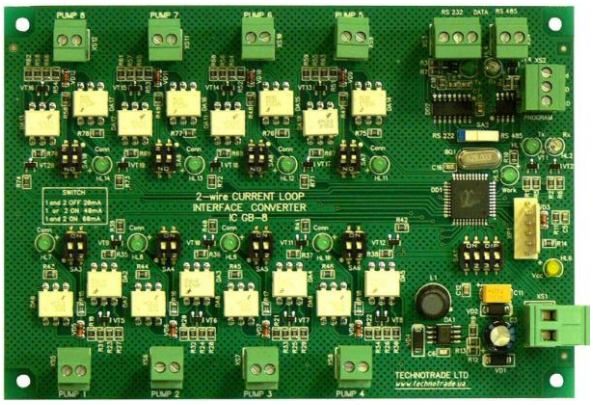
# 2-wire current loop interface converters GB-2 and GB-8

## (RS-485/RS-232 to 2-wire current loop and backwards)




TECHNICAL GUIDE

*Review date: 20 January, 2017*

*Revision number: 1.05*

**TECHNOTRADE LTD**

# *CONTENT*

# REVISION HISTORY

| REV | DATE | BY | SECTION | DESCRIPTION |
|---|---|---|---|---|
| **1.05** | 2017.01.20 | Evgeniy Vasyliev | Firmware update procedure | Firmware update procedure using 4th DIP-switch SA1 |
| **1.04** | 2014.10.22 | Evgeniy Vasyliev | Installation requirements for petrol station | Requirements to power supply, requirements to grounding, requirements to laying of cable communications |
| **1.03** | 2014.08.01 | Evgeniy Vasyliev | Firmware update procedure | Description on how to update converter firmware Position of DIP-switch SA1 specified |
| **1.02** | 2013.11.30 | Evgeniy Vasyliev | Connection schemes | Position of DIP-switch SA1 specified |
| **1.01** | 2013.01.11 | Evgeniy Vasyliev | All | First release |

# PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of 2-wire interface converters GB-2 and GB-8. It contains basic information regarding their board interfaces and connectors, configuration and adjustments, connection to fuel dispensers and external control systems (POS systems, cash registers, OPT terminals, etc), cablings, firmware update procedure. Information regarding connection to specific models of fuel dispensers and correspondent configuration of the GB interface converters can be received upon request to TECHNOTRADE LTD company.

Due to a reason that GB interface converters are constantly being developed in direction of improvements of their possibilities, changes are possible in their final version, which are not described in given Technical Guide.

During the system development process given Technical Guide will be also expanded and updated and new chapters will be added. Latest version of this Technical Guide can be downloaded from the 2-wire GB interface converters web-page: *http://www.technotrade.ua/gilbarco-interface-converter.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*. We will be grateful to you for this valuable information.

All technical questions regarding the GB interface converters are welcome to be asked on support mailbox: *support_1a@technotrade.ua*. Our support team will be glad to help you.

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

## TECHNOTRADE LTD

Ukraine, 04114 Kiev, Polupanova str. 10, office 1
Tel: +38-044-502-46-55, +38-044-502-46-77
Web: *www.technotrade.ua*
Mail: *mail@technotrade.ua*

# APPOINTMENT

**2-wire interface converters GB (RS-485/RS-232 to 2-wire current loop and backwards)** are intended for communication with fuel dispensers, which use 2-wire current loop interface, through interfaces:

- RS-232
- RS-485 (2-wire)

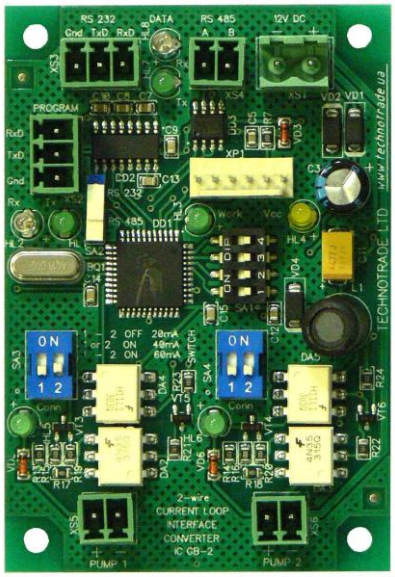
The GB interface converters can be applied for communication with following brands of fuel dispensers, which use 2-wire current loop for communication with control systems:

- *AG Walker*
- *ANGI International*
- *Baransay*
- *Batchen*
- *Bennett*
- *CFT Clean Fuel*
- *COMPAC*
- *EuroPump*
- *Falcon*
- *Fuelsis*
- *Galileo*
- *Gilbarco*
- *Greenfield*
- *Kalvacha*
- *Kraus*
- *Maser*
- *Meksan*
- *Mekser*
- *PEC (Gallagher Fuel Systems)*
- *Petposan*
- *Petrotec*
- *Prowalco*
- *Salzkotten*
- *Tankanlagen Salzkotten*
- *Wayne Dresser (USCL communication protocol)*
- *Yenen*
- *others*

The GB interface converters have 2 modifications:

*GB-2 (2-channel converter board):*

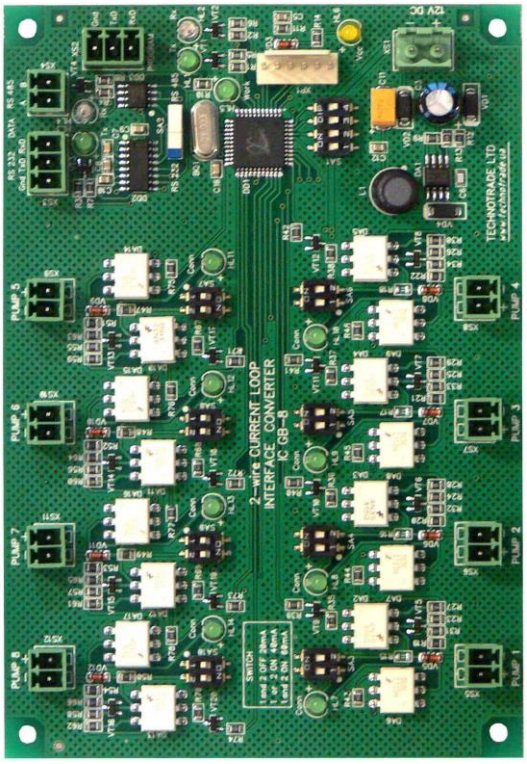
*Board without terminal blocks:*



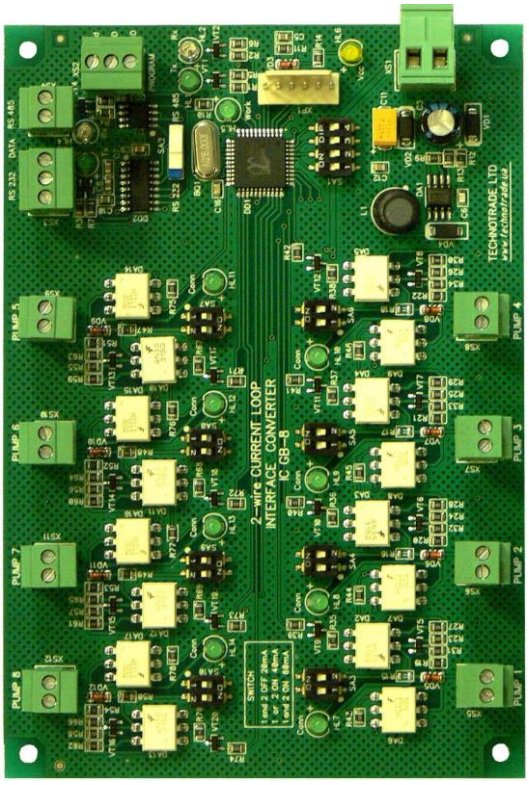

*Board with terminal blocks:*


*GB-8 (8-channel converter board):*

*Board without terminal blocks:*




*Board with terminal blocks:*



# TECHNICAL SPECIFICATIONS

## *Specification*

| | GB-2 | GB-8 |
|---|---|---|
| **Power supply voltage** | 12 V DC | |
| **Current consumption** | 140 mA max | 500 mA max |
| **Temperature range** | From -40°C to +80°C | |
| **Weight** | 45 g | 120 g |
| **Dimensions** | 85 x58 x 25 mm | 145 x 100 x 20 mm |

## *Technical characteristics*

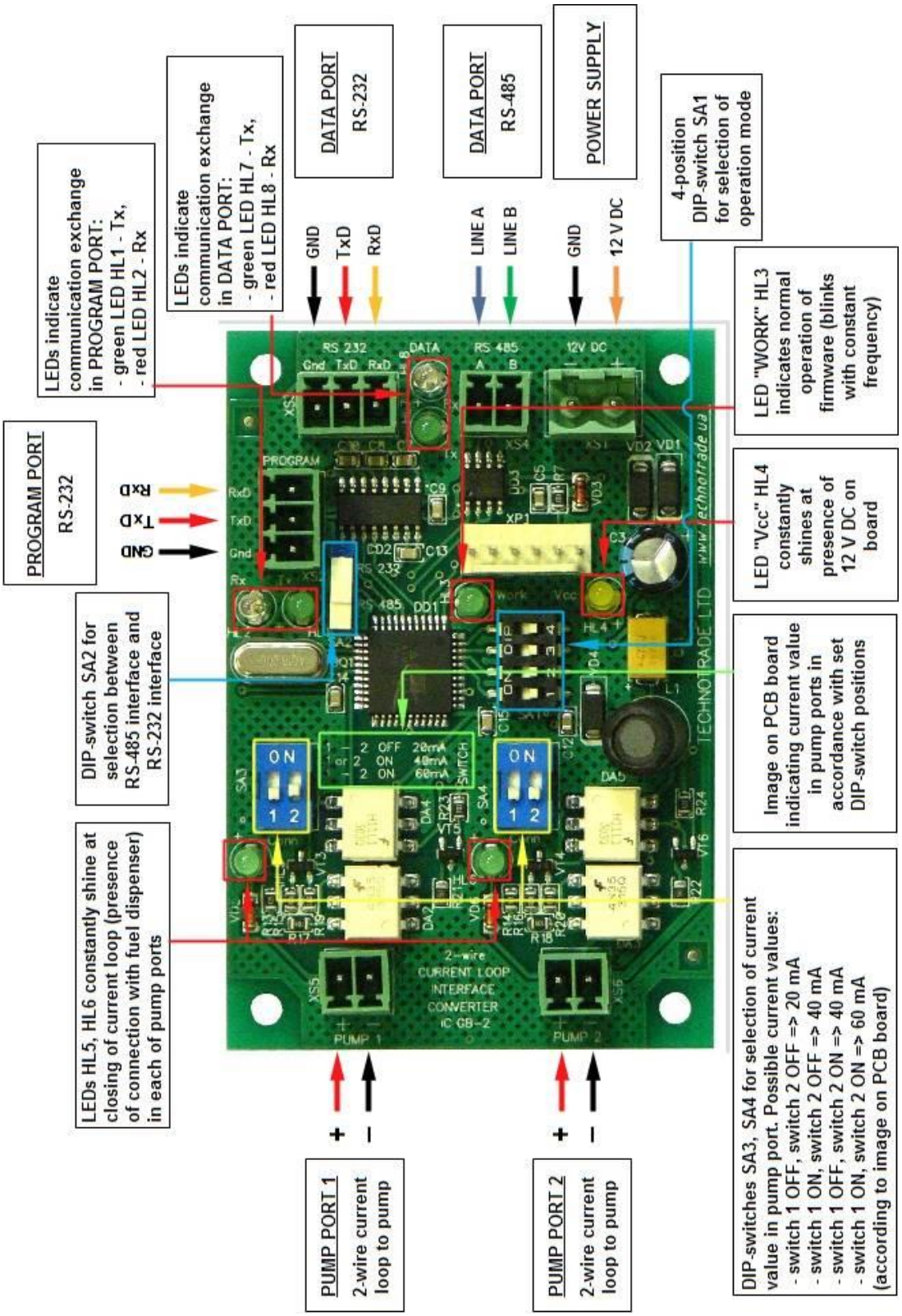
| | |
|---|---|
| **Current value in current loop interface** | Adjustable using DIP-switches, located on PCB board, selected values: 20 mA, 40 mA, 60 mA |
| **Current loop generator** | Current generator |

