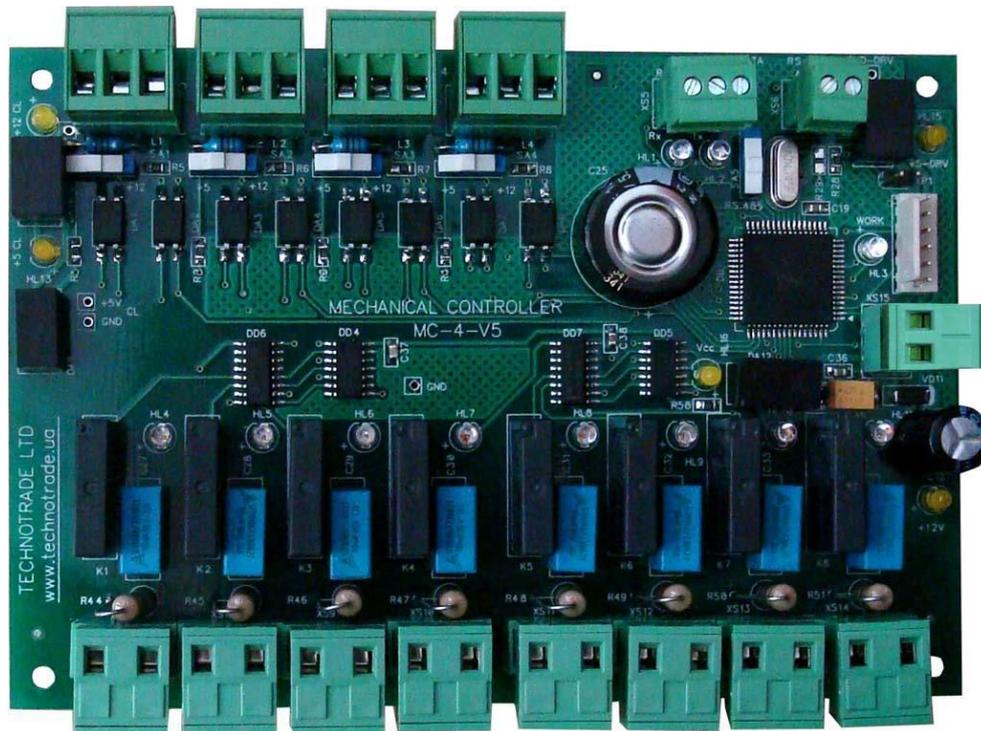
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## APPOINTMENT

**Controller over electromechanical fuel dispensers** is intended to be used in connection with a control system for petrol station (POS system, cash register, OPT terminal, etc) to provide direct control over operation of electronic and mechanical fuel dispensers by controlling dispenser's internal resources: motor, pulse sensor, nozzle, slowdown valve.

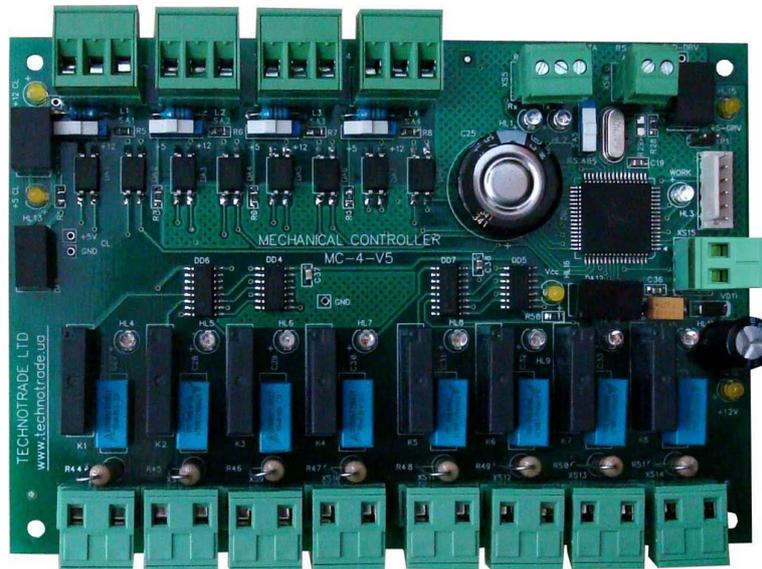


## TECHNICAL SPECIFICATIONS

PARAMETER	VALUE
<b>Voltage</b>	12 V DC
<b>Power consumption</b>	300 mA max
<b>Temperature range</b>	-30°C ÷ +60°C
<b>Weight</b>	230 g
<b>Dimensions</b>	145 x 100 x 20 mm
<b>Interface</b>	<ul style="list-style-type: none"> <li>- RS-232,</li> <li>- RS-485 (2-wire)</li> </ul>
<b>Input communication protocol</b>	UniPump
<b>Quantity of connected dispensing nozzles</b>	1 ... 4
<b>Control</b>	1 controller can simultaneously control over 4 nozzles of delivery dispensers: <ul style="list-style-type: none"> <li>- switching on/off of pump's motor for each nozzle (1 ... 4)</li> <li>- switching on/off of slowdown valves for each nozzle (1 ... 4)</li> </ul>
<b>Signals received</b>	1 controller can receive signals from: <ul style="list-style-type: none"> <li>- pulse sensors for each nozzle (1 ... 4)</li> <li>- nozzle take up/down for each nozzle (1 ... 4)</li> </ul>
<b>Maximal ordered and dispensed doze</b>	9999,99 liters
<b>Maximum volume total counter values</b>	999999,99 liters

**COMPLETE SET**

Depending on the order code (see section "Order information") MC controller can be supplied either in a view of electrical board (variant of controller supply *MC4-PCB-z*), or installed in a mounting box with cables inputs and a power switching button (variant of controller supply *MC4-BOX-z*).

