TECHNOTRADE
PETROL STATION TECHNOLOGIES

www.technotrade.ua
mail@technotrade.ua
+38 044 502 46 55
Ukraine, 04114 Kiev, Priorska str. 10

PTS-2 forecourt controller

over fuel dispensers and ATG systems for petrol stations

TECHNICAL GUIDE

(PCB board modification: PTS-2, revision: PTS-U5-v21)

Review date: 30 December, 2021

CONTENT

PURPOSE OF THE DOCUMENT 7
APPOINTMENT 8
APPLICATIONS 9
Pumps' control 9
Tanks' monitoring 10
Price boards control 11
RFID readers control 12
Fuel delivery trucks control 13
GPS recording 14
Upload of data to a remote server 15
Automatic operation on sight 16
Built-in web-server 17
Conversion between pumps communication protocols 18
Conversion between probes communication protocols 19
TECHNICAL CHARACTERISTICS 20
General specification 20
Peripheral hardware 20
Communication 20
Configuration 20
COMPLETE SET 21
SUPPORTED BRANDS OF FUEL DISPENSERS AND REGISTER METERS* 22
SUPPORTED BRANDS OF ATG SYSTEMS AND PROBES* 23
SUPPORTED BRANDS OF PRICE BOARDS* 23
SUPPORTED BRANDS OF READERS* 23
INSTALLATION REQUIREMENTS 24
BOARD CONNECTORS AND INTERFACES 26
COMMUNICATION PORTS 27
CONNECTION TO CONTROL SYSTEMS USING ETHERNET INTERFACE 28
CONNECTION TO CONTROL SYSTEMS USING RS-232 INTERFACE 29
CONNECTION TO DISPENSERS 30
CONNECTION TO ATG SYSTEMS AND PROBES 31
CONNECTION TO Price boards 32
CONNECTION TO RFID readers 33
CONFIGURATION DIP-switch 34
SD flash card 35
WEB-SERVER 36
General information 36
Scheme of connections 37
Login 38
Device information page 38
Configuration page 40
Pumps control page 60
Tanks monitoring page 62
Reporting page 64
Logging 72
Self-diagnostics page 74
Firmware update page 76

BUILT-IN PUMPs SIMULATOR 77
BUILT-IN ATG PROBEs SIMULATOR 79
FILES STORED ON SD FLASH DISK 81
GPS module 84
RFID READERS 86
PTS-2 CONTROLLER SOFTWARE DEVELOPMENT KIT (SDK) 89
PTS-2 controller SDK appointment 89
PTS-2 controller SDK structure 90
PTS-2 controller SDK technical features 90
Specification 90
PTS-2 controller SDK connections scheme 91
UniPump pumps software simulator 92
Purpose 92
Main view 92
Configuration 93
UniProbe ATG probes software simulator 95
Purpose 95
Main view 95
Configuration 96
NET Core API and open-source application 98
Step-by-step configuration of the PTS-2 controller SDK 99
Purpose 99
Step 1. Assembling PTS-2 controller SDK cabling and connection to PC 99
Step 2. Starting of PTS-2 controller web-server 101
Step 3. Configuration of pump ports 102
Step 4. Configuration of probes ports 103
Step 5. Configuration of PTS-2 controller parameters 104
Step 6. Configuration of pumps parameters 105
Step 7. Configuration of probe parameters 106
Step 8. Configuration of fuel grades 107
Step 9. Configuration of tanks 108
Step 10. Configuration of pump nozzles 109
Step 11. Configuration of pumps software simulator 110
Step 12. Configuration of ATG probes software simulator 112
Step 13. Control over pumps and ATG probes 113
Step 14. Saving of pumps sales and tank measurements to database with reports generation 115
Step 15. Reading of pump totals automatically in end of filling 117
Step 16. Automatic pumps authorization on nozzle up 121
Step 17. Testing of operation with PTS-2 controller from Postman utility 121
EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES 122
Gilbarco dispenser connection scheme 123
Wayne Dresser dispenser connection scheme (RS-485 interface) 126
Wayne Dresser dispenser connection scheme (current loop interface) 127
Tatsuno (Japan) dispenser connection scheme 128
Tatsuno Europe (former Benc) dispenser connection scheme 129
Tokheim dispenser connection scheme 130
Tokheim dispenser connection scheme (RS-485 interface) 133
Tokheim India dispenser connection scheme 135
Nuovo Pignone dispenser connection scheme (RS-485 interface) 136

Nuovo Pignone dispenser connection scheme (4-wire current loop interface) 137
Logitron dispenser connection scheme (3-wire current loop interface) 138
Bennett dispenser connection scheme (RS-485 interface) 139
Bennett dispenser connection scheme (2-wire current loop interface) 140
Batchen Email dispenser connection scheme 141
Scheidt & Bachmann T20 dispenser connection scheme 142
Coptron dispenser connection scheme 143
Midco dispenser connection scheme 144
Petrotec dispenser connection scheme 145
Galileo dispenser connection scheme 146
Prowalco dispenser connection scheme 147
Emgaz Dragon / Fornovo LPG dispenser with EsiWelma pumphead connection scheme 148
Maser dispenser connection scheme 149
Petposan-S4 / Meksan-S4 / Europump-S4 / Yenen dispensers connection scheme 150
Yenen dispensers connection scheme 151
Petposan-Beta / Europump-Beta dispensers connection scheme 152
EuroPump dispenser connection scheme 153
Mekser dispenser connection scheme 154
Fuelsis dispenser connection scheme 155
Mepsan Unimep dispenser connection scheme 156
Meksan / Wayne SU86 dispenser connection scheme 157
Baransay dispenser connection scheme 158
2A LPG dispenser connection scheme 159
Falcon dispenser connection scheme 160
Korea EnE (LG EnE) dispenser connection scheme 161
Dong Hwa Prime dispenser connection scheme 162
Gallagher (PEC) dispenser connection scheme 163
Compac dispenser connection scheme 164
Safe dispenser connection scheme 165
MS Gas dispenser connection scheme 166
Shibata dispenser connection scheme 167
Aspro Develco dispenser connection scheme 168
HongYang dispenser connection scheme 169
Lanfeng dispenser connection scheme 170
Sanki dispenser connection scheme 171
Datian Machines dispenser connection scheme 173
Eaglestar dispenser connection scheme 174
Blue Sky dispenser connection scheme 175
Topaz dispenser connection scheme 176
Shelf dispenser connection scheme 177
UniCon dispenser connection scheme 178
EXAMPLES OF ATG SYSTEMS CONNECTION SCHEMES 179
Gilbarco Veeder Root TLS consoles connection scheme 180
Start Italiana console connection scheme 180
Start Italiana wired probes connection scheme 181
Start Italiana wireless probes connection scheme 181
Alisonic wired probes connection scheme 182
Alisonic wireless probes connection scheme 182
Struna ATG system connection scheme 183

OPW Site Sentinel ATG system connection scheme 183
Colibri ATG system connection scheme 184
Fafnir ATG system connection scheme 184
Hectronic ATG probes connection scheme 185
Vega radar level meters 185
Windbell magnetostrictive probes connection scheme 186
North Falcon wired probes connection scheme 187
North Falcon wireless probes connection scheme 187
CONFIGURATION FILE pts_config_en.js 188
RS-232 PORT CABLE CONNECTOR 191
ORDER INFORMATION 192

REVISION HISTORY

REV	DATE	BY	SECTIONS	DESCRIPTION
R01	**2019.06.07**	Evgeniy Vasyliev	All	First release of PTS-2 board revision
R02	**2020.03.03**	Evgeniy Vasyliev	All sections reviewed and added	Added new sections for upload of data to remote server and tanks calibration charts, all existing sections reviewed.
R03	**2020.10.21**	Evgeniy Vasyliev	Configuration sections updates	Updates related to new configuration options added.
R04	**2021.03.23**	Evgeniy Vasyliev	Configuration sections updates	Updates related to new configuration options added.
R05	**2021.07.09**	Evgeniy Vasyliev	All	Revised due to lots of changes in development made.
R06	**2021.12.12**	Evgeniy Vasyliev	Updated firmware version for support of price-boards and RFID readers	Added support for readers and price-boards, web server screenshots updated, GPS module description updated.

PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of PTS-2 forecourt controller for petrol stations. It contains basic information regarding its

- technical characteristics
- supported communication protocols of fuel dispensers, ATG systems, price boards, readers
- board interfaces and connectors
- configuration
- description, configuration and connection of PTS-2 controller software development kit (SDK)
- schemes of connection to fuel dispensers and ATG systems
- cabling

Information regarding connection to specific fuel dispensers and correspondent configuration of PTS-2 controller can be received upon request to Technotrade LLC company.

Due to a reason that PTS-2 controller firmware is constantly being developed in direction of improvement of its possibilities, changes are possible in final version, which are not described in given Technical Guide.

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 PTS-2 controller web-page: *http://www.technotrade.ua/pts2-forecourt-controller.html*.

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@technotrade.ua*. We will be grateful to you for this valuable information.

All technical questions regarding the PTS-2 forecourt controller are welcome to be asked on support mailbox: *support@technotrade.ua*. Our support team will be glad to help you.

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

Technotrade LLC

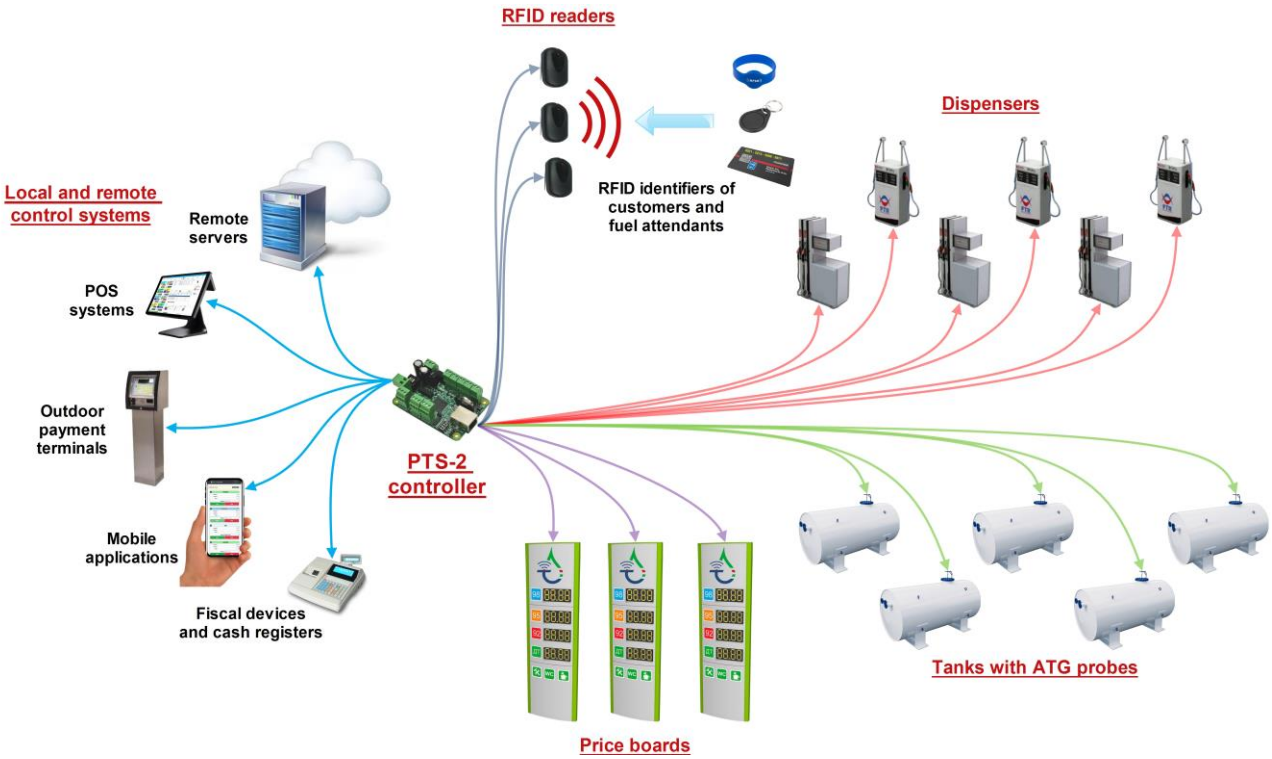
Ukraine, 04114 Kiev, Priorska str. 10, office 1
Tel: +38-044-502-46-55, +38-044-502-46-77
Web: *www.technotrade.ua*
Mail: *mail@technotrade.ua*

APPOINTMENT

PTS-2 forecourt controller for petrol stations is a powerful modern forecourt controller for provision of control over:

- petroleum, LPG and CNG dispensers
- automatic tank gauge systems and probes
- price boards
- RFID readers

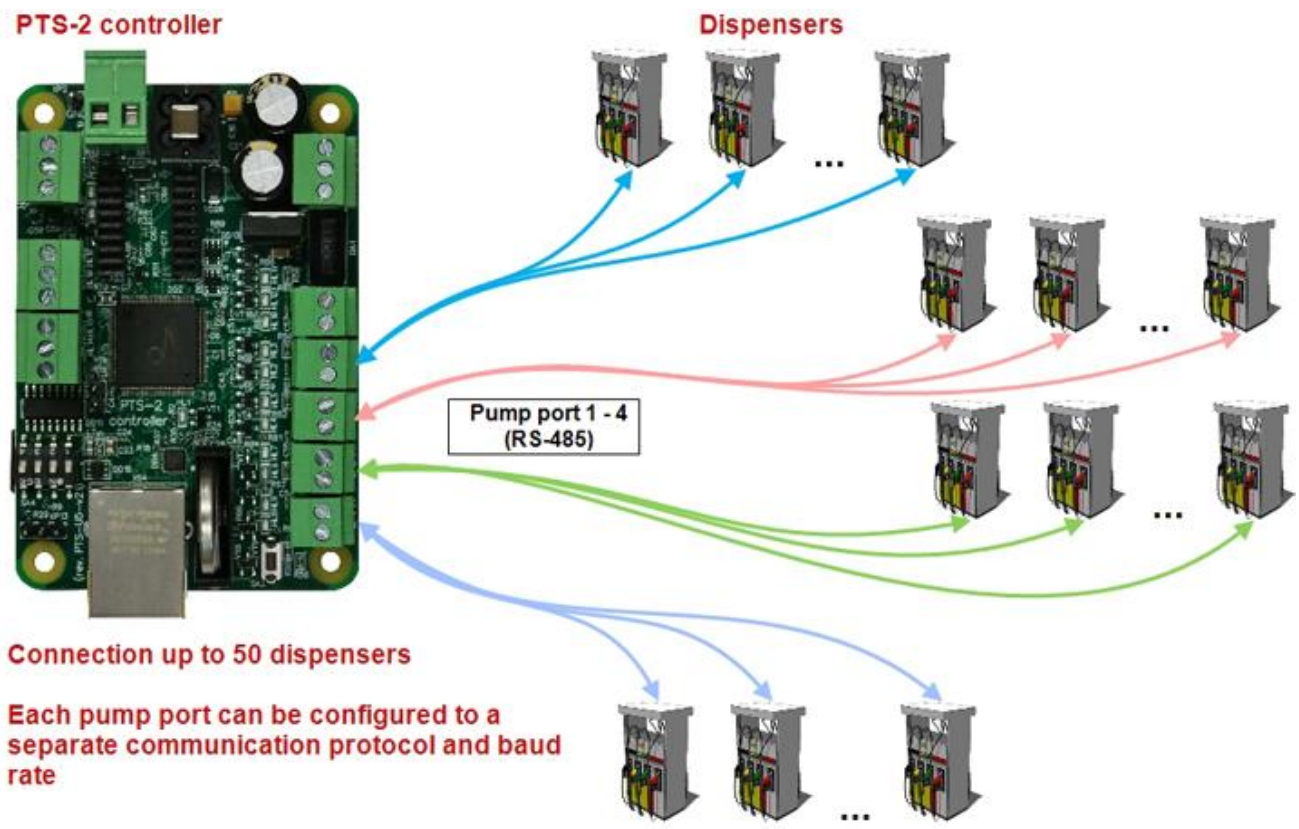
Its dimensions are extremely small with a size of a credit card, which makes its suitable for installation inside any third-party hardware.



PTS-2 controller knows communication protocols of a great variety of dispensers, ATG systems and probes, price boards and readers allowing to control over any of them in a common way regardless of the brand or communication protocol used, so using the PTS-2 controller any management system (POS system, OPT, mobile application) can use a common way for provision of control over any supported brands in the same way.

APPLICATIONS

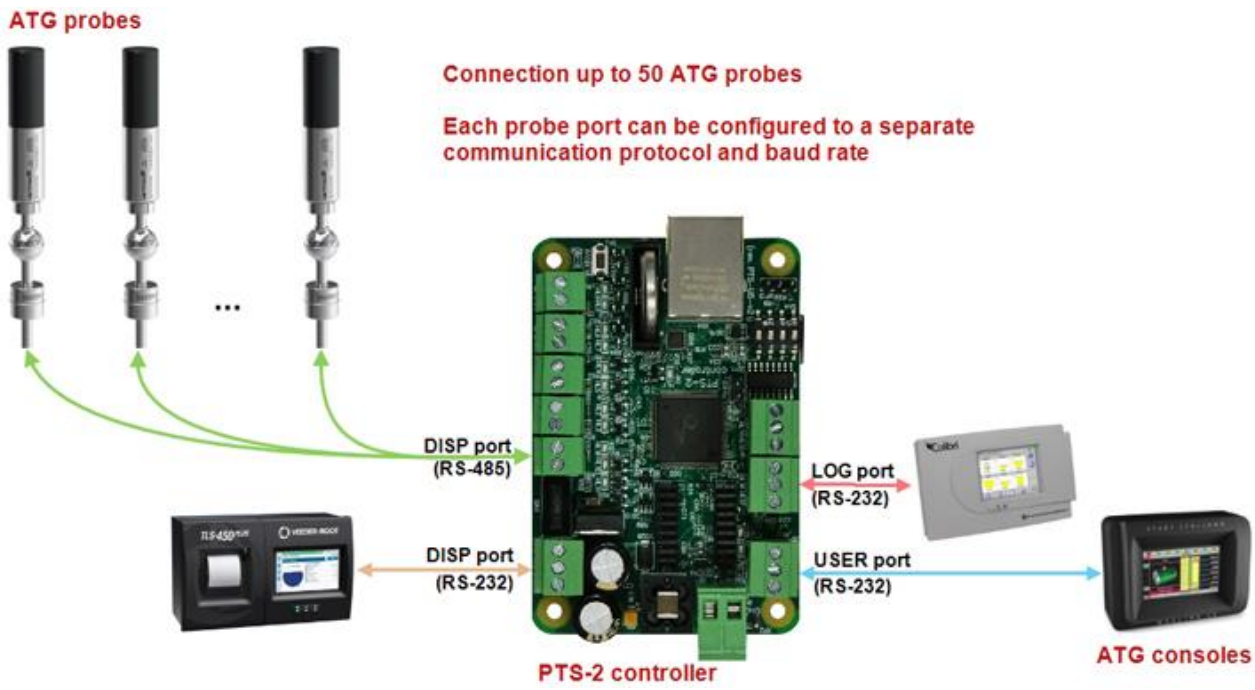
Pumps' control



PTS-2 controller allows to control over up to 50 pumps same time, at this connected dispenser can be of 4 various brands, which use different communication protocols. Following actions can be performed with dispensers regardless the brand:

- get dispenser status
- start fueling process
- stop fueling process
- suspend fueling process
- resume fueling process
- set/get nozzles' prices
- get nozzles' total counters
- get filling information during dispensing process (volume, amount, price)
- get transaction information after dispensing process (volume, amount, price)
- calculation of product temperature-compensated volume in case if there is ATG system or probe installed in tank
- all pumps' sales data can be recorded in PTS-2 controller for reporting through a web-browser and additionally uploaded to a remote server for processing and analysis.

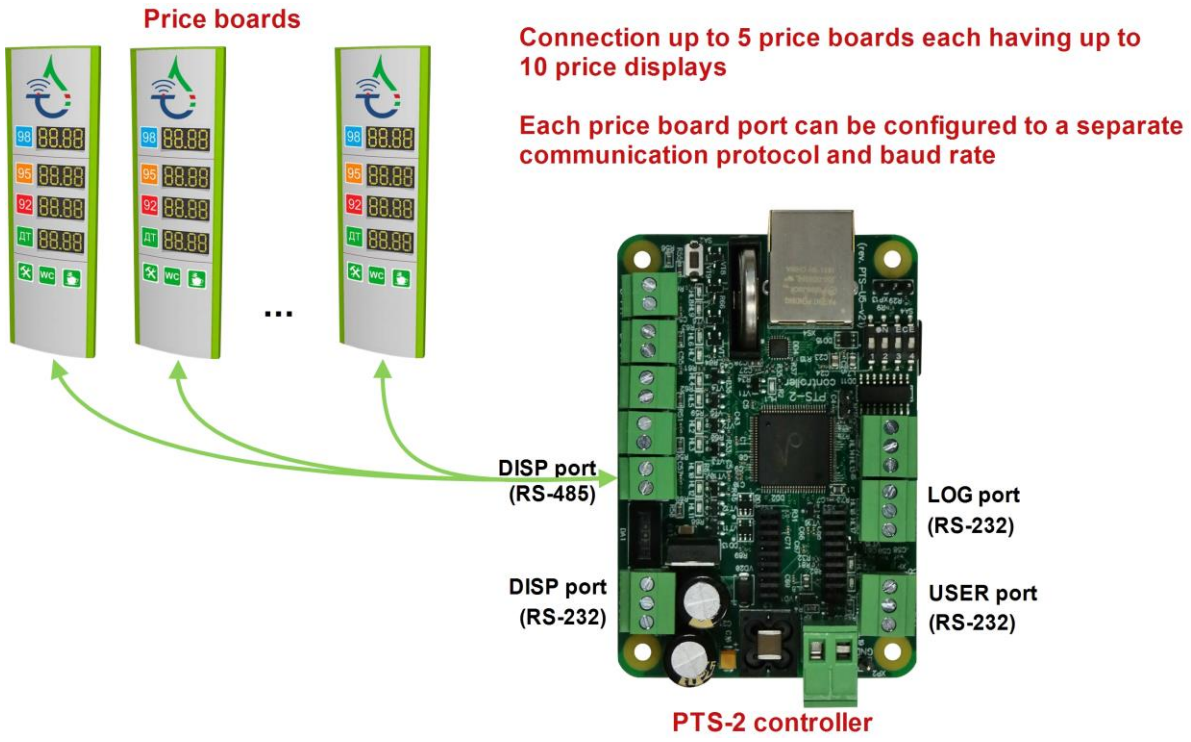
Tanks' monitoring



PTS-2 controller allows to monitor same time up to 50 tanks, equipped with probes or ATG systems, at this connection of 3 different brands of probes or ATG systems using different communication protocols is possible same time. Following features are present for any tank regardless of the ATG system or probe used:

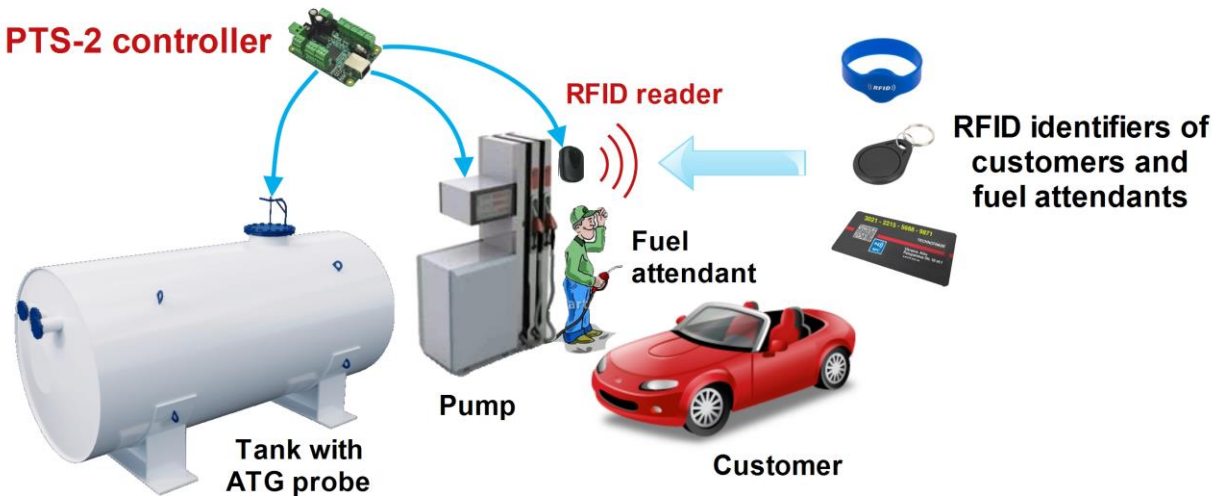
- informing probes' measurements data: product level, water level, temperature, product volume, water volume, product temperature-compensated volume, tank ullage, product density, product mass
- In case if the probes do not provide volume measurements – then PTS-2 controller can provide calculation of product volume based on tank calibration chart and product level, measured by probe
- automatic calculation of product temperature-compensated volume in tank
- automatic track of tank alarms: probe failures, high and low product levels, high water level
- automatic detection of product in-tank deliveries received, it can be done even during pumps fueling process
- automatic calculation of product mass
- at communication to ATG consoles PTS-2 controller can be used for sending fuel dispensers sales data to consoles in order to make console provide tanks reconciliation reports and automatic tanks calibration

Price boards control



PTS-2 controller allows to control same time up to 5 price boards each having up to 10 price displays, at this connection of 3 different brands of price-boards using different communication protocols is possible same time.

RFID readers control



PTS-2 controller allows to read the RFID identifiers (cards, tags, wrist straps, etc.) same time from up to 50 readers. The readers can be used as standalone, so as can be linked to pumps programmatically.

PTS-2 controller provides leading a list of tags for customers and fuel attendants, which allows to verify the customer or fuel attendant before the filling to avoid unauthorized fillings.

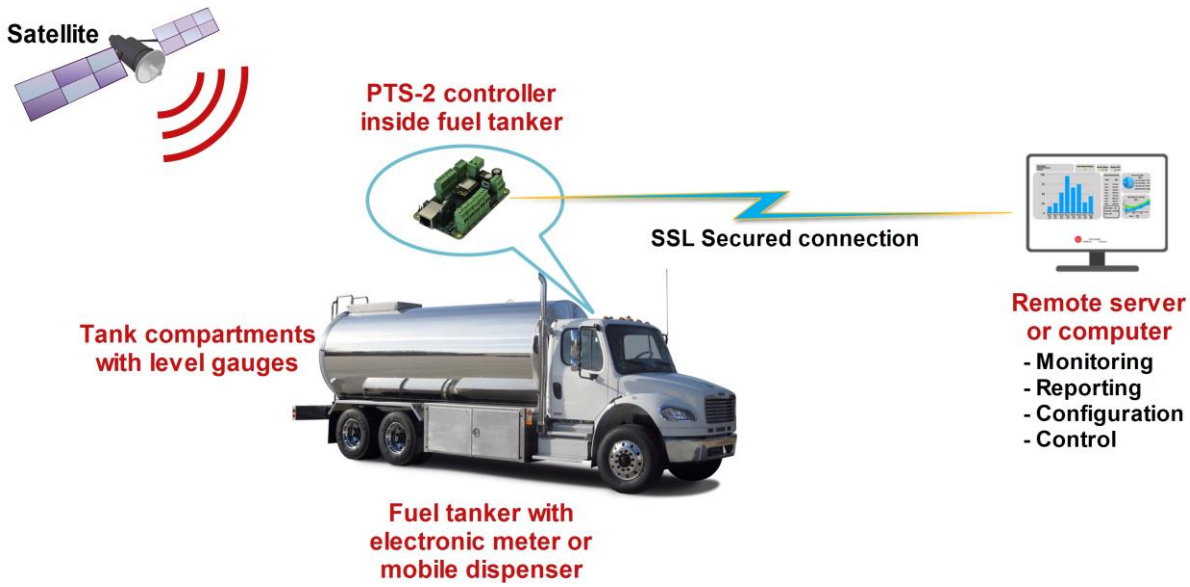
In the end of the filling the PTS-2 controller saves information on the performed transactions together with the read tags to the database allowing to track actions of the customer or fuel attendant and view in reports sales performed by each customer or fuel attendant.

