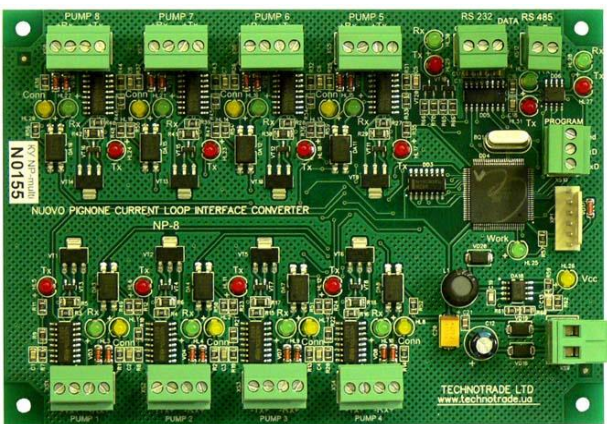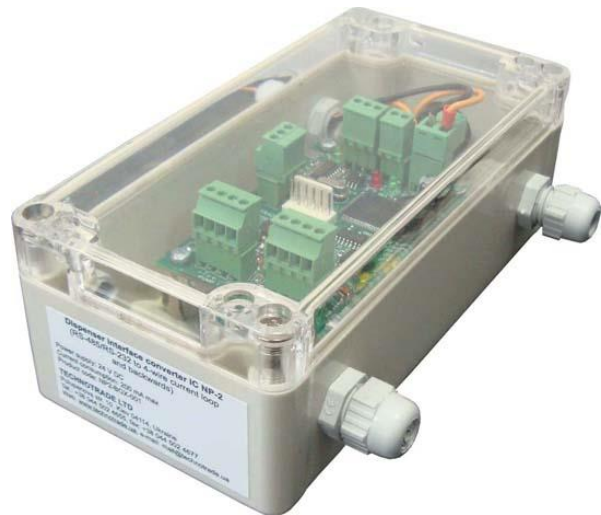# 4-wire current loop interface converters NP-2 and NP-8
(RS-485/RS-232 to 4-wire current loop and backwards)

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 updated.
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	2013.30.11	Evgeniy Vasyliev	Connection schemes	Position of DIP-switch SA1 specified
1.01	2013.17.07	Evgeniy Vasyliev	All	First release

PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of 4-wire interface converters NP-2 and NP-8. It contains basic information regarding its 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 NP interface converters can be received upon request to TECHNOTRADE LTD company.

Due to a reason that NP interface converters are constantly being developed in direction of improvements of their possibilities, changes are possible in 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 4-wire NP interface converters web-page: *http://www.technotrade.ua/nuovo-pignone-interface_converter.html*.

TECHNOTRADE LTD hereby permits reproduction of this document as may be required by any of the customers or OEMs wishing to use it.

This document has been carefully prepared and is believed to be accurate. However TECHNOTRADE LTD, its employees and its agents do not assume responsibility for its use either directly or indirectly. TECHNOTRADE LTD shall not be liable for technical or editorial errors or omissions which may appear in this document. TECHNOTRADE LTD reserves a right to make changes to this document at any time without notice. Prospective users of this document should contact TECHNOTRADE LTD at the time they wish to use NP interface converters together with their products to become aware of any updates that may apply.

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 NP 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

4-wire interface converters NP (RS-485/RS-232 to 4-wire current loop and backwards) are intended for communication with fuel dispensers, which use 4-wire current loop interface, through interfaces:
- RS-232
- RS-485 (2-wire)

The NP interface converters can be applied for communication with following brands of fuel dispensers, which use 4-wire current loop for communication with control systems:
- *Nuovo Pignone*

The NP interface converters have 2 modifications:

NP-2 (2-channel converter board):
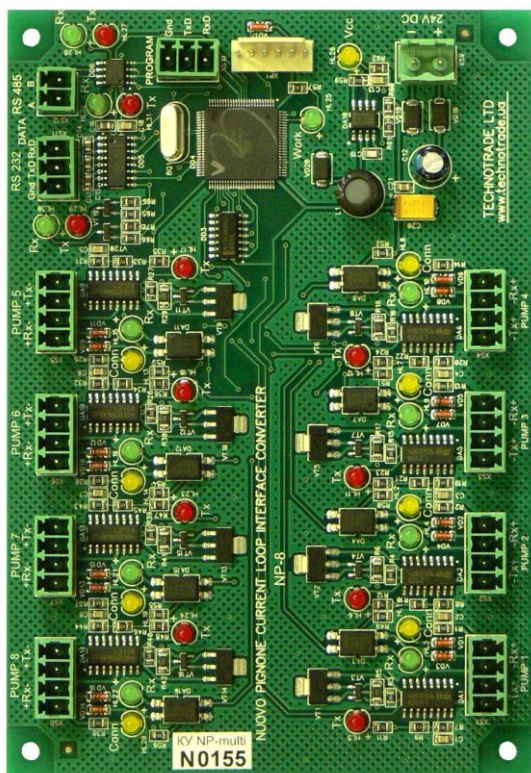
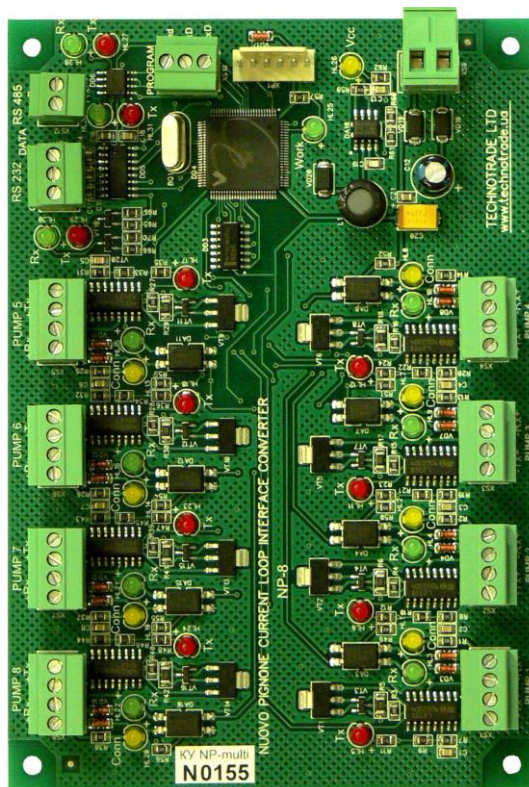*Board without terminal blocks:*   *Board with terminal blocks:*