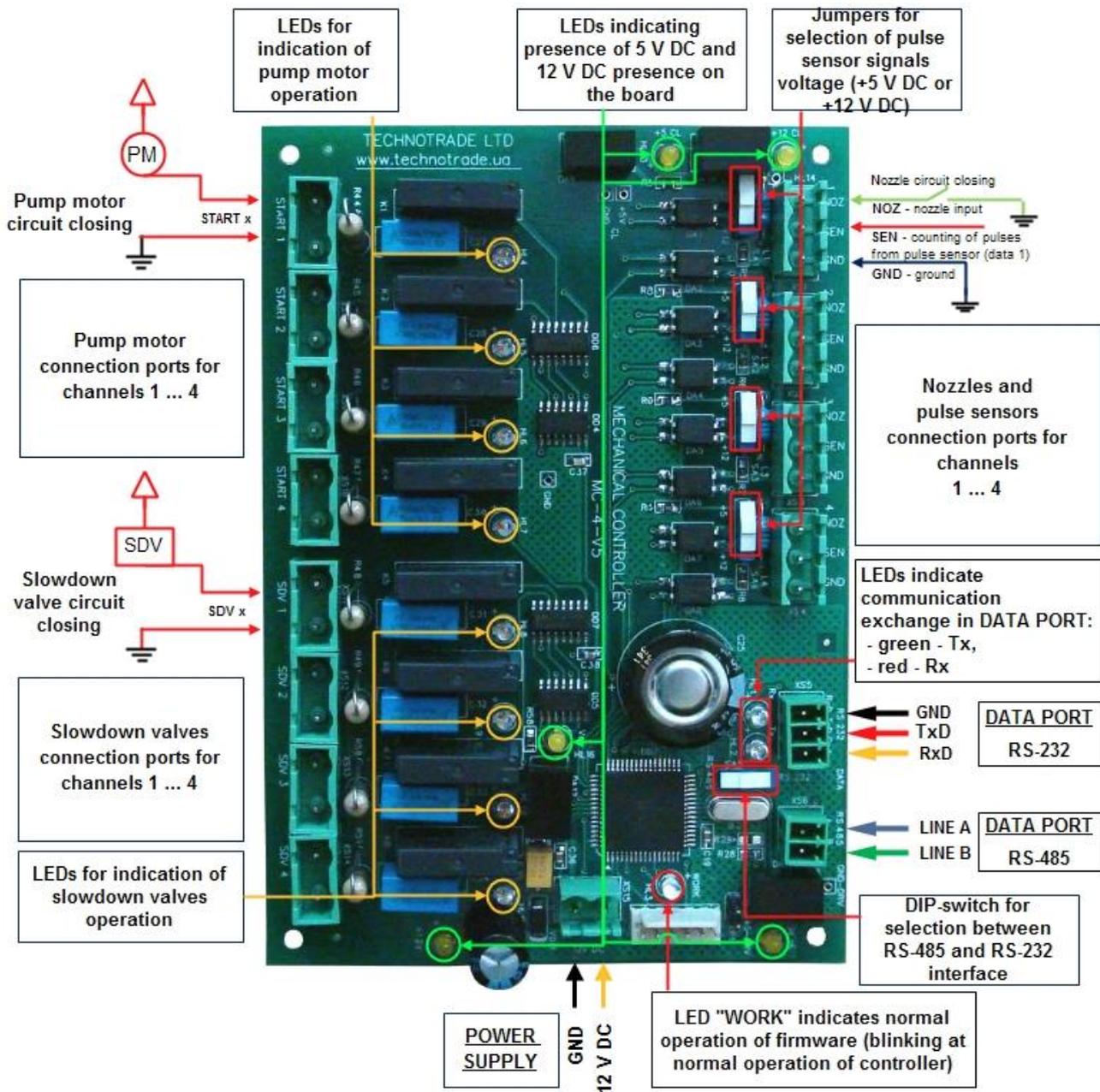


Variant of MC-4 controller supply in a view of electrical board (*MC4-PCB-z*)



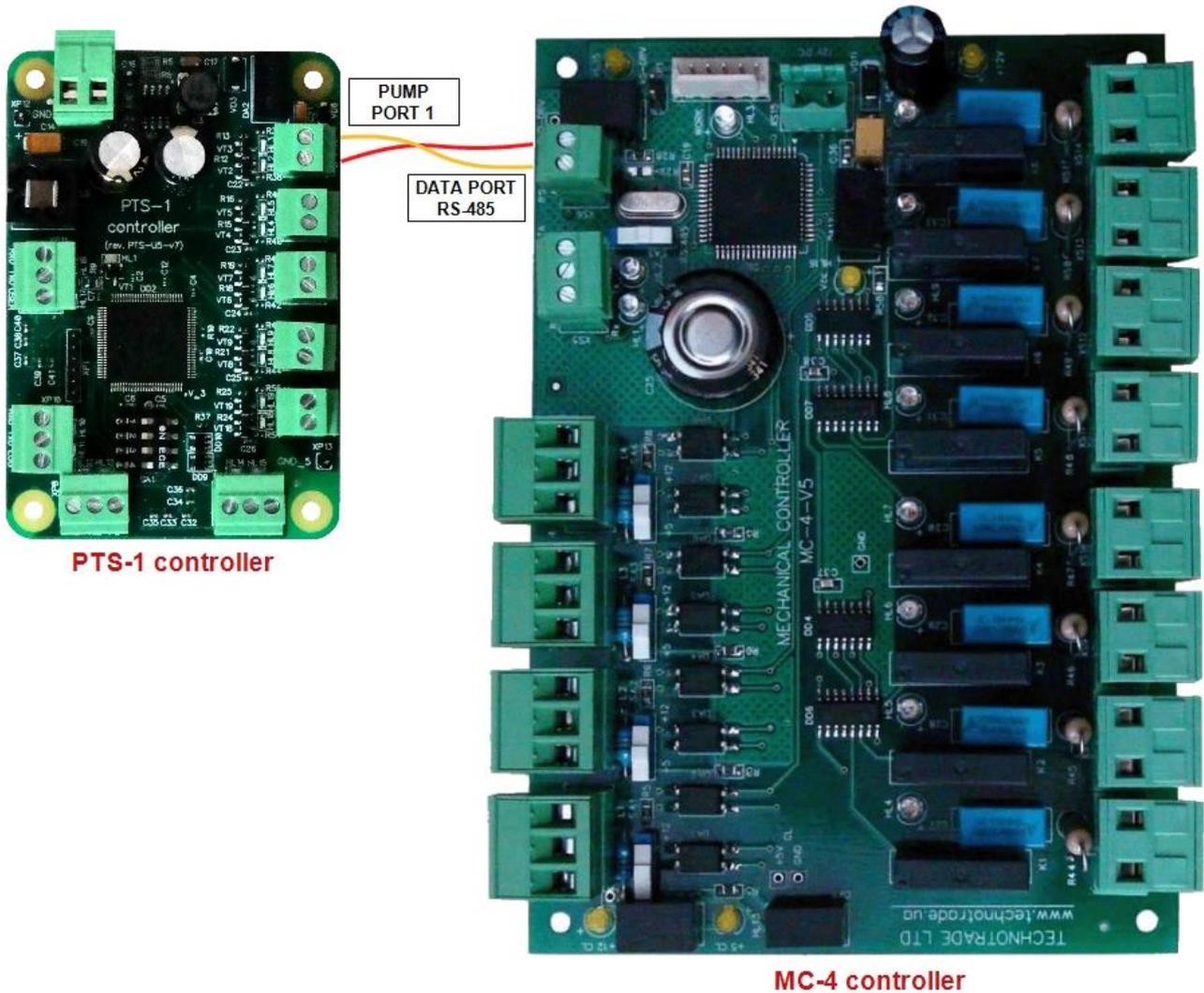
Variant of MC-4 controller supply installed in a plastic box with cables inputs and power switching button (*MC4-BOX-z*)