Fuel delivery trucks control

PTS-2 controller already supports operation with most popular brands of electronic register meters used on fuel delivery trucks including:

- Gilbarco Veeder Root EMR3 and EMR4
- Total Control Systems TCS 3000
- Liquid Controls LectroCount LCR II, LCR 600, LCR iQ
- Satam Equalis
- IPT
- Yokogawa Rotomass
- other brands

At this, PTS-2 controller automatically accounts all the dispensing performed, with saving to local database and upload to a central server. Additionally, PTS-2 controller can automatically calculate temperature-compensated volume of dispensed fuel if such option is not provided by the meter used.



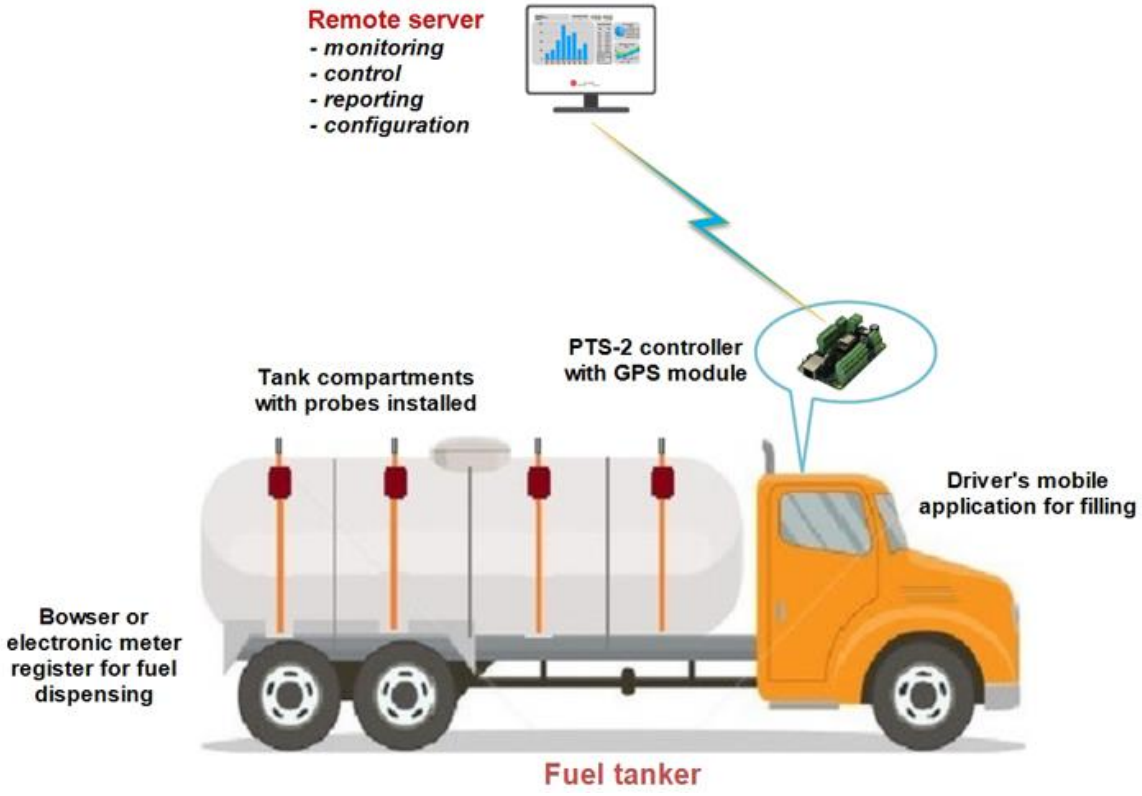
If the fuel truck has tanks equipped with ATG system – then PTS-2 controller will automatically detect dispensings made from tanks and deliveries made to tanks with saving to local database and upload to a central server.

PTS-2 controller can be equipped with a GPS module for tracking location of fuel tankers:

- tracking of the present location
- tracking of the whole route covered for specified period
- tracking of the fuel level in tanks while the fuel tanker was moving on route
- tracking of places, where fuel level in tanks was changed (tank should be equipped with the probe)
- tracking of places, in which fuel was dispensed through the flowmeter

It is possible to evaluate fuel frauds or leakages done while the tanker is on the route as PTS-2 controller records GPS coordinates and controls any change with fuel levels in tank. Based on these records you can define exact location, where fuel removals or receptions happened without allowed registration.

GPS recording



PTS-2 controller can be equipped with a GPS module for tracking of fuel tankers' location:

- tracking of the present location
- tracking of the whole route covered for specified period
- tracking of the fuel level in tanks while the fuel tanker was moving on route
- tracking of places, where fuel level in tanks was changed (tank should be equipped with the probe)
- tracking of places, in which fuel was dispensed through the flowmeter

Having this information, it is possible to know present location of the fuel tanker on the route and the, most important, to know possible frauds done with fuel while the tanker is on the route because PTS-2 controller records GPS places if any change of fuel level in tank is done, PTS-2 controller automatically sends this data to a remote server for processing and analysis.

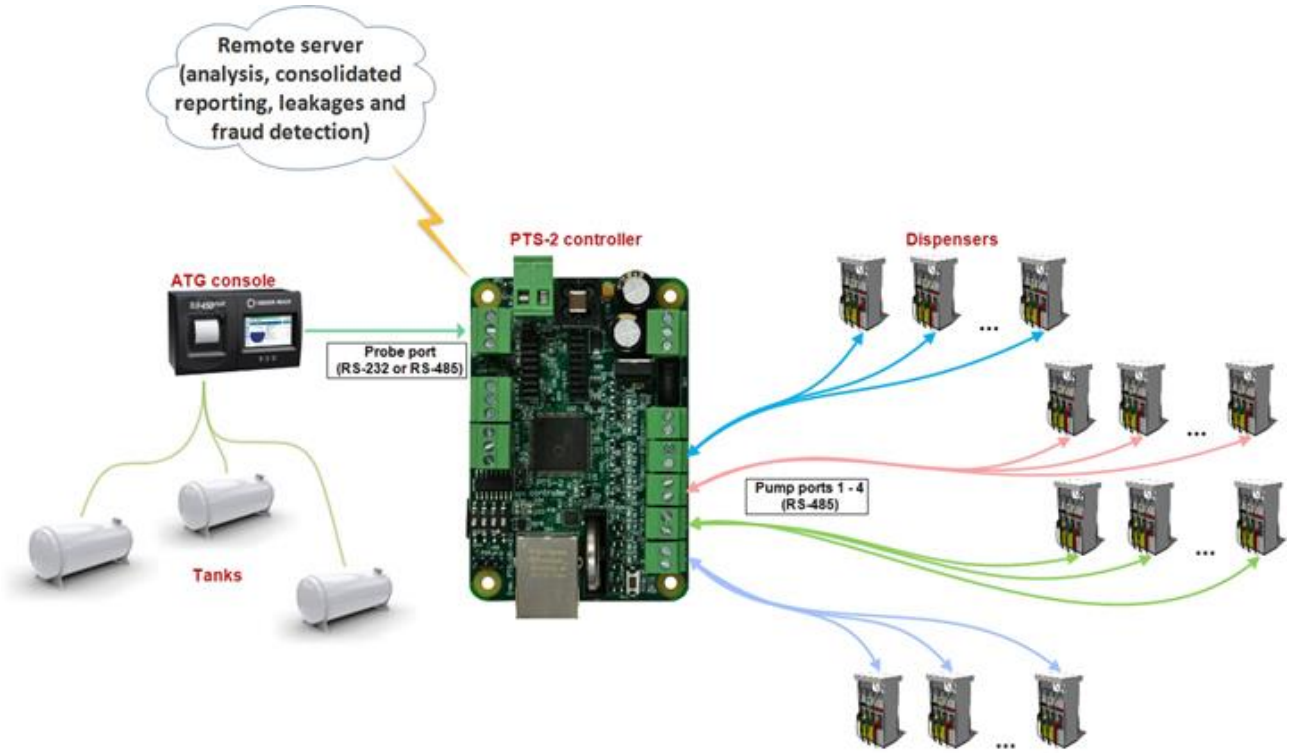
Upload of data to a remote server

PTS-2 controller accumulates 3 types of data in its memory:

- pumps transactions
- tanks' measurements
- GPS records

PTS-2 controller can automatically send all stored data to a remote server. This feature provides following possibilities:

- independent reporting on sales of dispensers and movement of petroleum products in tanks
- analysis of data with formation of tanks reconciliation reports, detection of tank leakages, etc.
- remote supervision over petrol station or petroleum depot operation
- definition of frauds and stealing at petrol station and hidden control over actions of personal
- generation of consolidated reporting from network of petrol stations and tank depots

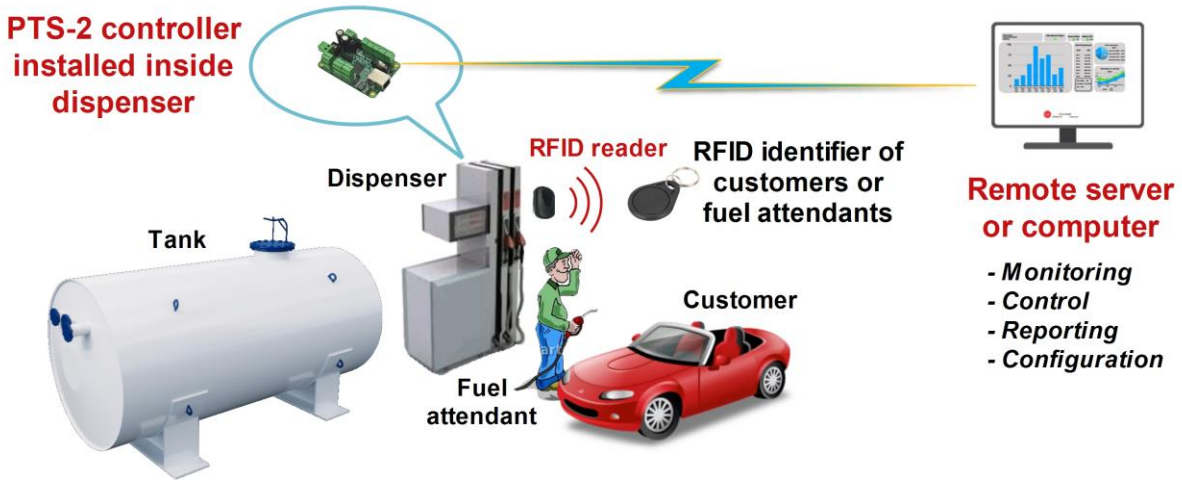


PTS-2 controller is able to constantly communicate with remote server without a need to have a static IP-address for upload of data to the remote server online for reporting and analysis. PTS-2 controller can connect to a remote server itself and upload all the data in JSON format, which is convenient for processing, so any third-party servers can easily implement support of PTS-2 controller to work with its data. Data can be uploaded with modern means of security (TLS cryptographic protocol), which makes it possible to use PTS-2 controller in applications, which require a high level of security and IoT applications.

Also, PTS-2 controller can establish constant connection to a remote server with a purpose to allow the server to execute any requests it needs like setting/getting configuration, provision of control over pumps and tanks, getting reports, etc. This application is important when a remote server should completely control PTS-2 controller.

Automatic operation on sight

This feature allows PTS-2 controller to work standalone on the station without any additional control system, providing control over pumps and tanks, saving all data to the database and uploading to a remote server automatically. This feature allows to have completely automatic installations with minimal hardware used on the sight. PTS-2 controller guarantees stable application during a long period.



At this PTS-2 controller automatically authorizes pumps and stores all sales to database. Also, PTS-2 controller tracks all changes of product measurements inside tanks with storing of all changes in database and automatic registration of in-tank deliveries and discharges from tanks.

Additionally, the RFID reader can be installed on the pumps to prevent unauthorized sales and track sales performed by the fuel attendants or customers.

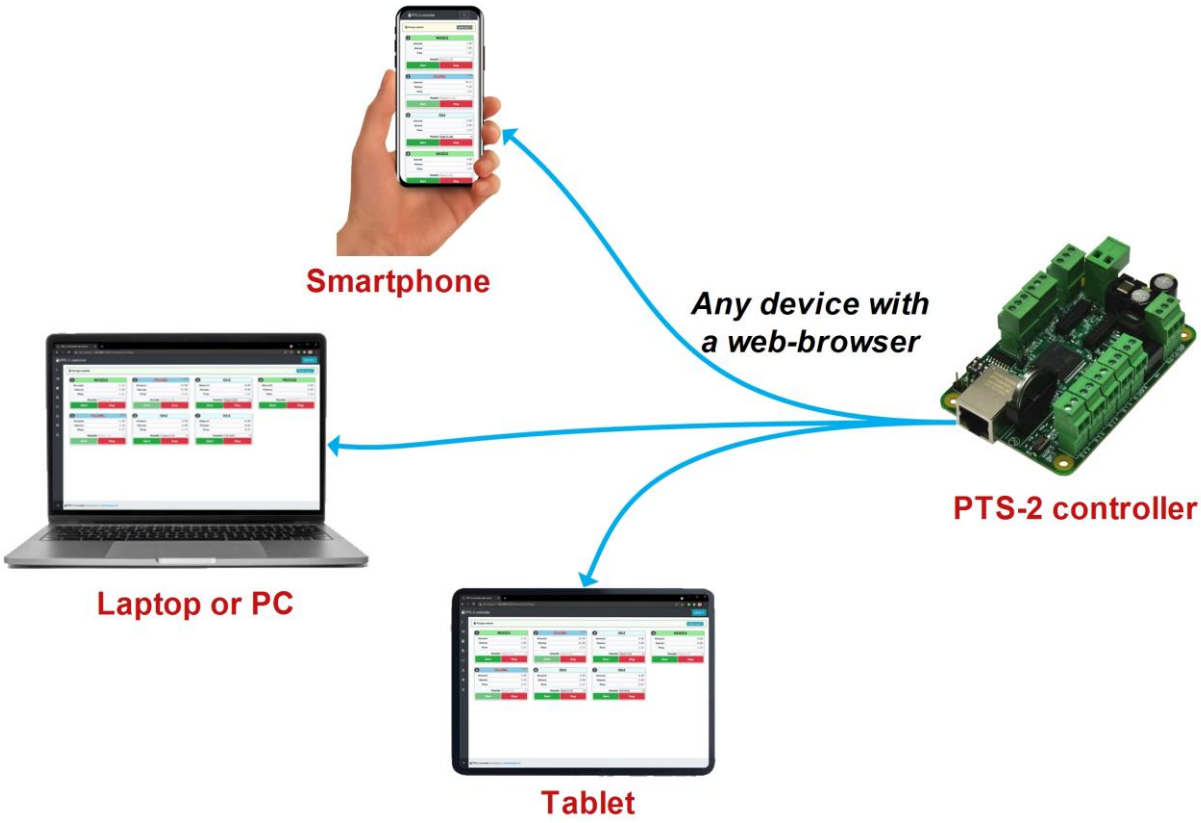
Having information on measured product level and temperature from ATG probes PTS-2 controller automatically calculates:

- product volume
- water volume
- tank ullage
- product temperature-compensated volume
- product mass (in case if probe provides measurements of product density)

All database records are automatically uploaded to remote server for subsequent analysis: reconciliation, automatic tanks calibration, detection of leakages and thefts.

PTS-2 controller can be used as IoT device for communication with dispensers and ATG probes, collecting and storing data and uploading to a remote server using encrypted communication.

Built-in web-server

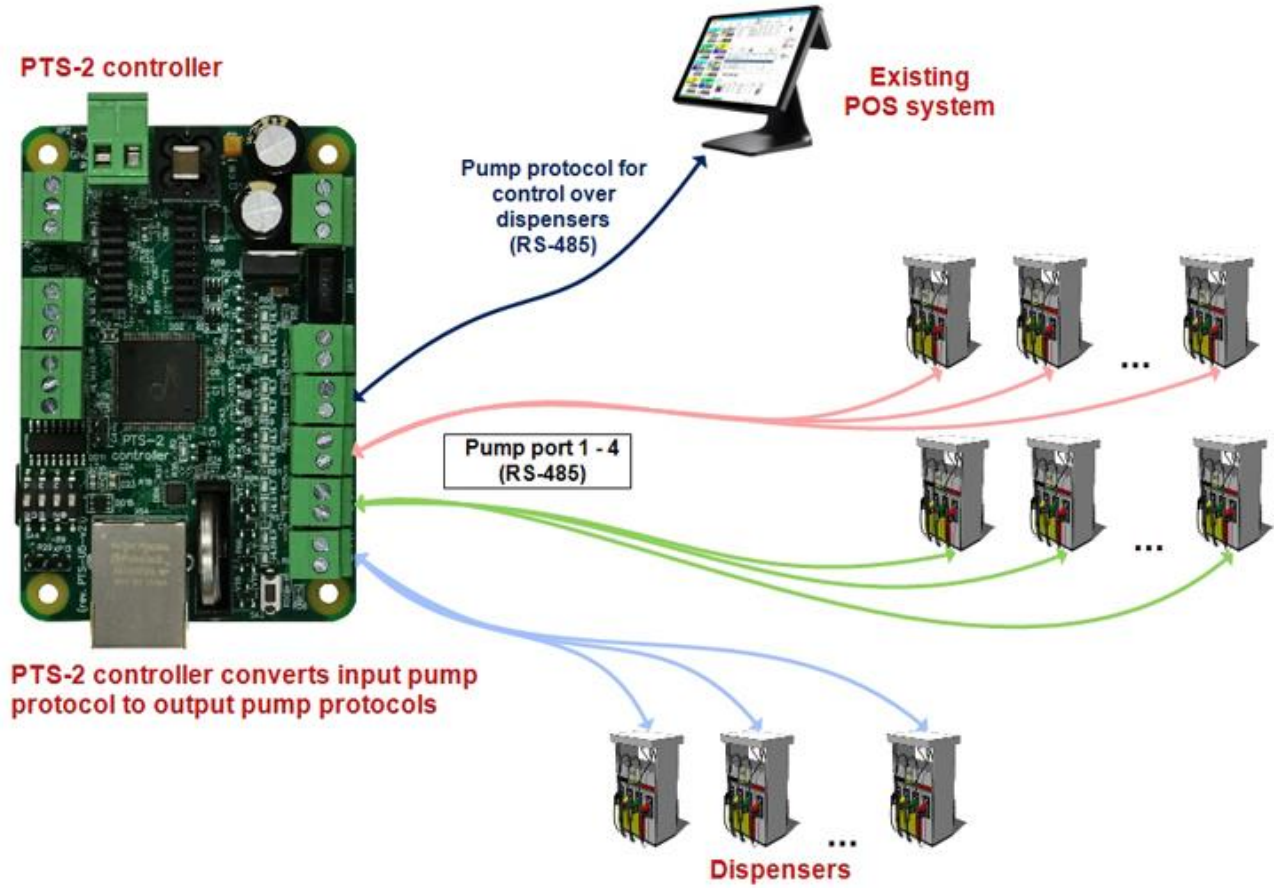


PTS-2 controller has a built-in web-server, which allows to communicate with it as locally, so as remotely using HTTP or HTTPS protocols.

Web-server allows to make full control of PTS-2 controller including control over pumps, monitoring over tanks, reporting, configuration, diagnostics, firmware update, others. A web-server has a responsive modern graphical user interface, so computers, tablets, mobile devices or any other devices with a web browser can connect to PTS-2 controller and display its web server pages in a convenient way.

Communication with the web-server is done using HTTP POST requests with data formatted in JSON format, so implementation of this protocol should be easy for any third-party system.

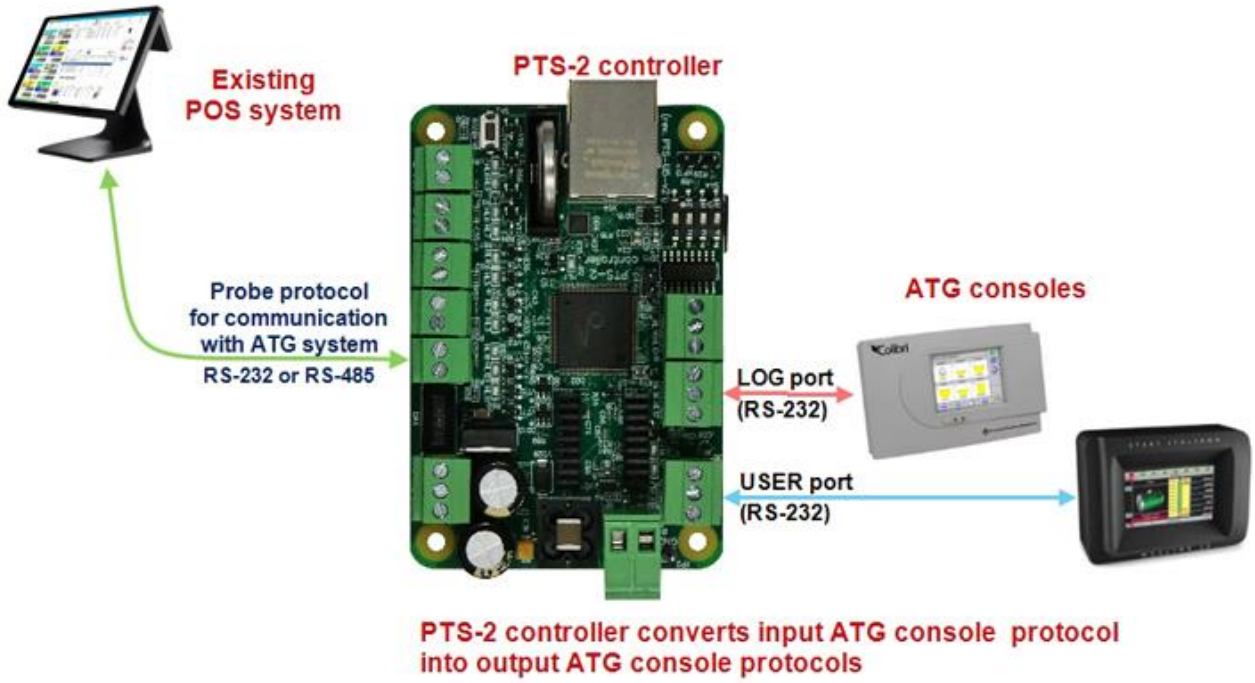
Conversion between pumps communication protocols



PTS-2 controller can work as a protocols converter converting between fuel dispensers' communication protocols and also between ATG systems and probes communication protocols.

In case if the POS system already knows some open communication protocol of dispensers, then it can use PTS-2 controller for its conversion to any other pump protocols without any additional integration. At this control over pumps can be done in parallel from control systems connected through pump port and PC port, PTS-2 controller internally tracks which control system locks control over dispensers.

Conversion between probes communication protocols



PTS-2 controller can work as a protocols converter converting between fuel dispensers' communication protocols and also between ATG systems and probes communication protocols.

In case if the POS system already knows some open communication protocols of ATG consoles then it can use PTS-2 controller for its conversion to any other ATG console or probe protocols without any additional integration.

TECHNICAL CHARACTERISTICS

General specification

##	PARAMETER	VALUE
1	**Power supply voltage**	12 V DC
2	**Maximal current consumption**	700 mA max
3	**Temperature range**	-40°C … +80°C
4	**Weight**	200 g
5	**Overall dimensions**	85 x 58 x 30 mm

Peripheral hardware

##	PARAMETER	VALUE
1	**Battery type**	CR2032 3V DC
2	**SD card**	microSD of types SC (standard capacity) and HC (high capacity), class 10, up to 32 GB

Communication

##	PARAMETER	VALUE
1	**Input protocol for Ethernet port**	jsonPTS protocol: JSON-based communication protocol (proprietary of Technotrade LLC)
2	**Input protocol for PC port (RS-232 interface)**	UniPump protocol: binary communication protocol (proprietary of Technotrade LLC)
3	**Security**	SSL/TLS 1.2

Configuration

##	PARAMETER	VALUE
1	**Quantity of pump ports**	4
2	**Quantity of pumps supported**	up to 50
3	**Quantity of probe ports**	3
4	**Quantity of probes supported**	up to 50
5	**Quantity of fuel grades**	up to 10
6	**Quantity of tanks**	up to 50
7	**Quantity of users**	up to 10
8	**Quantity of pump transaction records**	100000
9	**Quantity of tank measurements records**	100000
10	**Quantity of price boards supported**	up to 5
11	**Quantity of products per each price board**	up to 10
12	**Quantity of RFID readers supported**	up to 50
13	**Quantity of RFID tags supported**	No limit

COMPLETE SET

Depending on the order code (see section “Order information”) PTS-2 controller can be supplied either in a view of electrical board (variant of controller supply *PTS2-PCB-z*), or installed in a mounting box with cables inputs and a power switching button (variant of controller supply *PTS2-BOX-z)*.

Variant of controller supply in a view of electrical board (PTS2-PCB-z)

Variant of controller supply installed in a plastic box with cables inputs and a power switching button (variant of controller supply PTS2-BOX-z)

SUPPORTED BRANDS OF FUEL DISPENSERS AND REGISTER METERS*

1. *2A*
2. *ACTRONIC*
3. *ADAST (ADAMOV SYSTEMS)*
4. *AG WALKER*
5. *AGIRA*
6. *ANGI International*
7. *ARIEL*
8. *ASPRO*
9. *ASSYTECH*
10. *ASTRON*
11. *AZT*
12. *BARANSAY*
13. *BATCHEN*
14. *BENNETT*
15. *BLUE SKY*
16. *CENSTAR*
17. *CFT Clean Fuel*
18. *CHANGLONG*
19. *COMPAC*
20. *COPTRON*
21. *CORITEC*
22. *DATIAN MACHINES*
23. *DEM G. SPYRIDES*
24. *DEVELCO*
25. *DINT*
26. *DIGITAL FLOW*
27. *DONG HWA PRIME*
28. *DURULSAN*
29. *EAGLESTAR*
30. *EKOSIS*
31. *EMGAZ DRAGON*
32. *EPCO*
33. *ESIWELMA*
34. *EUROPUMP*
35. *FALCON LPG*
36. *FLOW*
37. *FORNOVO GAS*
38. *FUELQUIP*
39. *FUELSIS*
40. *FUREN HIGHTECH*
41. *GALILEO*
42. *GASLIN*
43. *GERKON*
44. *GILBARCO*
45. *GREENFIELD*
46. *HAKO*
47. *HITACHI*
48. *HONG YANG*
49. *IFSF (dispensers)*
50. *IMW*
51. *INTERMECH*
52. *IPT*
53. *JAPAN ENERJUMP*
54. *KAISAI*
55. *KALVACHA*
56. *KIEVNIIGAZ*
57. *KOREA ENE*
58. *KPG-2*
59. *KRAUS*
60. *KRIPFLOW*
61. *KWANGSHIN*
62. *LANFENG*
63. *LIQUID CONTROLS*
64. *LG ENE*
65. *LOGITRON*
66. *MAIDE*
67. *MASER*
68. *MEKSAN / WAYNE SU86*
69. *MEKSER*
70. *MEPSAN*
71. *MIDCO*
72. *MM PETRO (ZAP)*
73. *MOTOGAZ*
74. *MOUNTAIN CHINA*
75. *MRT*
76. *MS GAS*
77. *NARA*
78. *NUOVA MIGAS*
79. *NUOVO PIGNONE*
80. *ORCA*
81. *PEC (GALLAGHER FUEL SYSTEMS)*
82. *PECO*
83. *PEGASUS*
84. *PETPOSAN*
85. *PETROEQUIP*
86. *PETROMECCANICA*
87. *PETROTEC*
88. *PROWALCO*
89. *PUMP CONTROL*
90. *PUMPTRONICS*
91. *REAL-TECH*
92. *RIX*
93. *SAFE*
94. *SALZKOTTEN*
95. *SANKI*
96. *SATAM EQUALIS S*
97. *SEA BIRD*
98. *SHELF*
99. *SCHEIDT&BACHMANN*
100. *SHIBATA*
101. *SLAVUTICH*
102. *SOMO PETRO*
103. *STABILIZING*
104. *STAR*
105. *TATSUNO (JAPAN)*
106. *TATSUNO EUROPE (FORMER BENC)*
107. *TEKSER*
108. *TIGER*
109. *TOKHEIM*
110. *TOKHEIM INDIA*
111. *TOKICO*
112. *TOMINAGA*
113. *TOPAZ*
114. *TOTAL CONTROL SYSTEMS*
115. *TRANSPONDER*
116. *TRUE TECH*
117. *UCAR ELEKTRIC*
118. *UNICON-TIT*
119. *VANZETTI*
120. *WAYNE DRESSER*
121. *WAYNE PIGNONE*
122. *WELLDONE MACHINES*
123. *YENEN*
124. *ZCHENG GENUINE MACHINES*

** Some dispensers may demand using interface converter boards to RS-485 interface (depends on electronics of used pumphead in dispenser).*

SUPPORTED BRANDS OF ATG SYSTEMS AND PROBES*

1. *ACCU*
2. *ALISONIC*
3. *ASSYTECH*
4. *BLUESKY*
5. *DUT-E*
6. *EAGLESTAR*
7. *EBW*
8. *EMERSON ROSEMOUNT*
9. *ENRAF*
10. *ESCORT FD*
11. *FAFNIR*
12. *FRANKLIN FUELING*
13. *GAMICOS*
14. *GILBARCO VEEDER ROOT*
15. *HECTRONIC*
16. *HOLYKELL*
17. *HONG YANG*
18. *HUMANENTEC*
19. *IFSF (ATG systems)*
20. *INCON*
21. *KANGYU*
22. *KUNLUN*
23. *LABKO*
24. *LIGO*
25. *MECHATRONICS*
26. *MTS ATG SENSORS*
27. *ND*
28. *NORTH FALCON*
29. *O.L.E.*
30. *OMNICOMM*
31. *OMNTEC*
32. *OPW*
33. *PHOENIX*
34. *QINGDAO GUIHE*
35. *RCS EPSILON*
36. *SENSOR*
37. *SKE LEVEL GAUGE*
38. *START ITALIANA*
39. *STRUNA*
40. *TECHNOTON*
41. *UNIPROBE*
42. *VEGA*
43. *VEPAMON*
44. *WINDBELL*
45. *XT SENSORS*
46. *ZCHENG GENUINE MACHINES*

SUPPORTED BRANDS OF PRICE BOARDS*

1. *PWM*

SUPPORTED BRANDS OF READERS*

1. *VRD-485*

** Communication parameters (baud rate, parity control, data and stop bits) are configured for probes, price boards and readers ports in PTS-2 controller independently from used communication protocol.*

INSTALLATION REQUIREMENTS

***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 (lightning) it is required to install high-voltage arresters (dischargers) at the transformer substation or on poles of power lines.