## *Communication ports*

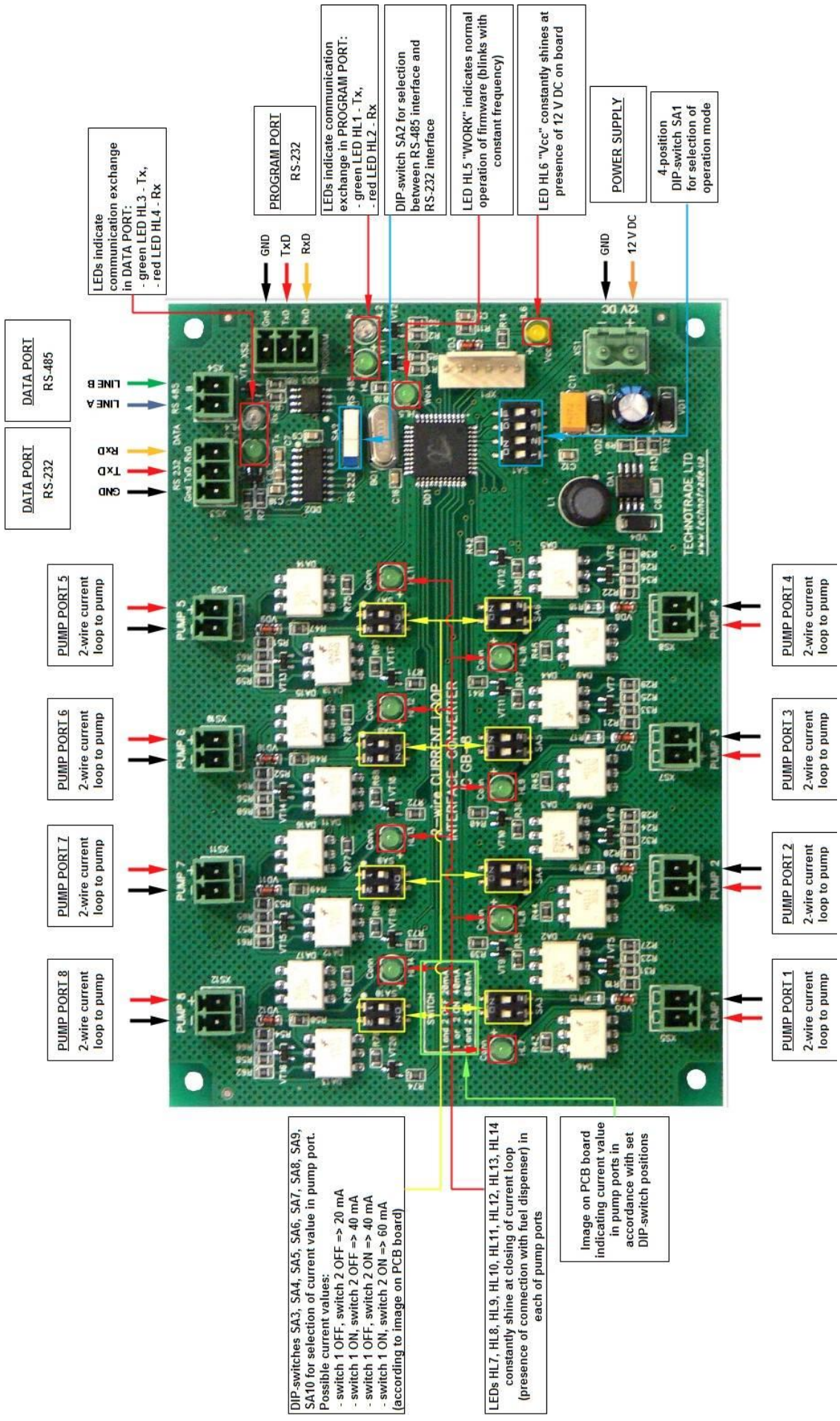
| PORT NAME | | INTERFACE | PURPOSE |
|---|---|---|---|
| **DATA PORTS** | **RS-232** | RS-232<br>(3 wires: TxD, RxD, Gnd) | Communication with a control system (POS terminal, cash register, OPT). Selection of interface is made using DIP-switch. |
| | **RS-485** | RS-485<br>(2-wires: line A, line B) | |
| **PUMP PORTS** | **Pump ports 1-2** | Optically isolated active current loop | Connection with fuel dispensers using 2 wires. One dispenser is to be connected to each of the pump ports. Selection of current value in current loop of pump ports is made using DIP-switches. |
| | **Pump ports 3-8 (GB-8 board only)** | | |
| **PROGRAM PORT** | **RS-232** | RS-232<br>(3 wires: TxD, RxD, Gnd) | Update of the interface converter firmware |

# PCB BOARD CONNECTORS OVERVIEW

*GB-2 (2-channel converter board):*



*GB-8 (8-channel converter board):*



***NOTE!***

**DIP-switch SA1** serves for selection of interface converter operation mode:

- switch 1 should be set in position “ON”
- switch 2 should be set in position “OFF”
- switch 3 should be set in position “OFF”
- switch 4 should be set in position “OFF”

**DIP-switch SA2** serves for selection of communication interface:

- RS-232
- RS-485 (2-wire)

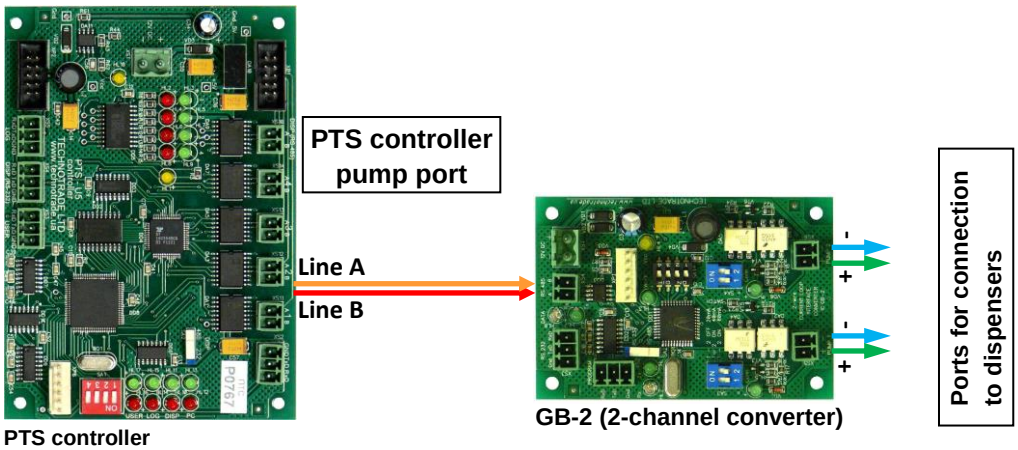
**DIP-switches SA3, SA4 in GB-2 and SA3, SA4, SA5, SA6, SA7, SA8, SA9, SA10 in GB-8** in each of the pump ports serve for selection of current value in current loop of each pump port and are adjusted in accordance with an image located on PCB board, which indicates current value in pump ports in accordance with set DIP-switch positions. Possible current values:

- switch 1 OFF, switch 2 OFF => 20 mA
- switch 1 ON, switch 2 OFF => 40 mA
- switch 1 OFF, switch 2 ON => 40 mA
- switch 1 ON, switch 2 ON => 60 mA

# CONNECTION SCHEME TO PTS CONTROLLER

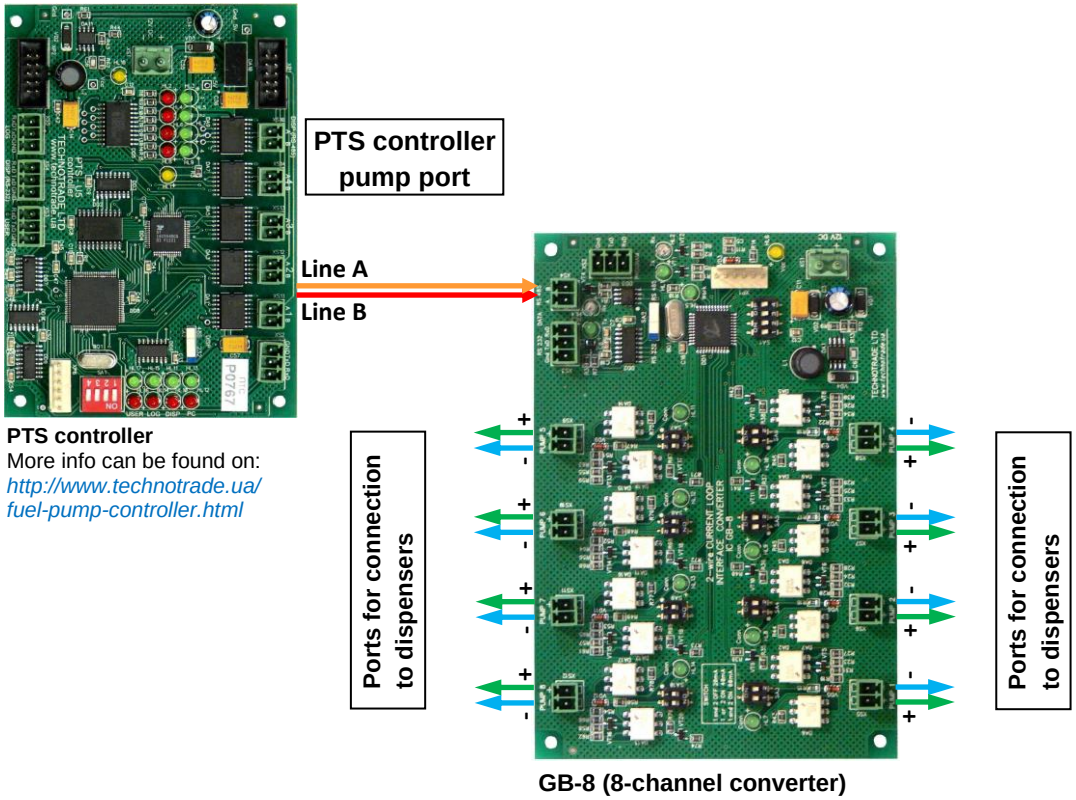
Information about PTS controller over fuel dispensers and ATG systems can be found on PTS controller web-page: *http://www.technotrade.ua/fuel-pump-controller.html*.

*GB-2 (2-channel converter board):*




**PTS controller**
More info can be found on:
*http://www.technotrade.ua/fuel-pump-controller.html*

*GB-8 (8-channel converter board):*




**PTS controller**
More info can be found on:
*http://www.technotrade.ua/fuel-pump-controller.html*

*At connection using RS-485 interface please check the following:*

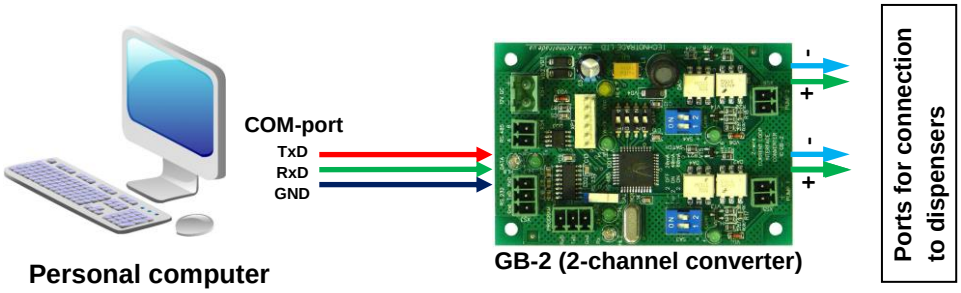
- ✓ **DIP-switch SA1**:
  - switch 1 should be set to position “ON”
  - switch 2 should be set to position “OFF”
  - switch 3 should be set to position “OFF”
  - switch 4 should be set to position “OFF”

- ✓ **DIP-switch SA2** should be in position “RS-485”
- ✓ **LED “WORK” (HL3 in GB-2 and HL5 in GB-8)**, which indicates normal operation of firmware, should be blinking with constant frequency
- ✓ **LED “Vcc” (HL4 in GB-2 and HL6 in GB-8)**, which indicates presence of 12 V DC on the board, should be constantly shining
- ✓ **Green and red LEDs “*Tx*” and “*Rx*” (HL7, HL8 in GB-2 and HL3, HL4 in GB-8)**, which indicate communication exchange in DATA PORT, should be blinking, which indicates communication with the PTS controller over RS-485 interface:
  - in case if both LEDs “Rx” and “Tx” are not blinking – there are no requests from the control system and no responses from the dispenser.
  - in case if LED “Rx” is blinking and LED “Tx” is not blinking – there are requests from the control system (LED “Rx” is blinking), but there are no responses from the dispenser.
  - in case if LED “Rx” is blinking and LED “Tx” is blinking – there are requests from the control system (LED “Rx” is blinking) and there are responses from the dispenser (LED “Tx” is blinking).
- ✓ **LEDs on pump ports (HL5, HL6 in GB-2 and HL7, HL8, HL9, HL10, HL11, HL12, HL13, HL14 in GB-8)**, where the dispenser is connected, should be constantly shining at closing of the current loop interface
- ✓ **DIP-switches on pump ports (SA3, SA4 in GB-2 and SA3, SA4, SA5, SA6, SA7, SA8, SA9, SA10 in GB-8)**, where dispenser is connected, should be set in accordance with a current value in current loop. Possible current values:
  - switch 1 OFF, switch 2 OFF => 20 mA
  - switch 1 ON, switch 2 OFF => 40 mA
  - switch 1 OFF, switch 2 ON => 40 mA
  - switch 1 ON, switch 2 ON => 60 mA