# PCB BOARD CONNECTORS OVERVIEW



## CONNECTION SCHEME TO PTS CONTROLLER

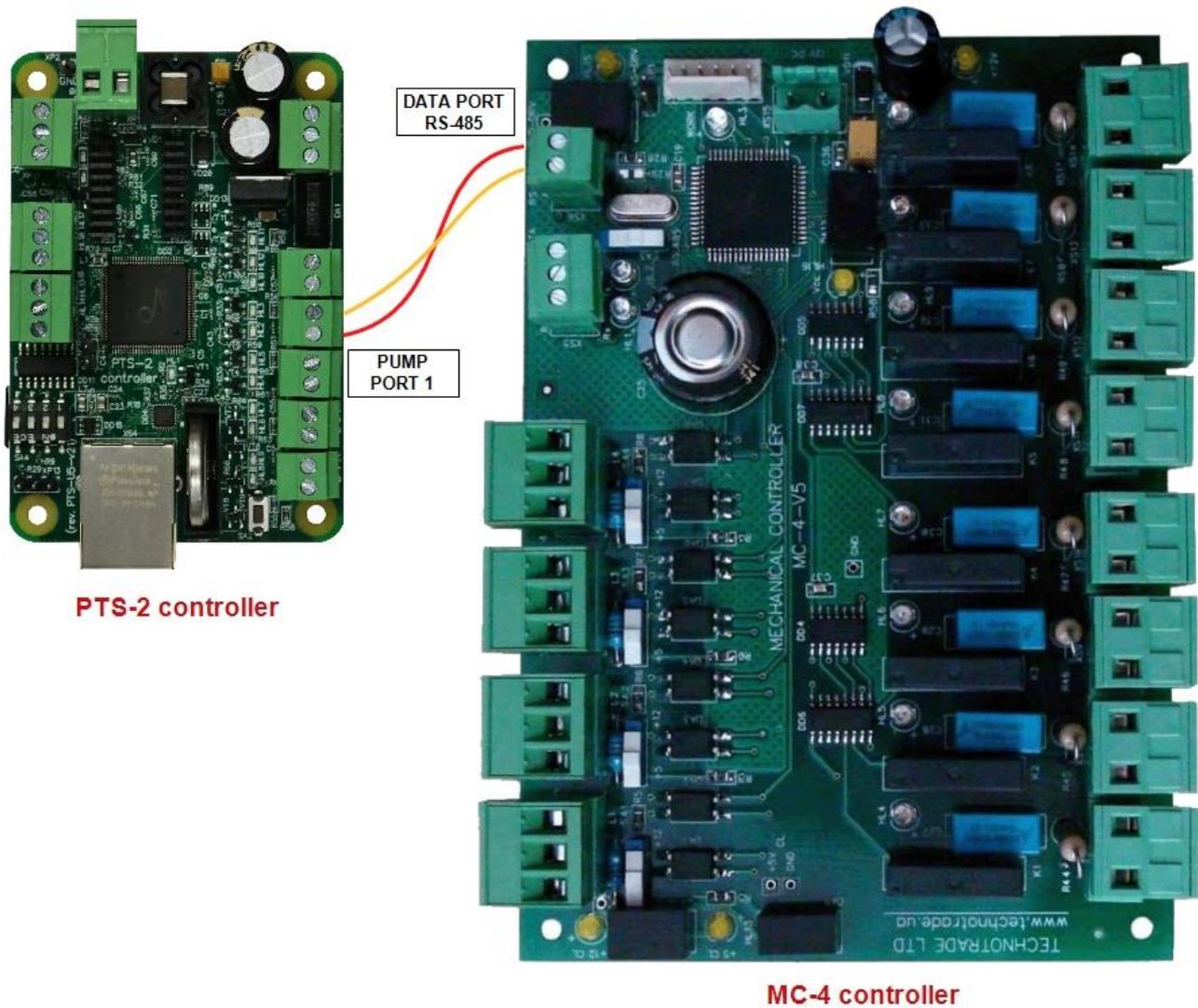
*Connection scheme to PTS-1 controller (information about PTS controller over fuel dispensers and ATG systems can be found on PTS-1 controller web-page: <http://www.technotrade.ua/fuel-pump-controller.html>):*



### NOTE!

At connection using RS-485 interface please check that DIP-switch should be in position "RS-485"

Connection scheme to PTS-2 controller (information about PTS controller over fuel dispensers and ATG systems can be found on PTS-2 controller web-page: <http://www.technotrade.ua/pts2-forecourt-controller.html>):