2. Requirements to grounding

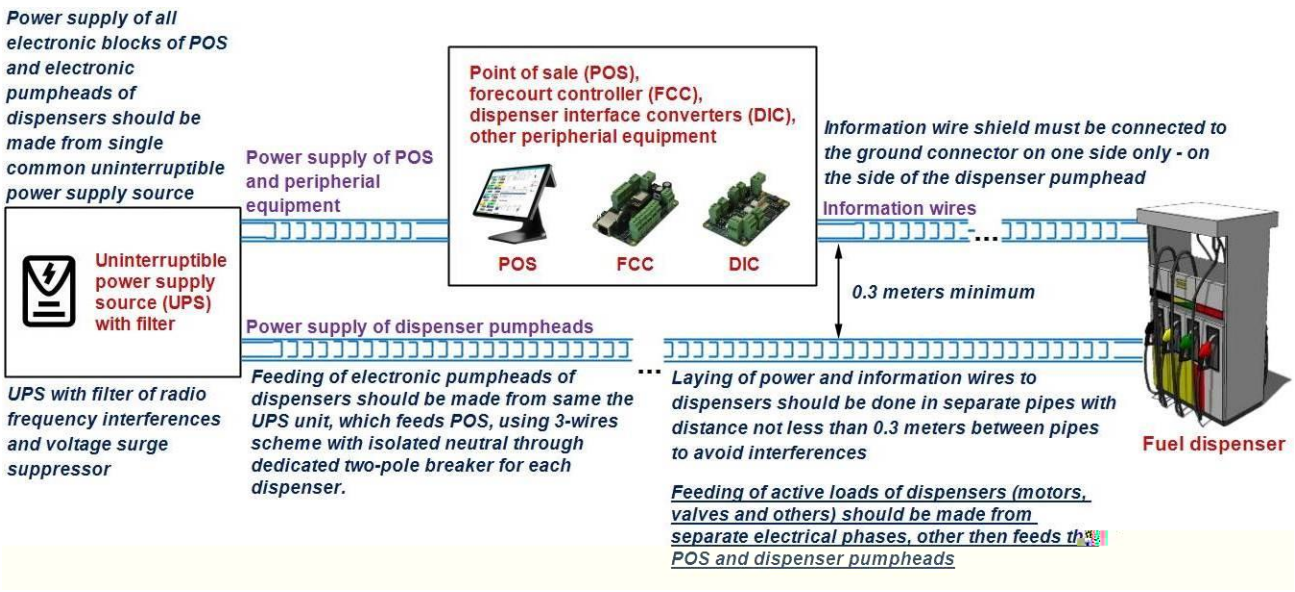
In the switchboard the ground wire of feeder socket should be connected to the grounding screw, which should be connected by means of welding with a protection grounding circuit of petrol station by steel wire with a diameter of not less than 5 mm.

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)

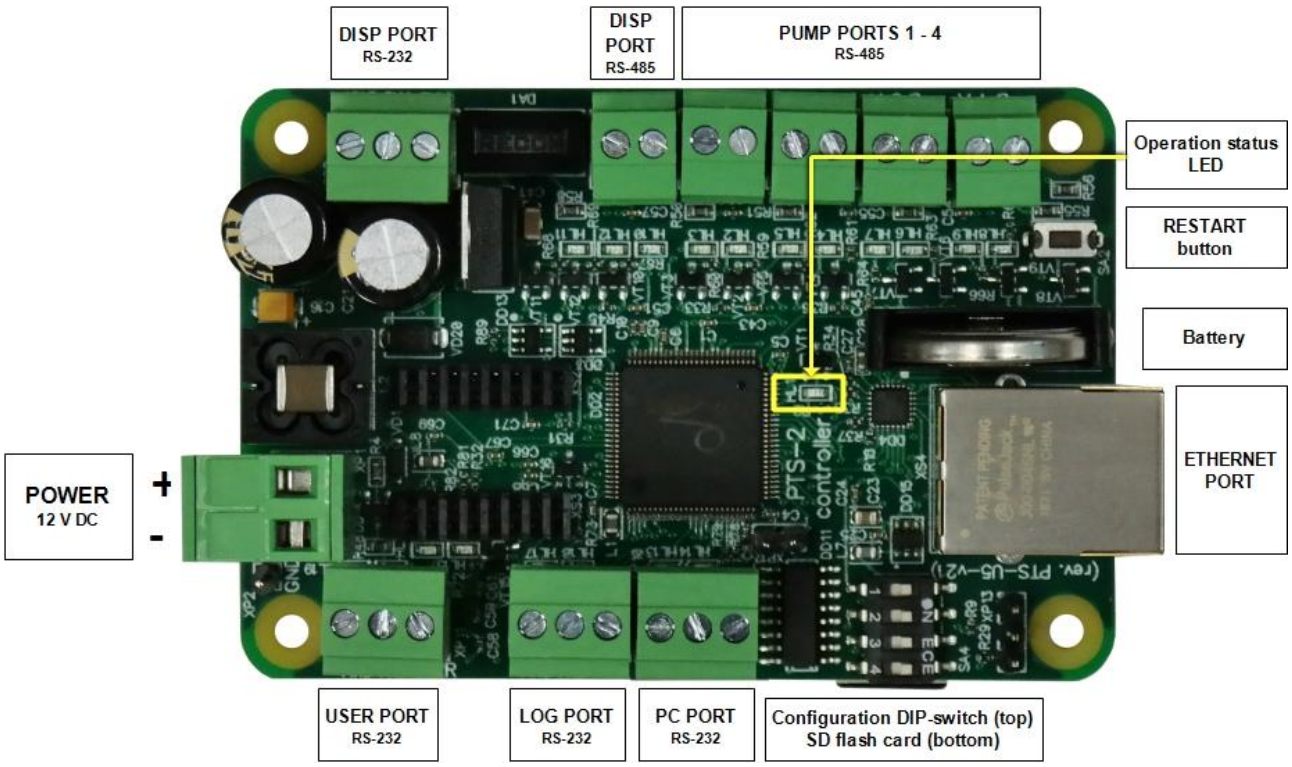
it is recommended to use shielded twisted-pair cables (recommended type – FTP CAT 5E). The cable shield must be connected to the ground connector on one side only – on the side of the dispenser.



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 and explosion-protected junction boxes should be used, in case if probes have intrinsic safety – then connection should be performed through suitable safety barriers.

BOARD CONNECTORS AND INTERFACES



PTS-2 controller is supplied together with terminal blocks for each of the connectors for screwing of connection wires.

NOTE! Operation status LED is yellow LED, blinking during operation. In case if the system loaded correctly and there are no errors found – then the yellow LED blinks with toggling its state (on/off) each second. However, if it is blinking fast (toggling its state each 100 ms) – then there is a problem at system load and it can not operate.

COMMUNICATION PORTS

PORT NAME		INTERFACE	APPOINTMENT
ETHERNET		**Ethernet**	Communication with control systems, monitoring systems, analytics systems, upload of data to remote server
PC PORT		**RS-232 (3 wires: TxD, RxD, Gnd)**	Connection with control system. It is recommended to use shielded cable.
PUMP PORTS	**Pump port 1**	**RS-485 (2 wires: line A, line B)**	Connection with dispensers using configurable proprietary communication protocol and with control systems using popular pumps communication protocol. It is required to use shielded cable, which shield is connected to ground on the side of connected pump.
	Pump port 2	**RS-485 (2 wires: line A, line B)**	
	Pump port 3	**RS-485 (2 wires: line A, line B)**	
	Pump port 4	**RS-485 (2 wires: line A, line B)**	
PROBE PORTS	**LOG port**	**RS-232 (3 wires: TxD, RxD, Gnd)**	Connection with ATG systems (probes) using configurable proprietary com. protocol and with control systems using popular probes communication protocol.
	USER port	**RS-232 (3 wires: TxD, RxD, Gnd)**	
	DISP port (RS-485)	**RS-485 (2 wires: line A, line B)**	
	DISP port (RS-232)	**RS-232 (3 wires: TxD, RxD, Gnd)**	
DEBUG PORT		**RS-232 (2 wires: TxD, Gnd)**	Debugging of operation.
WF PORT		**RS-232 (3 wires: TxD, RxD, Gnd)**	Connection to GPS receiver.

NOTE!

It is strictly prohibited to connect any of the cables' shields to ports of PTS-2 controller.

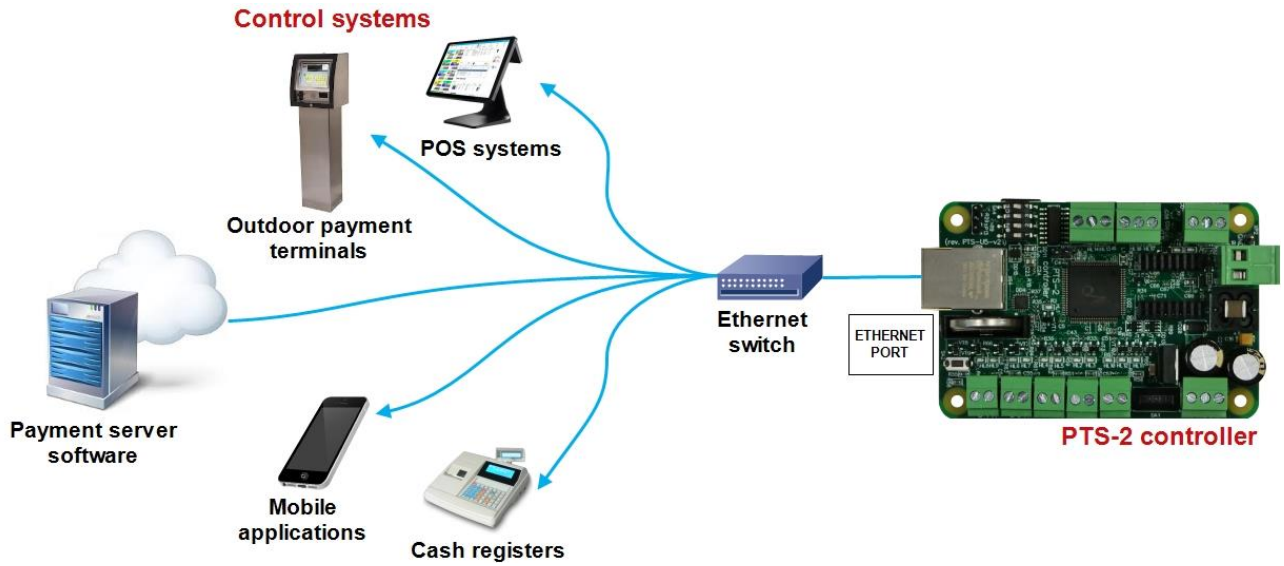
Manufacturer reserves a right to bring in modifications in construction of controller for improving of its technical and functional characteristics, so supplied version of controller may differ from described in given technical guide.

Warning! This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

CONNECTION TO CONTROL SYSTEMS USING ETHERNET INTERFACE

Connection to the control systems can be done through Ethernet port.

Scheme of connections:

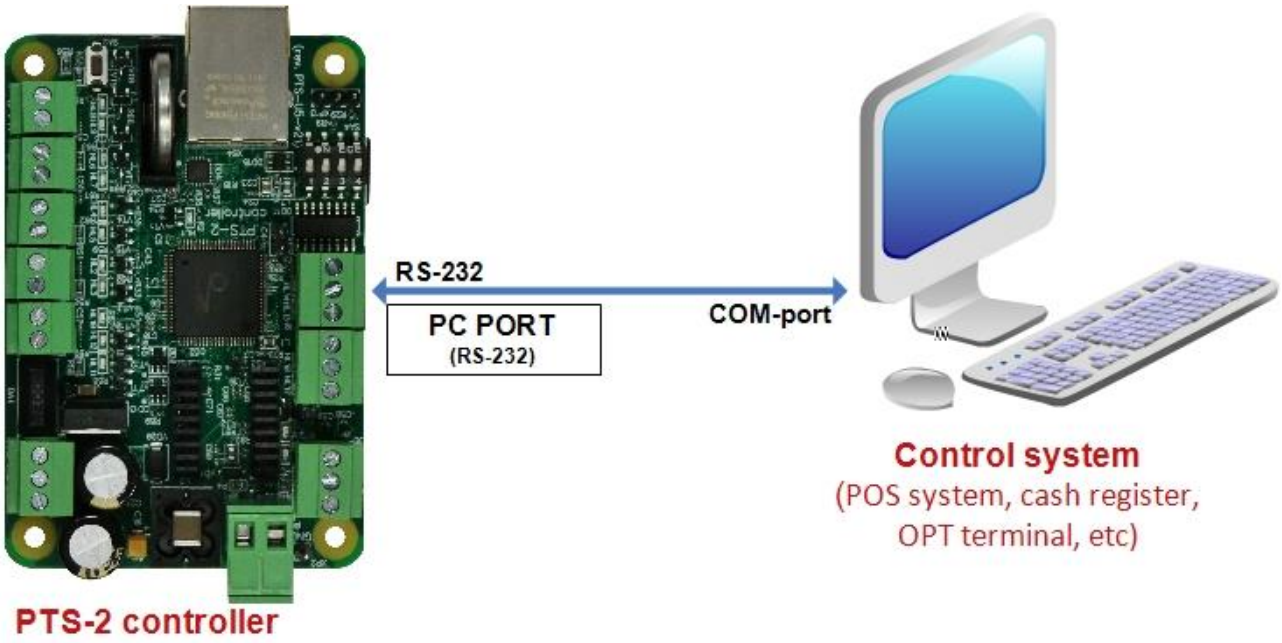


Communication with PTS-2 controller is made using commands and responses described in jsonPTS communication protocol (own proprietary protocol of Technotrade LLC) – see document "*jsonPTS communication protocol specification for PTS-2 controller*" for more information.

CONNECTION TO CONTROL SYSTEMS USING RS-232 INTERFACE

Connection to the control system (POS system, cash register, OPT terminal, etc) can be done through PC port, which has RS-232 interface (3 wires: TxD, RxD, Gnd).

Scheme of connections:



In case if the control system does not have a COM-port – it is possible to use any type of converter to COM-port (like USB-to-COM, Ethernet-to-COM, Bluetooth-to-COM, other converters).

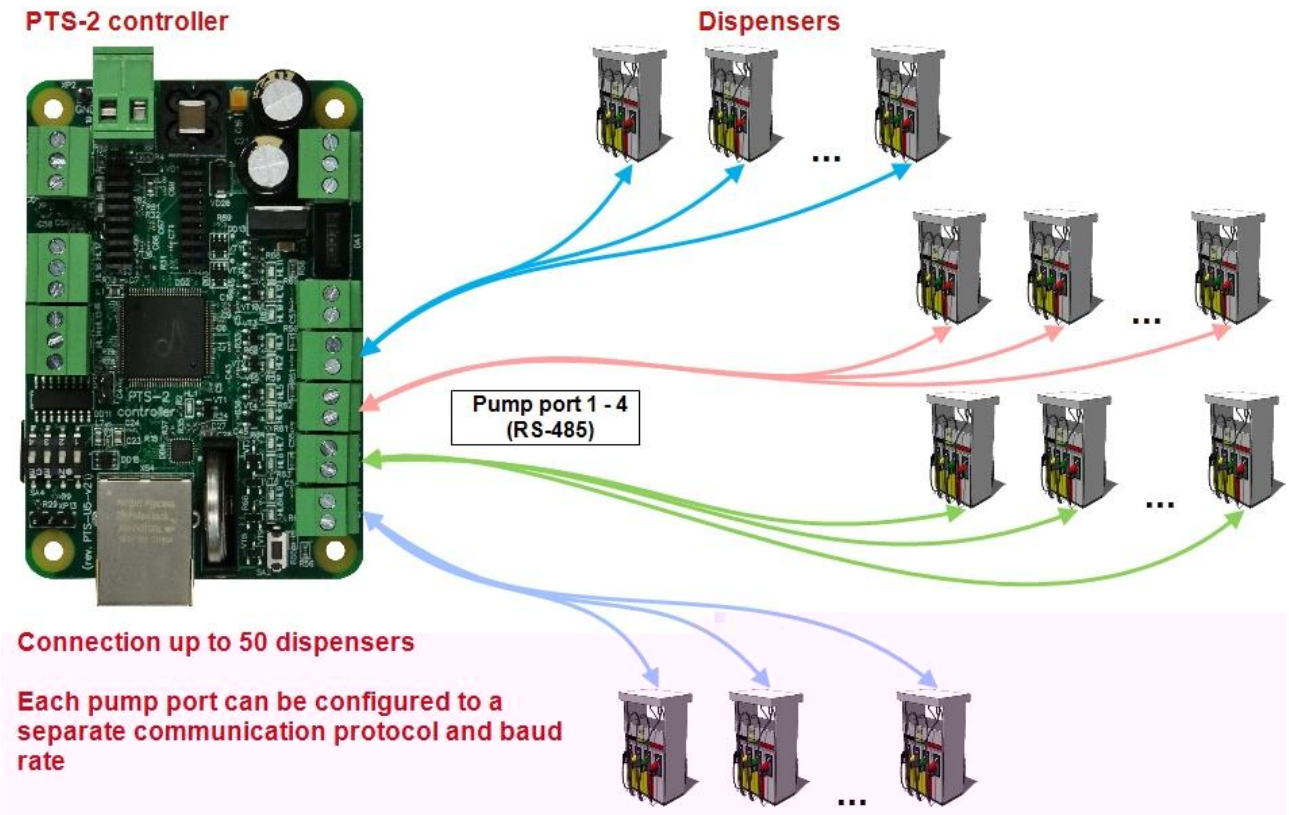
Communication with PTS-2controller is made using commands and responses described in UniPump communication protocol (own proprietary protocol of Technotrade LLC) – see document "*UniPump communication protocol specification for PTS-2 controller over fuel dispensers and ATG systems*" for more information. Thus, PTS-2 controller provides conversion of the common communication protocol UniPump into various proprietary communication protocols of fuel dispensers and ATG systems.

Control over PTS-2 controller in this case is done same way as with PTS-1 controller (*http://www.technotrade.ua/fuel-pump-controller.html*). This mode is left intentionally for backward compatibility. The only difference in this mode is that PTS-2 controller supports control over up to 50 dispensers and up to 50 probes using same UniPump protocol unlike PTS-1 controller, which is limited to 16 pumps and 16 probes maximum.

CONNECTION TO DISPENSERS

PTS-2 controller can simultaneously control up to 50 fueling places (50 single-sided dispensers or 25 double-sided dispensers or mixture of single-sided and double-sided dispensers) that use up to 4 various communication protocols (each of the pump ports can be adjusted to a separate communication protocol and baud rate) (see section "*Examples of connection to fuel dispensers*").

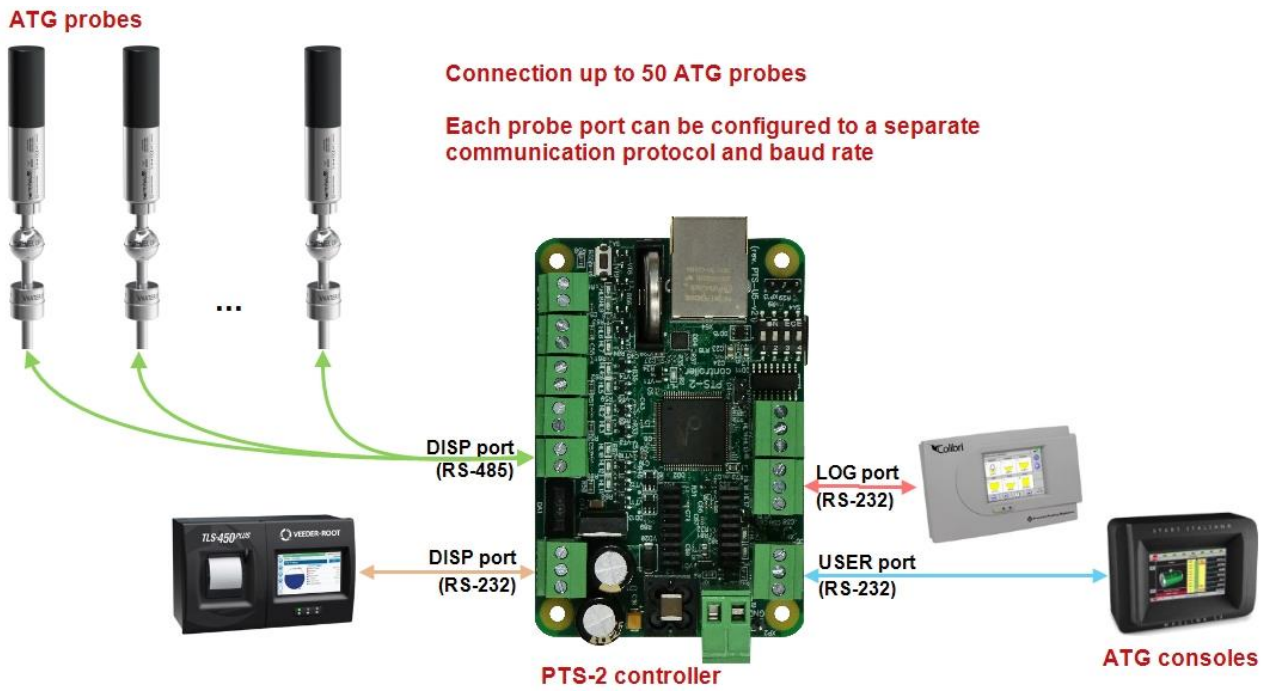
So, you can distribute all the 50 pumps between the any of the pump ports.



NOTE: if there are less than 4 various types of fuel dispensers at petrol station (which use various communication protocols) then it is recommended to distribute fuel dispensers between 4 pump ports in approximately equal quantities in order to minimize delays between fuel dispensers querying in the same pump port, so that communication is the most efficient.

CONNECTION TO ATG SYSTEMS AND PROBES

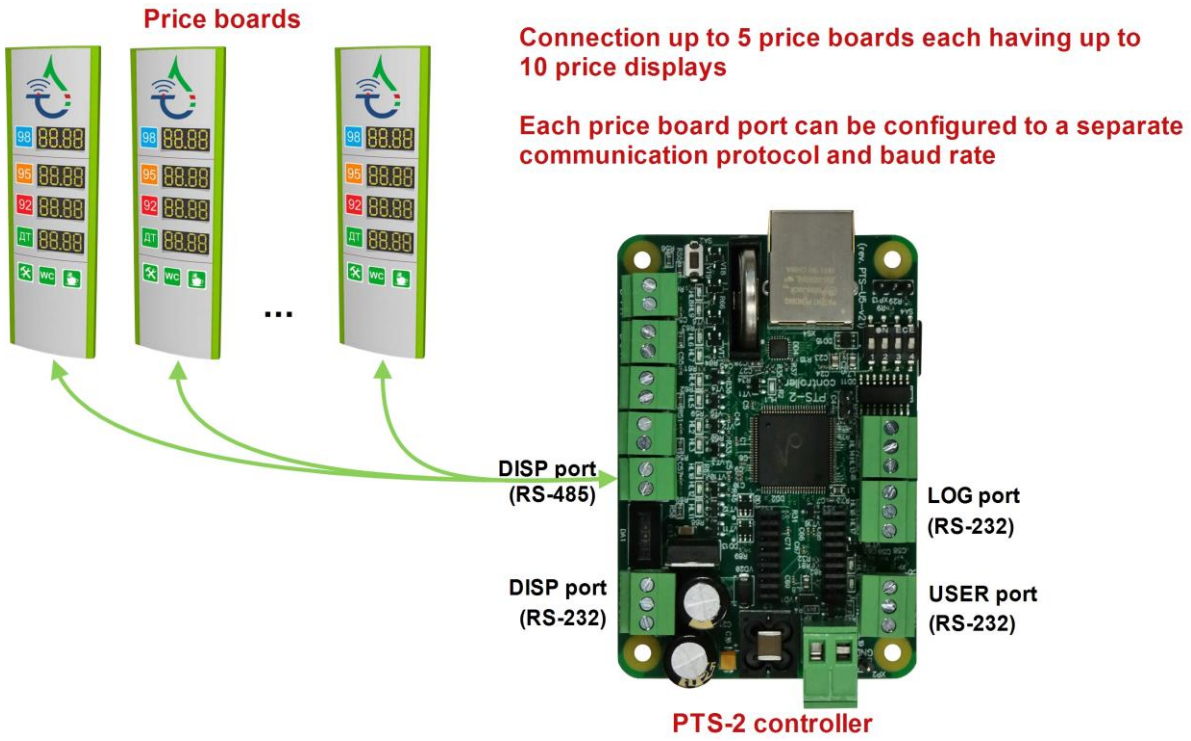
PTS-2 controller can simultaneously control up to 50 automatic tank gauges (probes) (separate probes or probes connected to ATG systems / consoles) that use up to 3 various communication protocols (each of the probe ports can be adjusted to a separate communication protocol, baud rate and communication settings: number of data bits and stop bits, parity) (see section "*Examples of connection to ATG systems*").



NOTE: DISP port provides a possibility to connect ATG system (probes) over either RS-485 or RS-232 interfaces – interface is selected using a configuration parameter in PTS-2 controller.

CONNECTION TO PRICE BOARDS

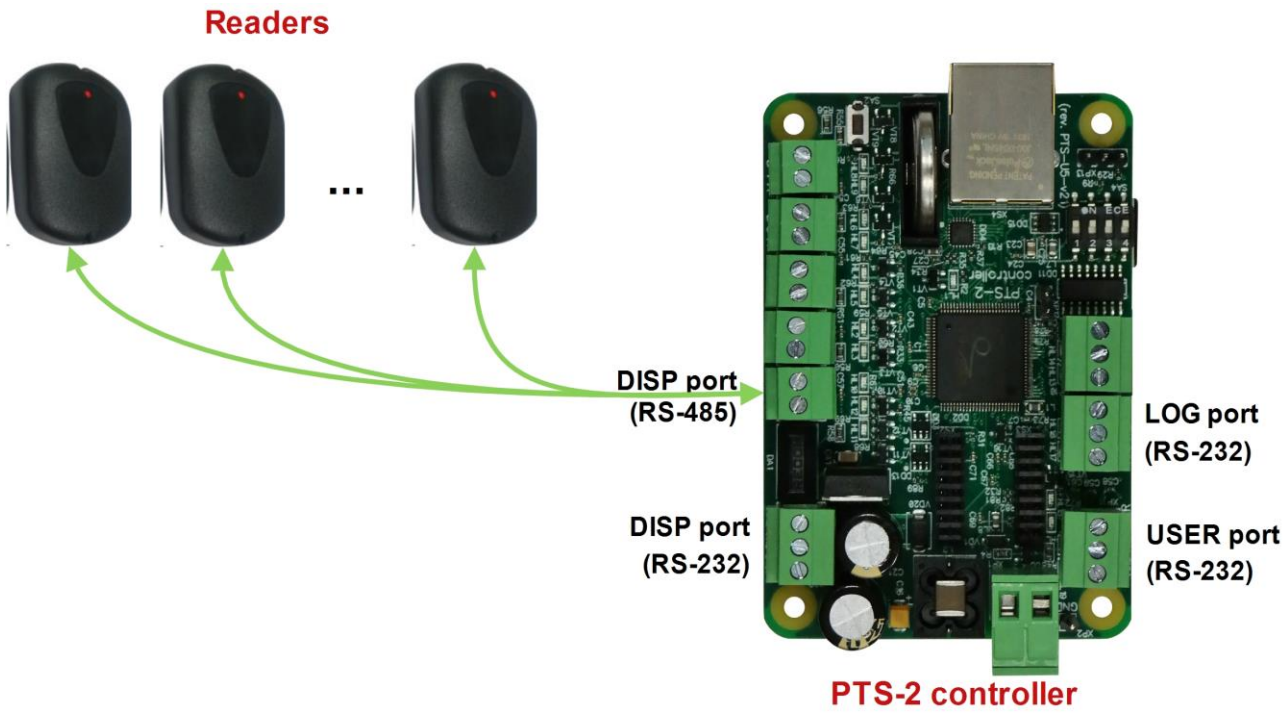
PTS-2 controller allows to control same time up to 5 price boards each having up to 10 price displays, at this connection of 3 different brands of price-boards using different communication protocols is possible same time (each of the ports can be adjusted to a separate communication protocol, baud rate and communication settings: number of data bits and stop bits, parity).