NP-8 (8-channel converter board):

Board without terminal blocks: *Board with terminal blocks:*
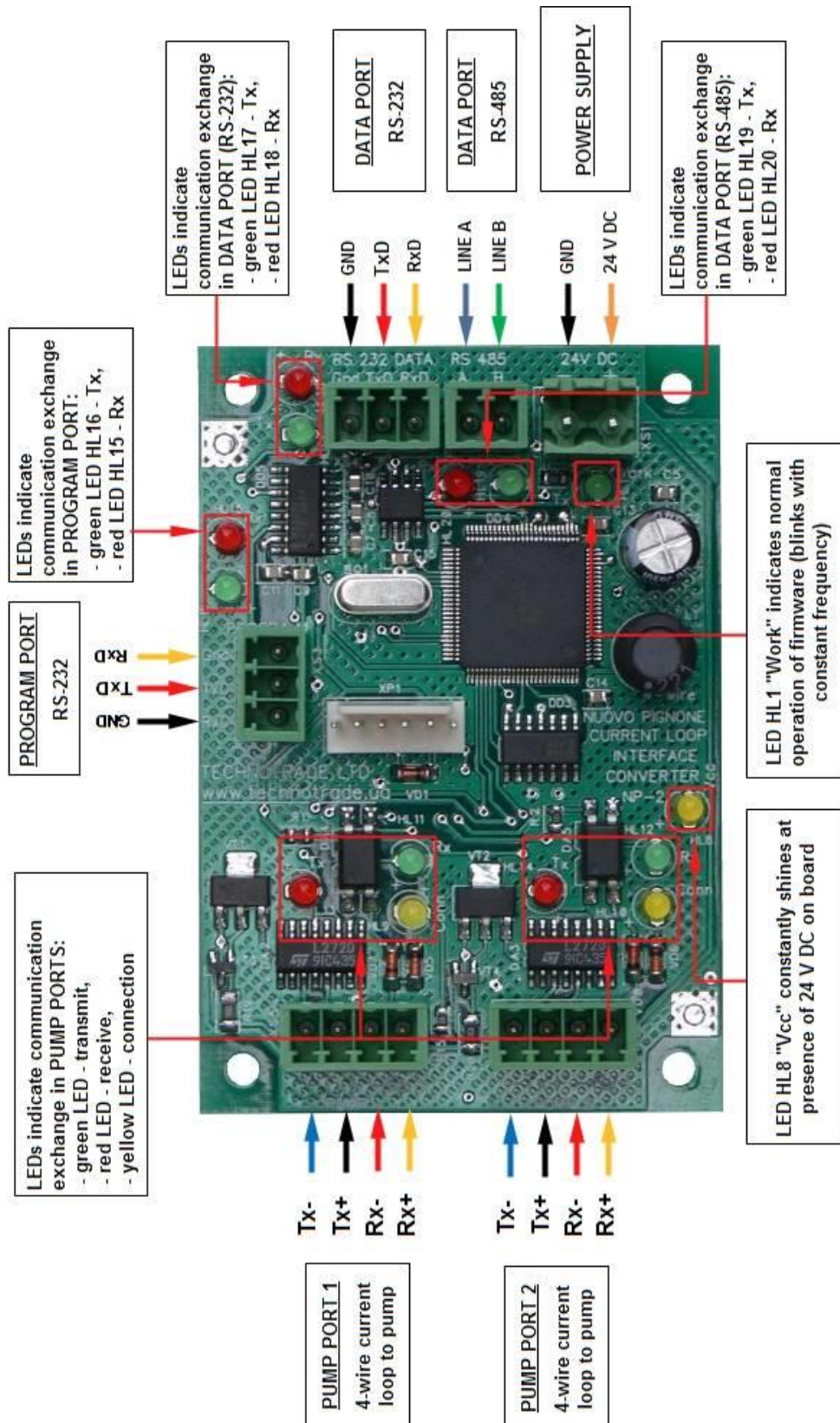
TECHNICAL SPECIFICATIONS

Specification

	NP-2	NP-8
Power supply voltage	24 V DC	
Current consumption	200 mA max	450 mA max
Temperature range	From -40°C to +80°C	
Weight	45 g	120 g
Dimensions	85 x 58 x 25 mm	145 x 100 x 20 mm

Communication ports

	PORT NAME	INTERFACE	PURPOSE
DATA PORTS	**RS-232**	RS-232 (3 wires: TxD, RxD, Gnd)	Communication with a control system (POS terminal, cash register, OPT).
	RS-485	RS-485 (2-wires: line A, line B)	
PUMP PORTS	**Pump ports 1-2**	Optically isolated active current loop	Connection with fuel dispensers using 4 wires. One dispenser is to be connected to each of the pump ports.
	Pump ports 3-8 (NP8 version only)		
PROGRAM PORT	**RS-232**	RS-232 (3 wires: TxD, RxD, Gnd)	Update of the interface converter firmware

PCB BOARD CONNECTORS OVERVIEW

NP-2 (2-channel converter board):

LEDs indicate communication exchange in DATA PORT (RS-232):
- green LED HL17 - Tx,
- red LED HL18 - Rx

LEDs indicate communication exchange in PROGRAM PORT:
- green LED HL16 - Tx,
- red LED HL15 - Rx

DATA PORT RS-232

GND
TxD
RxD

DATA PORT RS-485

LINE A
LINE B

POWER SUPPLY

GND
24 V DC

LEDs indicate communication exchange in DATA PORT (RS-485):
- green LED HL19 - Tx,
- red LED HL20 - Rx

LEDs indicate communication exchange in PROGRAM PORT:
- green LED HL16 - Tx,
- red LED HL15 - Rx

PROGRAM PORT RS-232

RxD
TxD
GND

LED HL1 "Work" indicates normal operation of firmware (blinks with constant frequency)

LEDs indicate communication exchange in PUMP PORTS:
- green LED - transmit,
- red LED - receive,
- yellow LED - connection

LED HL8 "Vcc" constantly shines at presence of 24 V DC on board

Tx-
Tx+
Rx-
Rx+

Tx-
Tx+
Rx-
Rx+

PUMP PORT 1 4-wire current loop to pump

PUMP PORT 2 4-wire current loop to pump

NOTE! Power supply voltage should be 24 V DC.