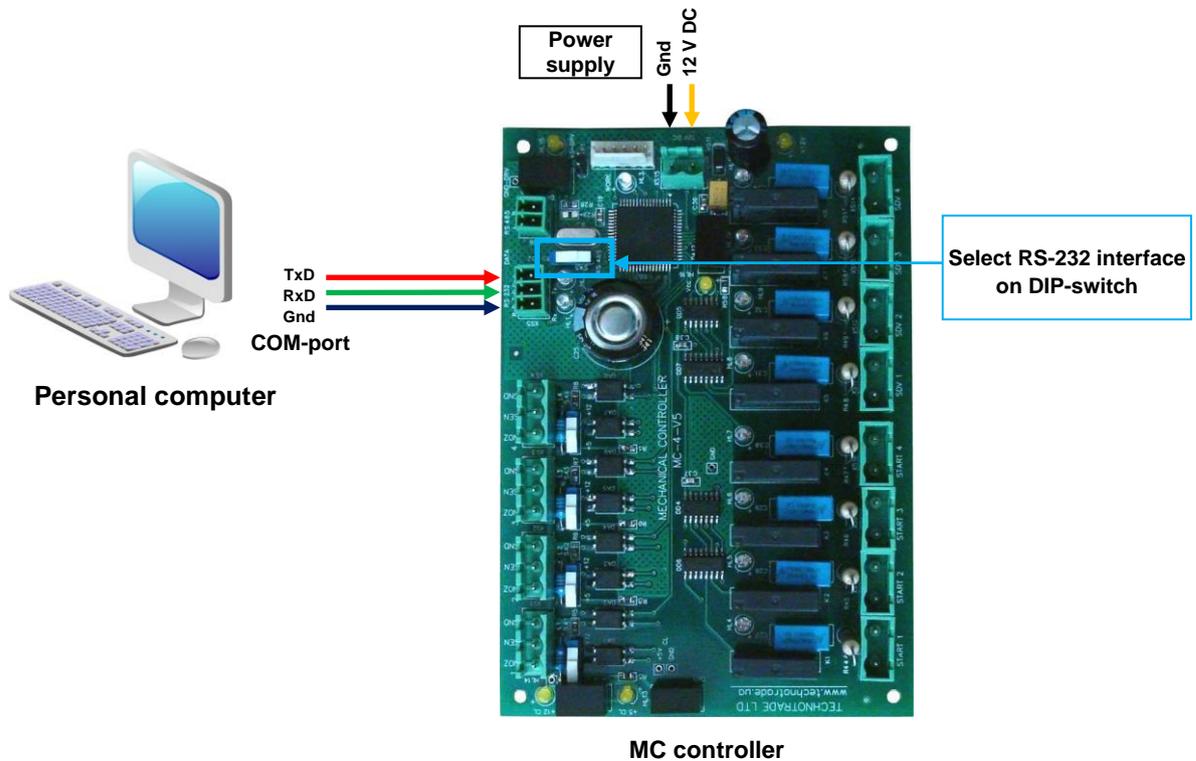
**NOTE!**

At connection using RS-485 interface please check that DIP-switch should be in position "RS-485"

## CONNECTION SCHEME TO PC COM-PORT (DATA COMMUNICATION)

Control over dispensers through the MC-4 controller from a personal computer:

*Scheme of connections of the MC controller to personal computer:*



### **NOTE!**

At connection using RS-485 interface please check that DIP-switch should be in position "RS-232"

## INSTALLATION REQUIREMENTS FOR PETROL STATION

**WARNING!** Manufacturer guarantees reliable and stable operation of products only at compliance with below requirements. In case of absence of uninterruptible power supply or incorrect wiring of products to it any claims to malfunction of software are not accepted.

### 1. Requirements to power supply

The described products come into structure of control system (POS) for petrol station. Power supply of the products should be done from a separate power supply with built-in filter of radio frequency interferences and limiter of high voltage pulse interferences. Power supply should have a safety factor of 1.5.

At emergency switching off the power supply or in case of power voltage exceeding its permitted ranges the products can switch off with loss or corruption of data and possible damage of hardware and software. Power supply of all electronic blocks of POS and electronic pumpheads of dispensers, which are connected through information lines, should be made from single common uninterruptible power supply source (UPS). Connection of other devices to given UPS is strictly prohibited. UPS should be of continuous action (online) and work with double conversion with output voltage regulation. UPS should have a safety factor of 1.5. Filter of radio frequency interferences and limiter of high voltage pulse interferences should be used for feeding equipment from UPS.

Supply of electronic pumpheads of dispensers should be made from the UPS unit using 3-wires scheme with isolated neutral through dedicated two-pole breaker for each dispenser. Connection of other parts of dispenser to UPS unit (except electronic pumpheads) is strictly prohibited.

UPS unit should be connected to a separate three-pole socket fed through the three-wire feeder (phase, neutral, ground wires) with insulated neutral from a dedicated circuit breaker of switchboard. Feeder coming from the switchboard to the socket should be located not closer than 0.3 meters to other feeders. The socket should be located at a distance of not more than 1 meter away from the POS. Phase wire of the feeder should not have any other consumer, which are sources of interferences (for example motors).

For protection of POS and UPS from secondary effects of atmospheric electricity it is required to install high-voltage arresters (dischargers) at the transformer substation or on poles of power lines.

