

NP interface converter

4-wire current loop interface converter
(RS-485/RS-232 to 4-wire current loop and backwards)

TECHNICAL GUIDE

(PCB board modification: NP-4)

Review date: 21 March, 2020

CONTENT

REVISION HISTORY	3
PURPOSE OF THE DOCUMENT	4
APPOINTMENT	5
TECHNICAL SPECIFICATIONS	6
COMPLETE SET	7
PCB BOARD CONNECTORS OVERVIEW	8
CONNECTION SCHEME TO PTS CONTROLLER	9
CONNECTION SCHEME TO PC COM-PORT (DATA COMMUNICATION).....	11
CONFIGURATION.....	12
FIRMWARE UPDATE	14
INSTALLATION REQUIREMENTS FOR PETROL STATION	16
EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES	18
Nuovo Pignone dispenser connection schemes.....	18
ORDER INFORMATION	19

REVISION HISTORY

REV	DATE	BY	SECTION	DESCRIPTION
1.06	2020.03.21	Evgeniy Vasyliiev	All	Regular document review
1.05	2017.01.20	Evgeniy Vasyliiev	Firmware update procedure	Firmware update procedure updated.
1.04	2014.10.22	Evgeniy Vasyliiev	Installation requirements for petrol station	Requirements to power supply, requirements to grounding, requirements to laying of cable communications
1.03	2014.08.01	Evgeniy Vasyliiev	Firmware update procedure	Description on how to update converter firmware Position of DIP-switch SA1 specified
1.02	2013.30.11	Evgeniy Vasyliiev	Connection schemes	Position of DIP-switch SA1 specified
1.01	2013.17.07	Evgeniy Vasyliiev	All	First release

PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of NP interface converter 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 NP interface converter 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 NP interface converter web-page: http://www.technotrade.ua/nuovo-pignone-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 NP interface converter 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 LLC

Ukraine, 04114 Kiev, Priorska str. 10, office 1

Tel: +38-044-502-46-55, +38-044-502-46-77

Web: www.technotrade.ua

Mail: mail@technotrade.ua

APPOINTMENT

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

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

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*

TECHNICAL SPECIFICATIONS

Specification

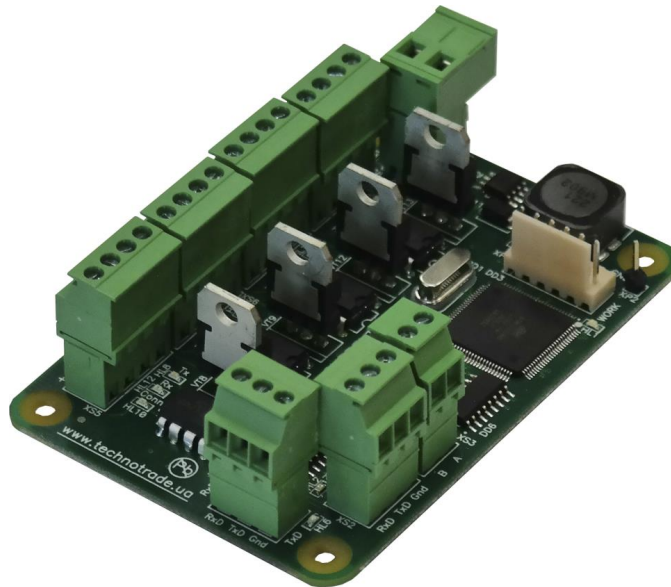
PARAMETER	VALUE
Power supply voltage	24 V DC
Current consumption	300 mA max
Temperature range	From -40°C to +80°C
Weight	45 g
Dimensions	85 x 58 x 25 mm

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...4 (4-wire current loop)	Optically isolated active current loop	Connection with fuel dispensers using 4 wires. One dispenser is to be connected to each of the pump ports.
PROGRAM PORT	RS-232	RS-232 (3 wires: TxD, RxD, Gnd)	Update of the interface converter firmware

COMPLETE SET

Depending on the order code (see section “Order information”) NP interface can be supplied either in a view of electrical board (variant of converter supply *NP4-PCB-z*), or installed in a mounting box with cables inputs and a power switching button (variant of converter supply *NP4-BOX-z*).