NP-8 (2-channel converter board):

LEDs indicate communication exchange in DATA PORT (RS-232):
- green LED HL30 - Tx,
- red LED HL29 - Rx

LEDs indicate communication exchange in DATA PORT (RS-485):
- green LED HL31 - Tx,
- red LED HL32 - Rx

LEDs indicate communication exchange in PROGRAM PORT:
- green LED HL27 - Tx,
- red LED HL26 - Rx

PROGRAM PORT RS-232

LED HL25 "Work" indicates normal operation of firmware (blinks with constant frequency)

LED HL26 "Vcc" constantly shines at presence of 24 V DC on board

POWER SUPPLY

DATA PORT RS-485

DATA PORT RS-232

PUMP PORT 5 4-wire current loop to pump

PUMP PORT 6 4-wire current loop to pump

PUMP PORT 7 4-wire current loop to pump

PUMP PORT 8 4-wire current loop to pump

PUMP PORT 4 4-wire current loop to pump

PUMP PORT 3 4-wire current loop to pump

PUMP PORT 2 4-wire current loop to pump

PUMP PORT 1 4-wire current loop to pump

LEDs indicate communication exchange in PUMP PORTS:
- green LED - transmit,
- red LED - receive,
- yellow LED - connection established

NOTE! Power supply voltage should be 24 V DC.

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*.

NP-2 (2-channel converter board):

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

NP-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:

- ✓ **LED "Work" (HL1 in NP-2 and HL25 in NP-8)**, which indicates normal operation of firmware, should be blinking with different frequency
- ✓ **LED "Vcc" (HL8 in NP-2 and HL26 in NP-8)**, which indicates presence of 24 V DC on the board, should be shining
- ✓ **Green and red LEDs "*Tx*" and "*Rx*" (HL19, HL20 in NP-2 and HL30, HL31 in NP-8)**, which indicate communication exchange in DATA PORT, should be blinking, which indicates communication with the PTS controller over RS-485 interface

✓ **Yellow LED "Conn"** on pump port, where the dispenser is connected, should be constantly shining
✓ **Green and red LEDs "*Tx*" and "*Rx*"** indicating communication exchange on the pump port, where the dispenser is connected, should be blinking, which indicates communication with the dispenser
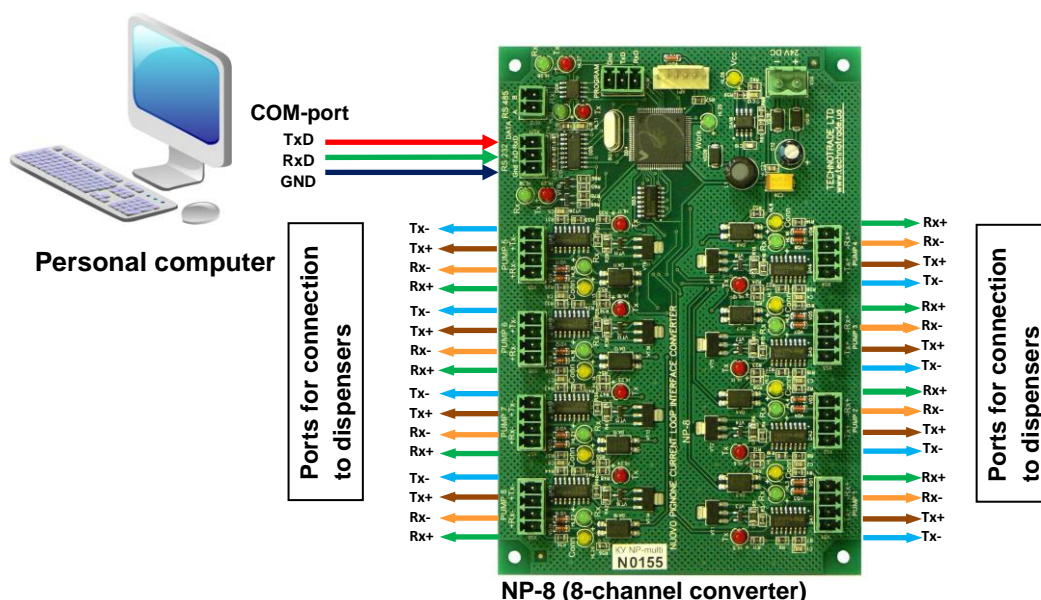
CONNECTION SCHEME TO PC COM-PORT (DATA COMMUNICATION)

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

NP-2 (2-channel converter board):
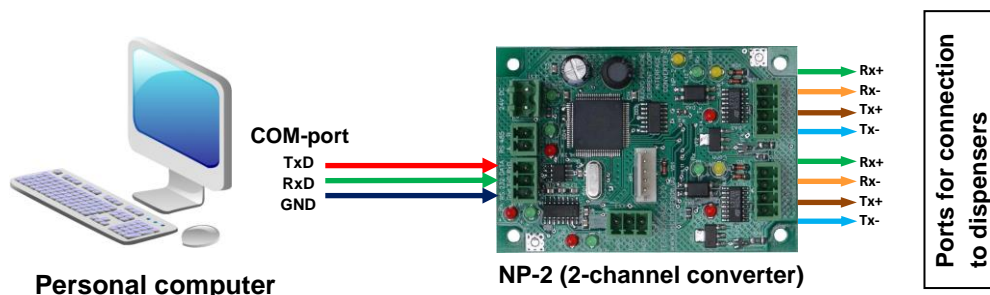
NP-8 (8-channel converter board):