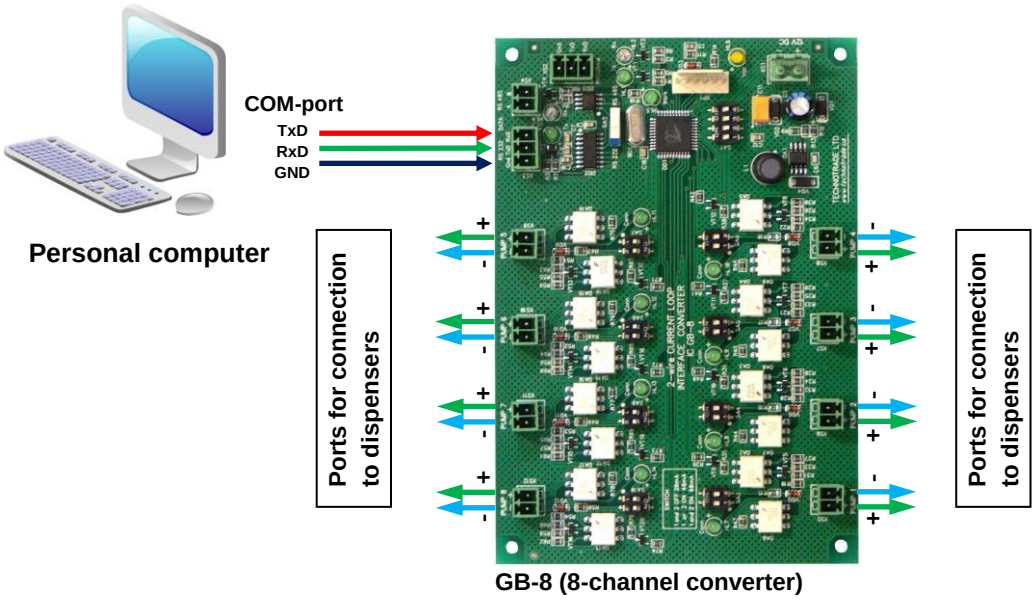
# CONNECTION SCHEME TO PC COM-PORT (DATA COMMUNICATION)

Control over dispensers through the interface converter from a personal computer:

*GB-2 (2-channel converter board):*




*GB-8 (8-channel converter board):*




*At connection using RS-232 interface please check the following:*

- ✓ **DIP-switch SA1**:
  - switch 1 should be set to position “ON”
  - switch 2 should be set to position “OFF”
  - switch 3 should be set to position “OFF”
  - switch 4 should be set to position “OFF”
- ✓ **DIP-switch SA2** should be in position “RS-232”
- ✓ **LED “WORK” (HL3 in GB-2 and HL5 in GB-8)**, which indicates normal operation of firmware, should be blinking with constant frequency
- ✓ **LED “Vcc” (HL4 in GB-2 and HL6 in GB-8)**, which indicates presence of 12 V DC on the board, should be constantly shining
- ✓ **Green and red LEDs “*Tx*” and “*Rx*” (HL7, HL8 in GB-2 and HL3, HL4 in GB-8)**, which indicate communication exchange in DATA PORT, should be blinking, which indicates communication with the personal computer over RS-232 interface:

- in case if both LEDs “Rx” and “Tx” are not blinking – there are no requests from the control system and no responses from the dispenser.
- in case if LED “Rx” is blinking and LED “Tx” is not blinking – there are requests from the control system (LED “Rx” is blinking), but there are no responses from the dispenser.
- in case if LED “Rx” is blinking and LED “Tx” is blinking – there are requests from the control system (LED “Rx” is blinking) and there are responses from the dispenser (LED “Tx” is blinking).

✓ **LEDs on pump ports (HL5, HL6 in GB-2 and HL7, HL8, HL9, HL10, HL11, HL12, HL13, HL14 in GB-8)**, where the dispenser is connected, should be constantly shining at closing of the current loop interface

✓ **DIP-switches on pump ports (SA3, SA4 in GB-2 and SA3, SA4, SA5, SA6, SA7, SA8, SA9, SA10 in GB-8)**, where dispenser is connected, should be set in accordance with a current value in current loop. Possible current values:

- switch 1 OFF, switch 2 OFF => 20 mA
- switch 1 ON, switch 2 OFF => 40 mA
- switch 1 OFF, switch 2 ON => 40 mA
- switch 1 ON, switch 2 ON => 60 mA

# CONNECTION TO POWER SUPPLY

It is recommended to use non-shielded cable at connection to power supply. It is recommended to install a ferrite ring core TDK ZCAT 2235-1030 on the power supply cable with 1 coil inside (as shown on image below).

*Ferrite ring core TDK ZCAT 2235-1030*

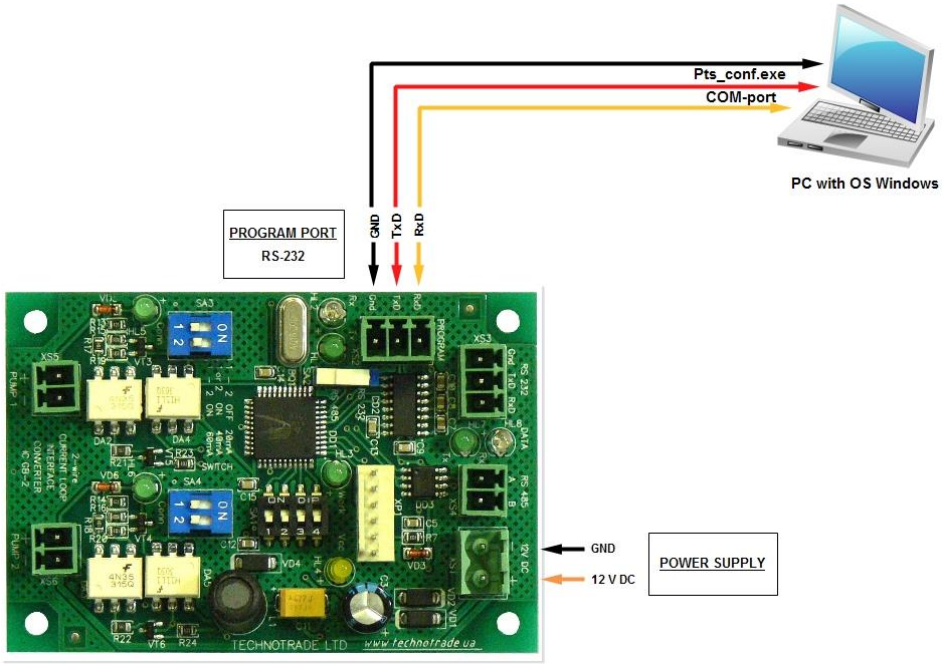
Ferrite ring coil should be located on the power supply cable nearby (up to 3 cm) the power supply connector of converter board or nearby the power supply cable input of box (in case if converter is supplied in plastic box). After placing a ferrite ring on the power supply cable it is required to check correctness of its installation, it is possible to check it by moving ferrite ring along the power supply cable by pushing power supply cable into it from one side and pulling the cable from another side of the ferrite ring.

# FIRMWARE UPDATE

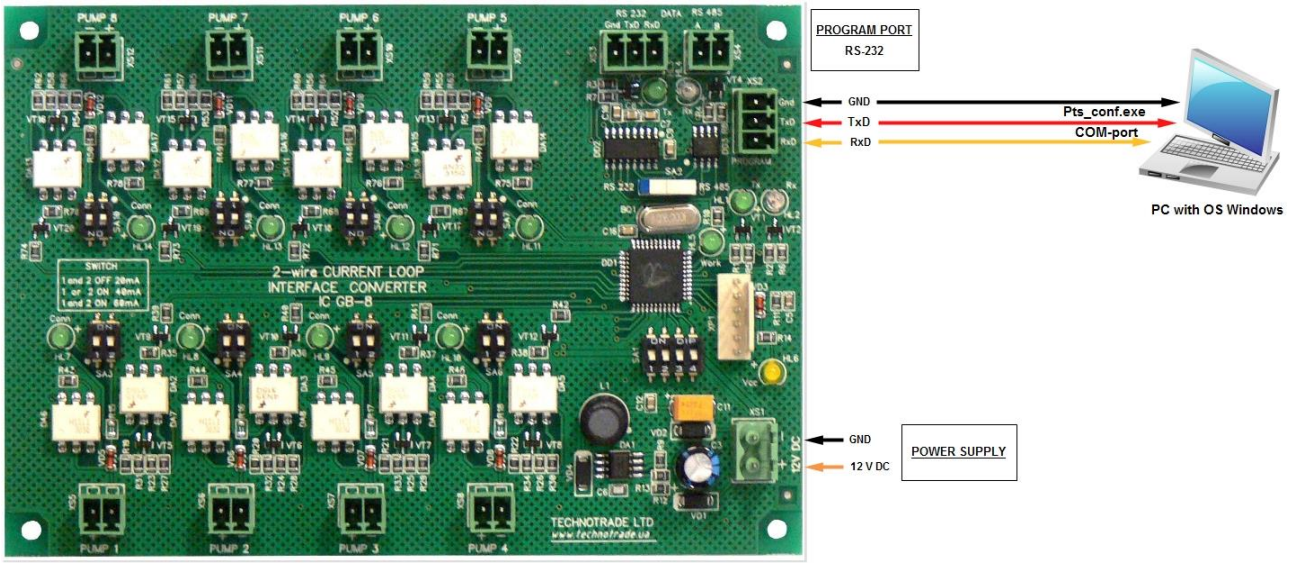
Interface converter firmware is constantly being improved and new versions of firmware with improved functionality, new possibilities and fixed bugs of the previous firmware versions are proposed to be applied. Latest version of interface converter firmware is always available for downloading for customers.

Update of the interface converter firmware is made through a COM-port of personal computer using a built-in updater in *Pts_config.exe* utility. Please read more about the *Pts_config.exe* utility in PTS controller technical guide, which can be downloaded from PTS controller web-page *http://www.technotrade.ua/fuel_pump_controller.html*.

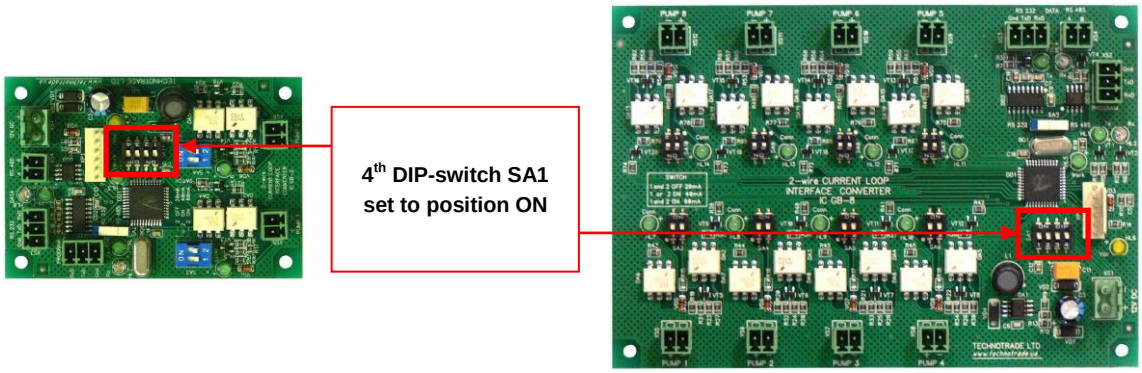
*Scheme of connections of the GB-2 interface converter to personal computer:*