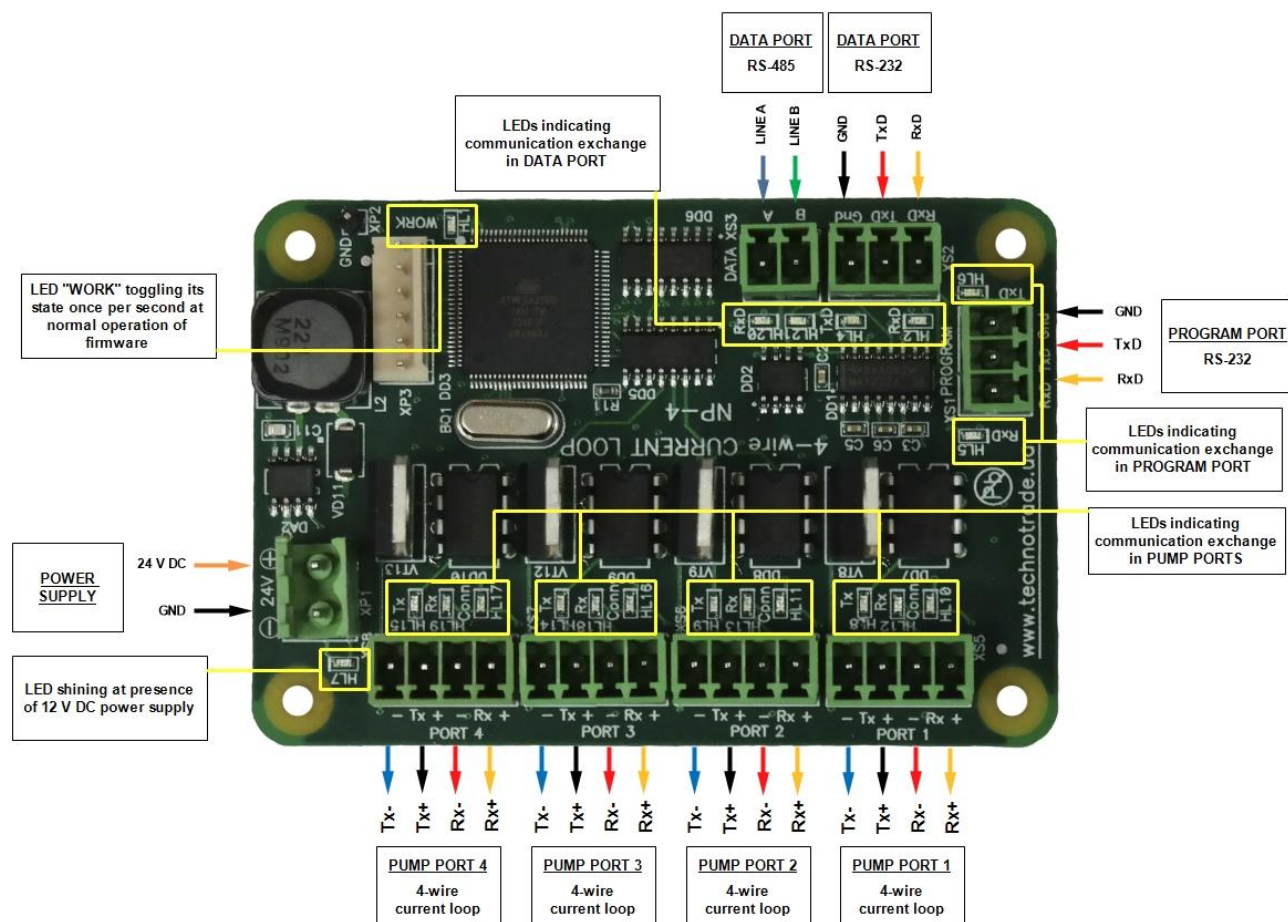


Variant of NP-4 interface converter supply in a view of electrical board (NP4-PCB-z)



Variant of NP-4 interface converter supply installed in a plastic box with cables inputs and power switching button (NP4-BOX-z)