At connection using RS-232 interface please check the following:
- ✓ **LED "Work" (HL1 in NP-2 and HL25 in NP-8)**, which indicates normal operation of firmware, should be blinking with different frequency
- ✓ **LED "Vcc" (HL8 in NP-2 and HL26 in NP-8)**, which indicates presence of 24 V DC on the board, should be shining
- ✓ **Green and red LEDs "*Tx*" and "*Rx*" (HL17, HL18 in NP-2 and HL29, HL30 in NP-8)**, which indicate communication exchange in DATA PORT, should be blinking, which indicates communication with the PTS controller over RS-485 interface
- ✓ **Yellow LED "Conn"** on pump port, where the dispenser is connected, should be constantly shining
- ✓ **Green and red LEDs "*Tx*" and "*Rx*"** indicating communication exchange on the pump port, where the dispenser is connected, should be blinking, which indicates communication with the dispenser

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 NP-2 interface converter to personal computer:
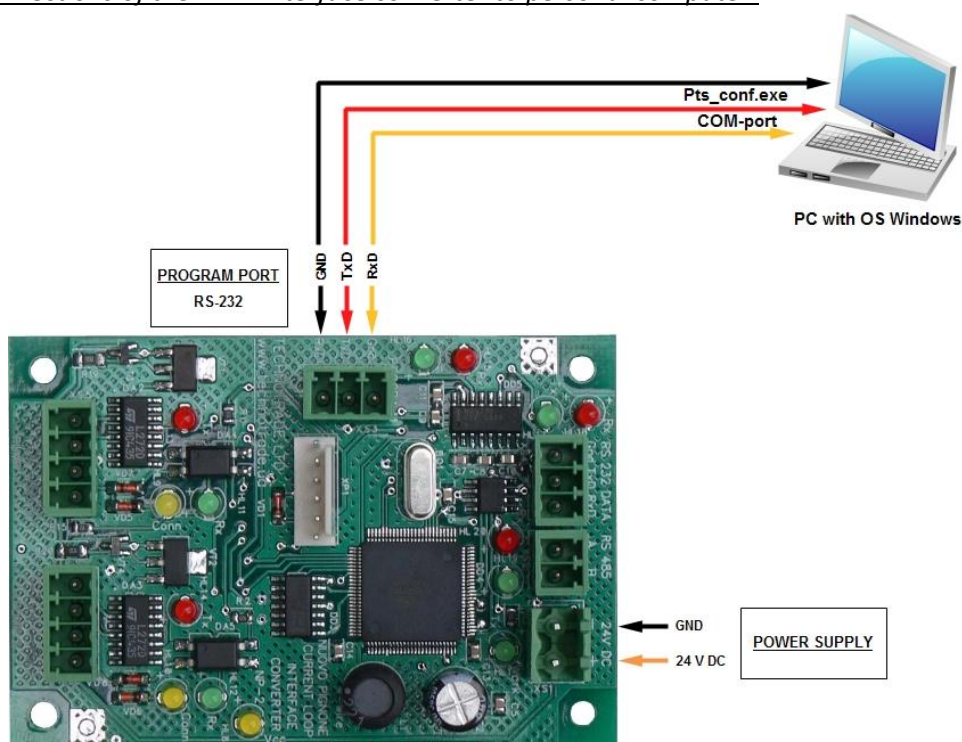
Scheme of connections of the NP-8 interface converter to personal computer:
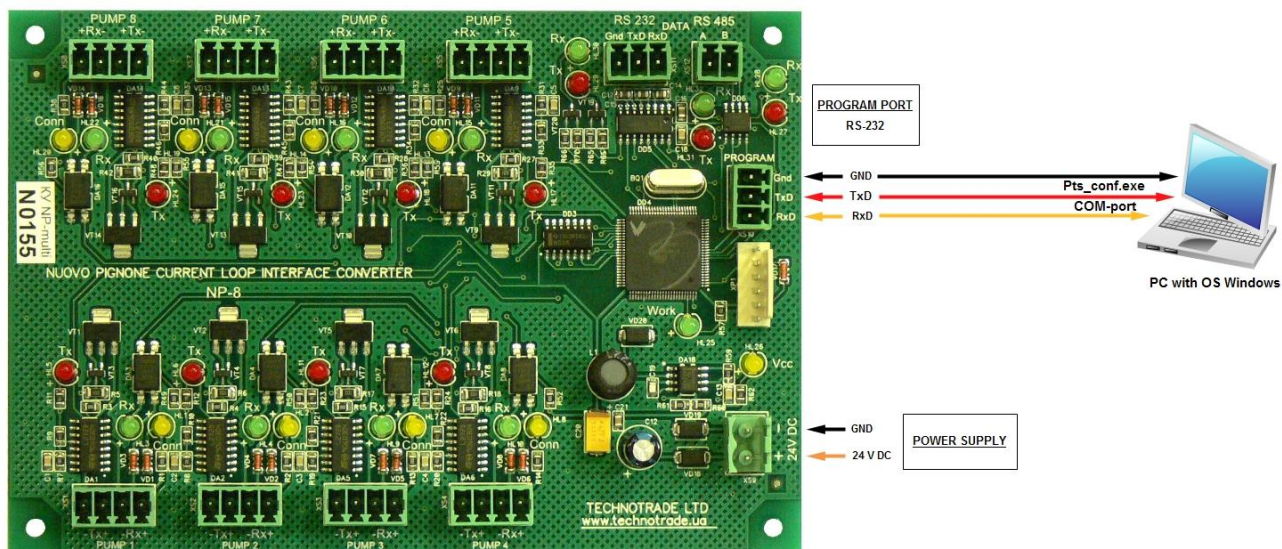
In *Pts_config.exe* utility leave a COM-port closed and go to tab "*Firmware update*". On the opened form select a COM-port of connected interface converter, path to a file with a new firmware and press a button "*Start update*". Firmware will start to be updated. Wait until the process is finished. In case of any errors - restart a tool and try again.
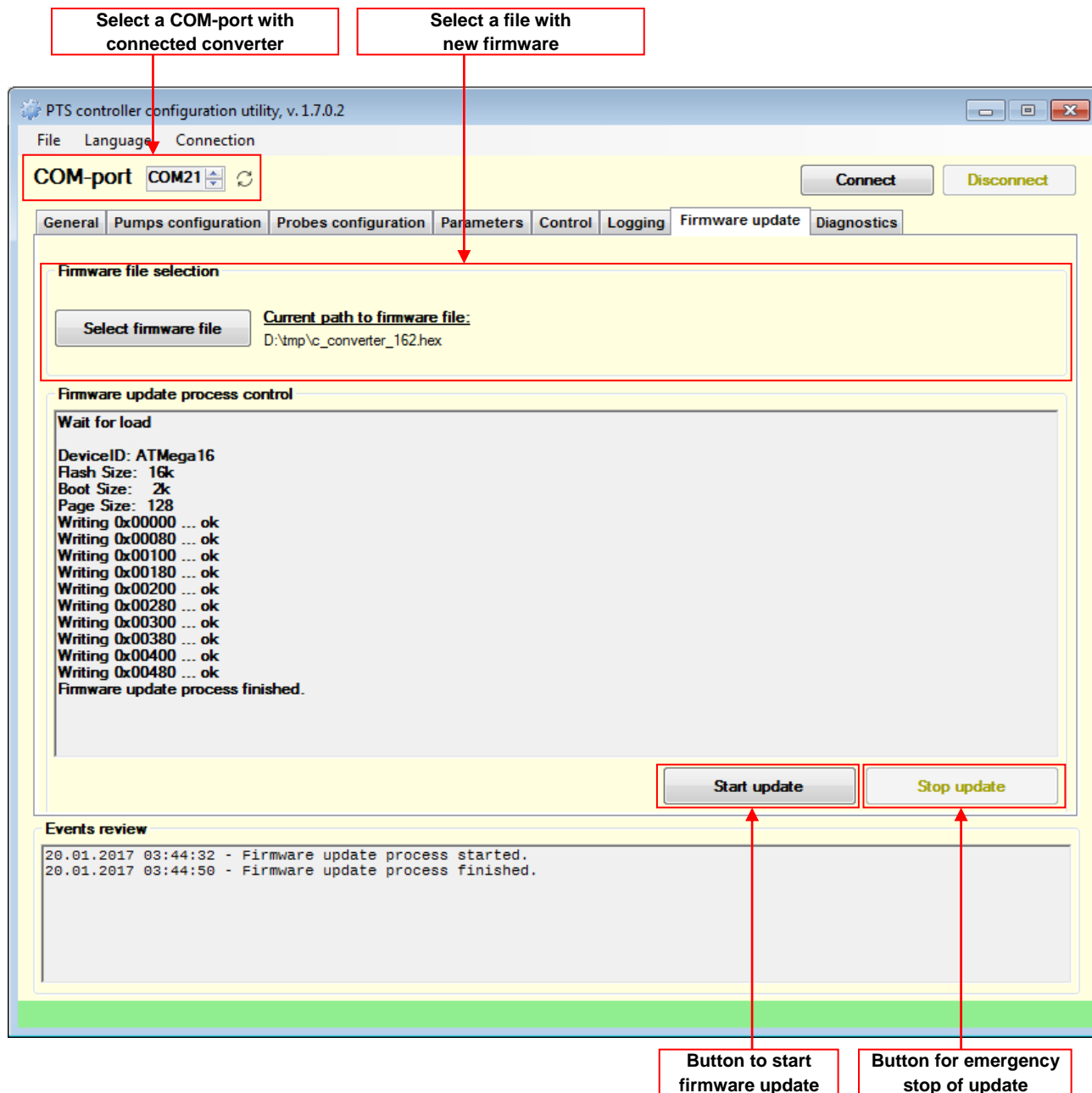
In case if the firmware is not being updated – power off the interface converter, click to start firmware update and power on the interface converter. At this the firmware update process should start.