NOTE: DISP port provides a possibility to connect price boards over either RS-485 or RS-232 interfaces – interface is selected using a configuration parameter in PTS-2 controller.

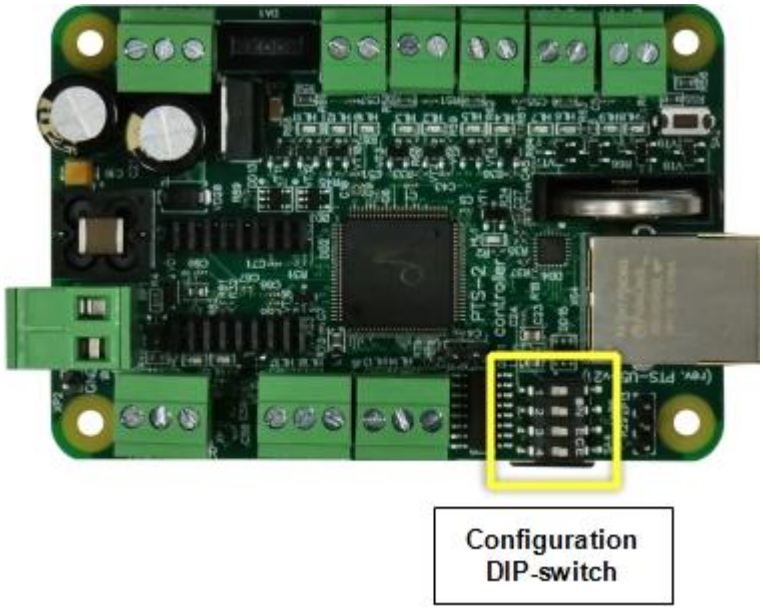
CONNECTION TO RFID READERS

PTS-2 controller allows to connect same time up to 50 readers, at this connection of 3 different brands of readers using different communication protocols is possible same time (each of the ports can be adjusted to a separate communication protocol, baud rate and communication settings: number of data bits and stop bits, parity).



The readers can be used as standalone, so as can be linked to pumps programmatically.

CONFIGURATION DIP-SWITCH

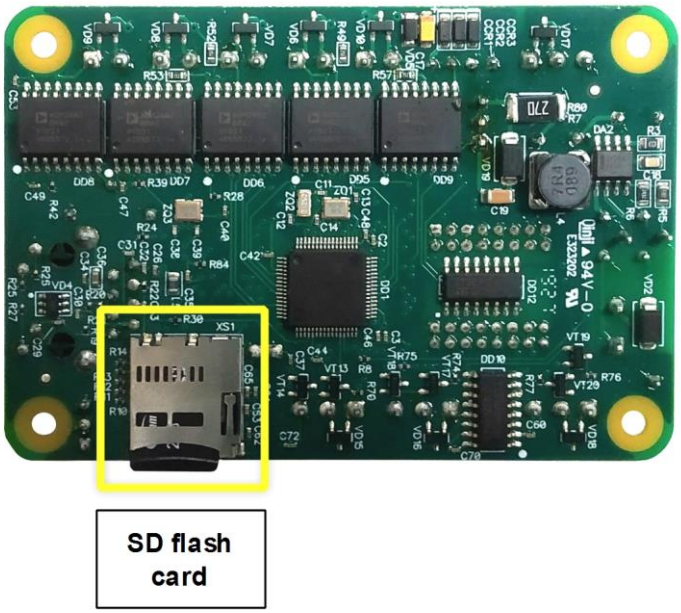


PTS-2 controller has a 4-position configuration DIP-switch, located on top of the PCB board. Appointment of the switches is the following:

- switch 1:
  - OFF position: communication through Ethernet using HTTPS protocol (by defaults port is 443)
  - ON position: communication through Ethernet using HTTP protocol (by defaults port is 80)
- switch 2:
  - OFF position: digest authentication
  - ON position: basic authentication
- switch 3:
  - OFF position: normal startup
  - ON position: format of SD flash card on startup
- switch 4:
  - OFF position: normal startup
  - ON position: reset of all configuration to default factory settings on startup

In case if switches 3 and 4 are set to ON position same time – then PTS-2 controller will not format SD-flash card, but will reset all the configurations to default factory settings on startup. After that PTS-2 controller will check SD flash disk for a file *Config.js* containing backup configuration and if such file exists – then PTS-2 controller will restore the configuration it automatically. Thus, PTS-2 controller memory can be cleared and configuration can be restored by placing the *Config.js* file to root of SD flash card.

SD FLASH CARD



PTS-2 controller has SD flash card for leading system files. It has FAT32 file system.

SD flash disk is used for storing files with pumps sales, tanks measurements, GPS records, tank calibration chards, system log, configuration, others. List of files and their structure are described in section "*Files stored on SD flash disk*".

NOTE! Operation status LED on PTS-2 controller board will show error, blinking fast and toggling its state each 100 ms in case if:

- SD flash disk is inserted incorrectly
- SD flash disk is not formatted to FAT32 file system or its file system is damaged

In this case it is necessary to recheck that SD flash disk is inserted correctly and has a valid FAT32 file system. Also, it is possible to format the SD flash disk using DIP-switch 3 of the configuration DIP-switch (see section "*Configuration DIP-switch*").

NOTE! PTS-2 controller can operate without SD card inserted. In this case PTS-2 controller ignores any operations with SD card if any are configured in it.

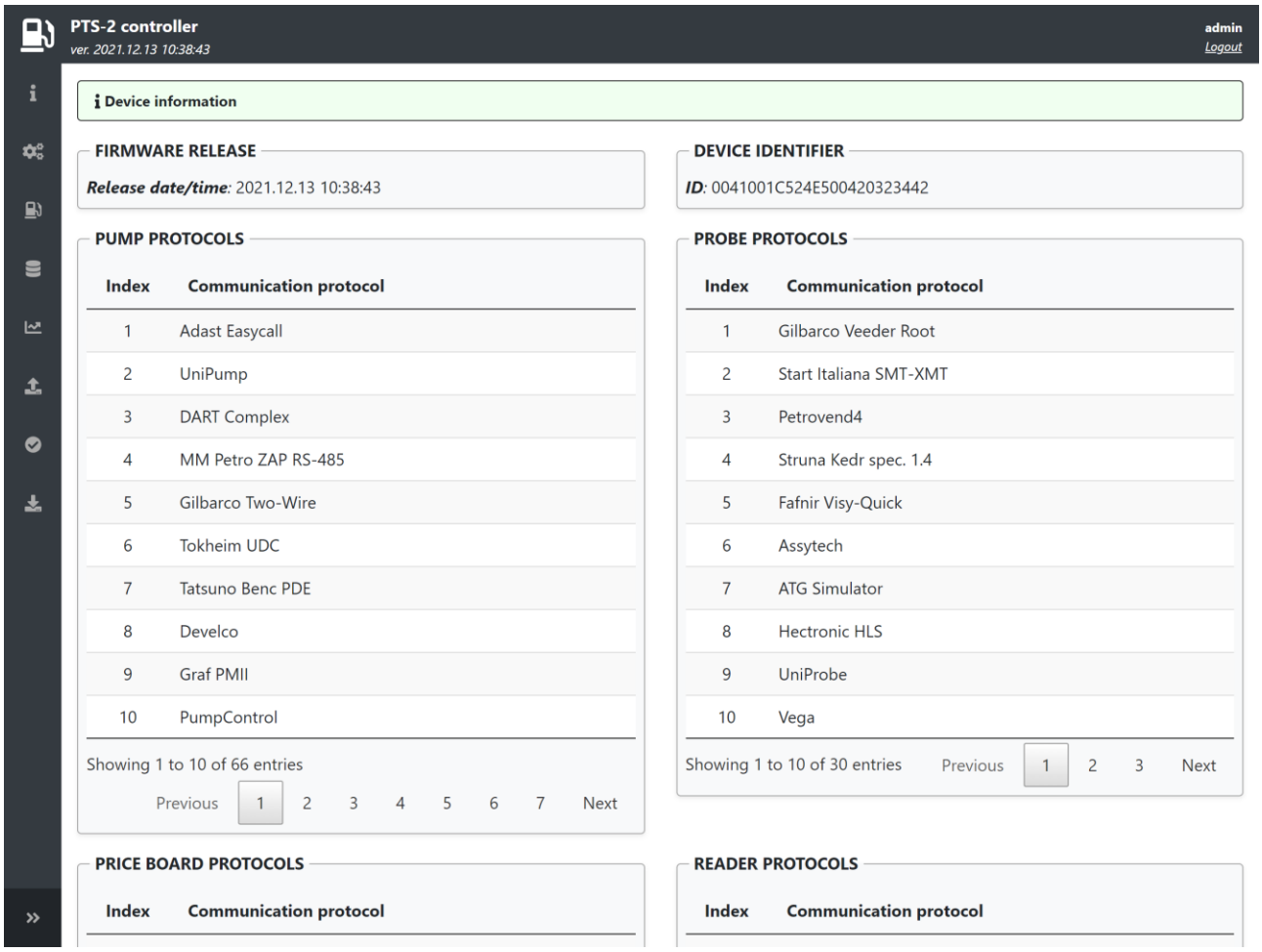
WEB-SERVER

General information

PTS-2 controller comes with a built-in web-server, which allows following possibilities:

- check of firmware information: firmware version and communication protocols included, system state, battery state, SD flash card state, unique identification number, others
- configuration: pumps and ATG probes ports, price boards and readers, fuel grades, tanks and calibration charts, linking of pumps' nozzles to fuel grades and tanks, users, parameters, others
- pumps control and monitoring over the pumps
- tanks measurements monitoring
- generation of reports on pumps sales, tanks measurements and GPS records
- logging of PTS-2 controller communication exchange with connected equipment
- self-diagnostics of peripheral hardware
- update of firmware

Web-server has adoptive user interface and was developed to suit to various types of mobile devices: PCs, laptops, tablets, smartphones.



Built-in web-server uses requests and responses described in *jsonPTS communication protocol* (own proprietary protocol of Technotrade LLC).

Communication to web-server is done using HTTP or HTTPS protocols depending on the position of switch 1 of configuration DIP-switch on the PTS-2 controller board (please check section "*Configuration DIP-switch*" for more information).

Default factory communication settings for PTS-2 controller:

- IP-address: 192.168.1.117
- Network mask: 255.255.255.0
- Gateway: 192.168.1.13
- HTTP port: 80
- HTTPS port: 443

Communication settings can be modified on *Configuration* page > *System settings* tab of web-server. Also, you can anytime reset the parameters to default using switch 4 of configuration DIP-switch on the PTS-2 controller board (please check section *Configuration DIP-switch* for more information).

In order to initially connect to PTS-2 controller web-server it is needed to set Ethernet IPv4 settings of PC to be in same network, for example:

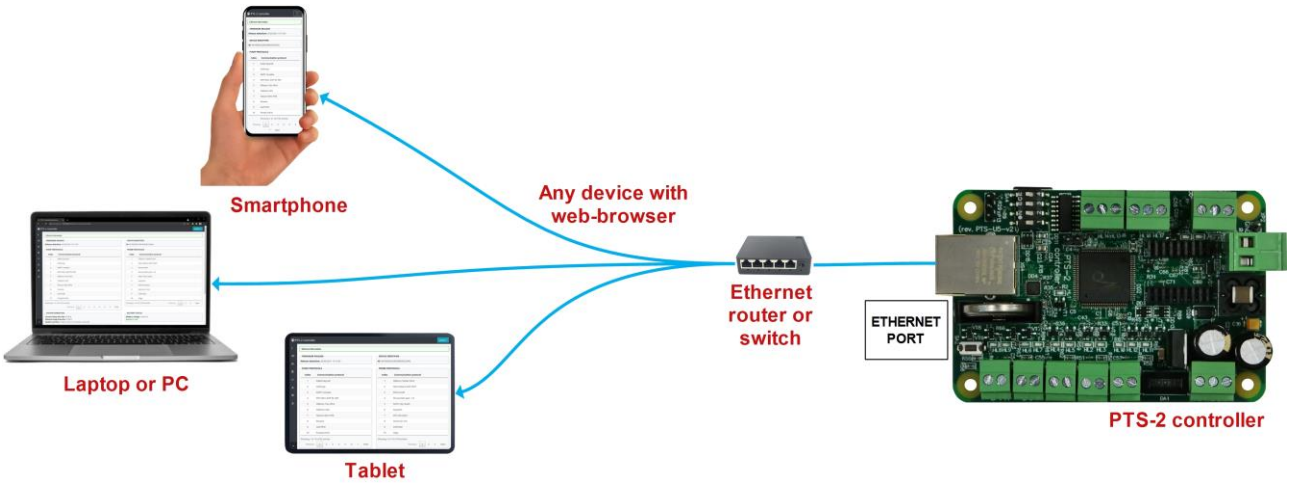
- IP-address: 192.168.1.10
- Network mask: 255.255.255.0
- Gateway: 192.168.1.13

Recommended web-browsers for application with PTS-2 controller web-server are Google Chrome and Mozilla Firefox.

After opening a web-browser in order to get to the web-server of PTS-2 controller type in the address line *http://192.168.1.117* (if DIP-1 is set to ON position) or *https://192.168.1.117* (if DIP-1 is set to OFF position) depending where usage of HTTP or HTTPS is configured by position of switch 1 of configuration DIP-switch on the PTS-2 controller board (please check section "*Configuration DIP-switch"* for more information).

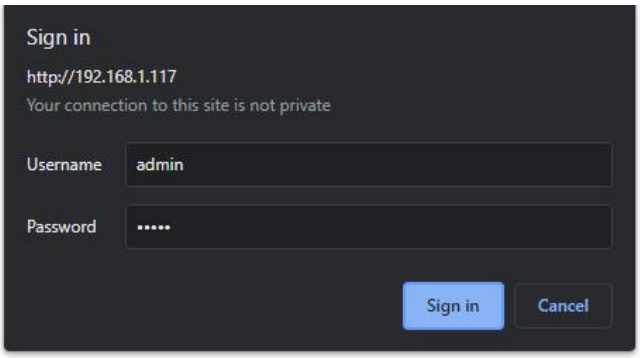
NOTE! PTS-2 controller is using self-signed certificate, so at connection in web-browser using HTTPS protocol it may ask whether you trust the web-site or not.

Scheme of connections



Login

PTS-2 controller leads users and their permissions. For login into the web-server you should know the user credentials.

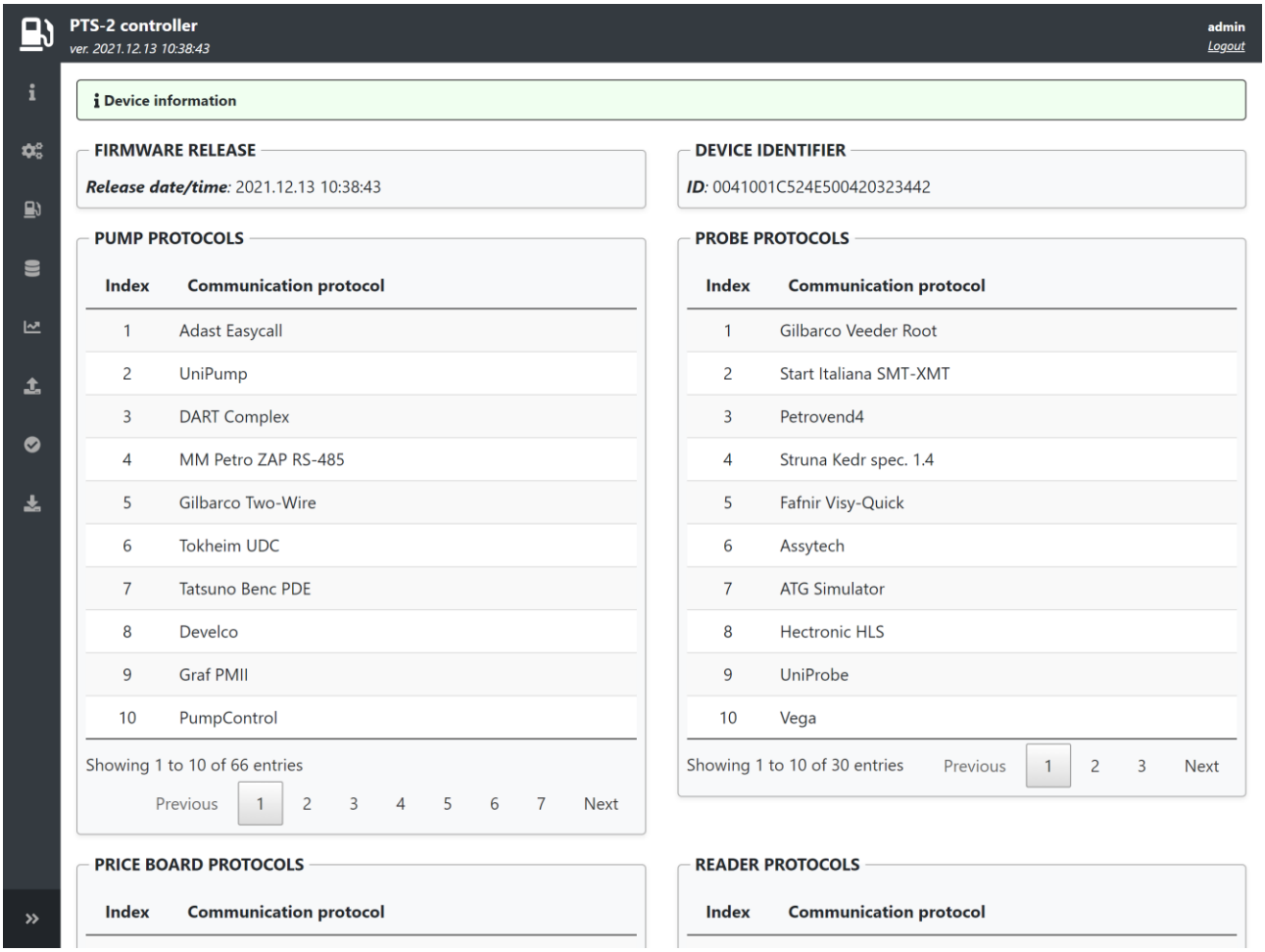


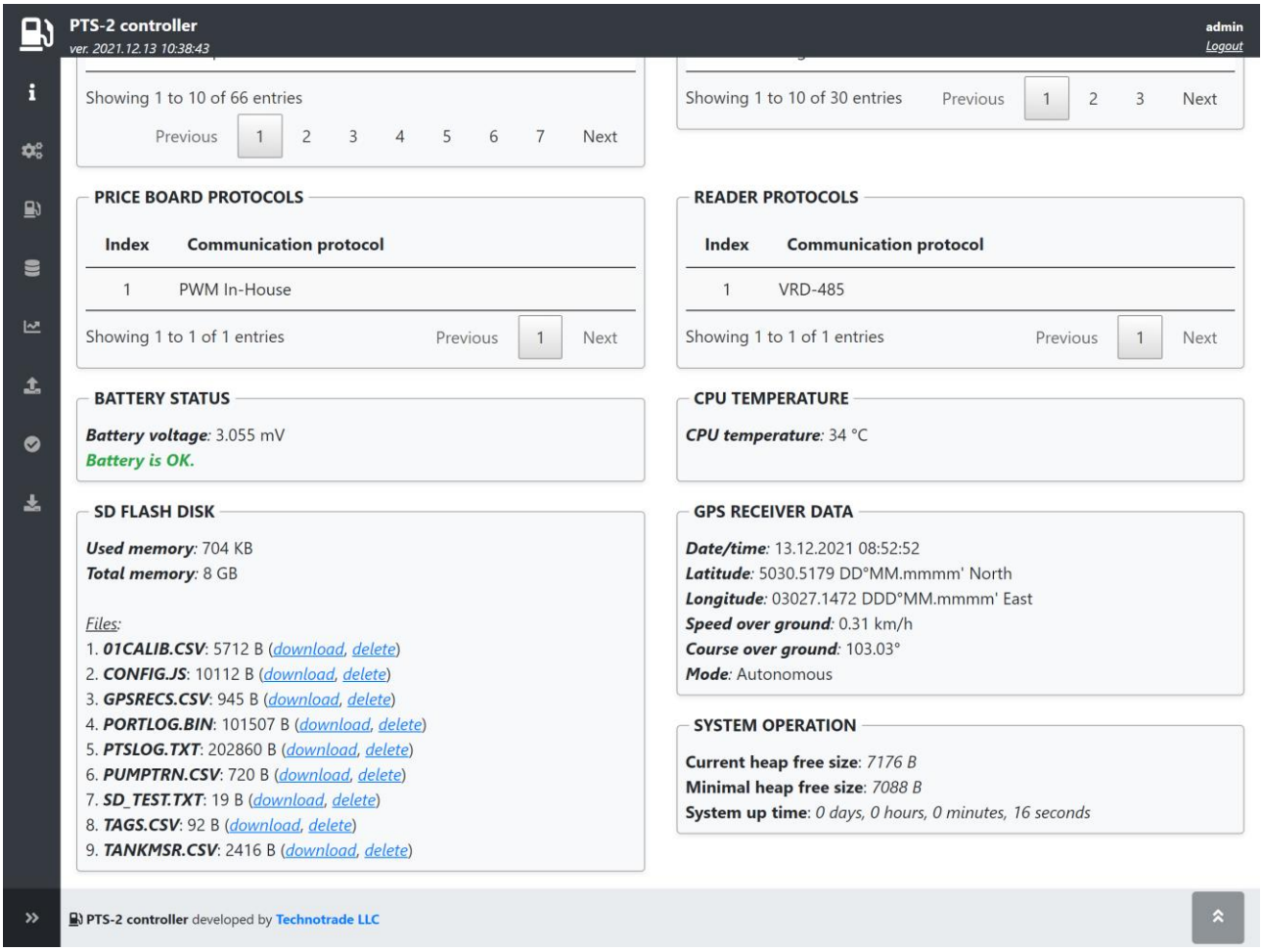
Default credentials for access to web-server are:

- login: *admin*
- password: *admin*

Device information page

Device information page serves for showing general information about PTS-2 controller firmware and hardware. You can check version of firmware and list of communication protocols included in it and also check state of battery, board unique identification number (used at upload of data to remote server) and SD flash disk memory state and files on it, at this any file can be downloaded from SD flash disk, GPS receiver status.





NOTE! Pay attention that the PTS-2 controller is using latest version of the firmware. Latest version of firmware can be received upon request from Technotrade LLC company or downloaded from Technotrade LLC company website.

NOTE! In case if battery voltage is lowered than required (lower than 3 V DC) – then it is strictly required to replace the battery with a new one, otherwise PTS-2 controller may not keep the system date and time correctly, which will lead to problems with saving of records to database, automatic detection of in-tank deliveries, and other operations as these operations are using clock.

NOTE! PTS-2 controller may work without SD flash disk inserted, but at this all operations concerning saving of data to SD flash disk will not be performed by PTS-2 controller. It is recommended to always use SD flash disk.

Configuration page

Configuration page contains all the settings of PTS-2 controller, which are divided in tabs.

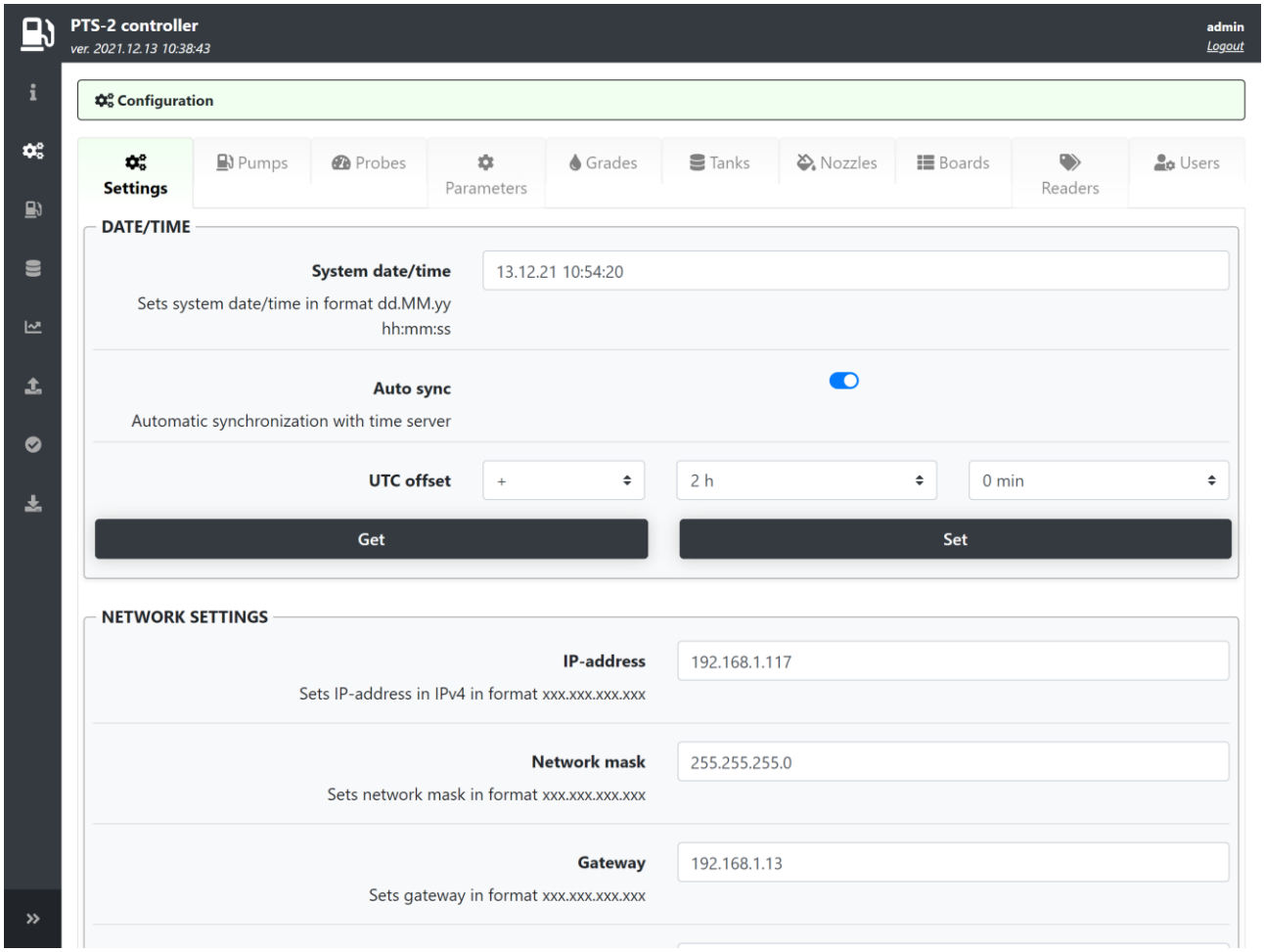
Settings tab

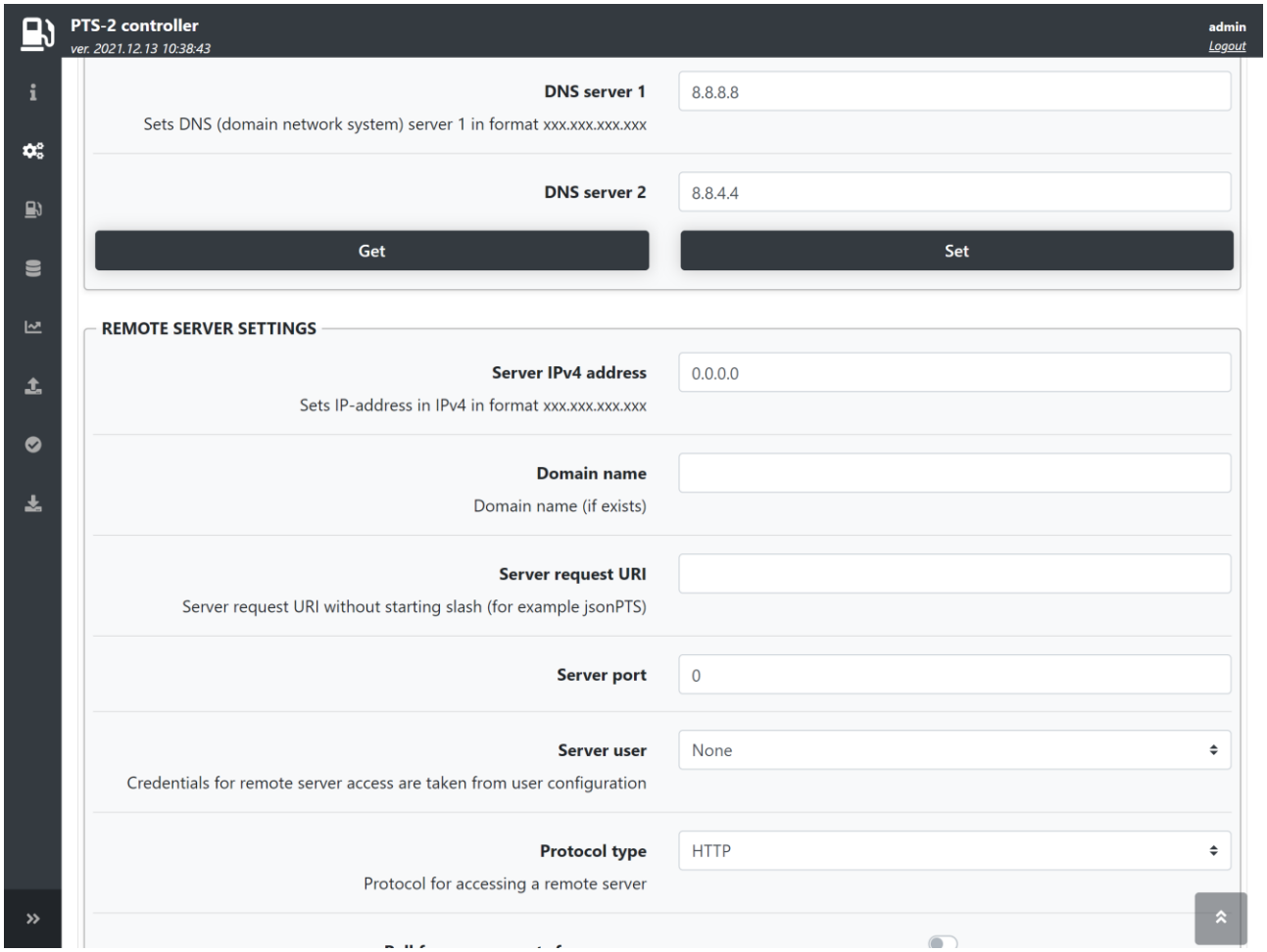
On Settings tab you can configure following settings:

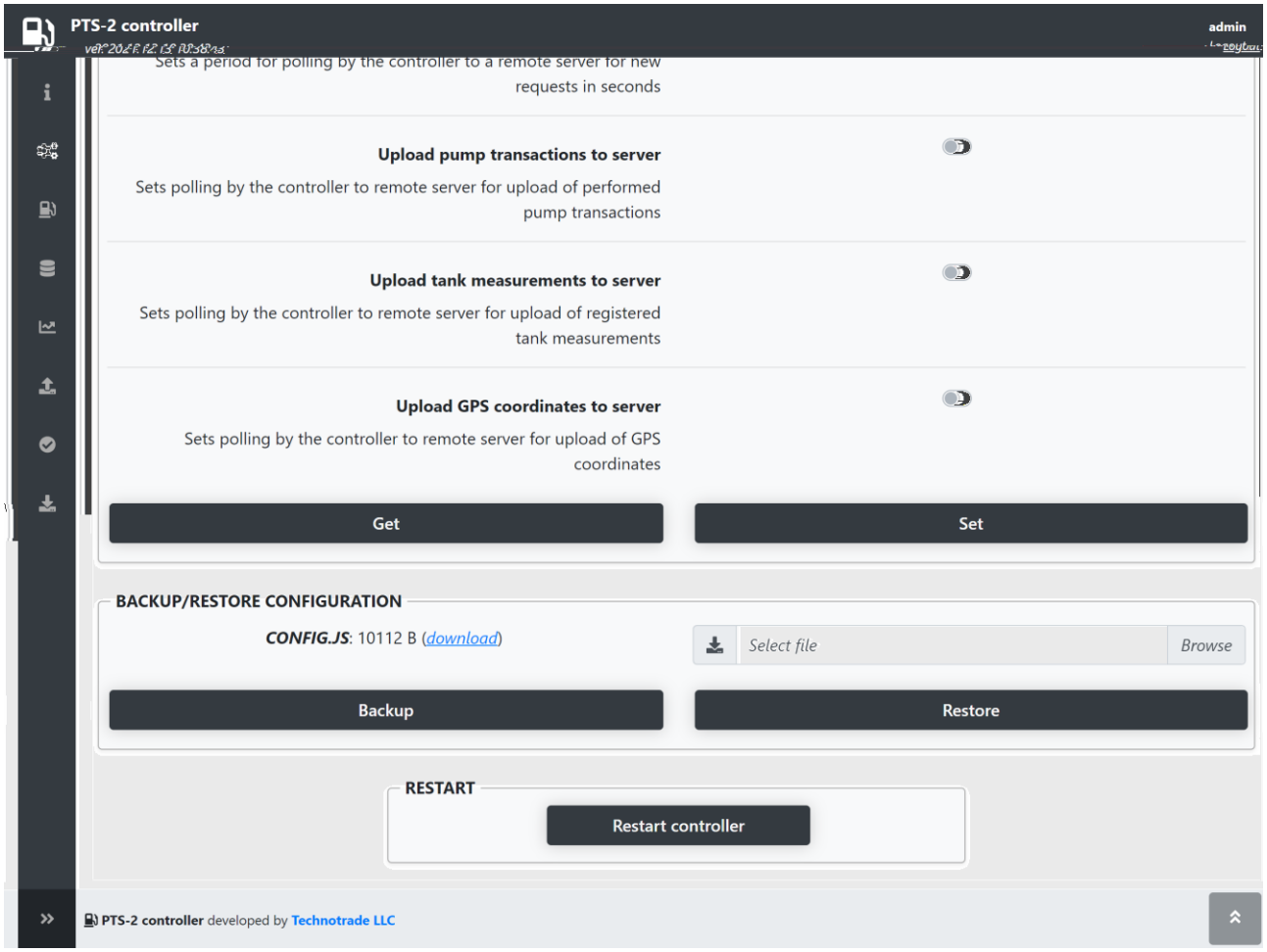
- system date and time for PTS-2 controller with a possibility to automatically synchronize with a time server and settings the UTC offset: time is used in many operations in PTS-2 controller including saving of records to database, calculation of in-tank deliveries, internal operations. For PTS-2 controller to lead time correctly there should be a battery inserted in the board.
- network settings of PTS-2 controller (IP-address, network mask, gateway, ports for HTTP and HTTPS, DNS servers)
- remote server configuration (IP-address, domain name, URI, user credentials, port, protocol type, data for upload)
- backup and restore configuration with a possibility to download and upload the configuration file *Config.js*
- restart button for instant PTS-2 controller restart

NOTE! As default port for HTTP is 80 and default port for HTTPS is 443, it allows not to enter any port in web-browser at addressing to PTS-2 controller when these ports are configured, for example address http://192.168.1.117 automatically equals http://192.168.1.117:80 and https://192.168.1.117 automatically equals https://192.168.1.117:443.

NOTE! In order for automatic time synchronization to work and also upload of data to remote server to work gateway should be configured in accordance to the network, to which PTS-2 controller is connected.

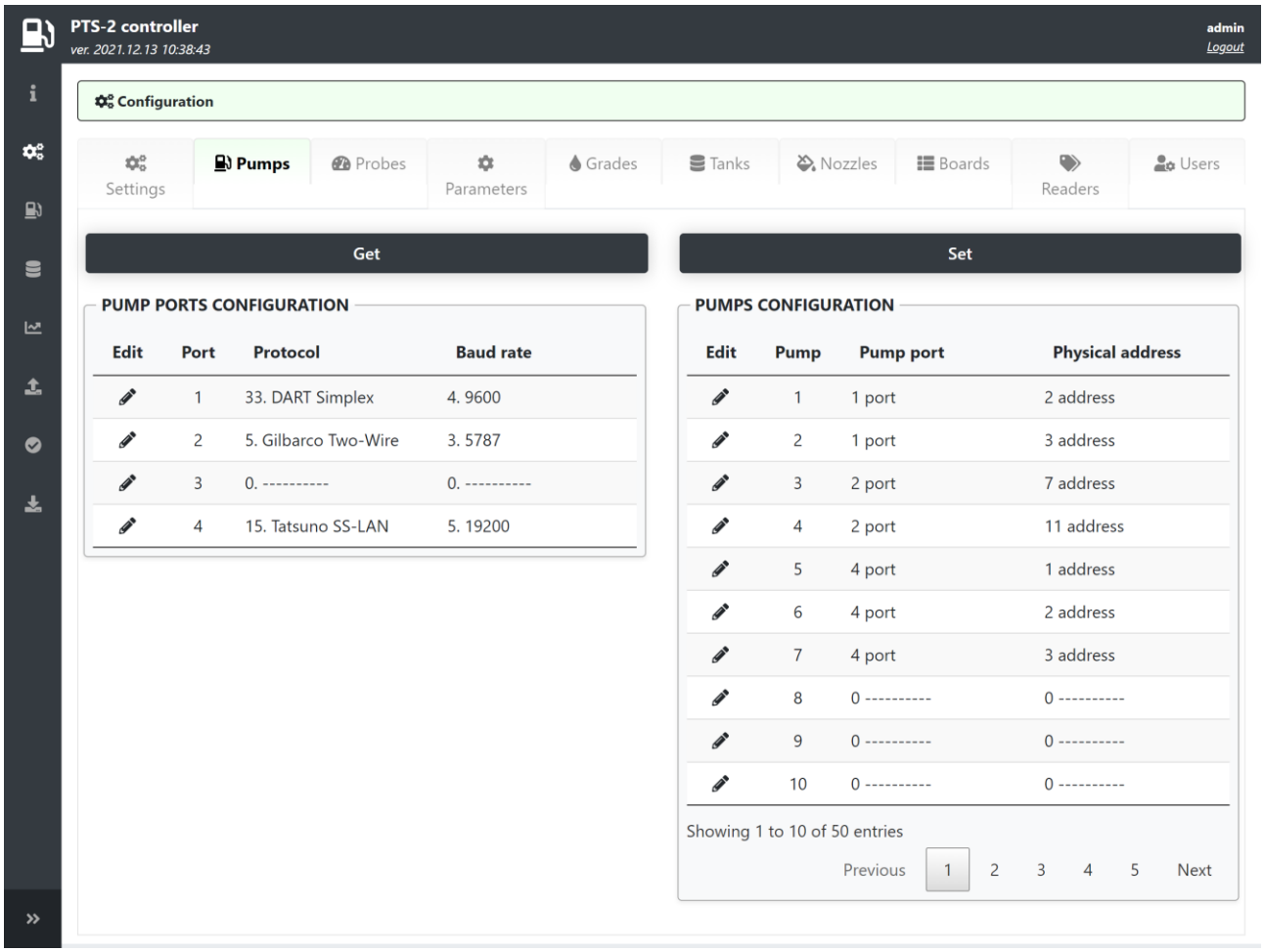



PTS-2 controller
ver. 2021.12.13 10:38:43
admin
Logout
DNS server 1
8.8.8.8
Sets DNS (domain network system) server 1 in format xxx.xxx.xxx.xxx
DNS server 2
8.8.4.4
Get
Set
REMOTE SERVER SETTINGS
Server IPv4 address
0.0.0.0
Sets IP-address in IPv4 in format xxx.xxx.xxx.xxx
Domain name
Domain name (if exists)
Server request URI
Server request URI without starting slash (for example jsonPTS)
Server port
0
Server user
None
Credentials for remote server access are taken from user configuration
Protocol type
HTTP
Protocol for accessing a remote server

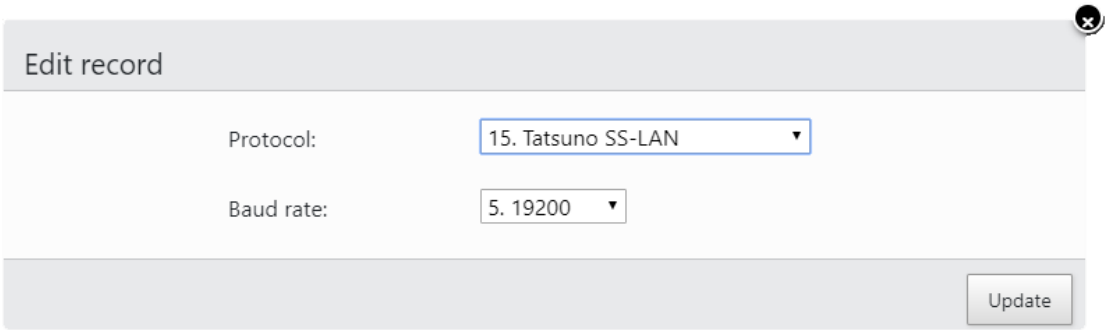

PTS-2 controller
admin
requests in seconds
Upload pump transactions to server
Sets polling by the controller to remote server for upload of performed pump transactions
Upload tank measurements to server
Sets polling by the controller to remote server for upload of registered tank measurements
Upload GPS coordinates to server
Sets polling by the controller to remote server for upload of GPS coordinates
Get
Set
BACKUP/RESTORE CONFIGURATION
CONFIG.JS: 10112 B (download)
Select file
Browse
Backup
Restore
RESTART
Restart controller
PTS-2 controller developed by Technotrade LLC

Pumps tab

On this tab you can configure each pump port to separate communication protocol and baud rate. Also, you can configure each of the pumps (up to 50) to its own pump port and assign it a physical address (communication address configured inside the dispenser).



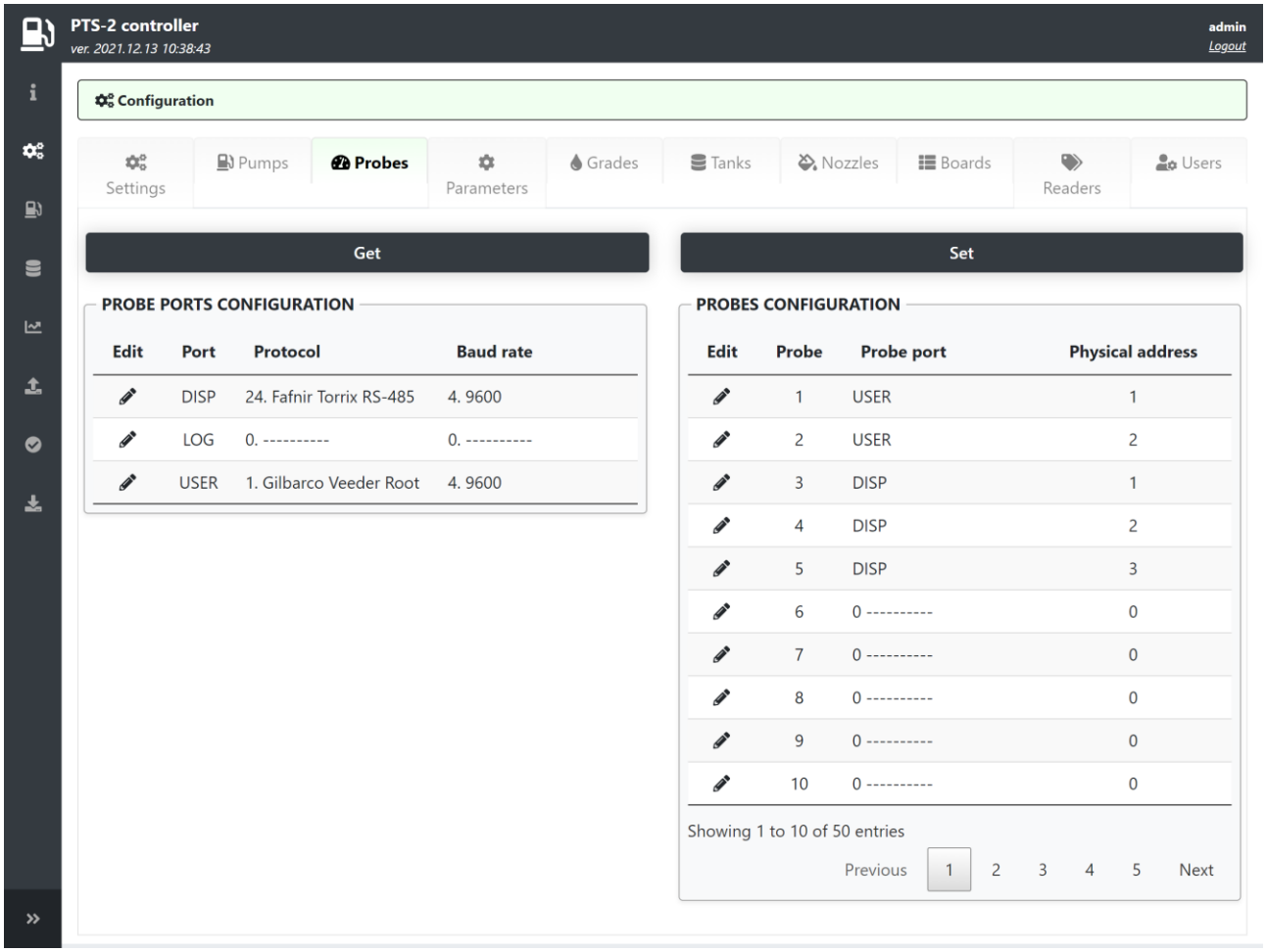
Configuration of pump ports includes setting of communication protocol and baud rate for each of the pump ports and also assigning of pumps to each of the pump ports. Each of the pumps can be assigned to any of the pump ports and requires specification of the pump physical address. Physical address of the pump means communication address (also named as ID or pump number) of the real fueling place, which is programmed or set in configuration of the fuel dispenser fueling place.



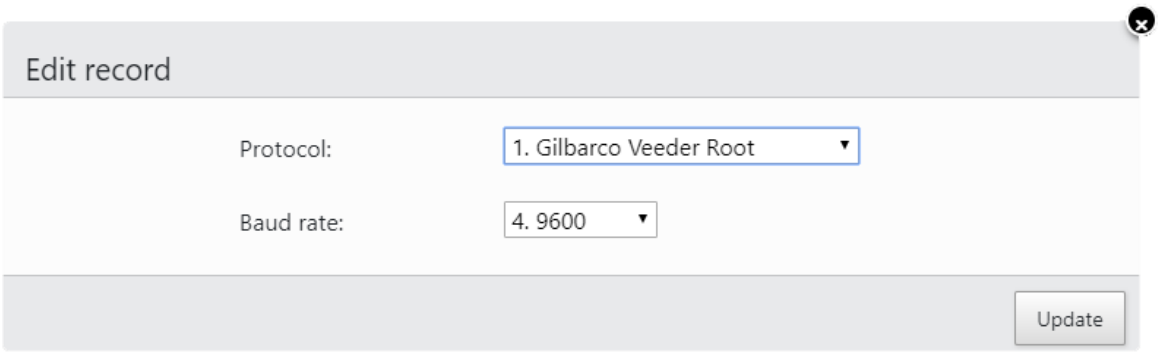
After configuration is finished it is necessary to click a button "*Set*", which writes current pump ports configuration to PTS-2 controller.

Probes tab

On this tab you can configure each probe port to separate communication protocol and baud rate. Also, you can configure each of the probes (up to 50) to its own probe port and assign it a physical address (communication address set in probe or in ATG console).



Configuration of probe ports includes setting of communication protocol and baud rate for each of the probe ports and also assigning of probes to each of the probe ports. Each of the probes can be assigned to any of the probe ports and requires specification of the probe physical address. Physical address of the probe means address of the ATG system probe, which is programmed or set in configuration of the ATG system console or in probe (in some models of probes address mean serial number stated on the probe label).



After configuration is finished it is necessary to click a button "*Set*", which will write current probe ports configuration to PTS-2 controller.

Parameters tab

On this tab you can configure parameters for

- PTS-2 controller
- pumps' parameters
- probes' parameters

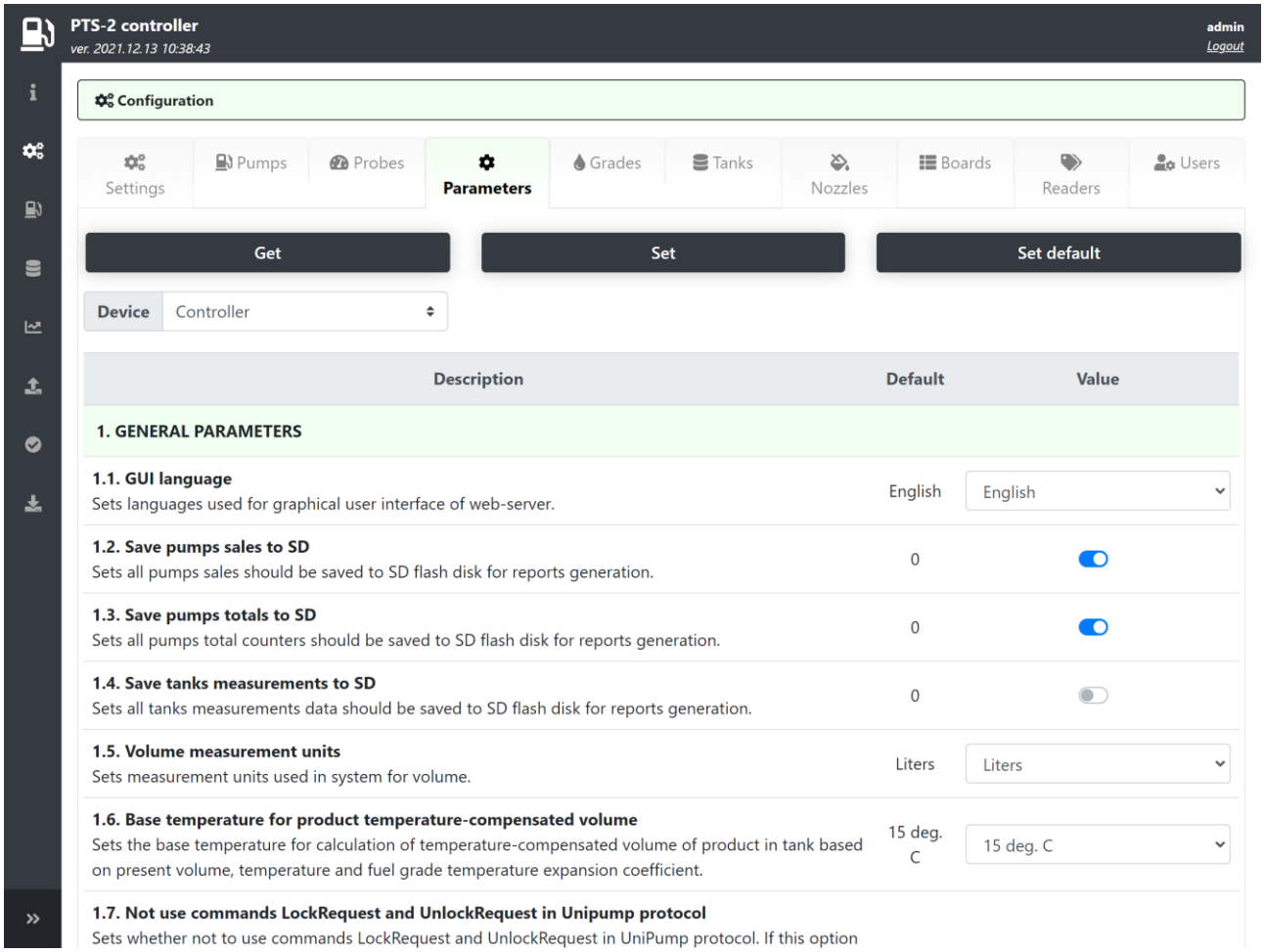
All parameters are listed in a table with detailed description. Default parameters values are specified in a separate column.

Parameters are specific settings used in PTS-2 controller, they are saved in a separate file Pts_config_en.js, please see section "*Configuration file Pts_config_en.js*" in this document. List of parameters depends on firmware version of PTS-2 controller.

After configuration is finished it is necessary to click a button "Set", which will write current parameters configuration to PTS-2 controller.