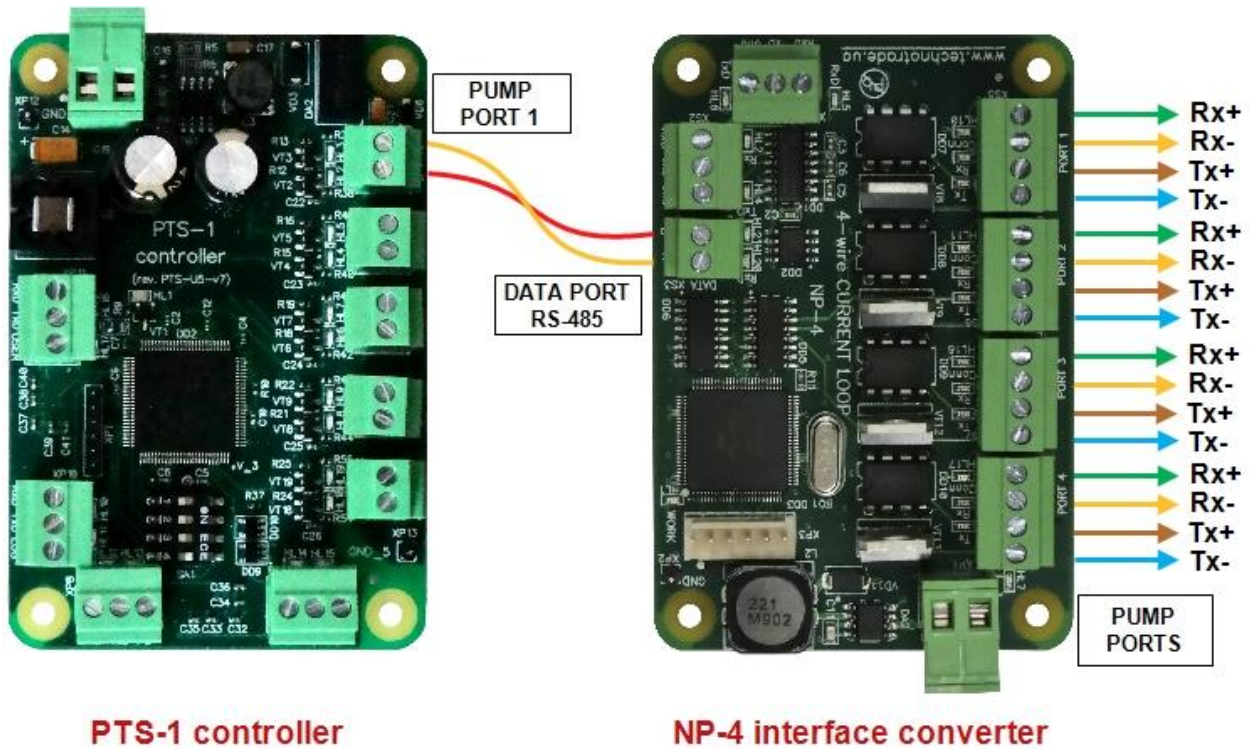
PCB BOARD CONNECTORS OVERVIEW



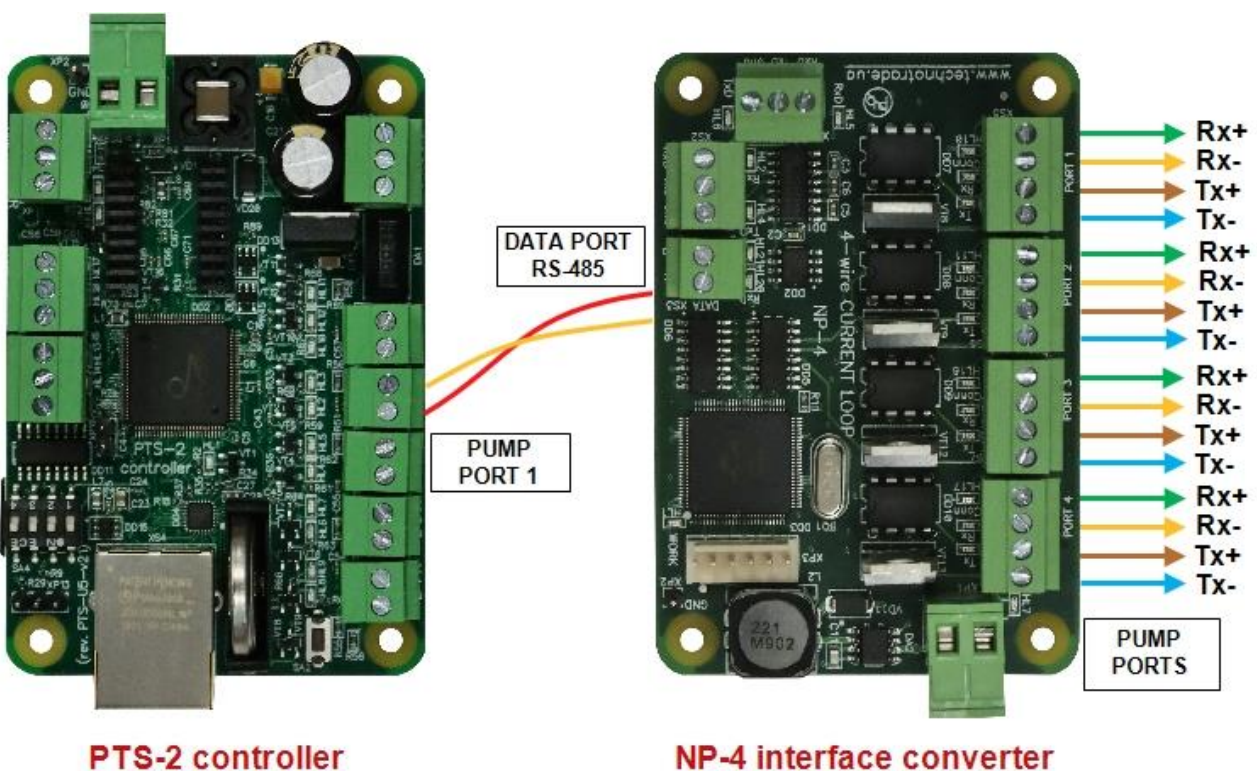
NOTE! Power supply voltage should be 24 V DC.

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>):



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>):

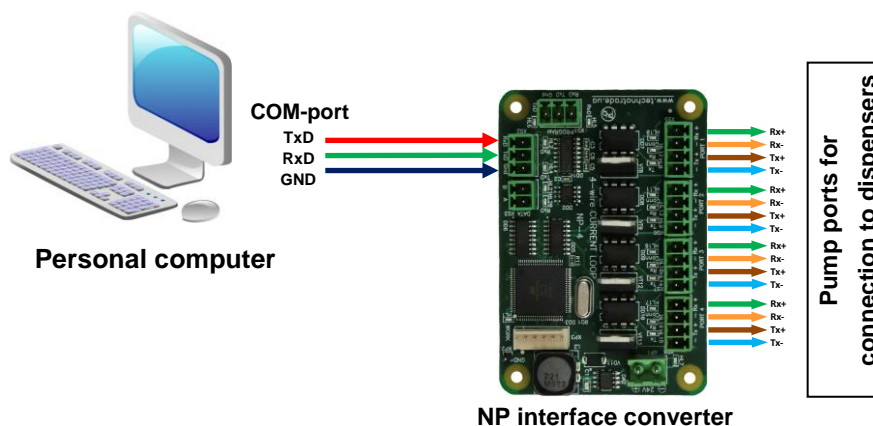


At connection using RS-485 interface please check the following:

- ✓ **LED HL1 “WORK”** indicates normal operation of firmware, should be blinking with different frequency
- ✓ **LED HL7** indicates presence of 24 V DC on the board, should be constantly shining
- ✓ **Green and red LEDs “Tx” and “Rx”**, which indicate communication exchange in DATA PORT RS-485, 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:



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

- ✓ **LED HL1 "WORK"** indicates normal operation of firmware, should be blinking with different frequency
- ✓ **LED HL7** indicates presence of 24 V DC on the board, should be constantly shining
- ✓ **Green and red LEDs "Tx" and "Rx"**, which indicate communication exchange in DATA PORT RS-232, 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

CONFIGURATION

As NP interface converter is used with non-addressable dispensers it needs to know which of the pump ports are to be used and which port should correspond to which pump logical address. Configuration and communication with NP interface converter is done in accordance with communication protocol named as “*NA/NP INTERFACE CONVERTERS COMMUNICATION PROTOCOL SPECIFICATION*” (can be received upon request to Technotrade LLC company).