### 2. Requirements to grounding

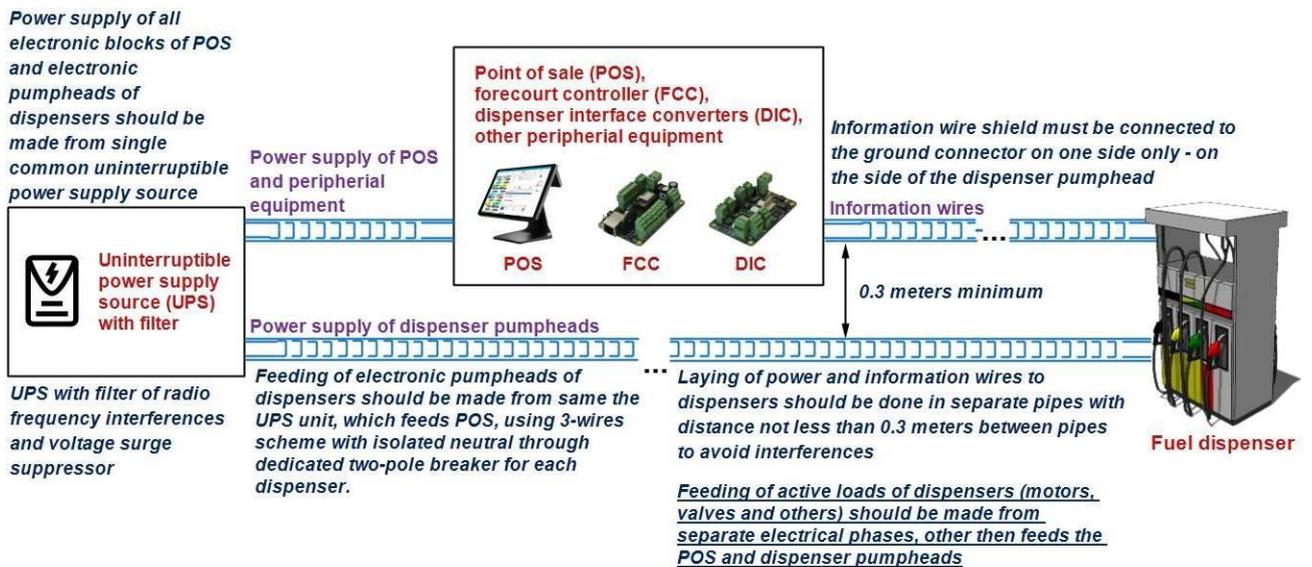
In the switchboard the ground wire of feeder socket should be connected to the grounding screw, which should be connected by means of welding with a protection grounding circuit of petrol station by steel wire with a diameter of not less than 5 mm.

Protection grounding circuit of petrol station should correspond to safety requirements and be separated from the station lightning protection circuit. Distance from the nearest electrode of protection grounding circuit to electrode of lightning protection circuit must be at least 10 meters. Resistance of the protection grounding circuit should be not more than 4 Ohms and must be confirmed by the test report. Length of wires from the switchboard to the nearest electrode of protection grounding circuit should not exceed 15 meters.

### 3. Requirements to laying of cable communications

Laying of power and information wires to dispensers should be done in separate pipes with distance of not less than 0.3 meters between each other. For informational wires (current loops, RS-485, other interfaces)

it is recommended to use shielded twisted-pair cables (recommended type – FTP CAT 5E). The cable shield must be connected to the ground connector on one side only – on the side of the dispenser.



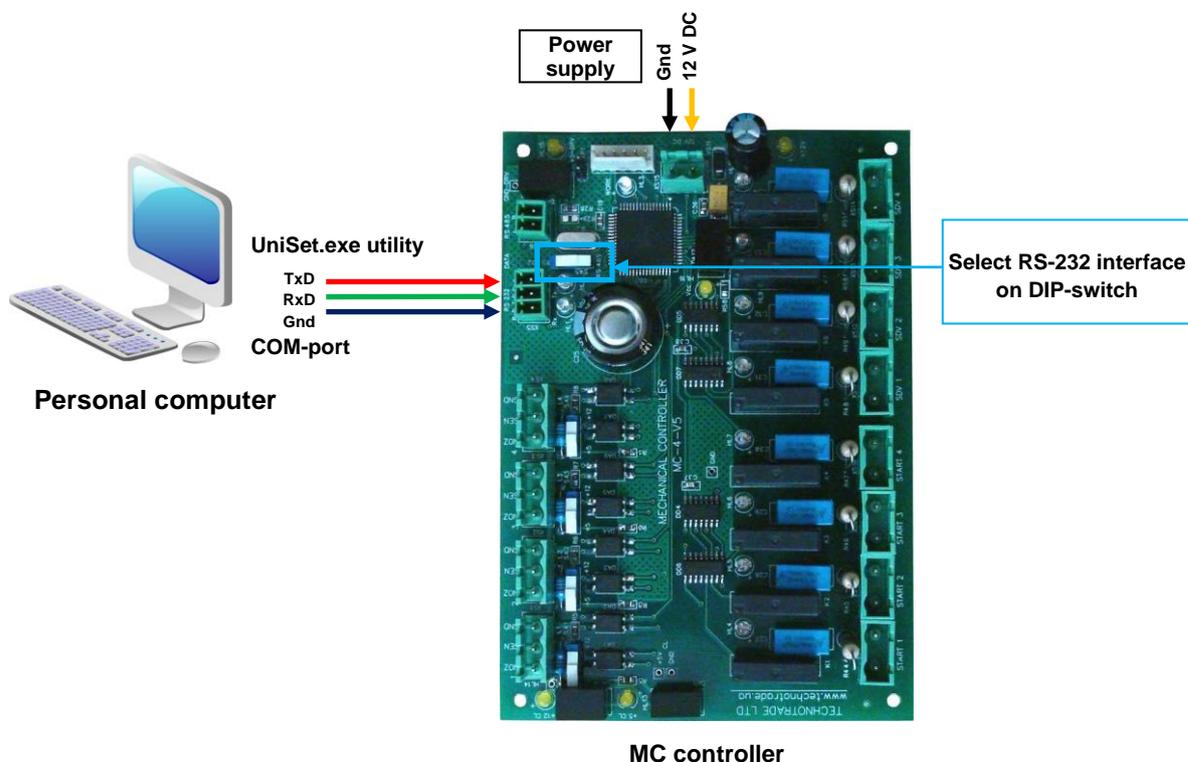
#### 4. Requirements to connection of ATG probes

Connection of ATG probes installed inside the tanks should be done only with provision of required safety measures: in case if probes have explosion-proof protection – then armored cables should be used, in case if probes have intrinsic safety – then connection should be performed through suitable safety barriers.

## CONFIGURATION

Use UniSet.exe utility to read/write configuration of the controller.

*Scheme of connections of the MC controller to personal computer:*



For configuration of the controller parameters UniSet.exe utility should be used. It allows to adjust all controller parameters individually on each of channels.