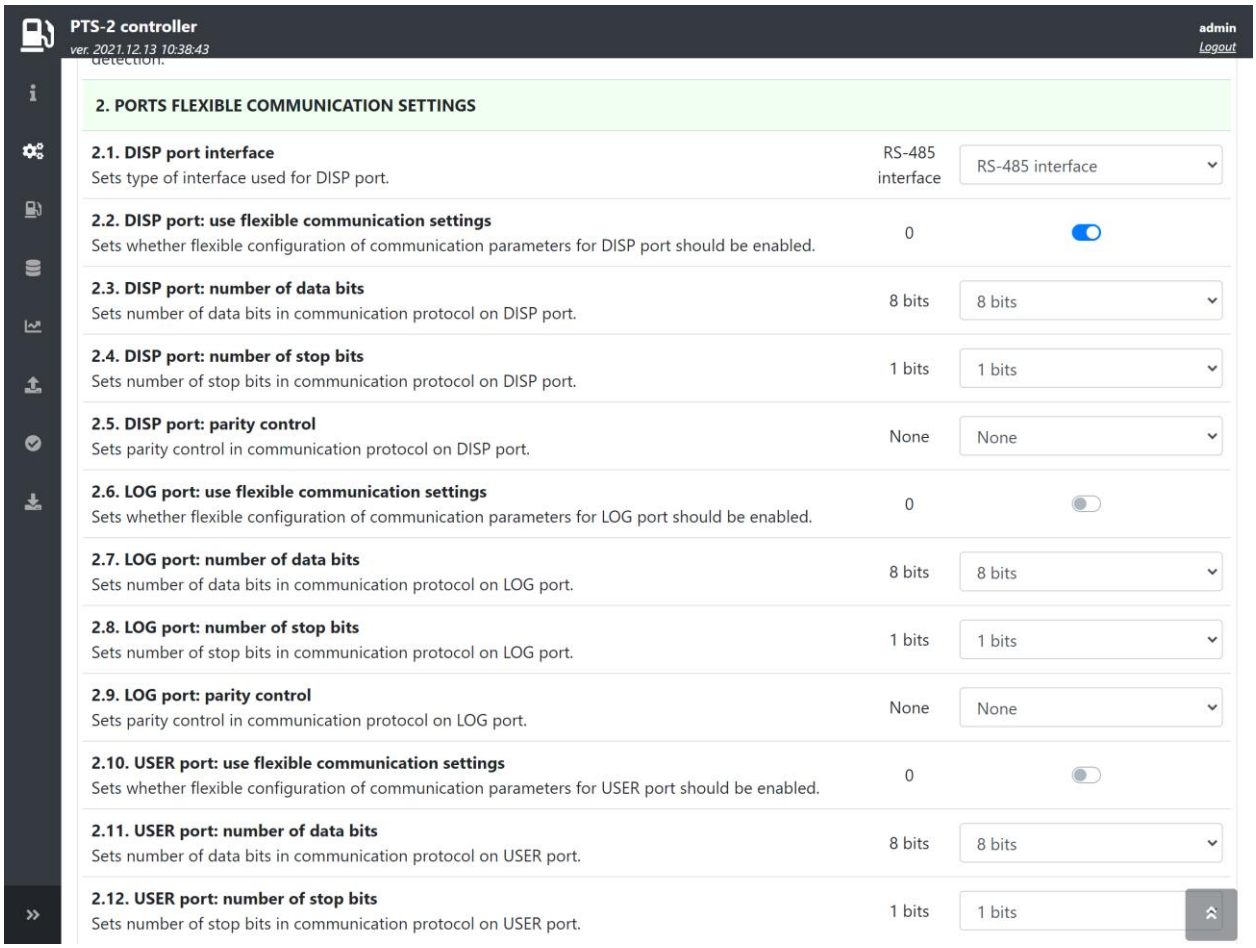
PTS-2 controller parameters

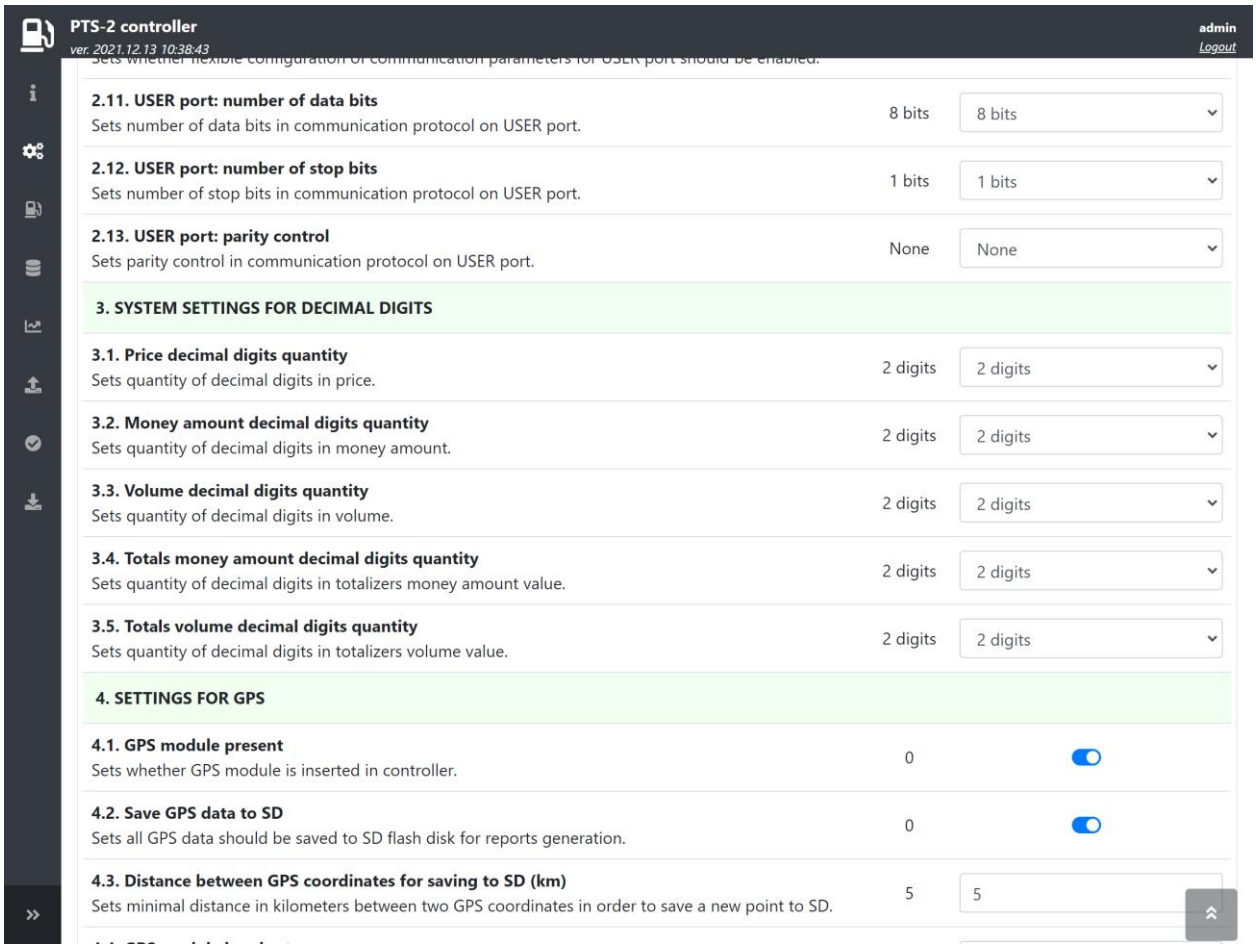
PTS-2 controller parameters define specific system settings for operation of the PTS-2 controller in general. All parameters are grouped by appointment with description. Parameters include general settings, flexible communication settings for probe ports, setting of decimal digits, GPS settings, ports settings for connection to non-addressable interface converters, others.



General parameters group includes such general parameters as saving of pumps sales (and total counters) and tanks measurements to SD flash disk, language, units of measurements and some other parameters.

Port flexible communication settings group includes parameters for setting communication parameters for each of the probe ports: number of data bits, number of stop bits, parity.





Decimal digits group set number of decimal digits for system account and saving to SD for:

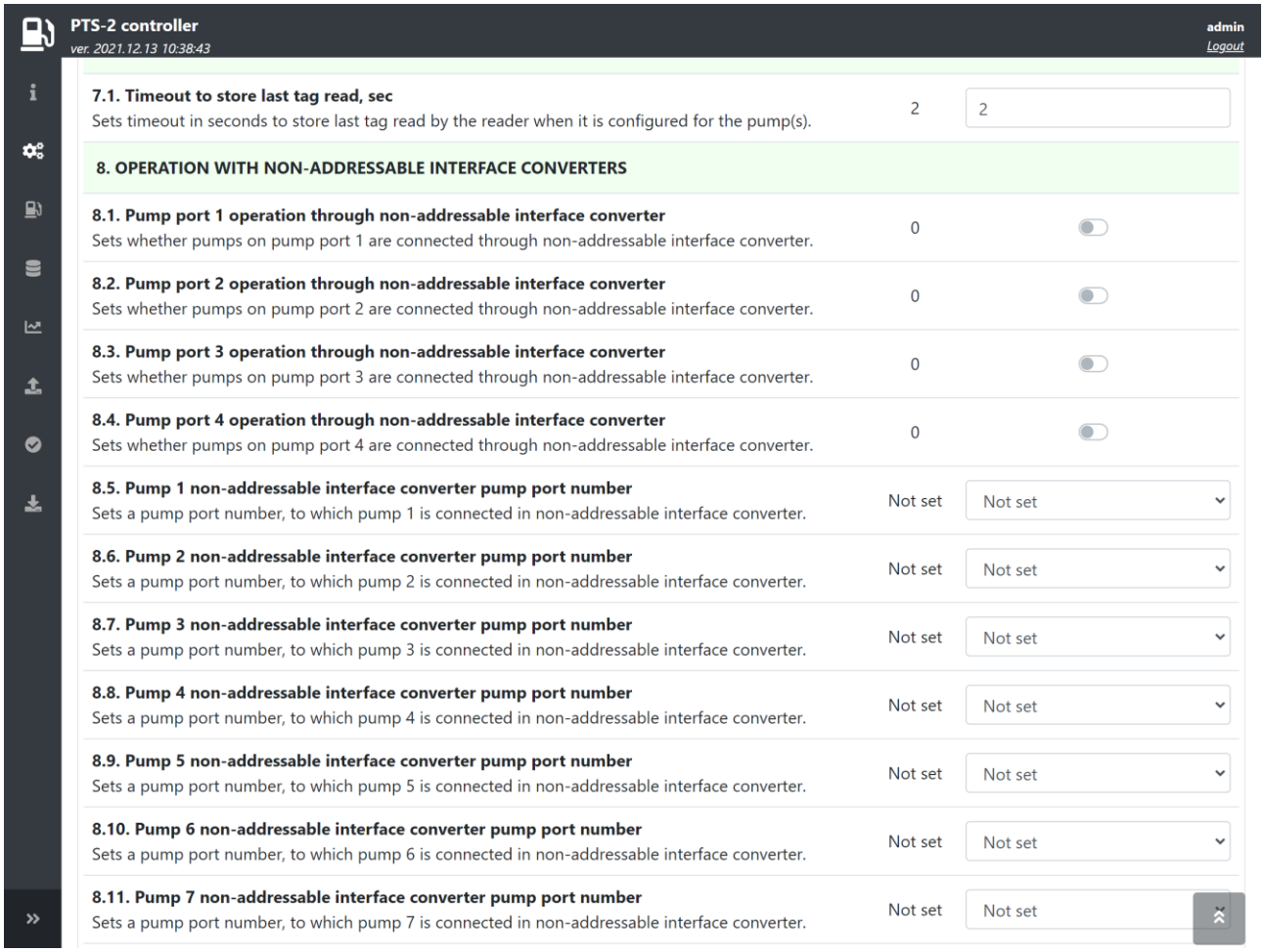
- price
- volume
- amount
- volume total counters
- amount total counters

GPS settings allow to configure presence of GPS module on the board of PTS-2 controller and set its configuration.

Settings for login allow to provide extended logging for operation in automatic mode.

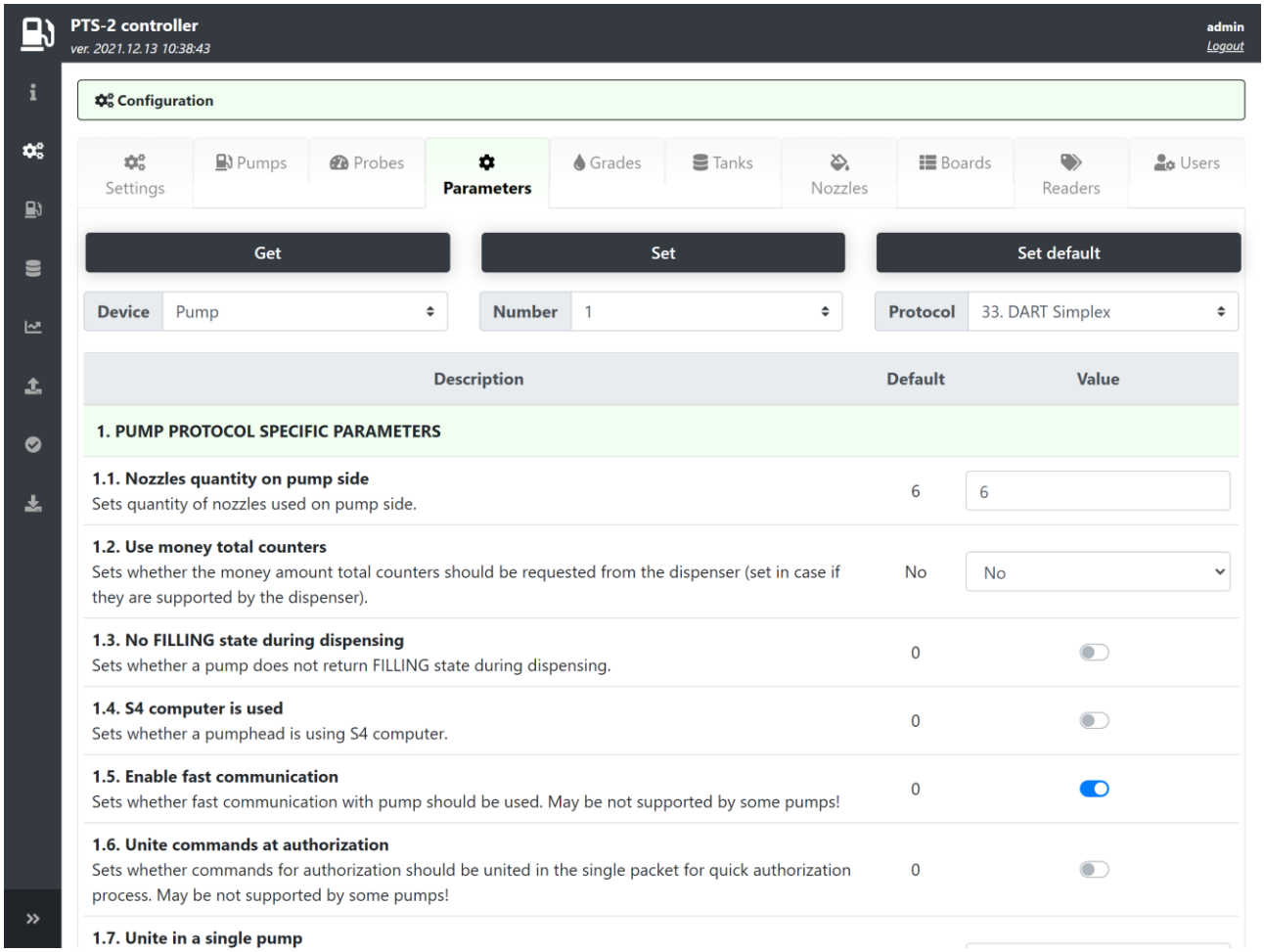
Settings for readers allow to set how long the tag identifier should be stored after successful reading.

Non-addressable interface converters group is used for configuration of PTS-2 controller for operation with non-addressable interface converters NA (https://technotrade.ua/non-addressable-interface-converter.html), used for connection to pump ports of PTS-2 controller of many dispensers, which do not have a communication address in their communication protocol.



Pump parameters

PTS-2 controller foresees specific configuration parameters for each type of pump communication protocols. They are to be set for each of the pumps individually.



Parameters for pumps include 3 several sections:

- protocol specific parameters: these parameters depend on the protocol type and for some pump protocols can be absent
- authorization settings: these settings are general for all the pumps and refer to authorization options
- multipliers: these settings are general for all the pumps to adjust the values sent/received to/from dispensers during communication to make PTS-2 controller display same values as displayed on the dispenser display

Authorization settings allow to set various way of dispensers operation. For example, if you need to set the dispensers in completely automatic mode of operation when the dispenser will get authorized automatically when the nozzle is taken up and each sale is saved PTS-2 controller for reporting – then enable the following parameters:

- parameter “Automatically authorize pump on nozzle up” in pump parameters
- parameter “Automatically close transaction” in pump parameters
- parameter “Read pump totals automatically” in pump parameters (if you need to have totals from pumps)
- parameter “Save pumps sales to SD” in parameters of PTS-2 controller

PTS-2 controller
ver. 2021.12.13 10:38:43
admin
Logout

2. PUMP AUTHORIZATION SETTINGS

2.1. Automatically authorize pump on nozzle up Sets whether controller should automatically authorize pump on nozzle up detection. Authorization is done to full tank, so preset can be entered from dispenser keyboard.	0	
2.2. Automatically close transaction Sets whether transactions should be closed automatically by controller in end of filling.	0	
2.3. Authorize pump only on nozzle up Sets whether ontroller should authorize pumps only on nozzle up. If this parameter is set - then at receiption of authorization command from control system on nozzle down controller will wait until the nozzle is taken up on a pump before sending authorization to it.	0	
2.4. Automatically stop pump at overfilling Sets whether stop command should be sent to pump automatically at detection of overfilling.	0	
2.5. Ignore repeated authorization Sets whether repeated authorization command should be ignored. If this parameter is set then controller will ignore any repeated authorization commands to pump if authorization command was already sent to it before.	0	
2.6. Read pump totals automatically Sets to read pumps total counters automatically at connection to pump and after each pump transaction end. If this parameter is set - then the controller will request total counters automatically in end of each dispensing and the control system will receive totals automatically in end of dispensing without a need to request them. Also, in case if the control system requests total counters separately - the controller will send them immediately without spending time to request them from the pump. Also, in case if parameter SAVE PUMP SALES TO SD is set in parameters of controller - then total counters would be also saved to SD with a possilibity to generate totals in report on pump transactions.	0	
2.7. Verify tag before authorization Sets to automatically verify the user's tag before pump authorization. This parameter needs the controller to have tag's readers configured and linked to this pump. The controller will authorize the pump only in case if the tag, read by the reader, linked to given pump, is valid. List of tags is stored inside the controller.	0	

PTS-2 controller
ver. 2021.12.13 10:38:43
admin
Logout

3.1. Number of nozzles Sets number of nozzles used in pump.	4	4
3.2. Send price only at authorization Sets whether price should be sent to pump only during authorization process. If this option is set - then controller will not send the prices to dispenser if it is not an authorization process, this will help to make authorization process be faster.	0	
3.3. Do not use pump totals Sets whether the pump is not using pump totals. If this option is set - then controller will respond with 0 values on request of total counters for any nozzle of given pump.	0	

4. PUMP MULTIPLIERS

4.1. Price multiplier Sets multiplier for price value.	1	1
4.2. PumpAuthorize request volume Sets multiplier for PumpAuthorize request volume value.	1	1
4.3. PumpAuthorize request amount Sets multiplier for PumpAuthorize request amount value.	1	1
4.4. PumpFillingStatus and PumpEndOfTransactionStatus responses volume Sets multiplier for PumpFillingStatus and PumpEndOfTransactionStatus responses volume value.	1	1
4.5. PumpFillingStatus and PumpEndOfTransactionStatus responses amount Sets multiplier for PumpFillingStatus and PumpEndOfTransactionStatus responses amount value.	1	1
4.6. PumpTotals response volume Sets multiplier for PumpTotals response volume value.	1	1
4.7. PumpTotals response amount Sets multiplier for PumpTotals response amount value.	1	1

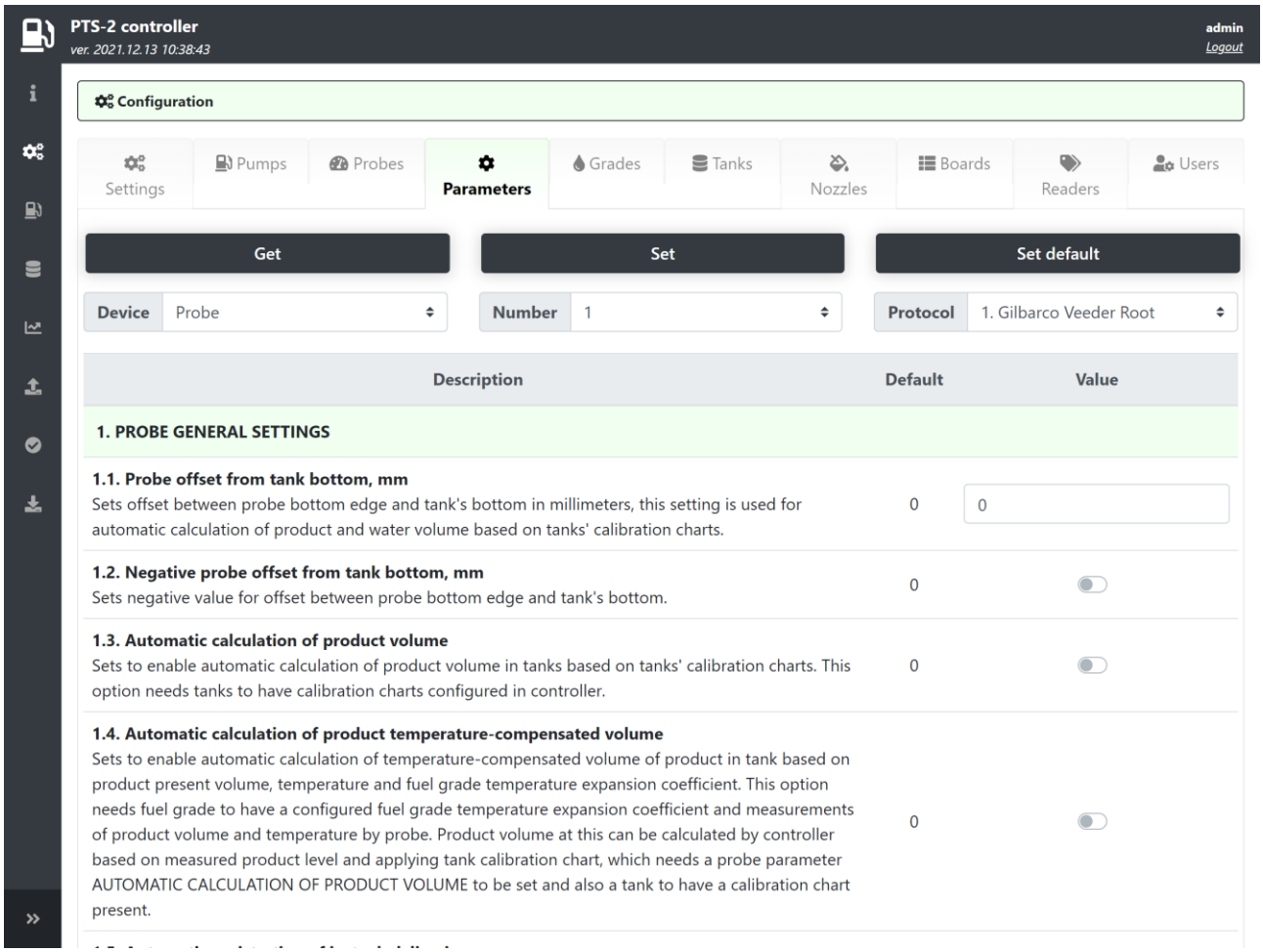
PTS-2 controller developed by Technotrade LLC

Probe parameters

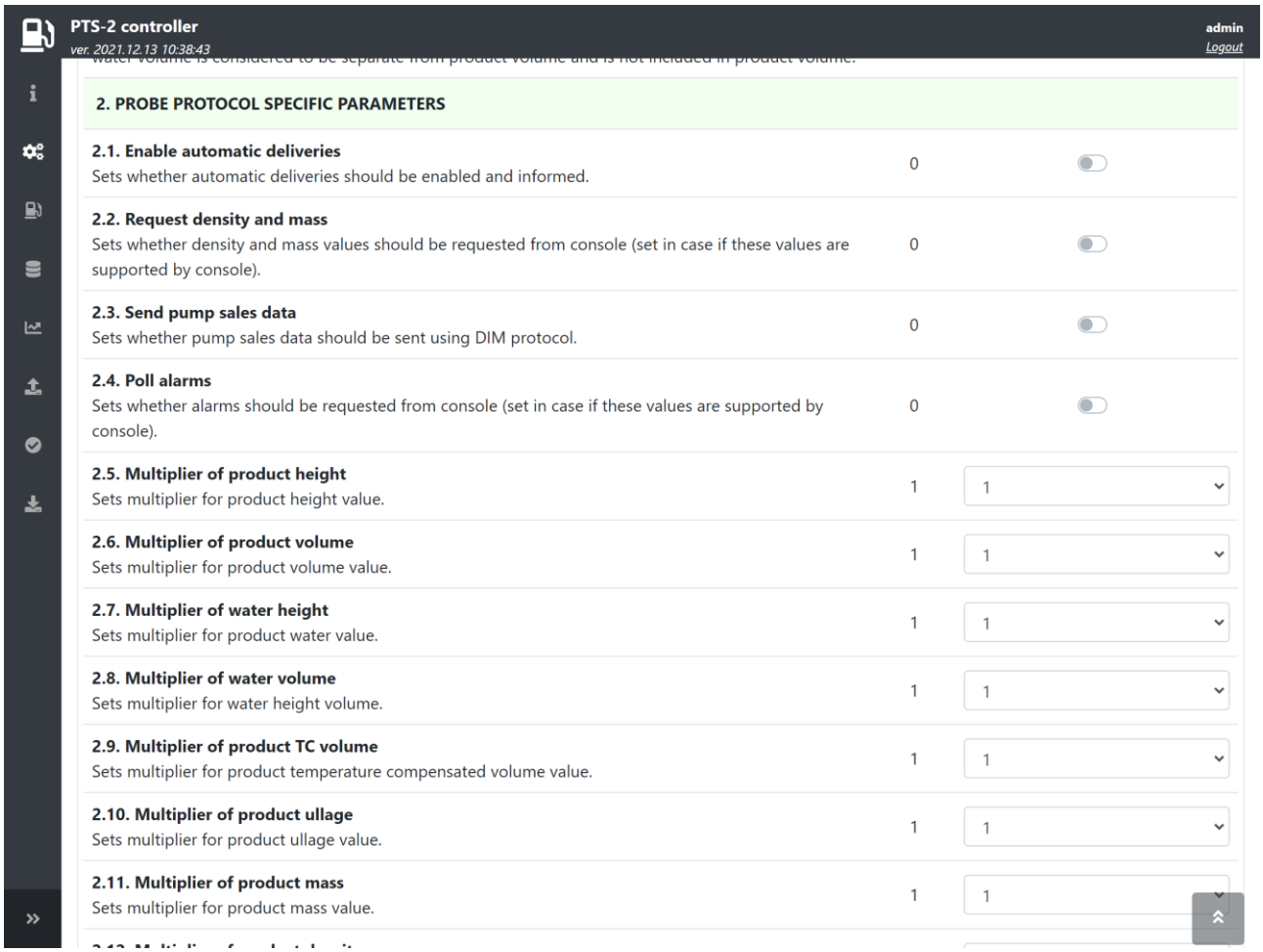
Similar to pumps protocols parameters PTS-2 controller foresees general parameters for each probe and also specific configuration parameters for each type of probe communication protocols. They are to be set for each of the probes individually.

Among general parameters you can find the following:

- enabling of automatic calculation of product volume in tank based on tank calibration chart: this parameter in necessary when PTS-2 connects to measurement probes installed in tanks, which measure only fuel level, in this case tanks in PTS-2 controller should have calibration charts uploaded
- enabling automatic calculation of product temperature-compensated volume of product in tank
- automatic detection of in-tank deliveries in tanks
- automatic detection of tank alarms
- automatic calculation of product mass
- others

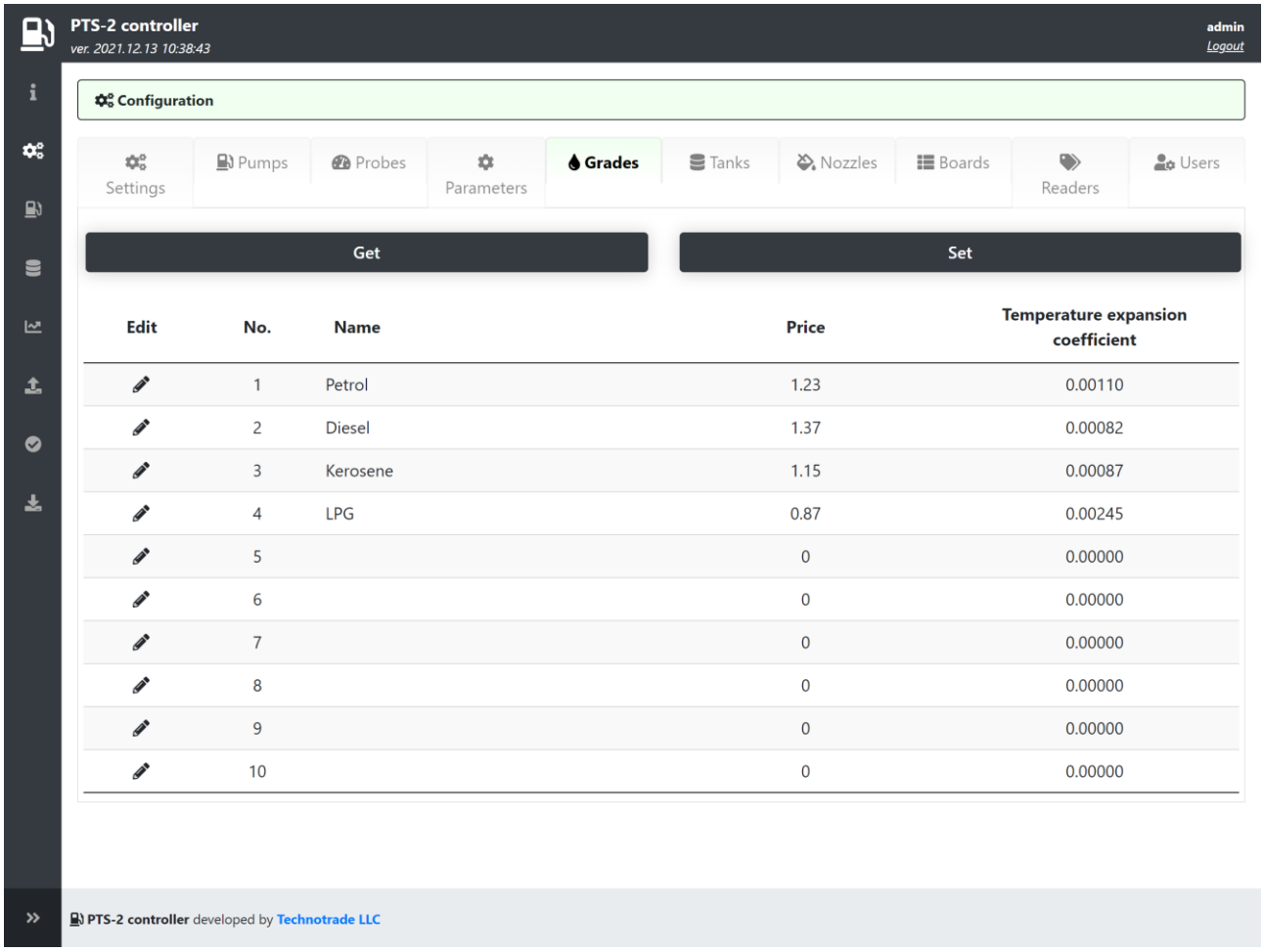


Probe specific parameters are protocol dependent.