In case if NP interface converter is used together with PTS controller – then configuration is done by setting parameters for PTS controller. Use Pts_config utility for PTS-1 controller, for PTS-2 controller use same settings in its web-server. At this PTS controller corresponding pump port should be connected to DATA PORT (RS-485) of NP interface converter and both devices should be powered on. PTS controller will write the settings to NP interface converter at writing the parameters to PTS controller. Use following parameters:

Parameters for enabling pump ports of PTS controller for operation with NP interface converter

Parameters for specifying the pump port in NP interface converter corresponding to pump in PTS controller configuration

PTS controller configuration utility, v. 1.2020.07.01

File Language Connection

COM-port: COM1 **Connected** Connect Disconnect

General Pumps configuration Probes configuration **Parameters** Control Logging Firmware update Diagnostics

Parameters setting

Device: PTS

Number	Index	Description	Default value	Current value	Default
40	12	PUMP PORT 1 OPERATION THROUGH NON-ADDRESSABLE INTERFACE CONVERTER Sets whether pumps on pump port 1 are connected through non-addressable interface converter.	0	<input checked="" type="checkbox"/>	»
41	12	PUMP PORT 2 OPERATION THROUGH NON-ADDRESSABLE INTERFACE CONVERTER Sets whether pumps on pump port 2 are connected through non-addressable interface converter.	0	<input type="checkbox"/>	»
42	12	PUMP PORT 3 OPERATION THROUGH NON-ADDRESSABLE INTERFACE CONVERTER Sets whether pumps on pump port 3 are connected through non-addressable interface converter.	0	<input type="checkbox"/>	»
43	12	PUMP PORT 4 OPERATION THROUGH NON-ADDRESSABLE INTERFACE CONVERTER Sets whether pumps on pump port 4 are connected through non-addressable interface converter.	0	<input type="checkbox"/>	»
44	13	PUMP 1 NON-ADDRESSABLE INTERFACE CONVERTER PUMP PORT NUMBER Sets a pump port number, to which pump 1 is connected in non-addressable interface converter.	Not set	Pump port 1	»

☒ Read parameters automatically Read parameters values

Events review

```

18.08.2020 11:32:40 - Getting value of parameter 5... OK
18.08.2020 11:32:40 - Getting value of parameter 6... OK
18.08.2020 11:32:40 - Getting value of parameter 7... OK
18.08.2020 11:32:40 - Getting value of parameter 12... OK
18.08.2020 11:32:40 - Getting value of parameter 13... OK
18.08.2020 11:32:40 - Getting value of parameter 14... OK
18.08.2020 11:32:40 - Parameters setting process finished.
  
```

There are 2 types of parameters to be configured:

1. Enable pump port of PTS controller for operation with NP interface converter. This is done in parameters named “PUMP PORT N OPERATION THROUGH NON-ADDRESSABLE INTERFACE CONVERTER” (where N can be from 1 to 4 meaning the number of pump port in PTS controller).