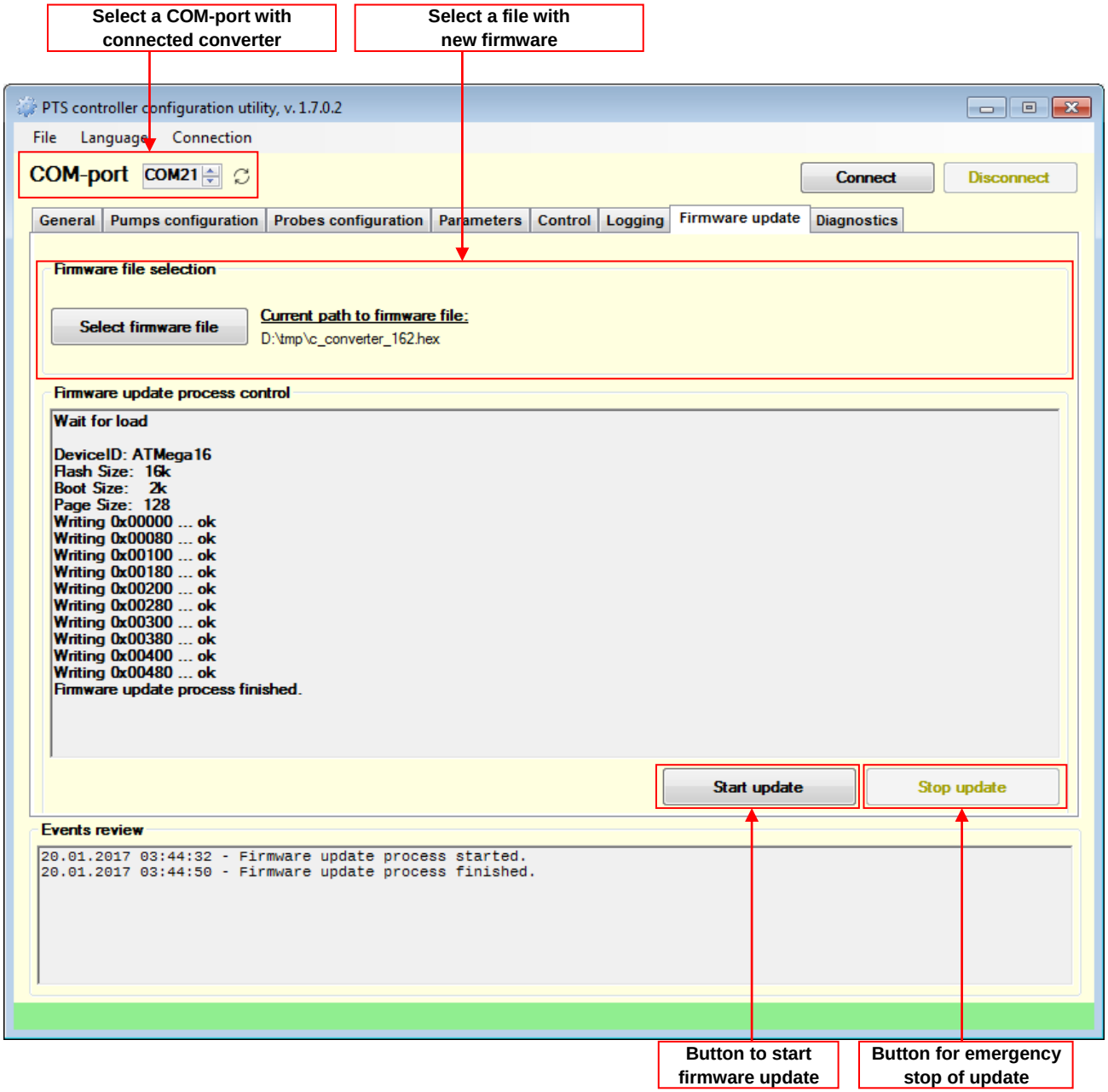

*Scheme of connections of the GB-8 interface converter to personal computer:*



Before start of firmware update it is necessary to switch 4th DIP-switch SA1 on the interface converter to position ON. After the firmware update process is complete it is recommended to set the 4th DIP-switch SA1 to position OFF.




In *Pts_config.exe* utility leave a COM-port closed and go to tab "*Firmware update*". On the opened form select a COM-port of connected interface converter, path to a file with a new firmware and press a button "*Start update*". Firmware will start to be updated. Wait until the process is finished. In case of any errors - restart a tool and try again.



In case if the firmware is not being updated – power off the interface converter, click to start firmware update and power on the interface converter. At this the firmware update process should start.

***NOTE!*** In order to prevent interface converter firmware from accidental update it is strictly recommended to keep 4$^{th}$ DIP-switch SA1 in OFF position in any moment of time except for firmware update needs.

# 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 (expect 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 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**

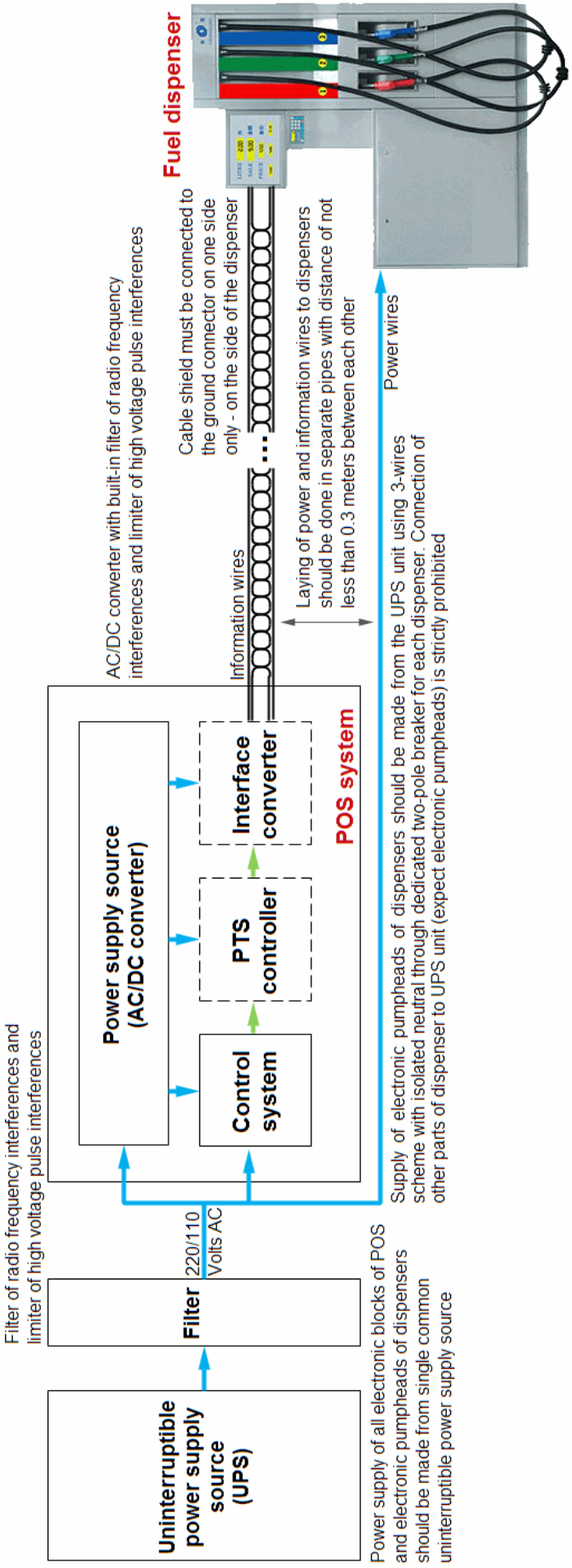
In the switchboard the ground wire of feeder socket should be connected to the grounding screw, which should be connected by means of welding with a protection grounding circuit of petrol station by steel wire with a diameter of not less than 5 mm.

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)

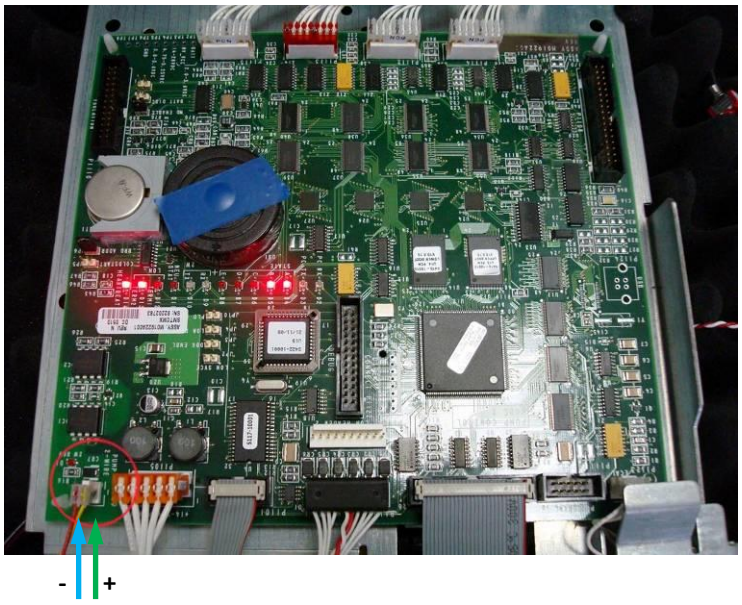
it is recommended to use shielded twisted-pair cables (recommended type – FTP CAT 5E). The cable shield must be connected to the ground connector on one side only – on the side of the dispenser.



# EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES

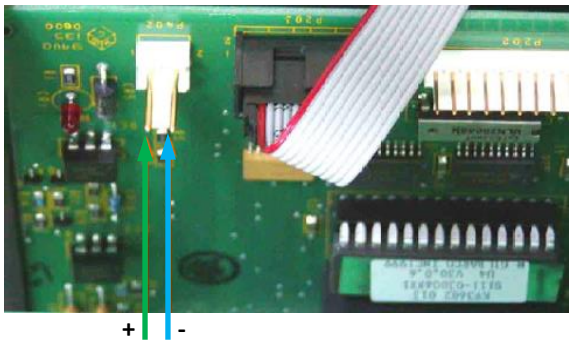
## *Gilbarco dispenser connection scheme*