For configuration of UniSet.exe on tab "Connection" select an item "Properties" and set up the following parameters:

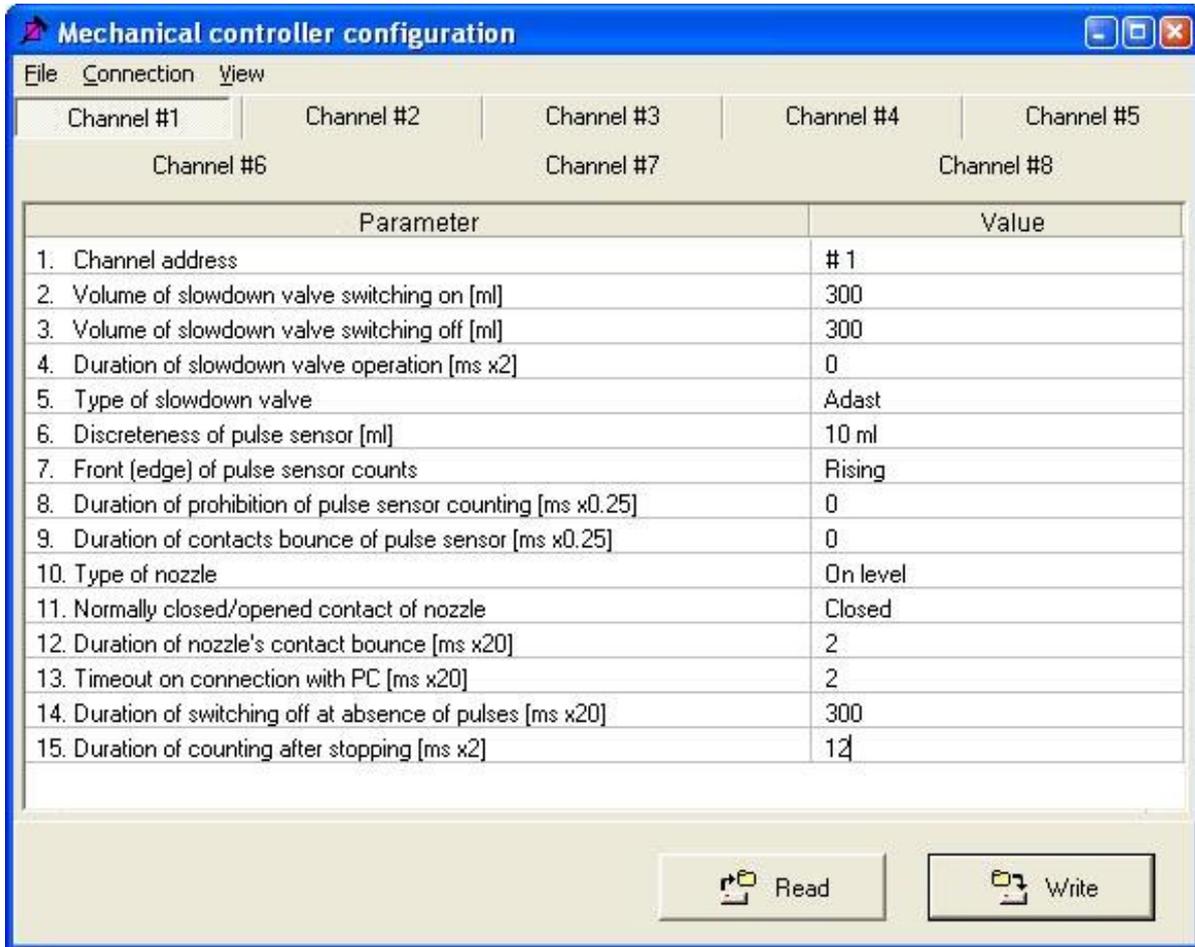
- correct COM-port number,
- baud rate 9600,
- disable echo in line,
- delay at switching Tx/Rx equal to 4 ms,
- timeout at packet reception 100 ms

Press OK button.

On main form of UniSet.exe after launching of the program a table will be filled with data by defaults, which can vary from data, written into controller. Therefore before changing of parameters and writing them in controller memory it is necessary to read all parameters of the controller by pressing a button "Read".

On program UniSet window in top there are buttons for switching of channels of the controller. Each of the channels have individual table of parameters

Parameters to configure in a table are the following:



**1. Channel address.**

Channels are understood as physical channels of a controller. Addresses mean logical number of the channel for a control system (POS system, cash register, OPT terminal, etc). This parameter is explained below on examples. Range of value of parameter: 1 ... 32.

Example 1.

Channel #	Channel address parameter value
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Control system will “see” controller as 8 single-nozzle fuel dispensers with addresses 1...8.

Example 2.

Channel #	Channel address parameter value
1	1
2	2
3	2
4	3
5	3
6	3
7	4
8	5

Control system will “see” controller as follows:

Fuel dispenser №1 – 1-nozzle, channel 1 – nozzle №1

Fuel dispenser №2 – 2-nozzle, channel 2 – nozzle №1, channel 3 – nozzle №2

Fuel dispenser №3 – 3-nozzle, channel 4 – nozzle №1, channel 5 – nozzle №2, channel 6 – nozzle №3

Fuel dispenser №4 – 1-nozzle, channel 7 – nozzle №1

Fuel dispenser №5 – 1-nozzle, channel 8 – nozzle №1

That means for 1-nozzle fuel dispensers a term “channel” can be understood as a fuel dispenser.

For multiproduct fuel dispensers term “channel” can be understood as “nozzle” and various parameters can be adjusted for each of the nozzles.

## 2. Volume of a slowdown valve switching on [ml].

See parameter 5.

## 3. Volume of a slowdown valve switching off [ml].

See parameter 5.

## 4. Duration of a slowdown valve operation [ms x2].

See parameter 5, pulse.

## 5. Type of a slowdown valve.

Adast:

Power supply of a valve of expenditure reduction is switched on when volume left to be dispensed till end of a dose equals to set by parameter 2 “Volume of valve of expenditure reduction switching on [ml]”.

Power supply of a valve of expenditure reduction is switched off when volume left to be dispensed till end of a dose equals to set by parameter 3 “Volume of valve of expenditure reduction switching off [ml]”.

Nara:

Power supply of a valve of expenditure reduction is switched on when volume left to be dispensed till end of a dose equals to set by parameter 2 “Volume of valve of expenditure reduction switching on [ml]”.

Power supply of a valve of expenditure reduction is switched off simultaneously with switching off pump’s motor.