Grades tab

On this tab you can configure fuel grades used in PTS-2 controller. This includes settings of fuel grade name, price per liter/gallon and setting of temperature-expansion coefficient.



Edit	No.	Name	Price	Temperature expansion coefficient
	1	Petrol	1.23	0.00110
	2	Diesel	1.37	0.00082
	3	Kerosene	1.15	0.00087
	4	LPG	0.87	0.00245
	5		0	0.00000
	6		0	0.00000
	7		0	0.00000
	8		0	0.00000
	9		0	0.00000
	10		0	0.00000

NOTE! Number of decimal digits in price is configured in parameters of PTS-2 controller on tab Parameters.

NOTE! Temperature-expansion coefficient is needed for automatic calculation of temperature-compensated volume in tanks and also dispensed by pumps.

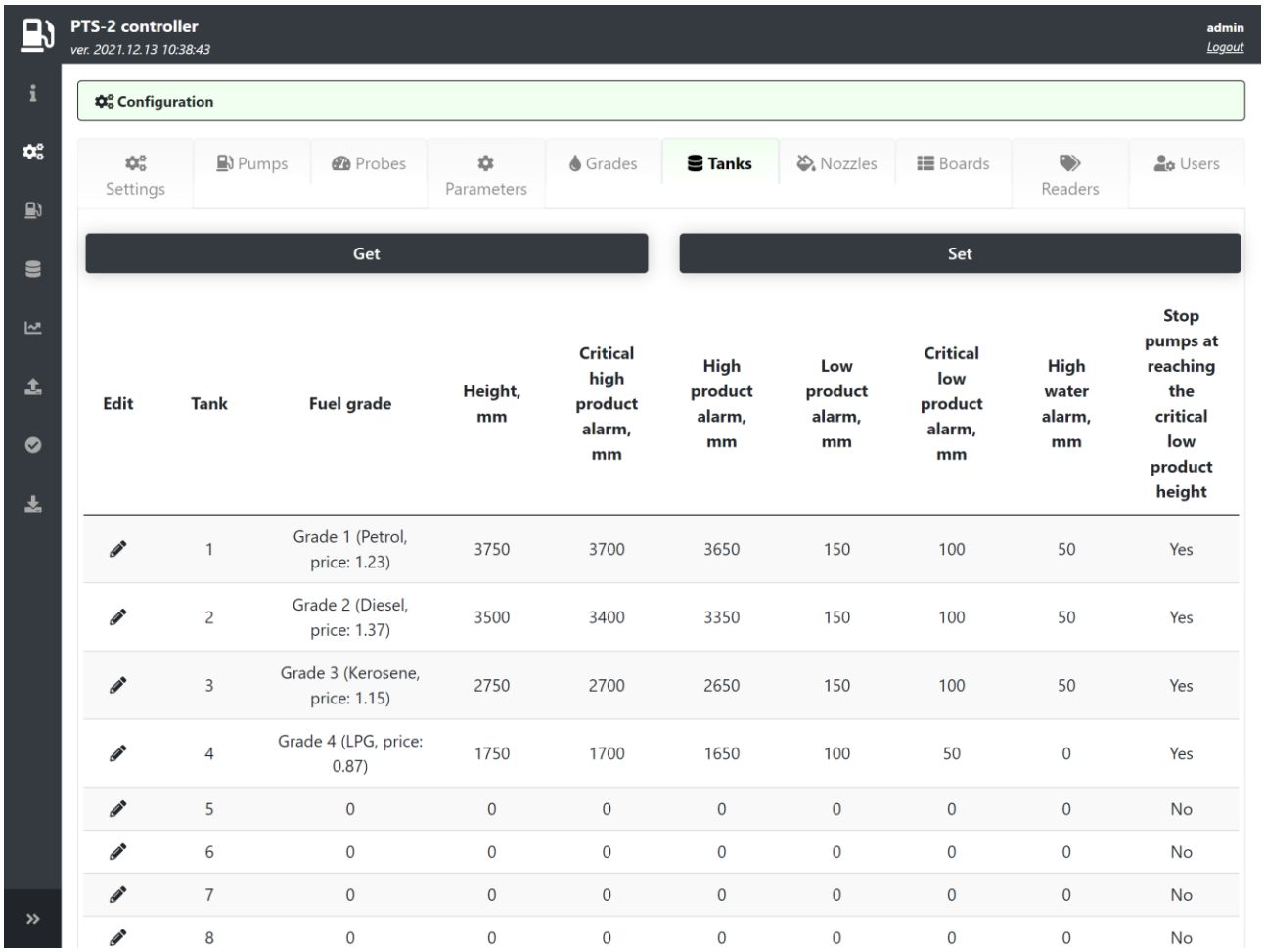
For general liquids a linear correction factor can be applied to give volumetric flow at base condition. The thermal expansion coefficient for liquids is determined empirically and can be found in chemical engineering texts.

Thermal coefficients of expansion at 15 °C for various liquids:

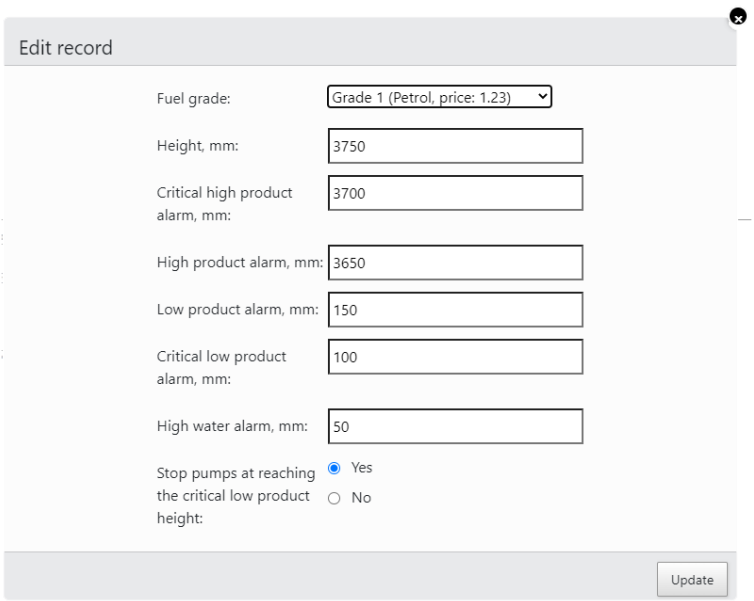
PRODUCT	COEFFICIENT OF EXPANSION / °C
LPG propane	0.00290
LPG butane	0.00200
Aviation gasoline	0.00120
Petrol	0.00110
Aviation jet a-1	0.00094
Lightning kerosene	0.00094
Power kerosene	0.00087
Heating oil	0.00087
Automotive distillate	0.00084
Industrial diesel fuel	0.00082
Fuel oil high sulphur	0.00070
Fuel oil low sulphur	0.00075
Bitumen	0.00063
Crude oil (bass strait)	0.00087
Benzene	0.00120
Toluene	0.00110
Xylene	0.00100
White spirit	0.00095
Mineral turpentine	0.00087
Lube oils:	
SAE10	0.00077
SAE20	0.00076
SAE30	0.00076
SAE40	0.00074
SAE50	0.00074
Water	0.00031

Tanks tab

On this tab you can configure tanks: used fuel grades and heights. Also, you can assign a calibration chart.



Edit	Tank	Fuel grade	Height, mm	Critical high product alarm, mm	High product alarm, mm	Low product alarm, mm	Critical low product alarm, mm	High water alarm, mm	Stop pumps at reaching the critical low product height
	1	Grade 1 (Petrol, price: 1.23)	3750	3700	3650	150	100	50	Yes
	2	Grade 2 (Diesel, price: 1.37)	3500	3400	3350	150	100	50	Yes
	3	Grade 3 (Kerosene, price: 1.15)	2750	2700	2650	150	100	50	Yes
	4	Grade 4 (LPG, price: 0.87)	1750	1700	1650	100	50	0	Yes
	5	0	0	0	0	0	0	0	No
	6	0	0	0	0	0	0	0	No
	7	0	0	0	0	0	0	0	No
	8	0	0	0	0	0	0	0	No

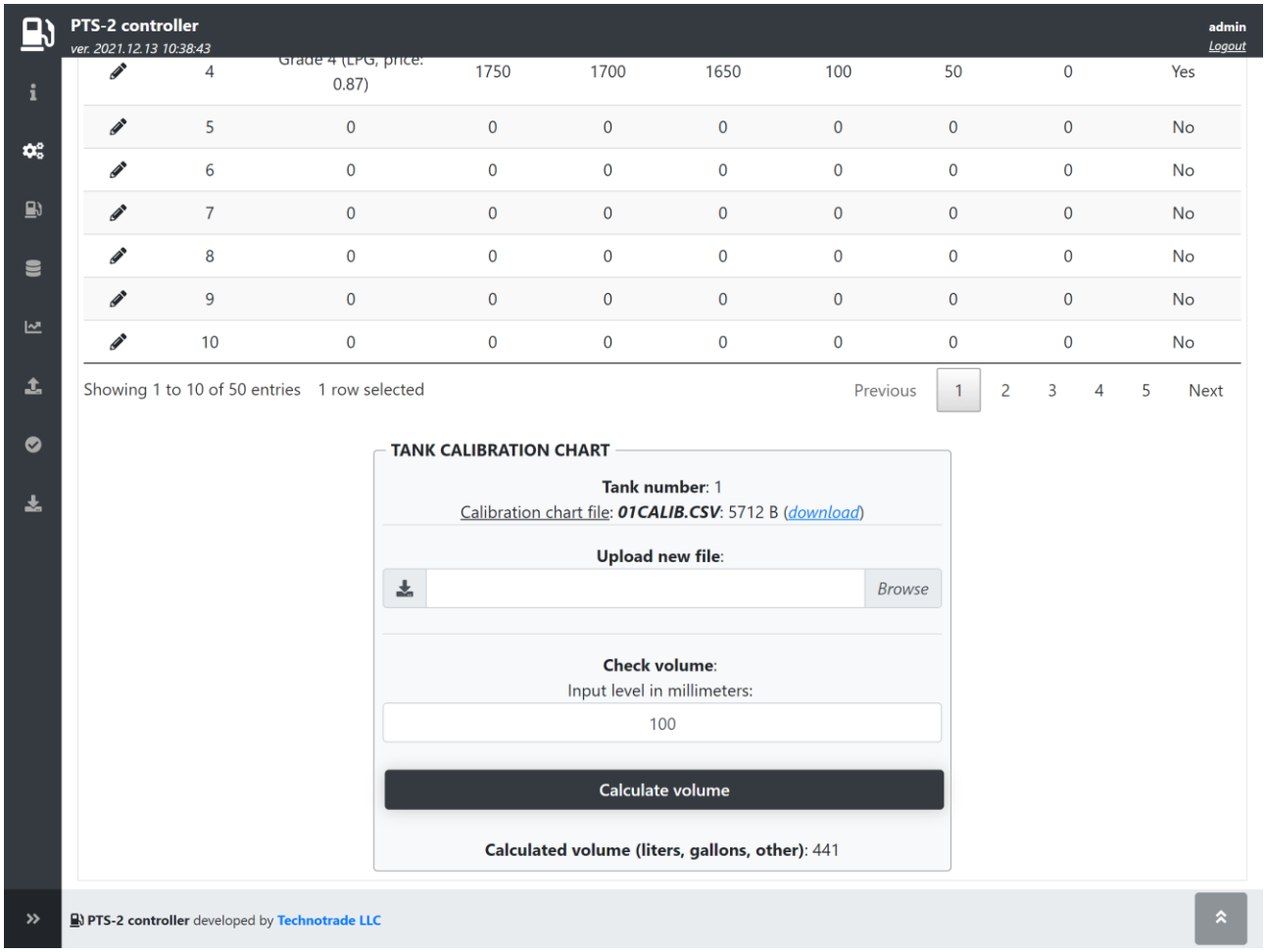


NOTE! It is assumed that tanks' IDs completely correspond to probes' IDs in meaning:

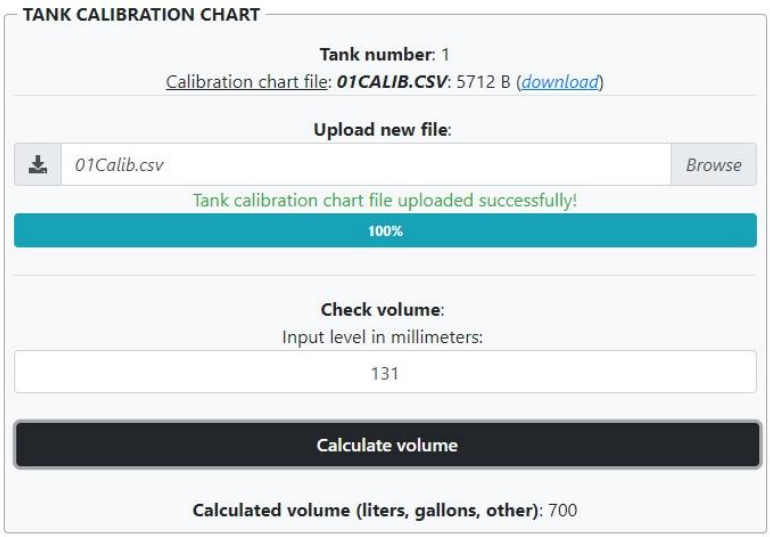
- tank with ID 1 corresponds probe with ID 1
- tank with ID 2 corresponds to probe with ID 2
- …
- tank with ID N corresponds to probe with ID N

It is possible to apply alarms for high and low product and water levels and also to set to stop pumps automatically when the product level lowers below the critical low value.

For assigning a tank calibration chart it is necessary to select a raw in a table for specific tank and in field under a tanks table to select a path to the tank calibration chart file.



Button "*Calculate volume*" allows to check tank's cabliration chart by checking volume for any level entered.

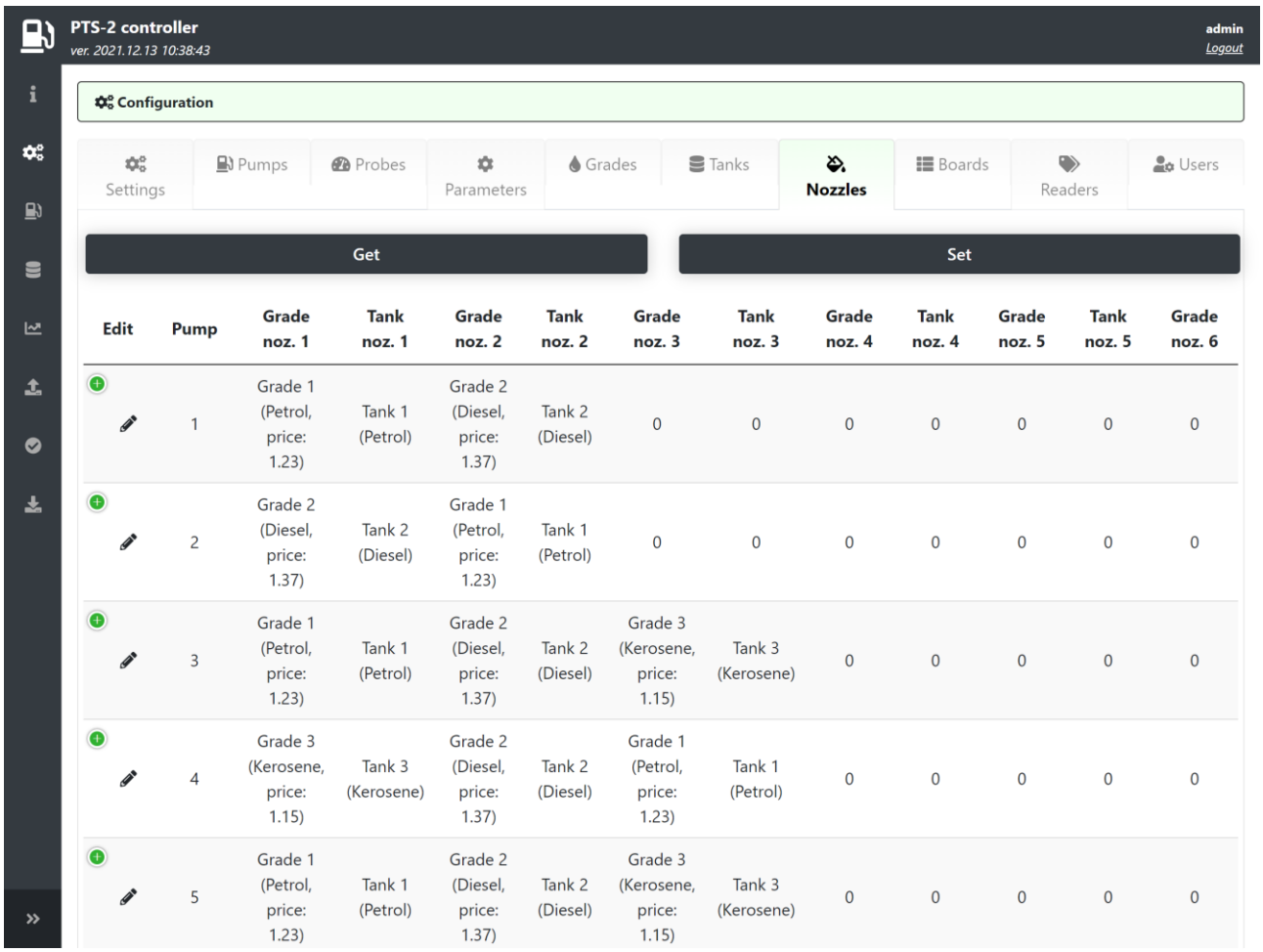


NOTE! It is possible to set a calibration chart for the tank after configuration of tanks is saved.

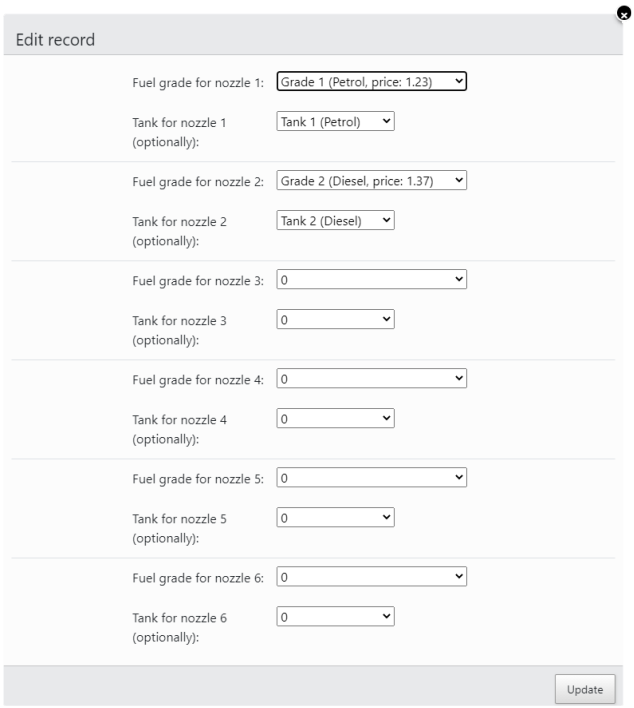
NOTE! Structure of tank calibration chart files is described in section "*Files stored on SD flash disk*".

Nozzles tab

On this tab you can configure linkage of pump nozzles to fuel grades and to tanks (optional). used in PTS-2 controller.



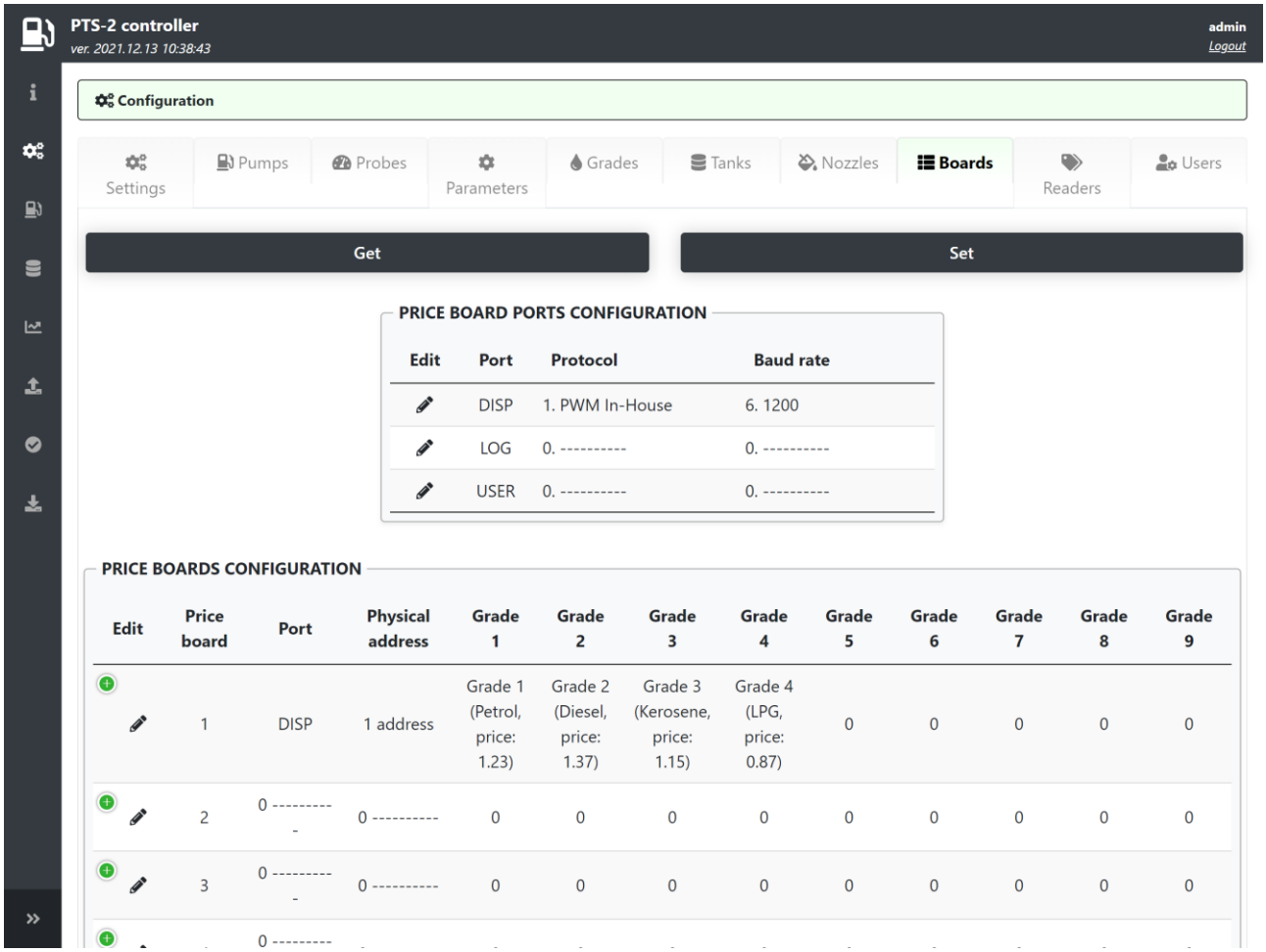
Edit	Pump	Grade noz. 1	Tank noz. 1	Grade noz. 2	Tank noz. 2	Grade noz. 3	Tank noz. 3	Grade noz. 4	Tank noz. 4	Grade noz. 5	Tank noz. 5	Grade noz. 6
	1	Grade 1 (Petrol, price: 1.23)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.37)	Tank 2 (Diesel)	0	0	0	0	0	0	0
	2	Grade 2 (Diesel, price: 1.37)	Tank 2 (Diesel)	Grade 1 (Petrol, price: 1.23)	Tank 1 (Petrol)	0	0	0	0	0	0	0
	3	Grade 1 (Petrol, price: 1.23)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.37)	Tank 2 (Diesel)	Grade 3 (Kerosene, price: 1.15)	Tank 3 (Kerosene)	0	0	0	0	0
	4	Grade 3 (Kerosene, price: 1.15)	Tank 3 (Kerosene)	Grade 2 (Diesel, price: 1.37)	Tank 2 (Diesel)	Grade 1 (Petrol, price: 1.23)	Tank 1 (Petrol)	0	0	0	0	0
	5	Grade 1 (Petrol, price: 1.23)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.37)	Tank 2 (Diesel)	Grade 3 (Kerosene, price: 1.15)	Tank 3 (Kerosene)	0	0	0	0	0



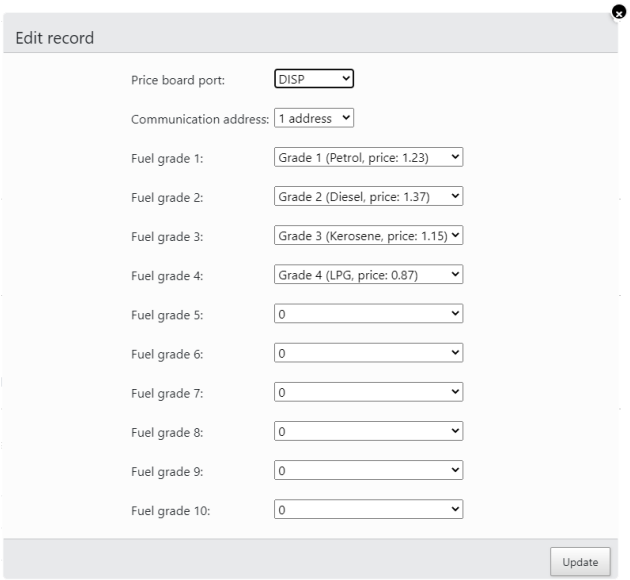
After configuration is finished it is necessary to click a button “Set”, which will write current configuration to PTS-2 controller.

Boards tab

On this tab you can configure ports for communication with price boards, you can configure each of the price boards (up to 5) to its own port and assign it a physical address (communication address configured inside the price board).

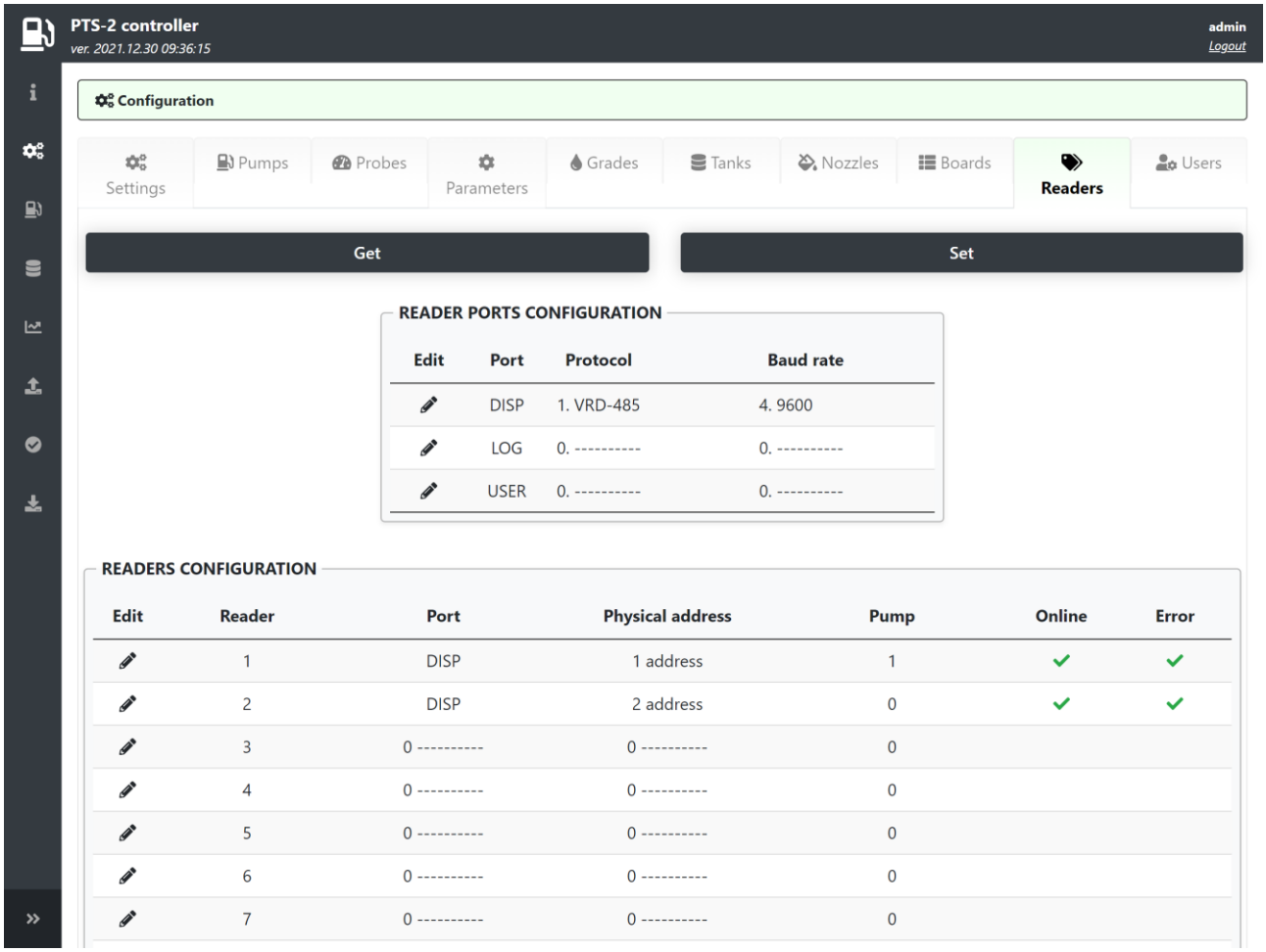


Configuration of ports includes setting of communication protocol and baud rate for each of the ports and also assigning the price boards to each of the ports. Each of the price boards should be also assigned grades, which prices it has to show on its displays (up to 10 prices per the price board). Price boards configuration table also displays price boards' statuses (online state and errors present in communication using icons).