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.
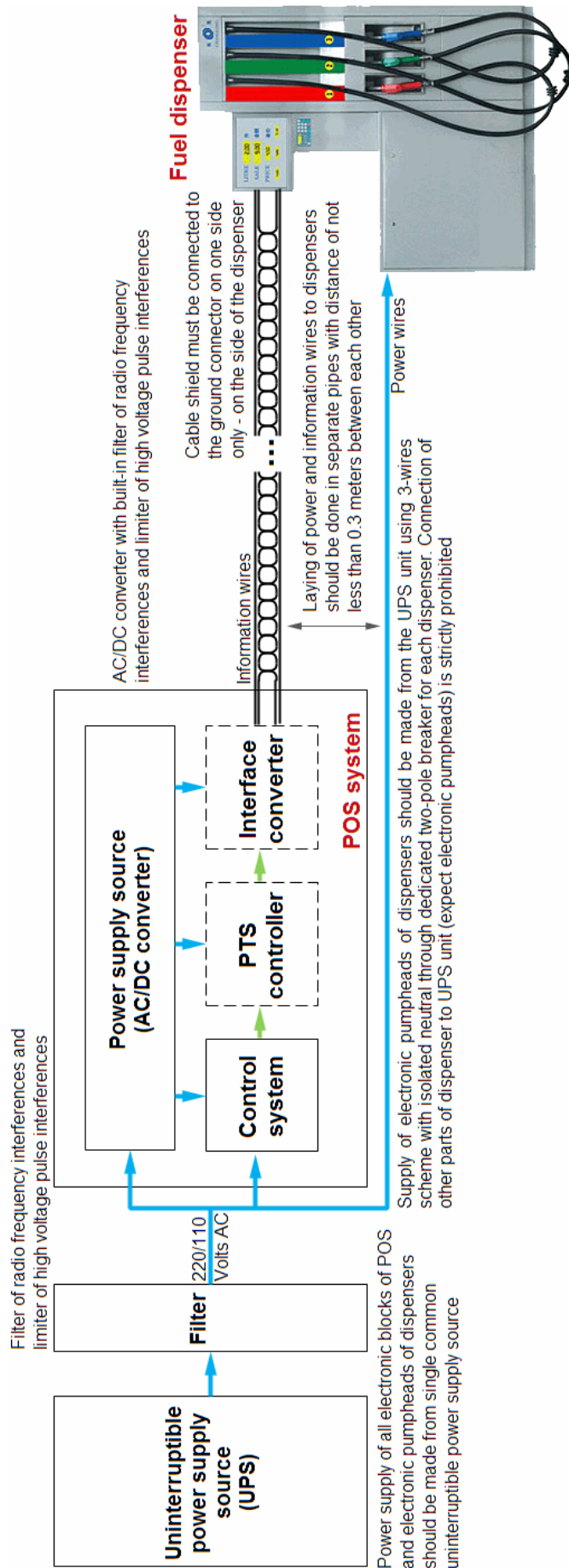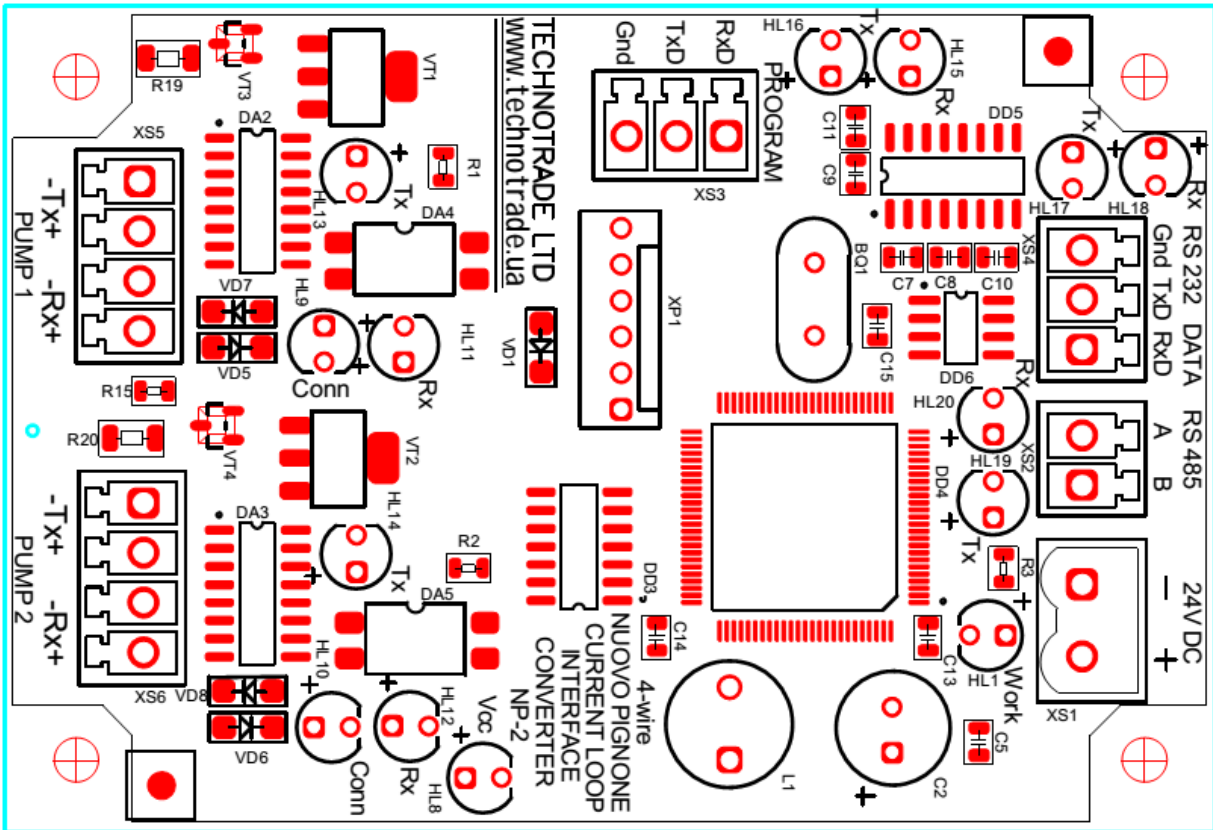
EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES

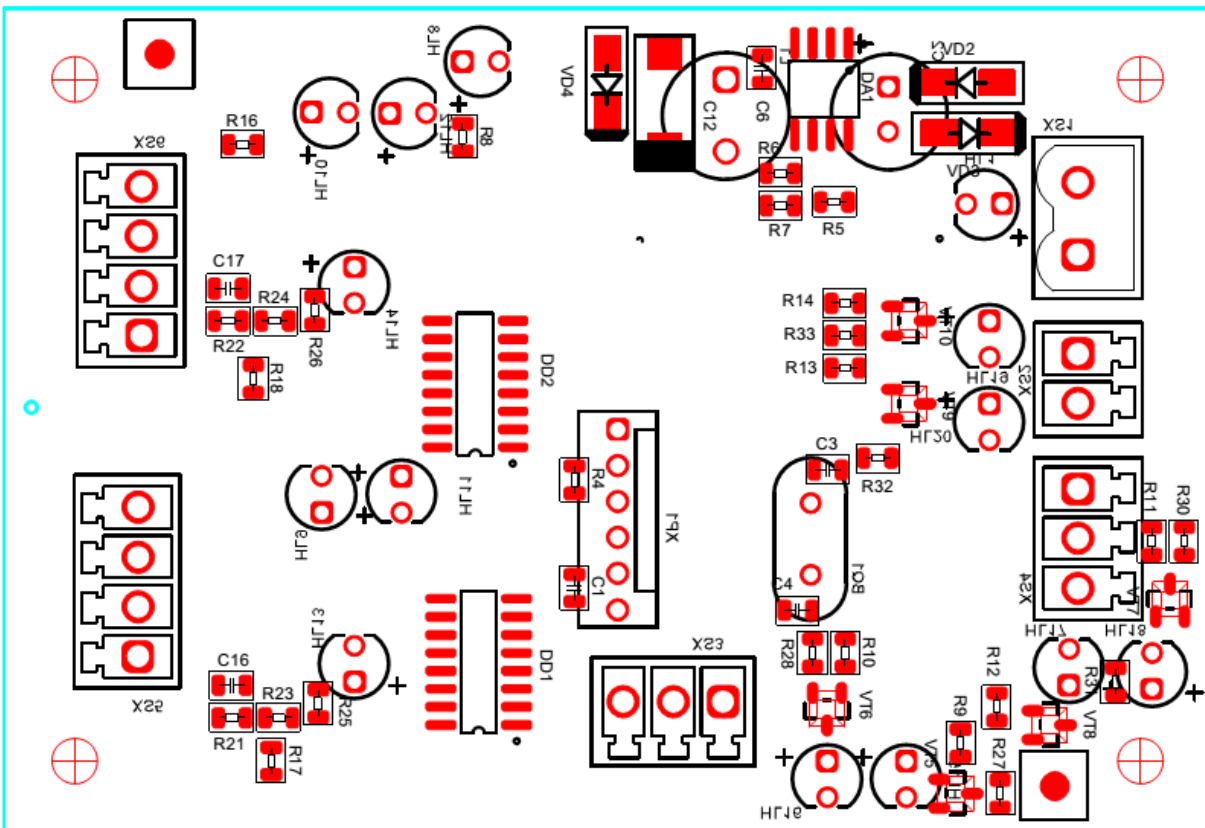## *Nuovo Pignone dispenser connection schemes*