*Gilbarco Encore 500 dispenser board*

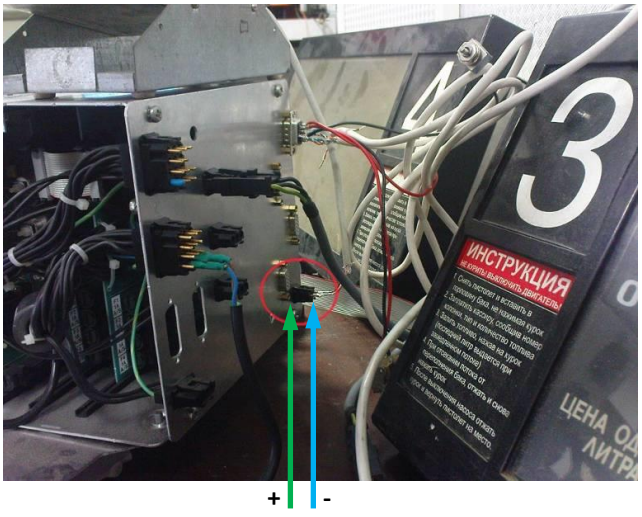




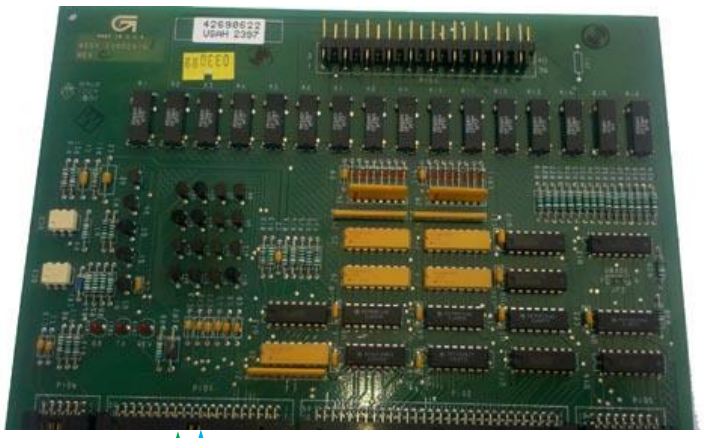
*Gilbarco dispenser board*




*Gilbarco Euroline dispenser board*

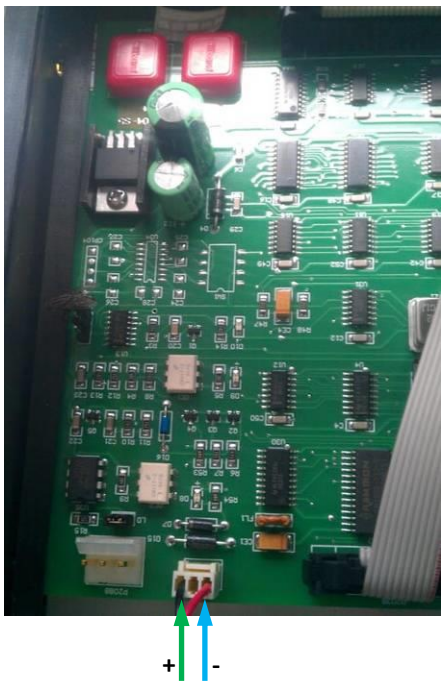


*Gilbarco Highline / Dimension Assy dispenser board*

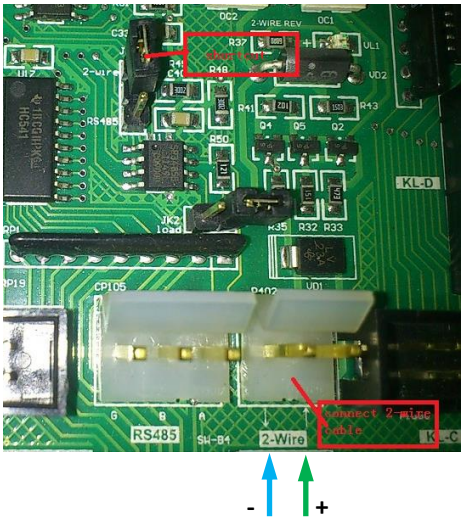


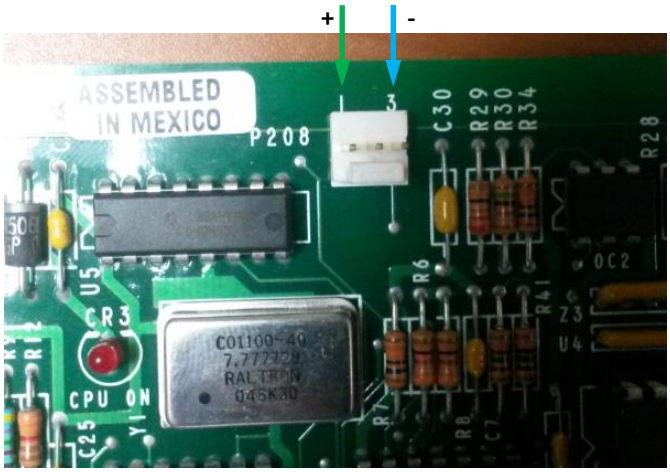

*(pins 23 and 24 of port P101)*

*Gilbarco Endeavor dispenser board*

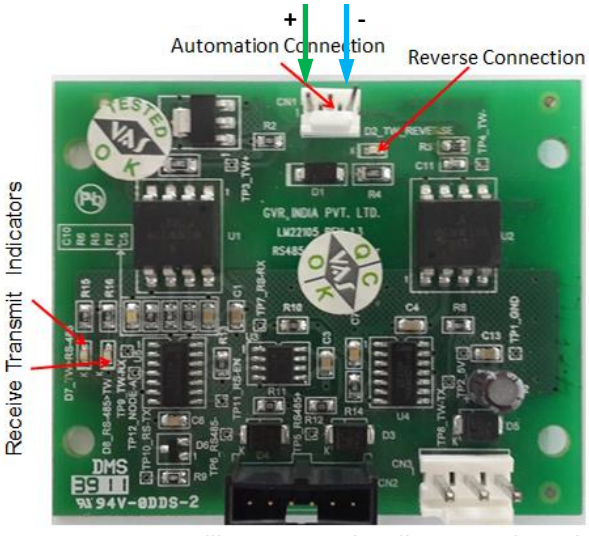



*Gilbarco 3202 series dispenser board*

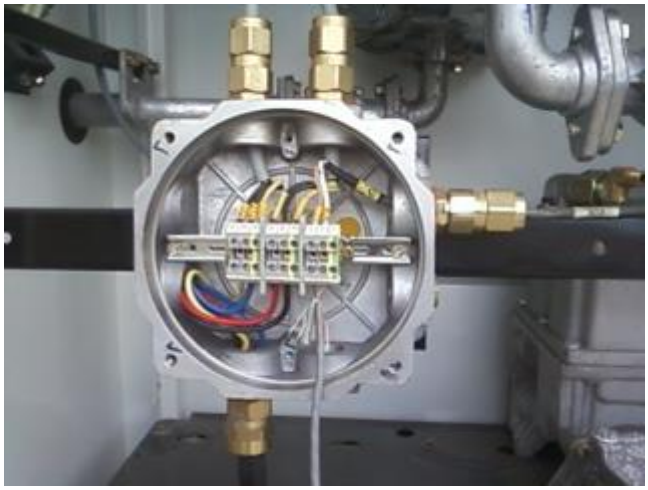


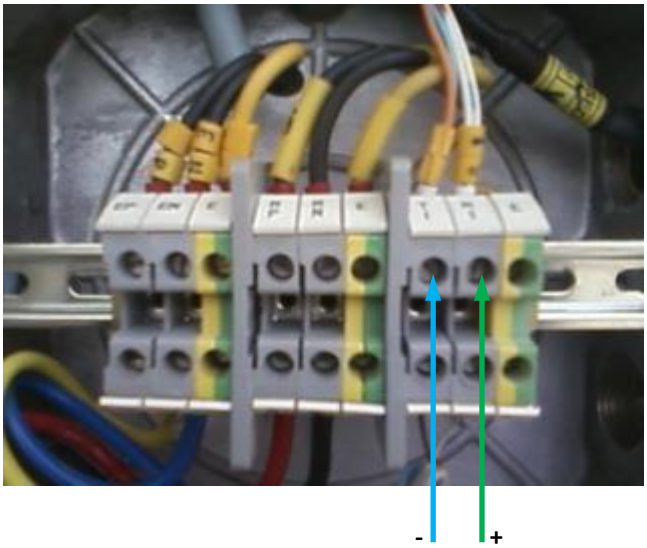




*Gilbarco Endeavor dispenser board*

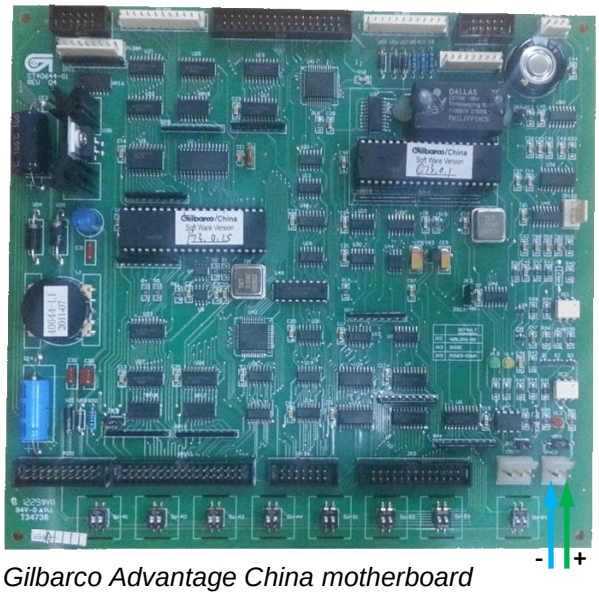



*Gilbarco Frontier dispenser board*

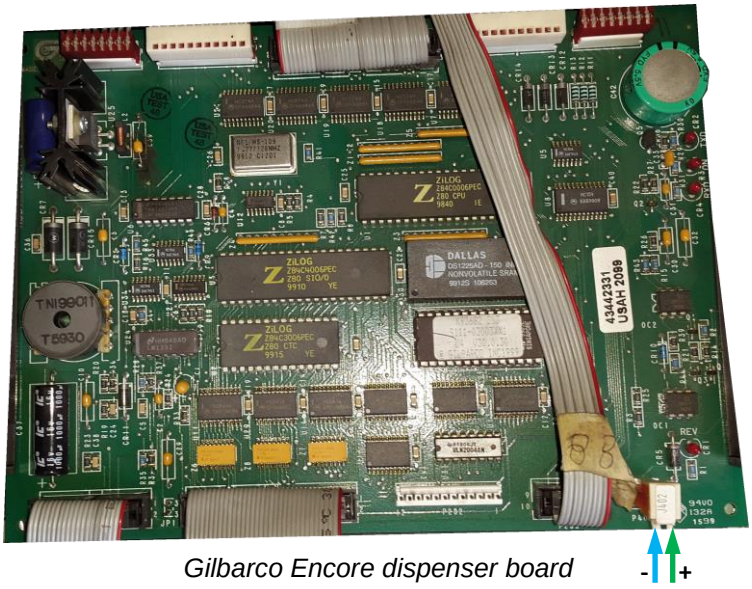





*Gilbarco Frontier dispenser connection*




*Gilbarco Advantage China motherboard*

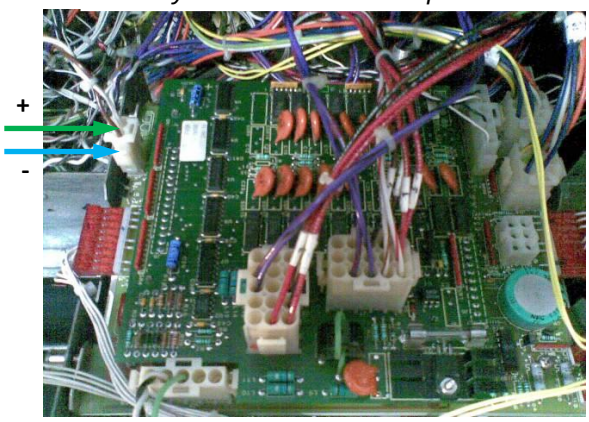



*Gilbarco Encore dispenser board*

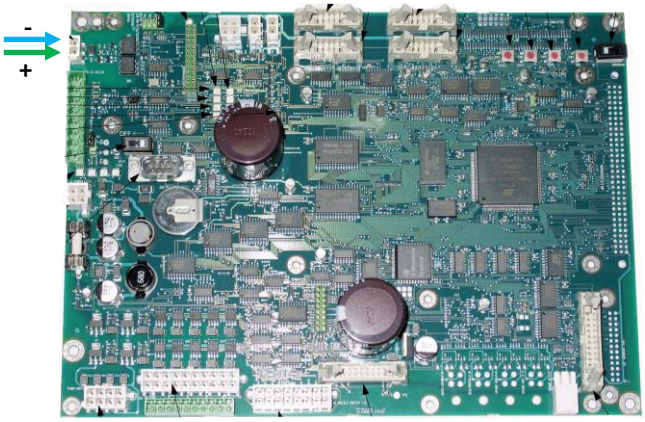
# *Wayne Dresser dispenser connection scheme (current loop interface)*