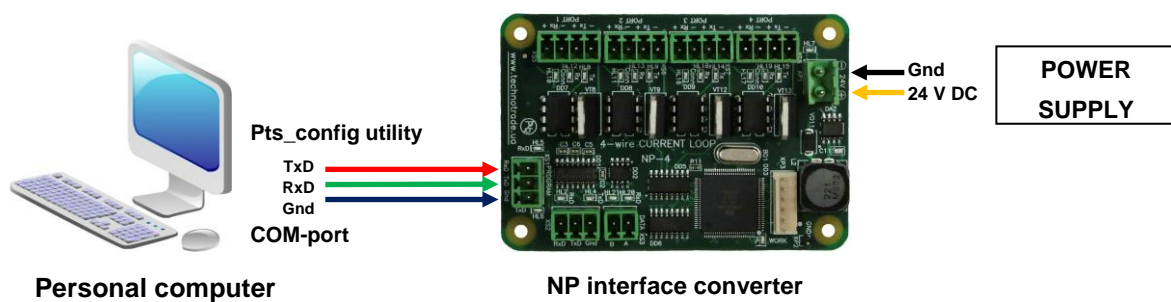
2. Specify the pump port in NP interface converter corresponding to pump in PTS controller configuration. This is done in parameters named "PUMP N NON-ADDRESSABLE INTERFACE CONVERTER PUMP PORT NUMBER" (where N can be from 1 to 50 meaning each pump in configuration of PTS controller). Here you can assign any pump port of NP interface converter to pump in PTS controller, just take care that the specified pump port in NP interface converter should be set only to 1 pump.

FIRMWARE UPDATE

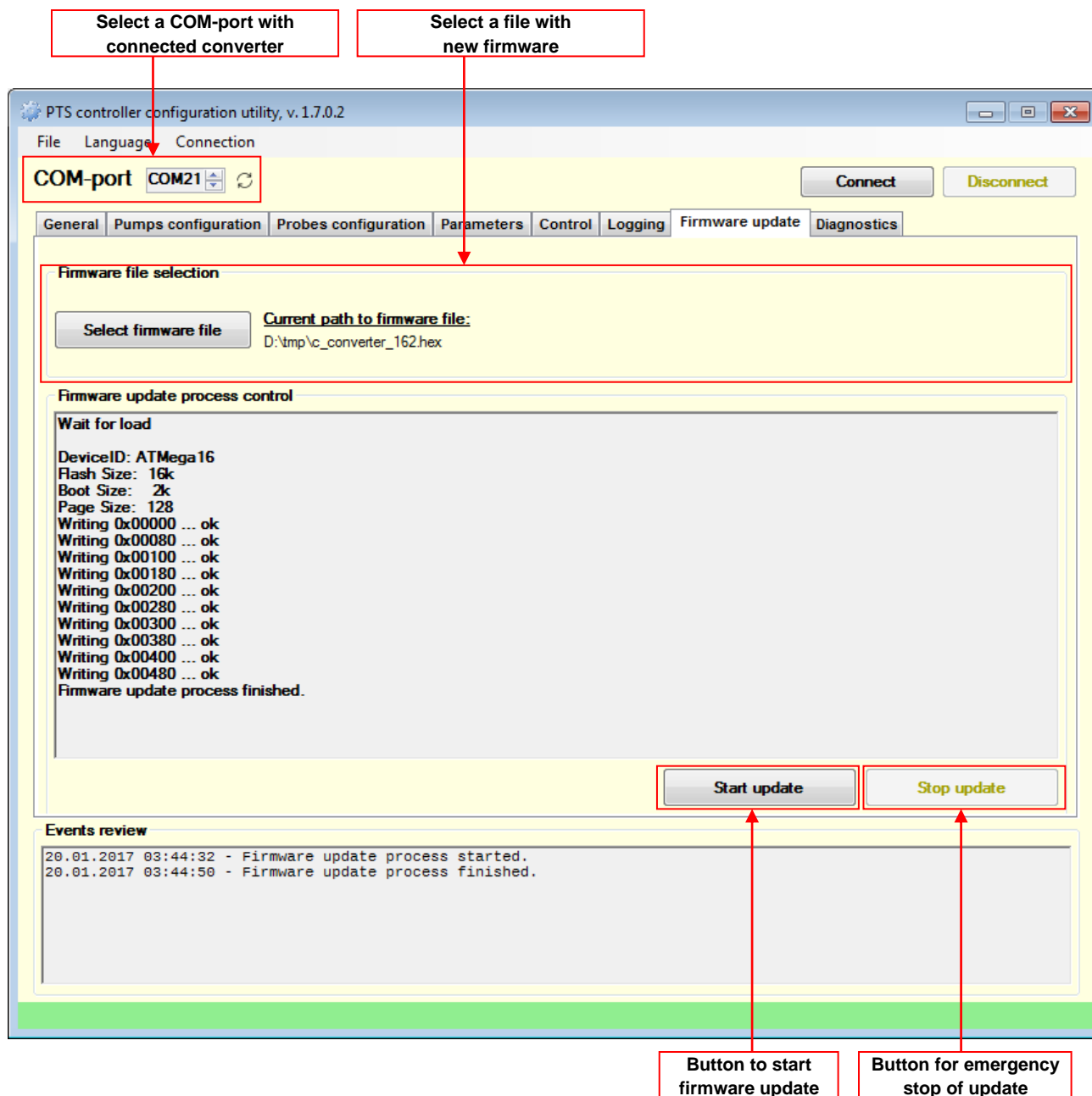
NP interface converter's firmware is constantly being improved and new versions of firmware with improved functionality, new possibilities and fixed bugs of the previous firmware versions are proposed to be applied. Latest version of interface converter firmware is always available for downloading for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