Nuovo Pignone dispenser board

Nuovo Pignone dispenser board
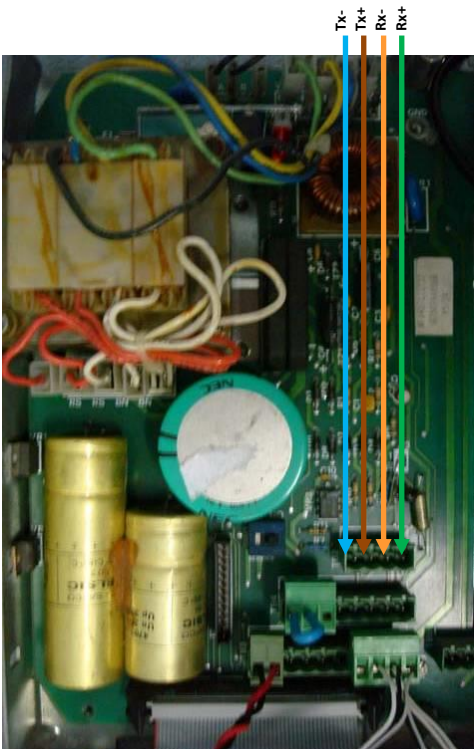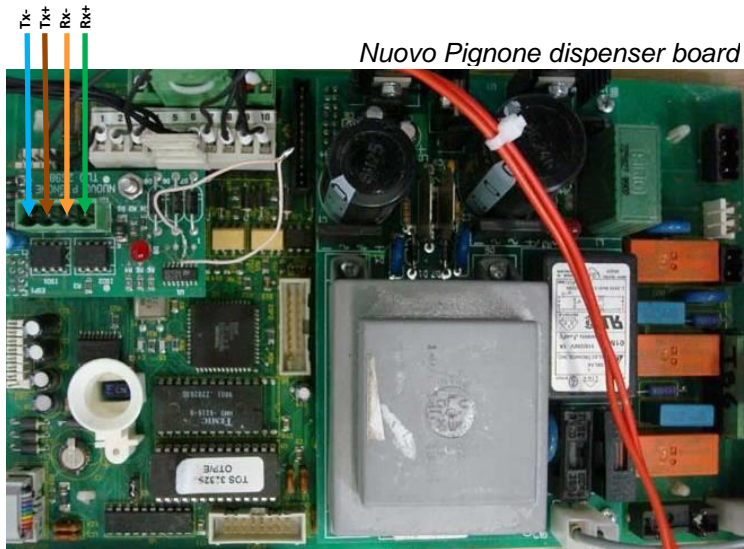
PCB MOUNTING BOARD