Pulse:

Power supply of a valve of expenditure reduction is switched on when volume left to be dispensed till end of a dose equals to set by parameter 2 "Volume of valve of expenditure reduction switching on [ml]".

Power supply of a valve of expenditure reduction is switched off after time specified in the parameter 4 "Duration of a valve of expenditure reduction operation [ms x2]".

## 6. Discreteness of pulse sensor [ml].

Weight of one impulse of a pulse sensor. Variants: 5ml, 10 ml, 20 ml, 25 ml, 50 ml, 100 ml, 500 ml, 1000 ml.

## 7. Front (edge) of pulse sensor counts.

Rising:

Counting is performed at changing of a level on input "Datx\_1" ("Pulse sensor", phase 1; where x – channel number in range 1...8) from low to high.

Falling:

Counting is performed at changing of a level on input "Datx\_1" ("Pulse sensor", phase 1; where x – channel number in range 1...8") from high to low.

Schwelm:

Front (edge) depends on a state of inputs "Datx\_1" ("Pulse sensor", phase 1; where x – channel number in range 1...8) and "Datx\_2" ("Pulse sensor", phase 2; where x – channel number in range 1...8) on a moment of giving a "Start" (PUSK) command.

Schwelm inverse:

Same as Schwelm, but with inverse.

## 8. Duration of prohibition of pulse sensor counting [ms x0.25].

Duration of time after command "Start" (PUSK) during which controller's channel does not counts pulses from a pulse sensor. Given parameter can be used in cases when after giving a signal to start pump's motor it demands some time on switching on a pulse sensor and thus a channel can count false impulses.

## 9. Duration of contacts bounce of pulse sensor [ms x0.25].

Minimal time duration of presence on input "Datx\_1" ("Pulse sensor". phase 1; where x – channel number in range 1...8) of high or low voltage level for perception of given level by a channel. If duration of a level is shorter, than set by given parameter – such level is considered as noise and is not perceived.

Duration of a counting pulse depends on productivity of a fuel dispenser and a type of a pulse sensor.

## 10. Type of nozzle.

On level:

State of nozzle is defined by level on input "Pist x" ("Nozzle", where x – channel number in range 1...8).

Trigger:

Any change of level on input "Pist x" ("Nozzle", where x – channel number in range 1...8) leads to switching of a channel from state "Nozzle is taken up" into "Nozzle is placed down" or from state "Nozzle is placed down" into "Nozzle is taken up". Can be applied when for signaling of a channel about taking up/down of a nozzle a button at fuel dispenser, pressed by a customer, is used.

**11. Normally closed/opened contact of nozzle.**

Normally closed:

At taking up of a nozzle an input "Pist" ("Nozzle") is disconnected with contact "GND" ("Ground").

Normally opened:

At taking up of a nozzle an input "Pist" ("Nozzle") is connected with contact "GND" ("Ground").

**12. Duration of nozzle's contact bounce [ms x20].**

Minimal time duration on input "Pist" ("Nozzle") of "Closed" or "Opened" for perception of such level by a channel.

If duration of a level is shorter, than set by given parameter – such level is considered as noise and not perceived.

**13. Timeout on connection with PC [ms x20].**

Time duration after command "Start" (PUSK), after which a channel will switch to state "Stopped" at absence of exchange with a control system. If given parameter equals to zero then absence of exchange with a control system does not affect on a state of a channel.

**14. Duration of switching off at absence of pulses [ms x20].**

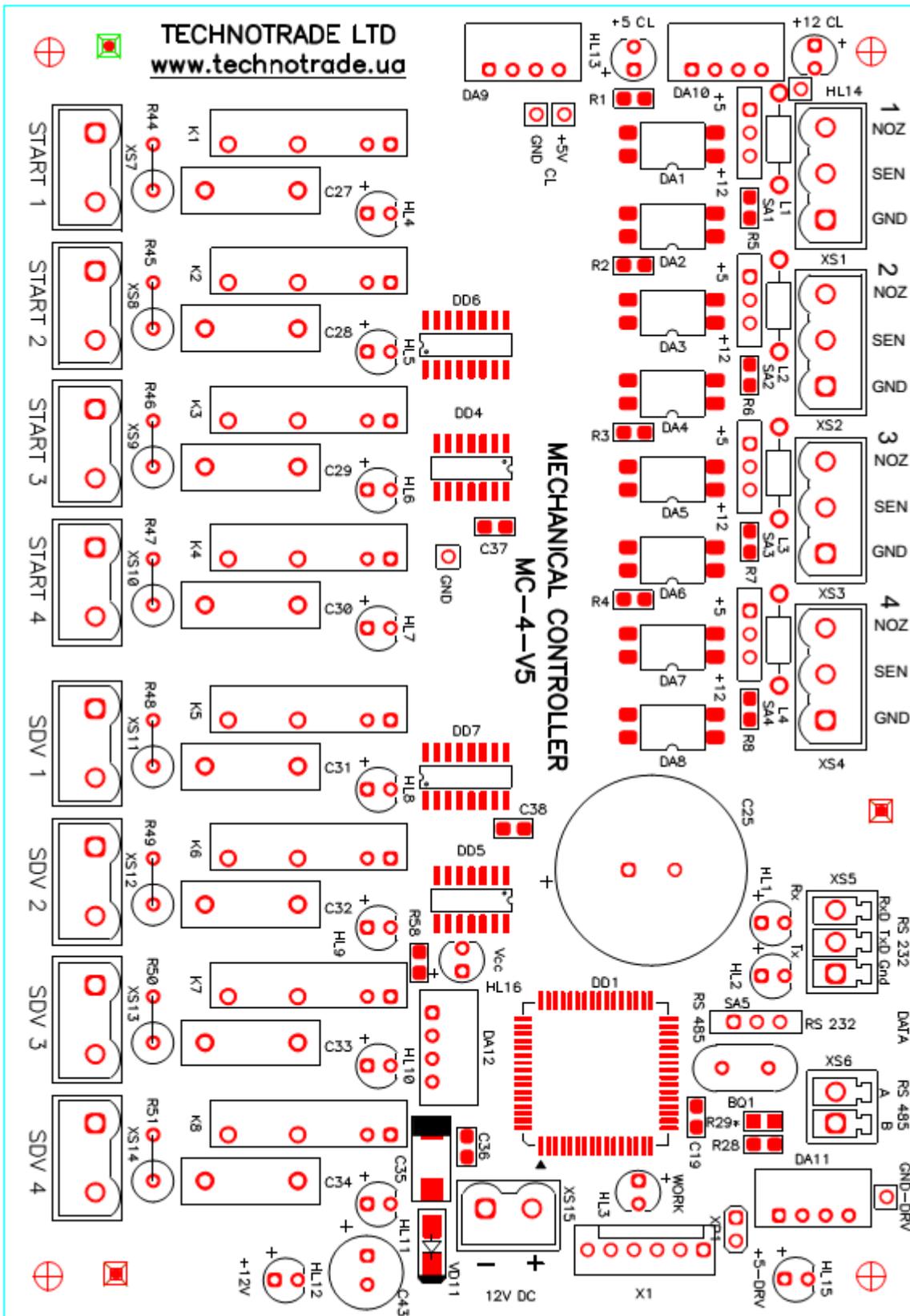
Time duration after which a channel will switch to state "Stopped" at absence of impulses from a pulse sensor. If given parameters equals to zero then absence of impulses from a pulse sensor does not affect on a state of a channel.