Power supply of all electronic blocks of POS and electronic pumpheads of dispensers should be made from single common uninterruptible power supply source

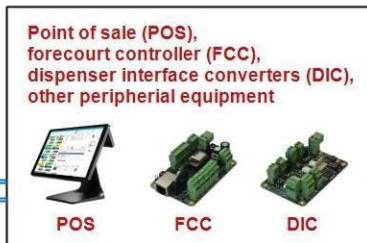


UPS with filter of radio frequency interferences and voltage surge suppressor

Power supply of POS and peripheral equipment

Power supply of dispenser pumpheads

Feeding of electronic pumpheads of dispensers should be made from same the UPS unit, which feeds POS, using 3-wires scheme with isolated neutral through dedicated two-pole breaker for each dispenser.



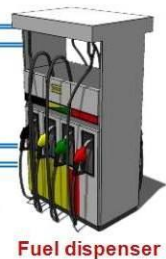
Information wire shield must be connected to the ground connector on one side only - on the side of the dispenser pumphead

Information wires

0.3 meters minimum

Laying of power and information wires to dispensers should be done in separate pipes with distance not less than 0.3 meters between pipes to avoid interferences

Feeding of active loads of dispensers (motors, valves and others) should be made from separate electrical phases, other then feeds the POS and dispenser pumpheads

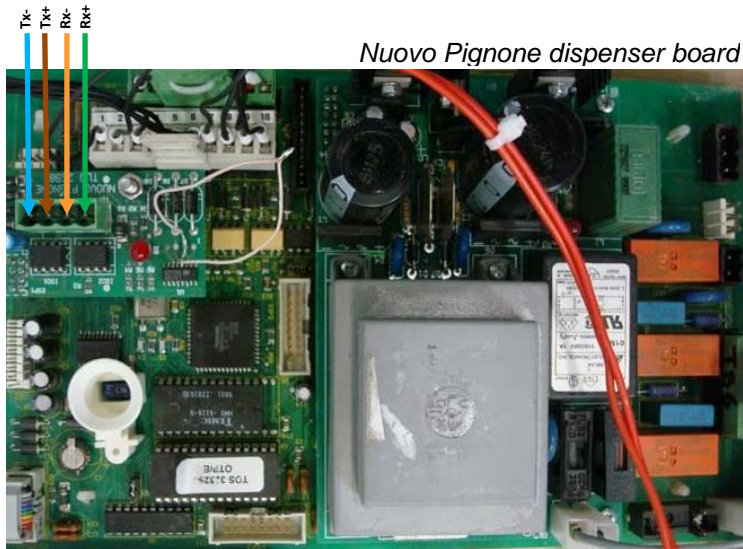


4. Requirements to connection of ATG probes

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.

EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES

Nuovo Pignone dispenser connection schemes



ORDER INFORMATION

Variant of NP-4 interface converter supply is marked with NP4-y-z, where

- y – type of supply:
 - “PCB” in case if NP interface converter is supplied in a view of electric board;
 - “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:
 - 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 NP-4 interface converter in a view of electric board: NP4-PCB-001;
- order of NP-4 interface converter installed in a plastic box: NP4-BOX-001.