*Wayne Dresser dispenser iGEM board*

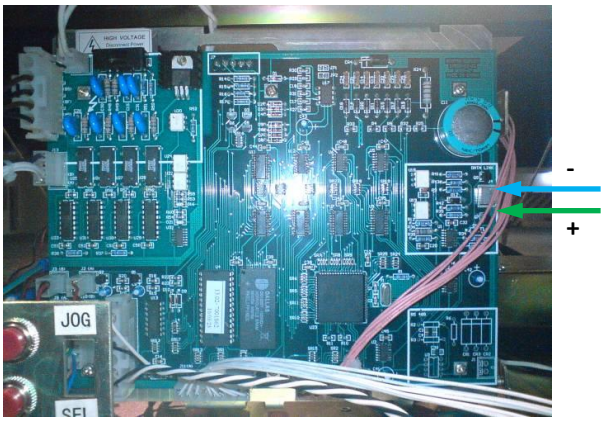
*Wayne Dresser V387 dispenser board*



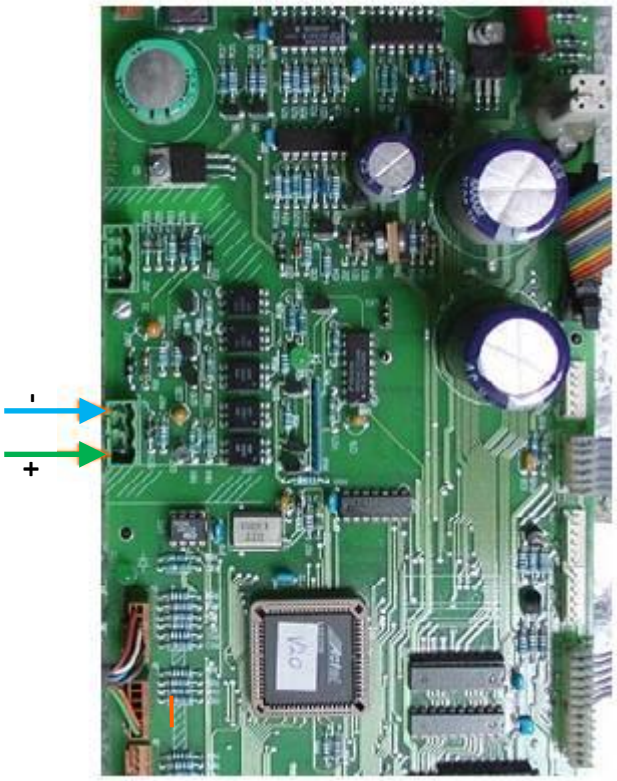

*Wayne Dresser iGEM2 dispenser board*



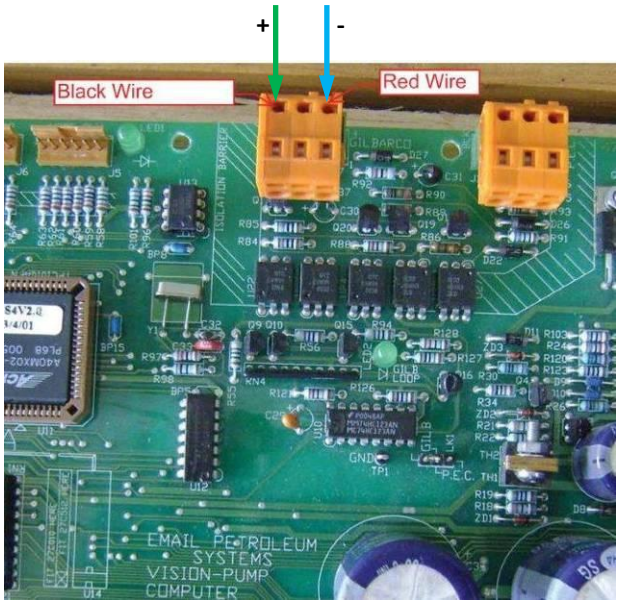

*Wayne Dresser STMTAX Duplex dispenser*



# *Batchen Email dispenser connection scheme*

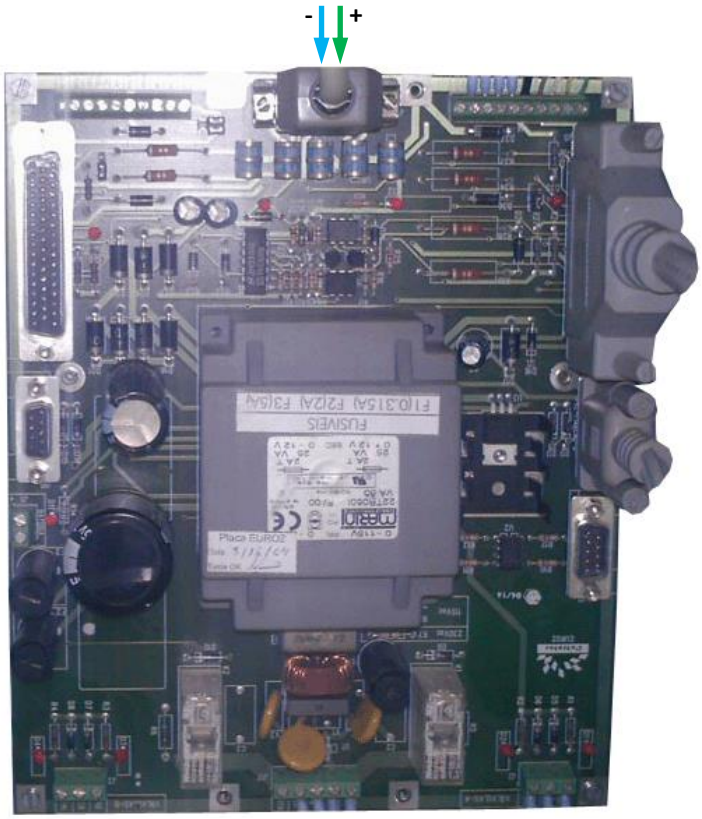



*Batchen dispenser board*



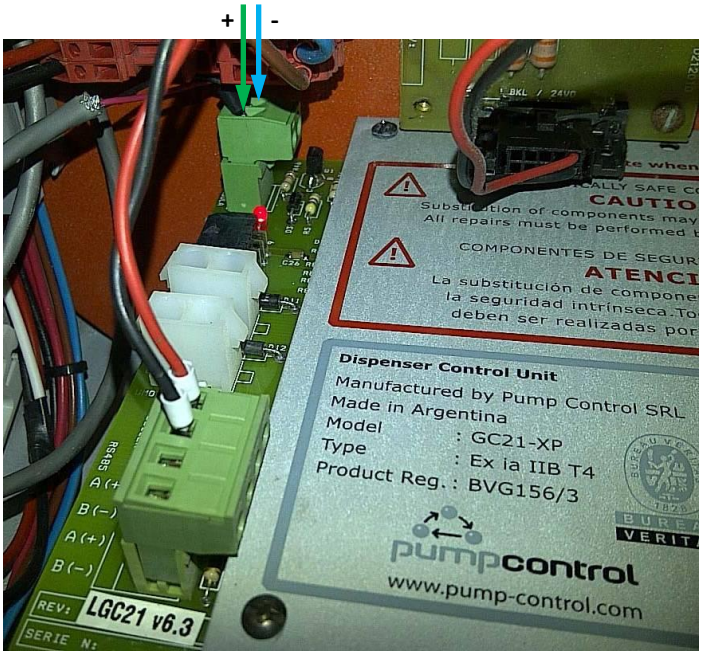

*Batchen dispenser board*

# *Petrotec dispenser connection scheme*



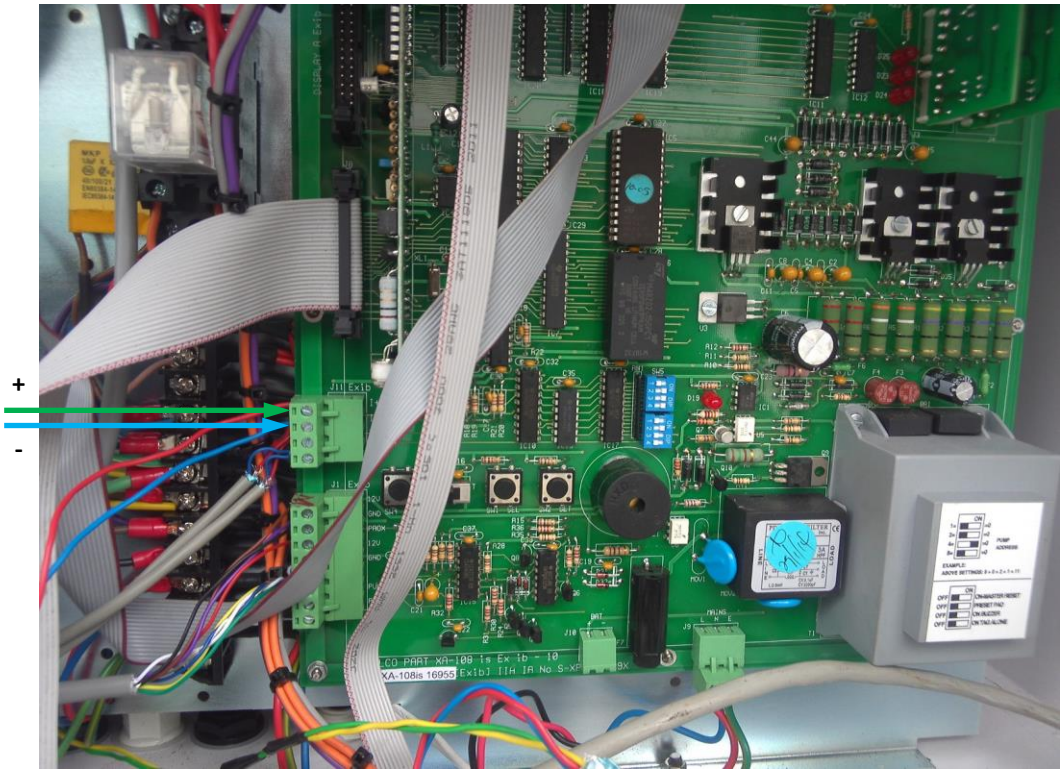

*Petrotec dispenser board*

# *Galileo dispenser connection scheme*



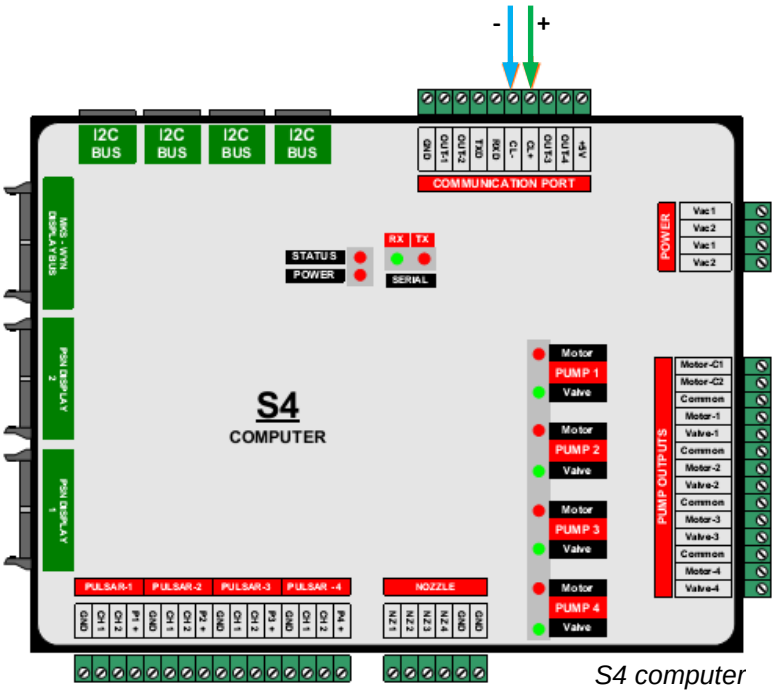

*Galileo dispenser board*

# *Prowalco dispenser connection scheme*



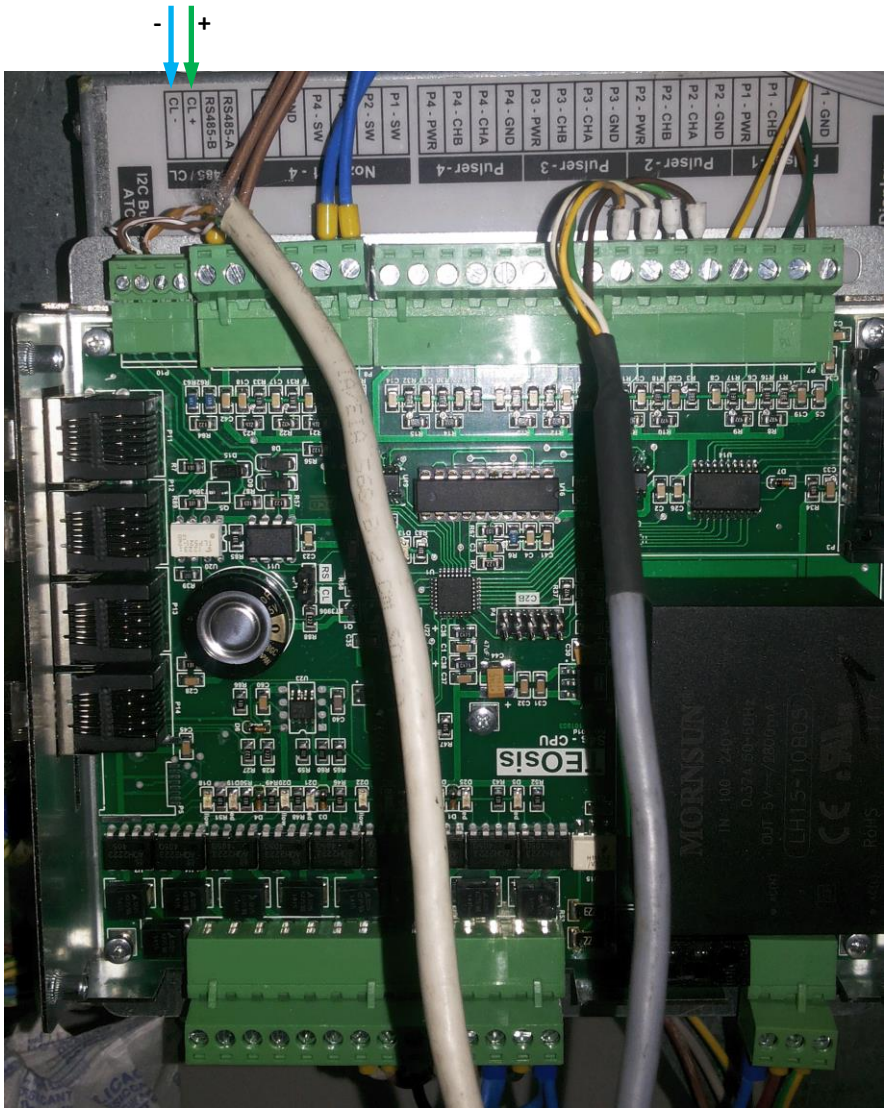

*Prowalco dispenser board*

# *Petposan-S4 / Meksan-S4 / Europump-S4 dispensers connection scheme*

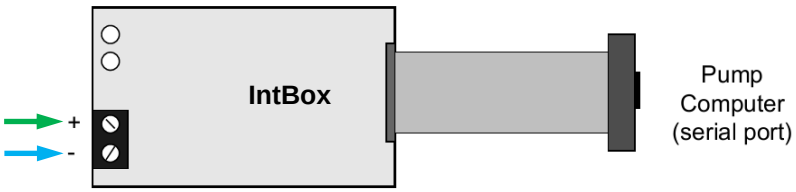



*S4 computer*

# *Yenen dispensers connection scheme*



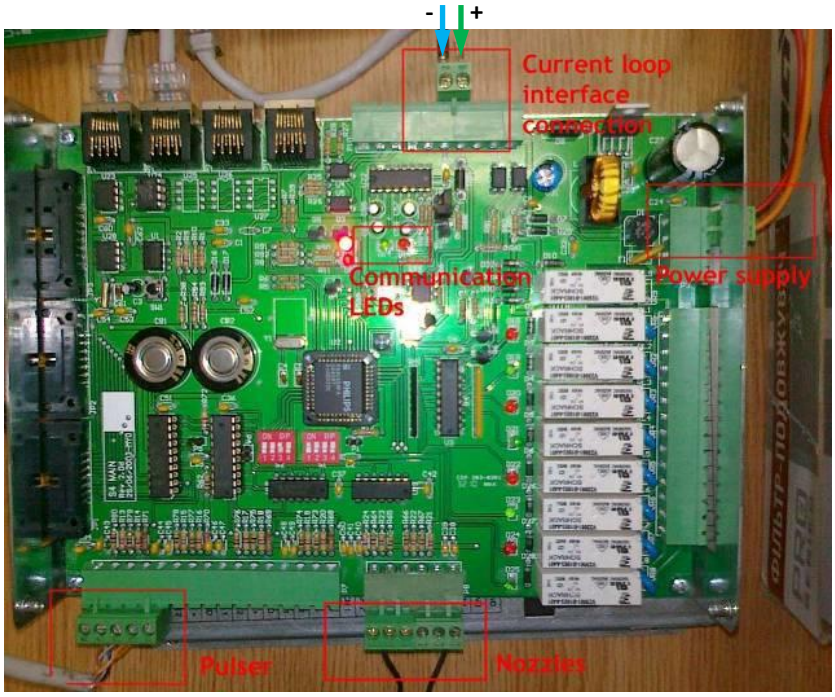
# *Petposan-Beta / Europump-Beta dispensers connection scheme*