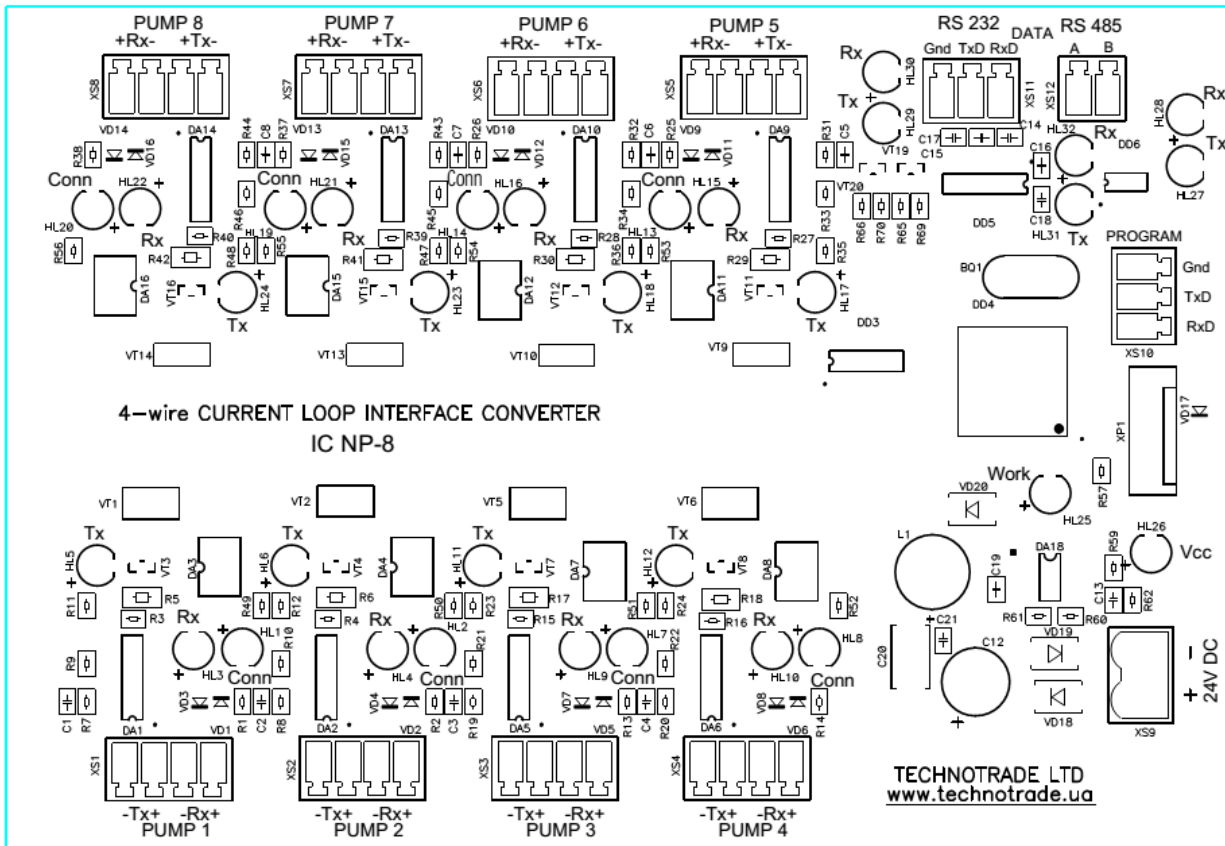*NP-2 (2-channel converter board):*

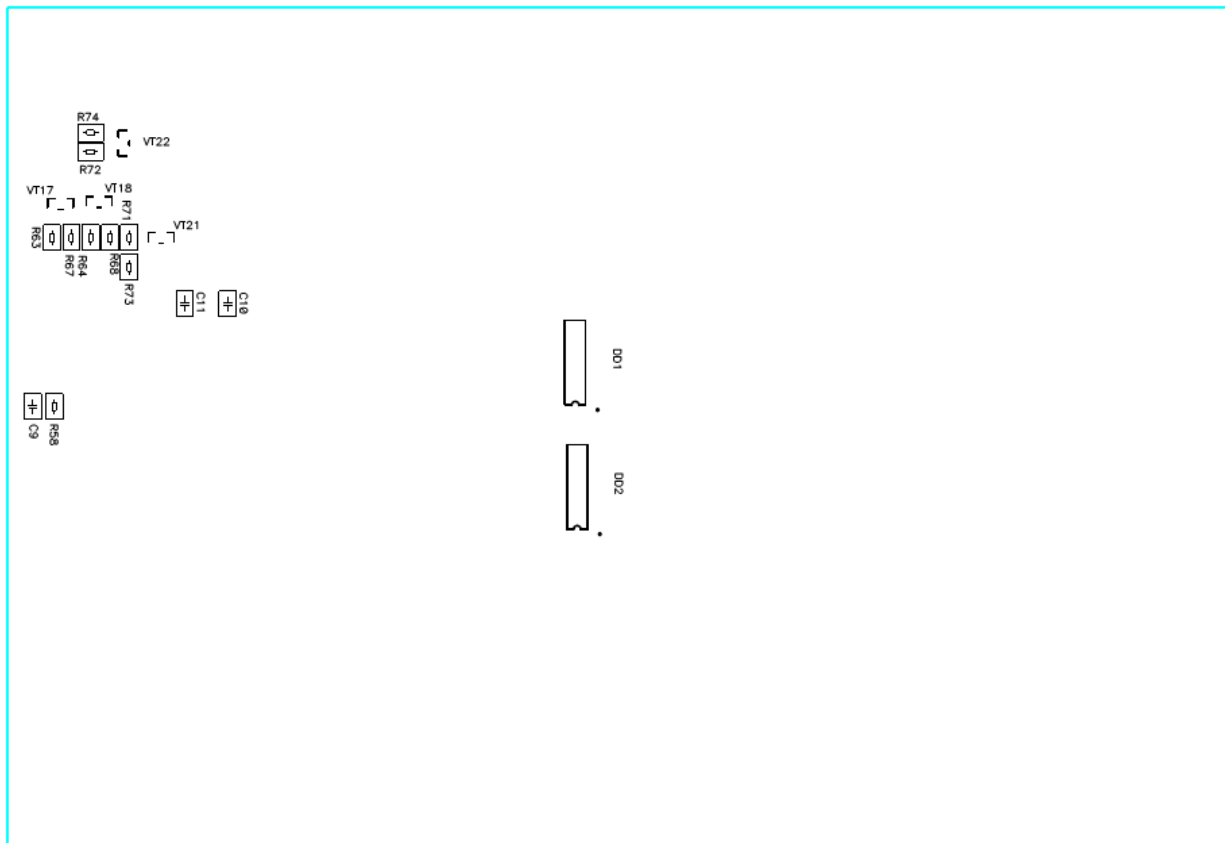*Top view:*

Bottom view:

NP-8 (2-channel converter board):

Top view:

Bottom view:

ORDER INFORMATION

Variant of NP interface converter supply is marked with NPx-*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:
  o "*PCB*" in case if NP interface converter is supplied in a view of electric board;
  o "BOX" in case if NP 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:
  o 001 – variant of supply with installed terminal blocks for controller ports
  o 002 – variant of supply without terminal blocks for controller ports (connection is made using connectors for stubs)

Examples of order:
- order of NP2 interface converter in a view of electric board: NP2-PCB-001;
- order of NP8 interface converter installed in a plastic box: NP8-BOX-001.