**15. Duration of counting after stopping [ms x2].**

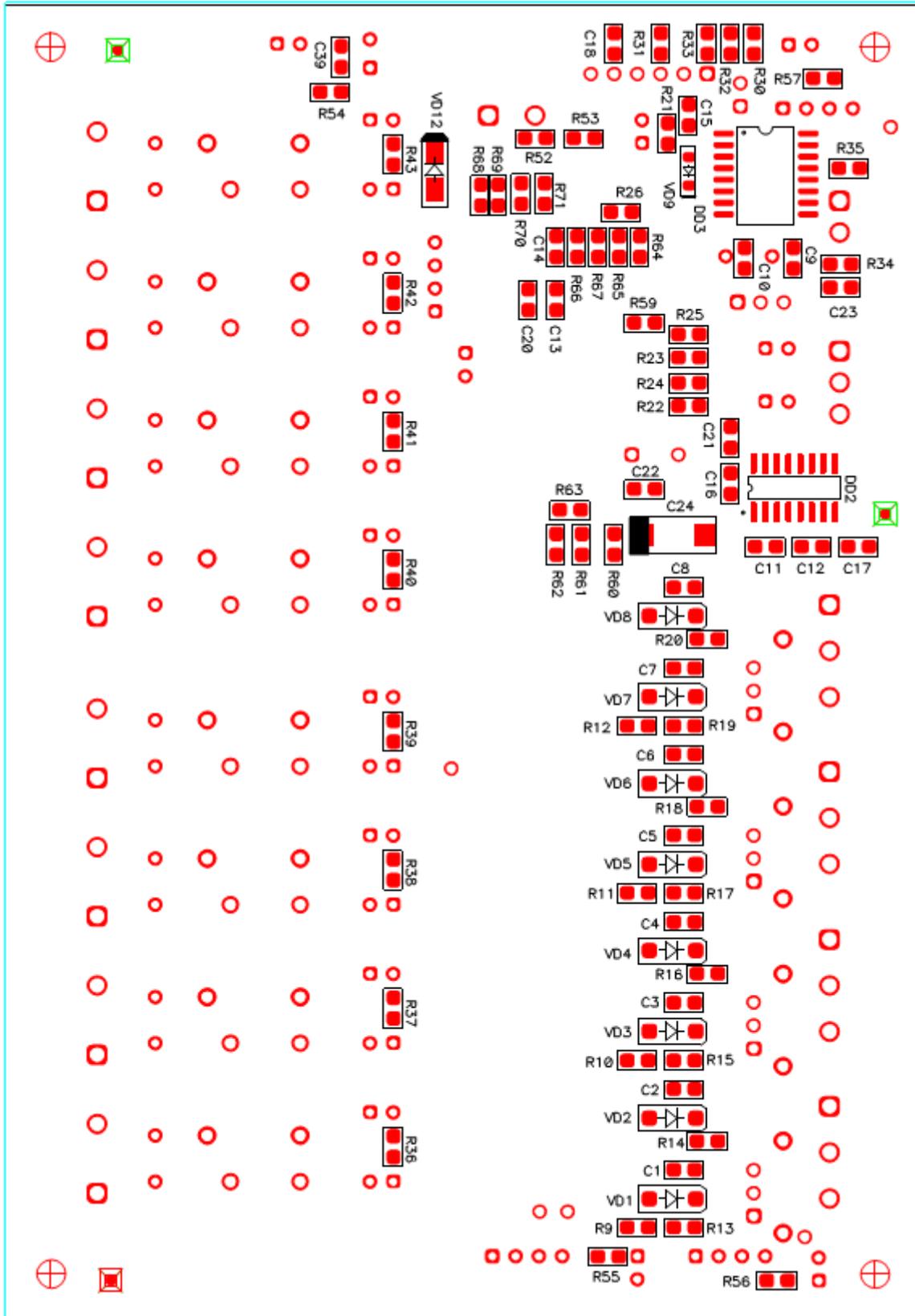
Time duration of impulses counting from a pulse sensor after switching off a pump's motor. If given parameters equals to zero then after switching off a pump's motor impulses are not counted from a pulse sensor. Given parameter allows to take into account a possible overflow of fuel at faults, for example in cut-off valves and valves of expenditure reduction.

**PCB MOUNTING BOARD**

Top view:



*Bottom view:*



## ORDER INFORMATION

Variant of controller supply is marked with MC4-y-z, where

- y – type of supply:
  - “PCB” in case if controller is supplied in a view of electric board;
  - “BOX” in case if controller is supplied installed in plastic box with hermetic inputs for connection of wires and a button for power supply switching;
- z – variant of supply:
  - 001 – variant of supply with installed terminal blocks for controller ports
  - 002 – variant of supply without terminal blocks for controller ports (connection is made using connectors for stubs)

Examples of order:

- order of MC-4 controller in a view of electric board: MC4-PCB-001;
- order of MC-4 controller installed in a plastic box: MC4-BOX-001.