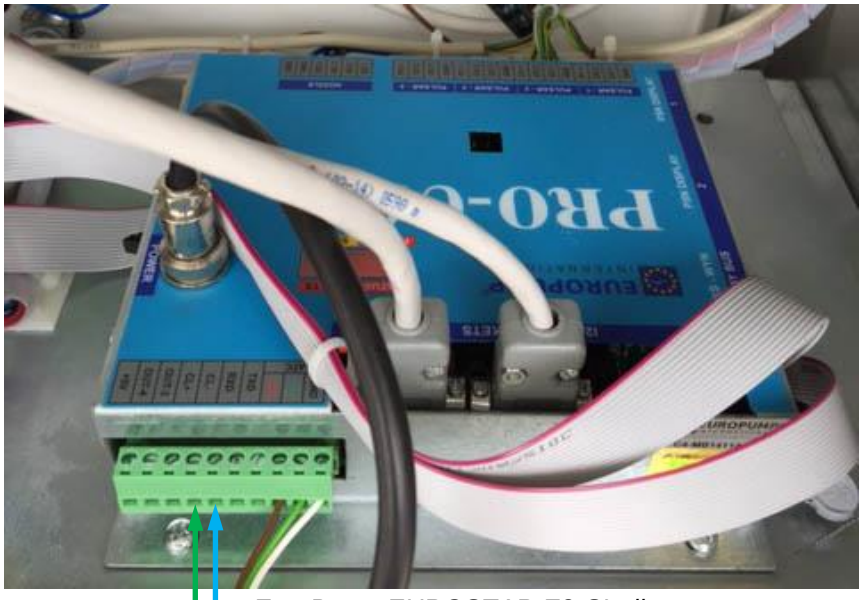


*Petposan-Beta CPU*

# *EuroPump dispenser connection scheme*

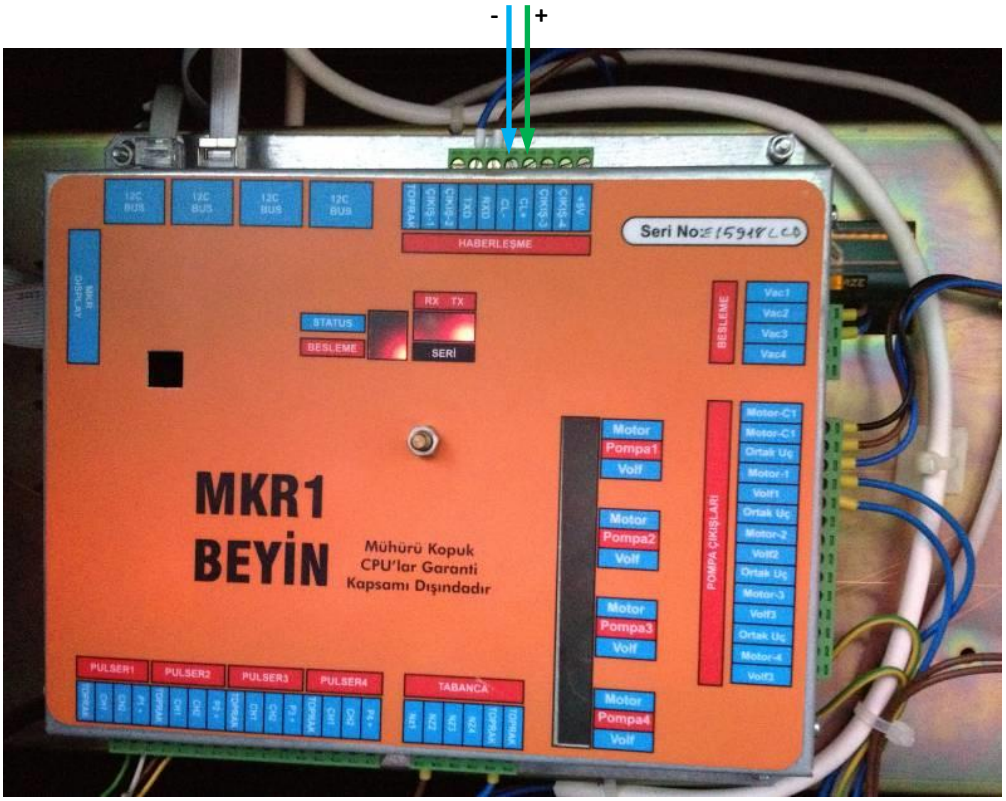



*EuroPump dispenser board*



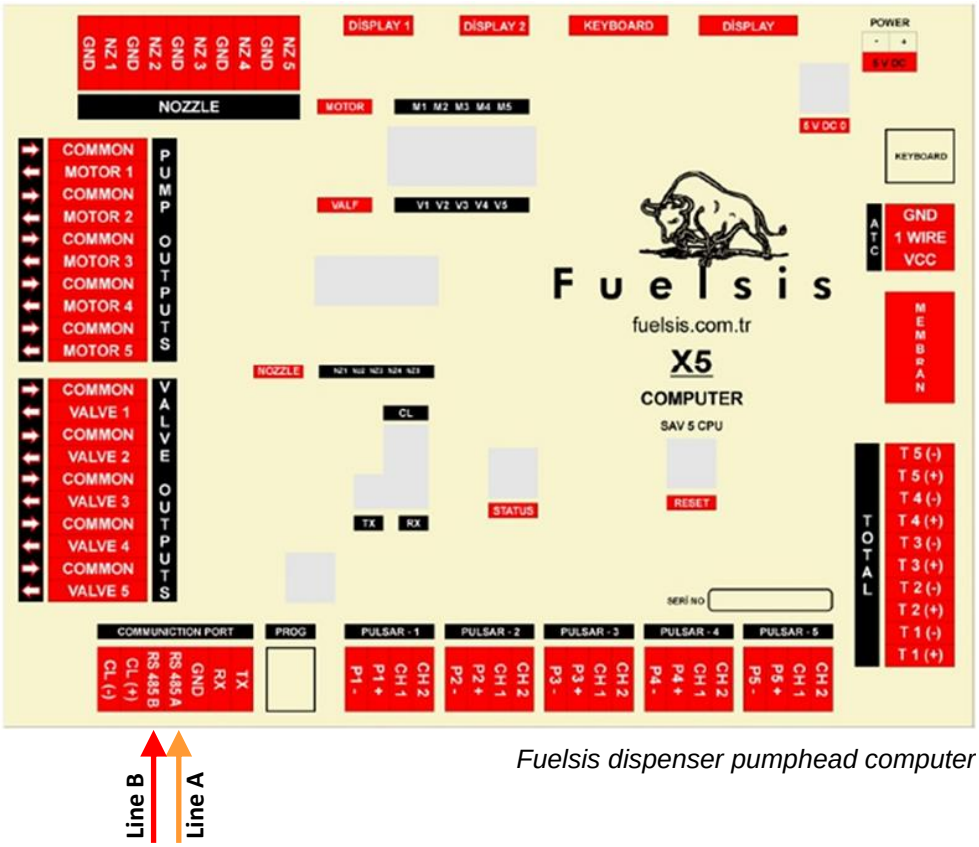

*EuroPump EUROSTAR E2-SL dispenser computer*

# *Mekser dispenser connection scheme*



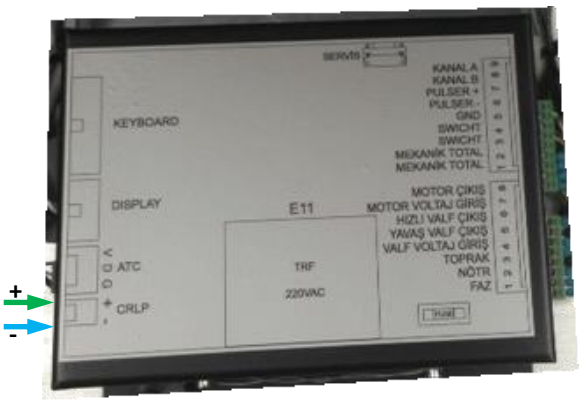

*Mekser dispenser board*

# *Fuelsis dispenser connection scheme*




*Fuelsis dispenser pumphead computer*

# *Falcon dispenser connection scheme*



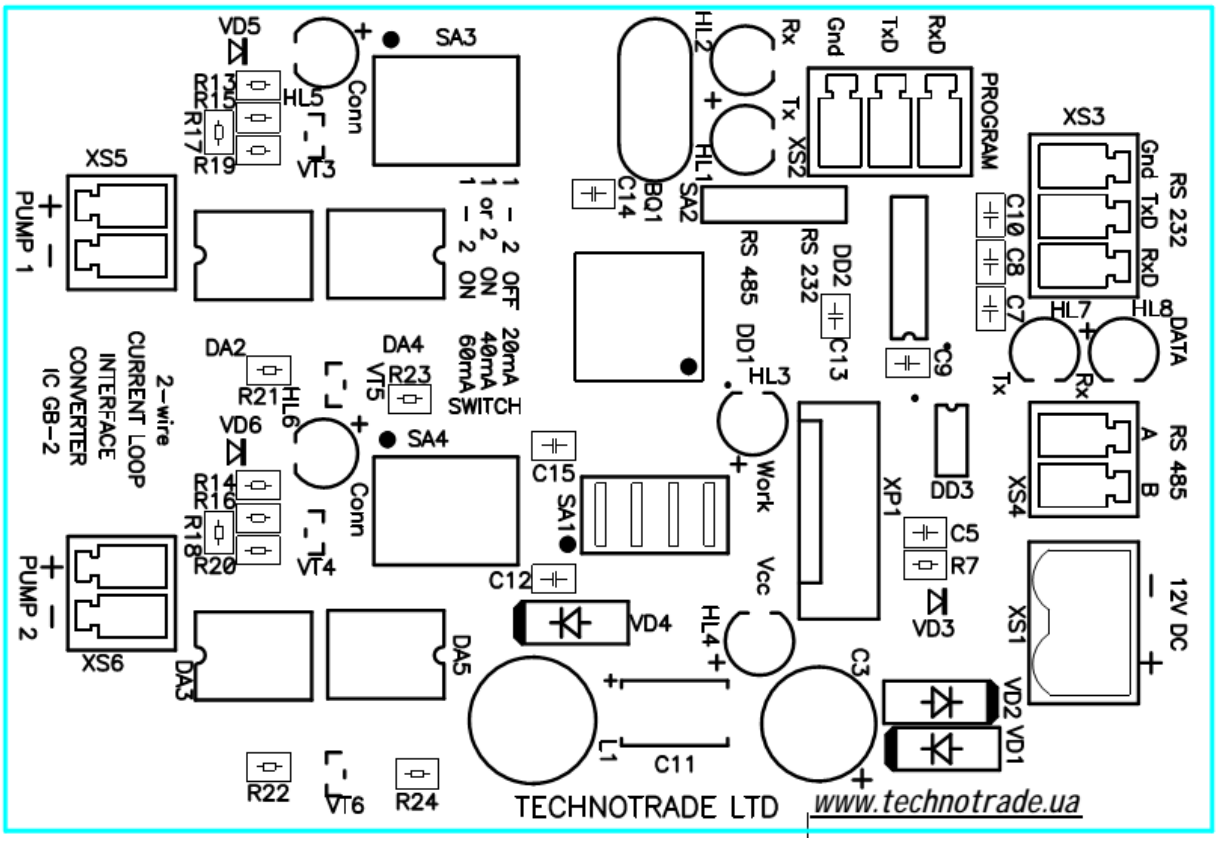

*Falcon dispenser computer E11*


*Falcon dispenser computer E22*

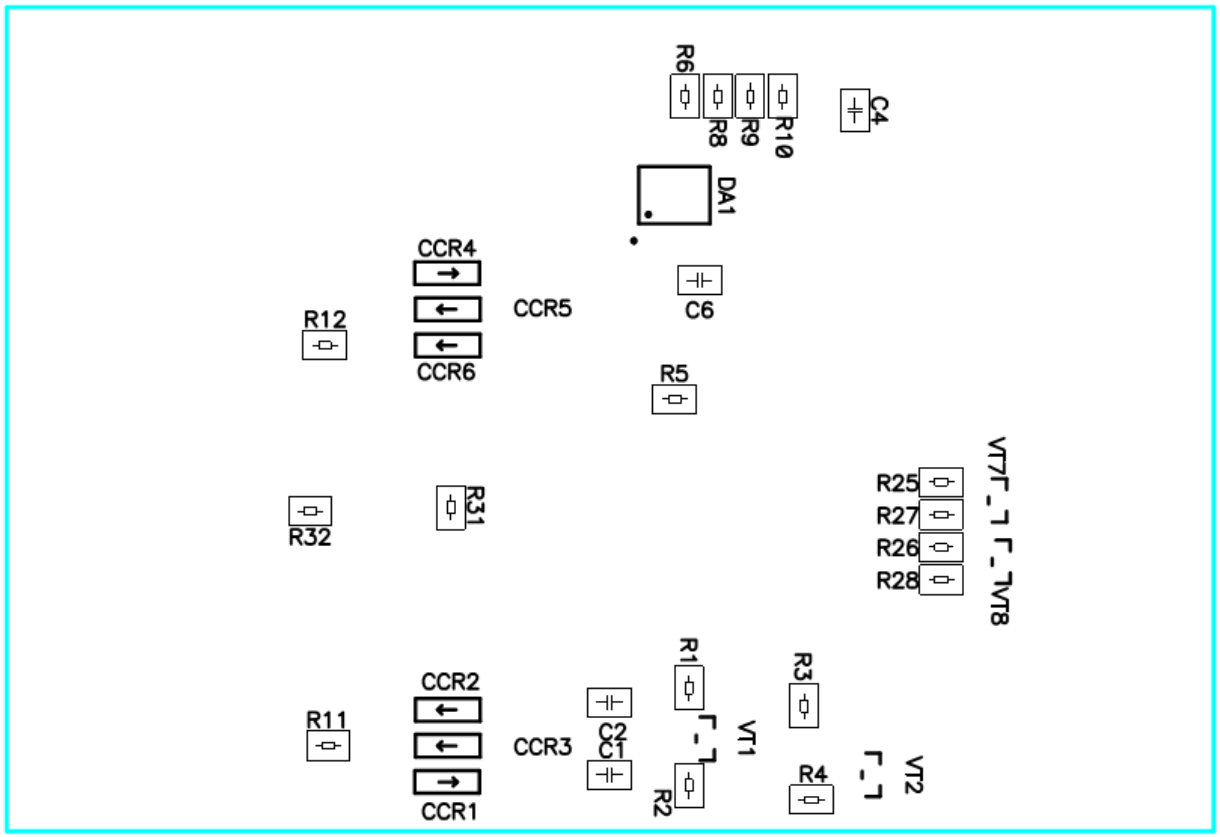
# PCB MOUNTING BOARD

*GB-2 (2-channel converter):*

*Top view:*

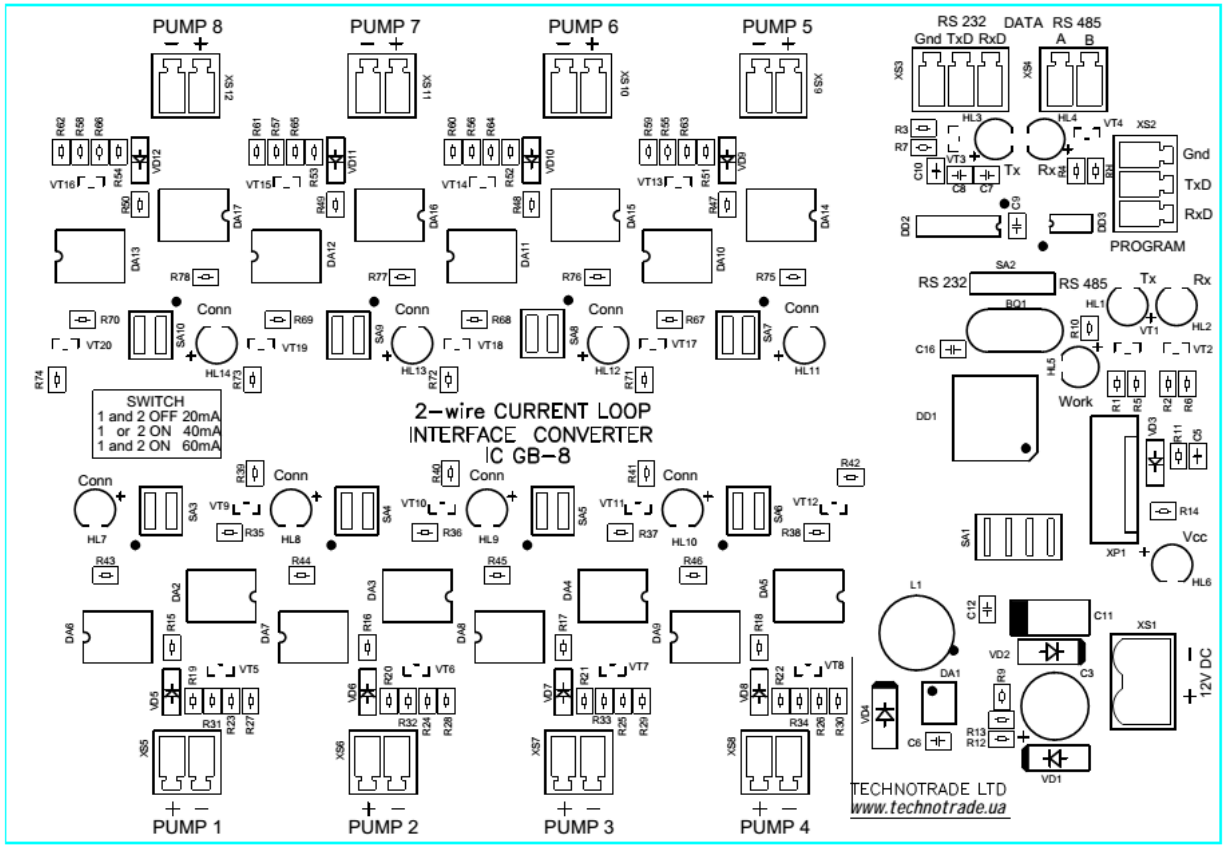



*Bottom view:*

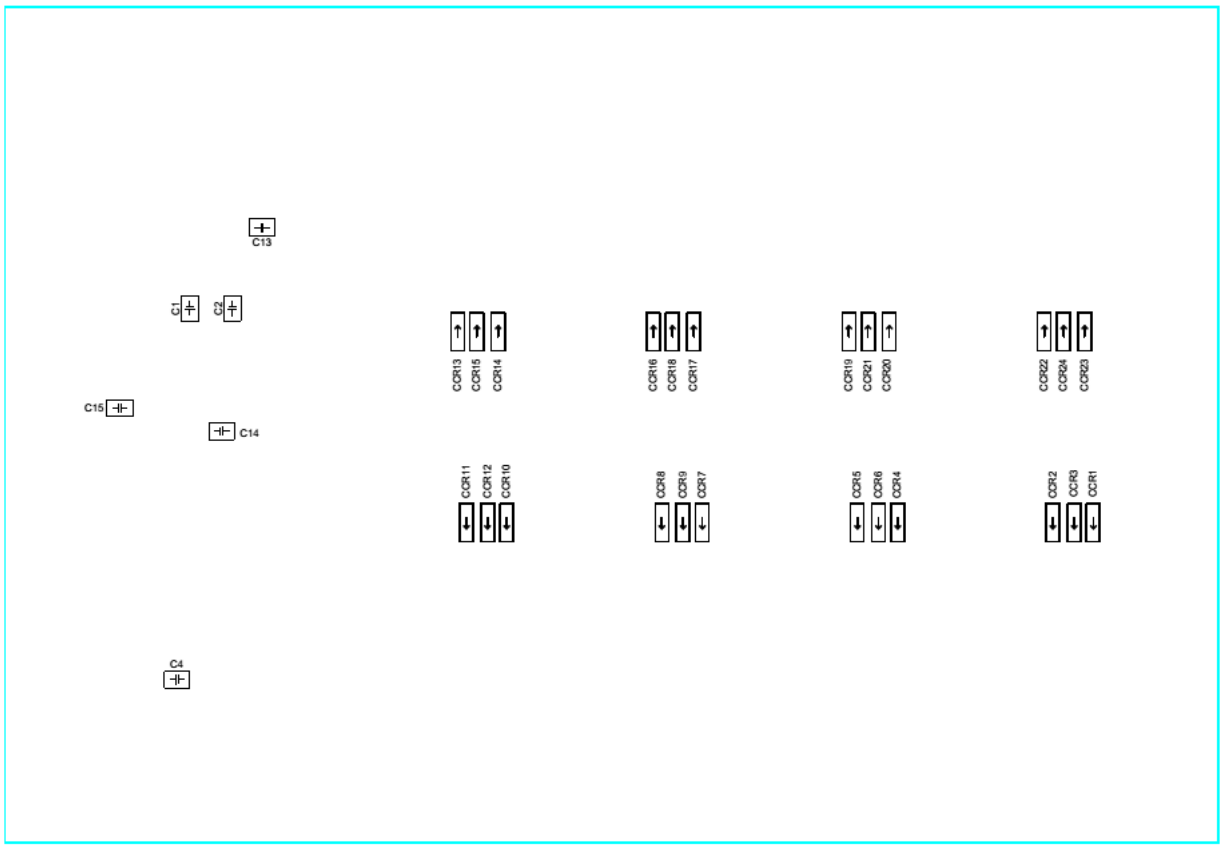


*GB-8 (2-channel converter):*

*Top view:*




*Bottom view:*



# ORDER INFORMATION

Variant of GB interface converter supply is marked with GBx-*y*-*z*, where

- x – quantity of channels on the interface converter (2 – for 2-channel interface converter, 8 – for 8 – channels interface converter type);
- y – type of supply:
  - "*PCB*" in case if GB interface converter is supplied in a view of electric board;
  - "BOX" in case if GB interface converter 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 GB2 interface converter in a view of electric board: GB2-PCB-001;
- order of GB8 interface converter installed in a plastic box: GB8-BOX-001.