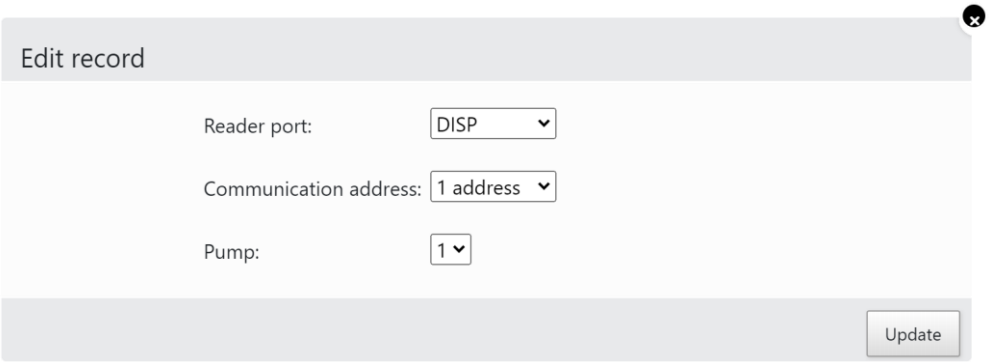


Readers tab

On this tab you can configure ports for communication with readers, you can configure each of the readers (up to 50) to its own port and assign it a physical address (communication address configured inside the reader).

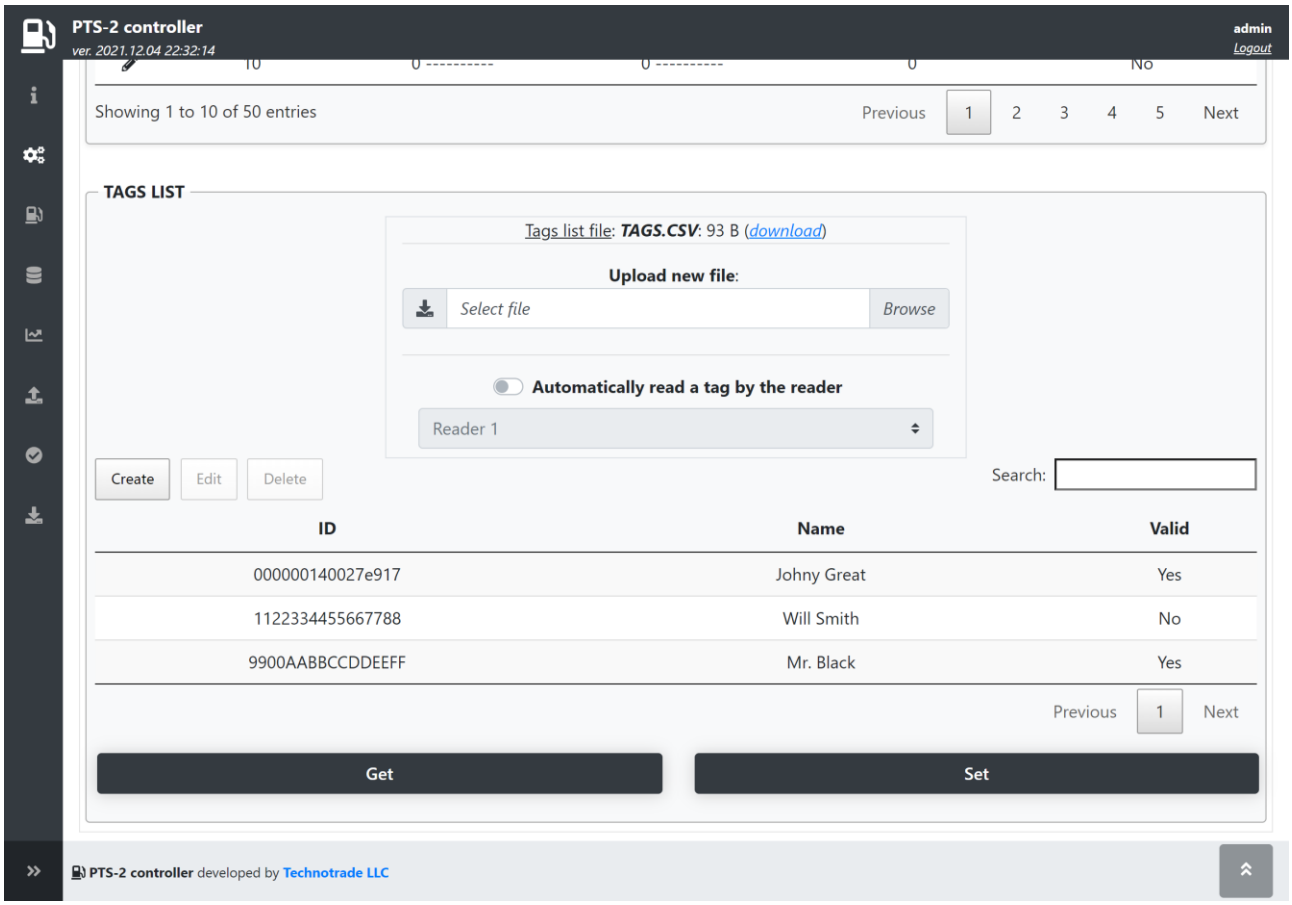


Configuration of ports includes setting of communication protocol and baud rate for each of the ports and also assigning the readers to each of the ports. Each of the readers should be also assigned a specific pump or otherwise can be set to serve any pump (if value is set to 0 for field "*Pump*"):

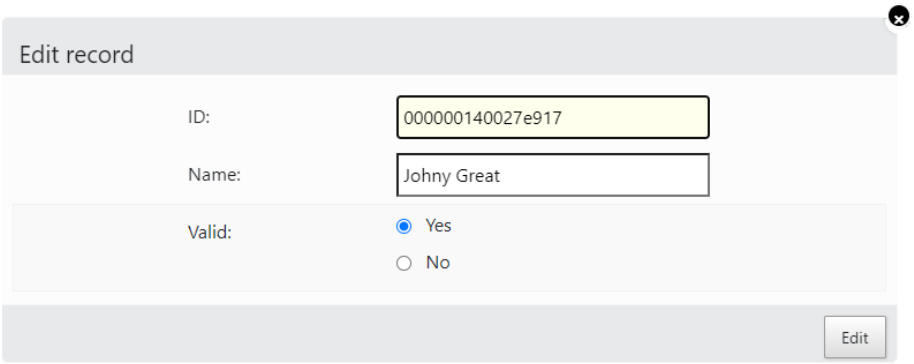


Readers configuration table also displays readers' statuses (online state and errors present in communication using icons).

Also, same page contains configuration of the tags, which can be used by fuel attendants or corporate customers:



Each tag configuration contains entering tag ID, tag holder name and validity flag:



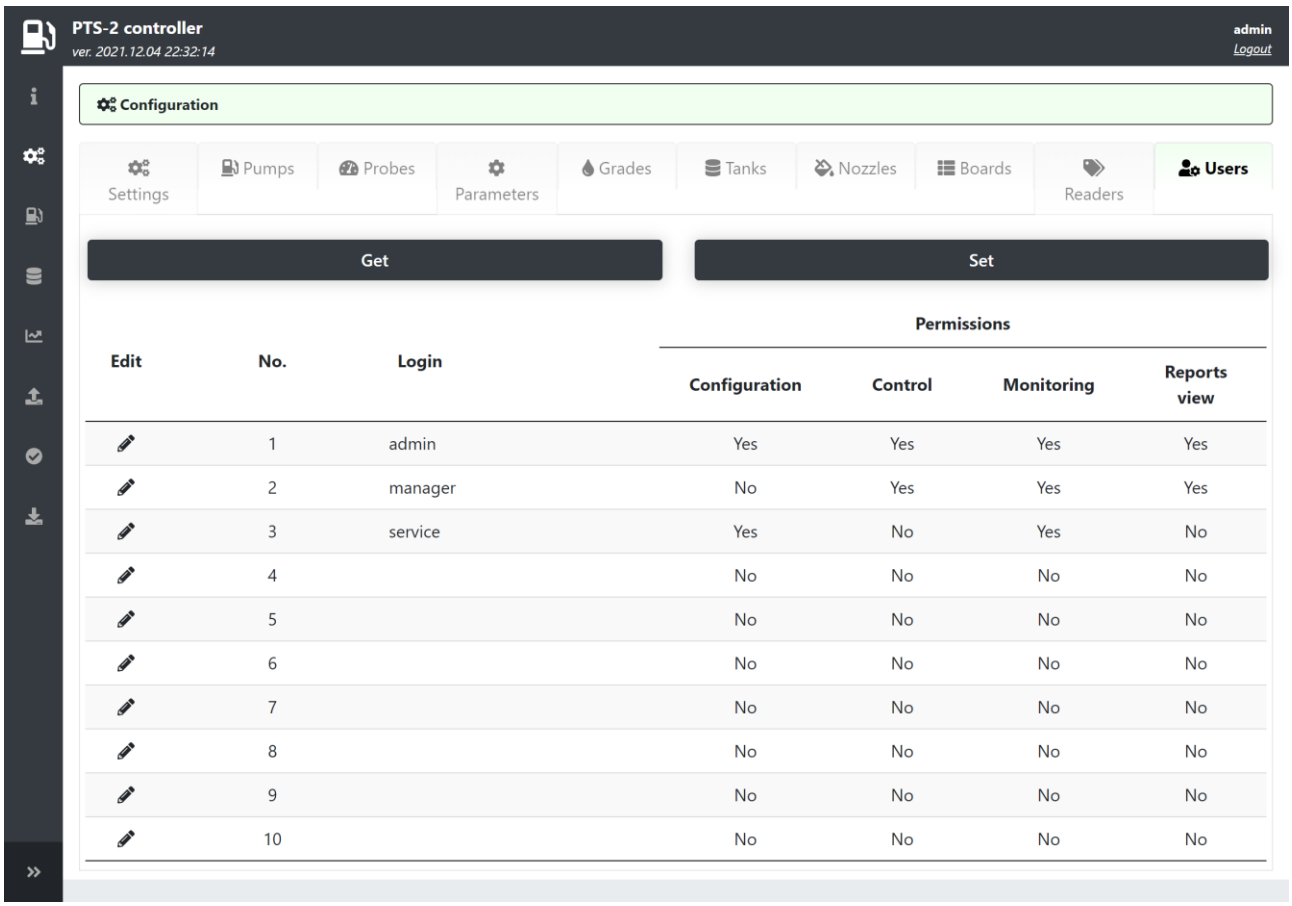
List of tags is stored in file 'Tags.csv' on SD flash disk. It can be downloaded from this page and also uploaded.

NOTE! Structure of tags list file is described in section "*Files stored on SD flash disk*".

Additionally, option '*Automatically read a tag by the reader*' allows to select a reader from a list and automatically read the tag identifiers by the selected reader when adding or editing the tags.

Users tab

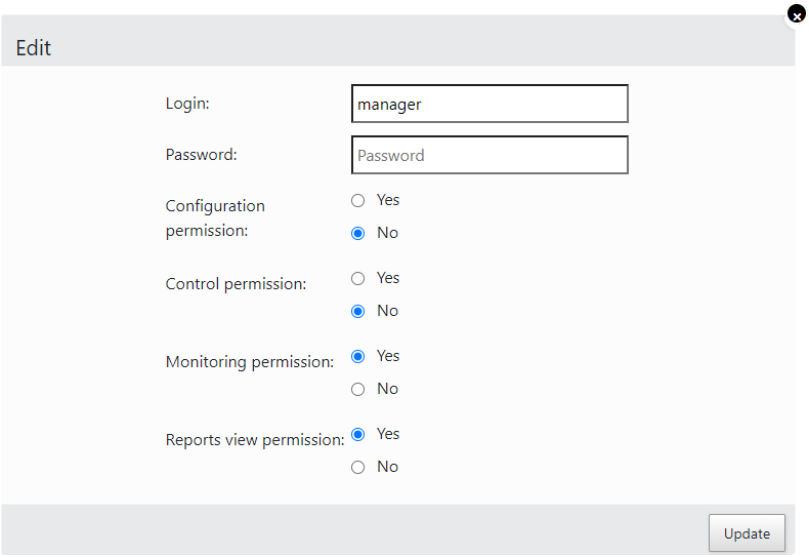
On this tab you can configure list of users and their permissions and also individual remote server parameters for upload of data for each user.



Edit	No.	Login	Permissions			
			Configuration	Control	Monitoring	Reports view
	1	admin	Yes	Yes	Yes	Yes
	2	manager	No	Yes	Yes	Yes
	3	service	Yes	No	Yes	No
	4		No	No	No	No
	5		No	No	No	No
	6		No	No	No	No
	7		No	No	No	No
	8		No	No	No	No
	9		No	No	No	No
	10		No	No	No	No

Under a user it is understood not obligatory a human being, but also it means credentials, under which remote control systems (POS, cash register, payment system server, mobile application, OPT, servers of data analysis, etc.) can communicate with PTS-2 controller. Each user is to be set a list of permissions:

- configuration
- control
- monitoring
- reports' view

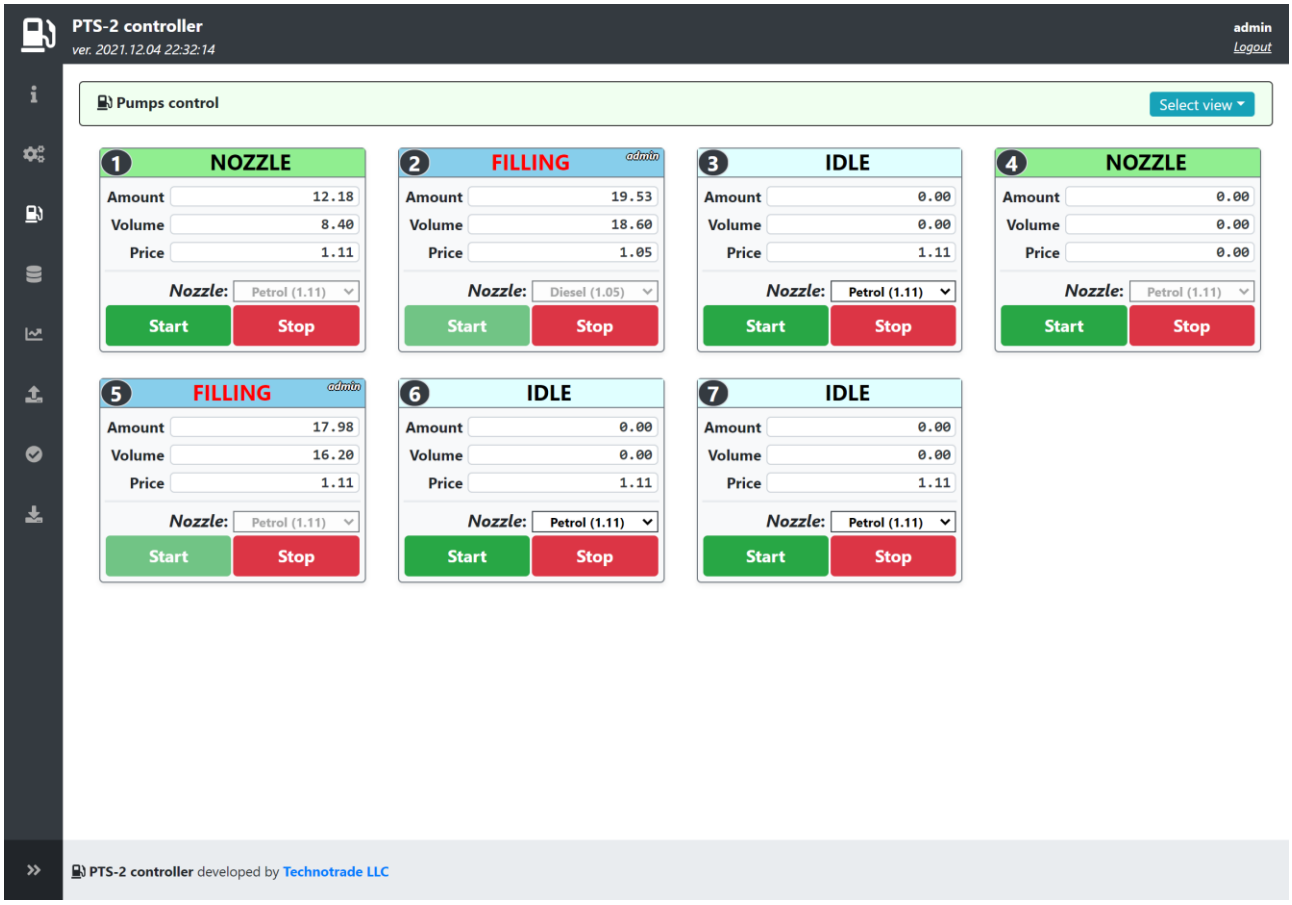


Pumps control page

Pumps control page allows to monitor all pumps and provide control over them. There are 2 views for this page: with pump widgets and with pumps table.

Pumps widgets

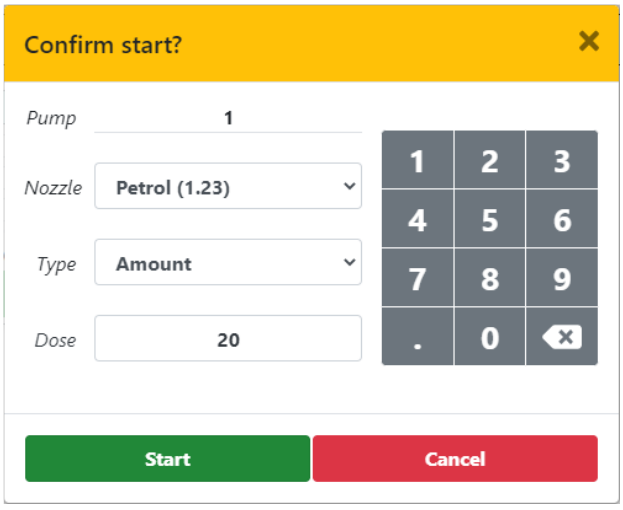
Pumps can be displayed as pump widgets showing all information on each pump:



It is possible to see each the pumps with information on:

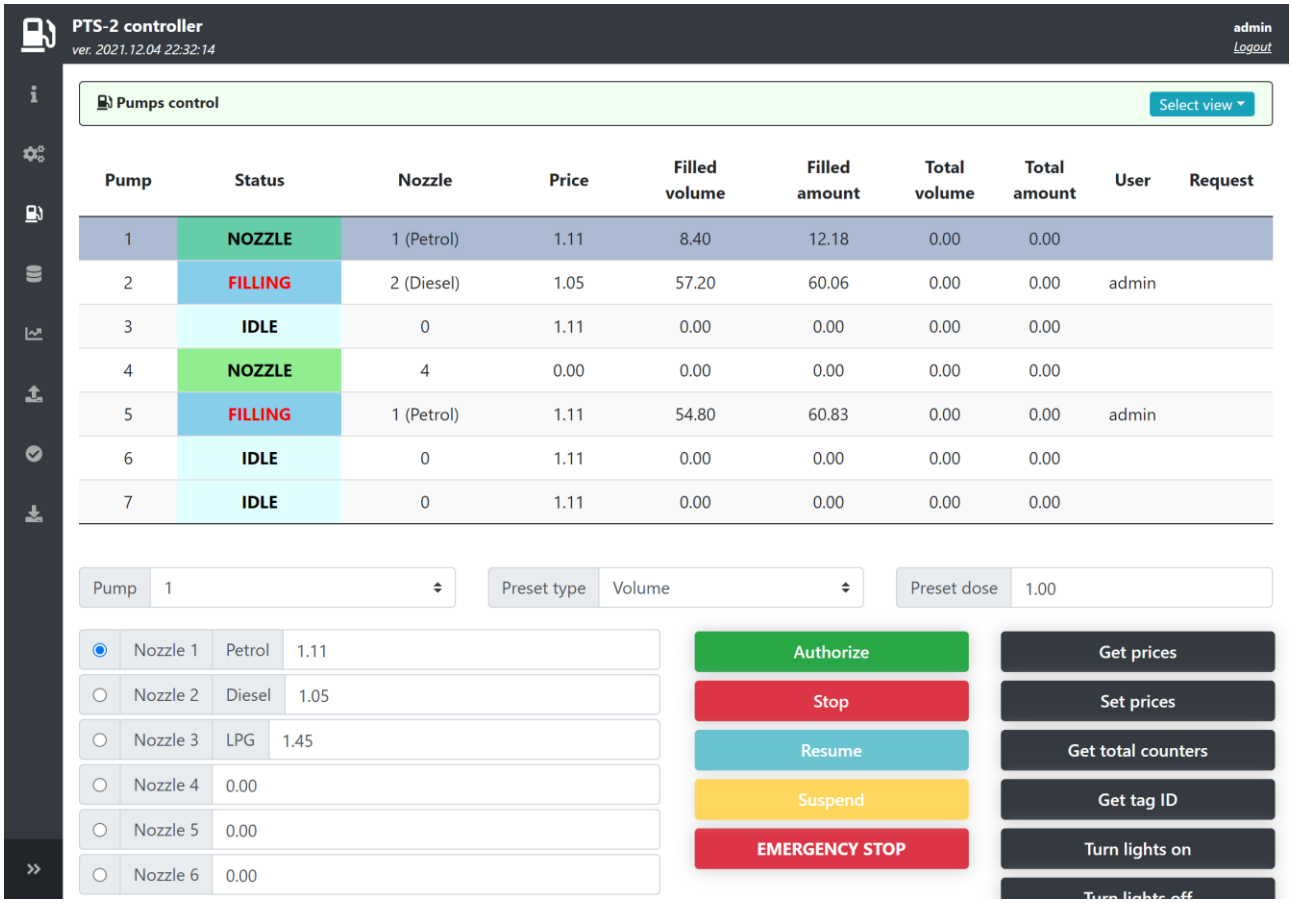
- pump state (IDLE, NOZZLE, FILLING, OFFLINE)
- values of volume, amount and price for present filling or last dispensing made
- grade/nozzle selection
- possibility to start and stop filling

When the user clicks on Start button – a dialog is opened for entering preset:



Pumps table

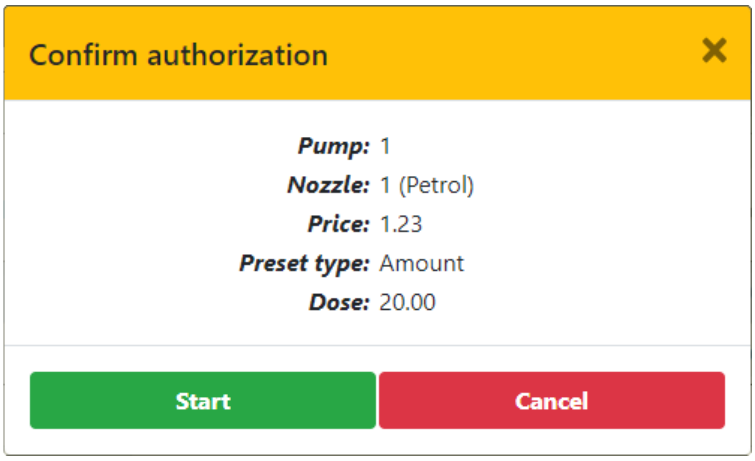
Pumps can be also displayed in a form of table with detailed information on each pump:



This user interface has additional buttons for provision of complete control over pumps:

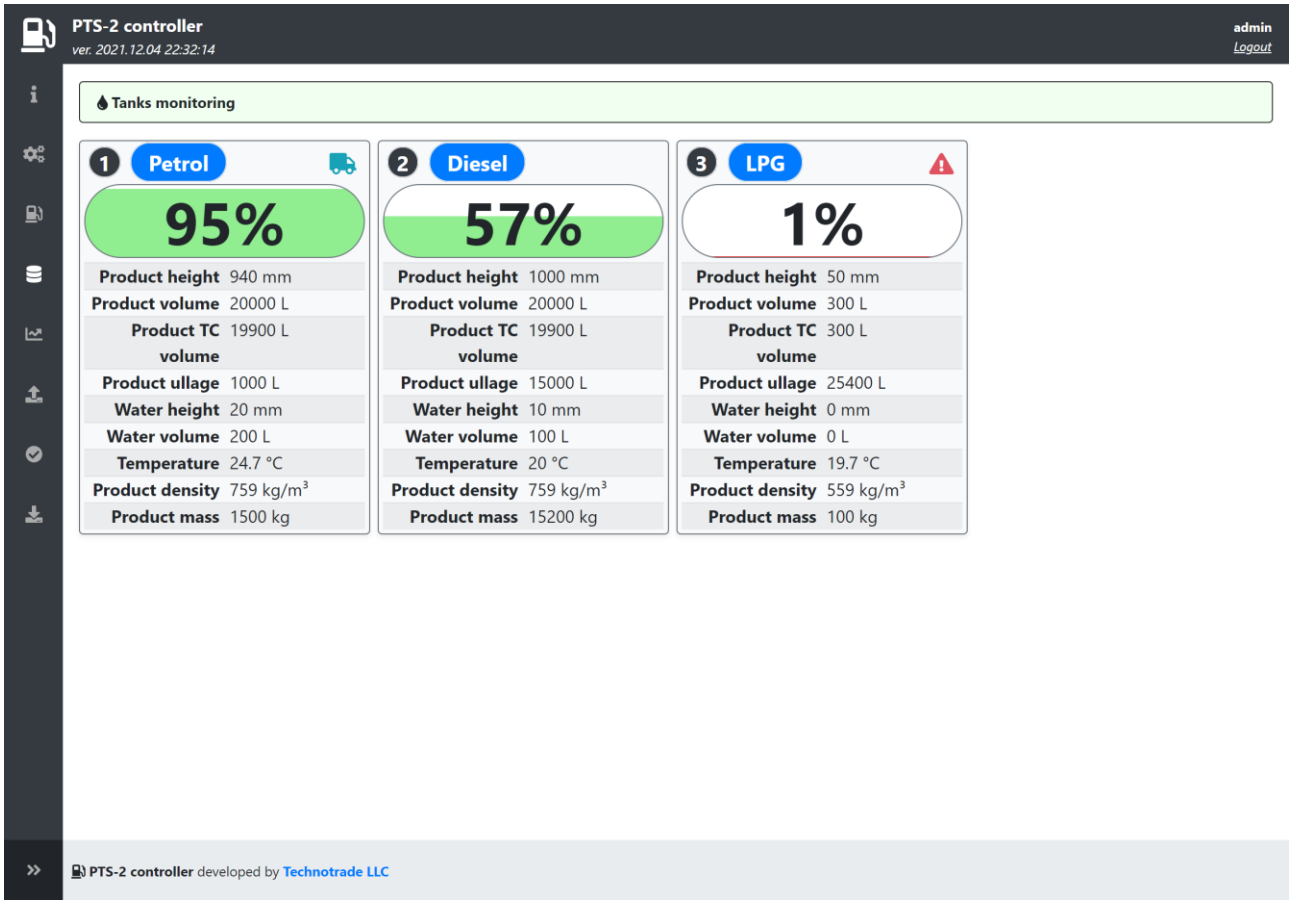
- authorize with preset (volume, amount) or to full tank
- stop
- suspend and resume
- get totals
- set and get prices
- get tag identifier (in case if pump supports)
- set on/off lights (in case if pump supports)

Prices and fuel grades are automatically loaded from configuration.
Preset type field allows preset order in volume and amount and full tank (preset from dispenser keyboard).

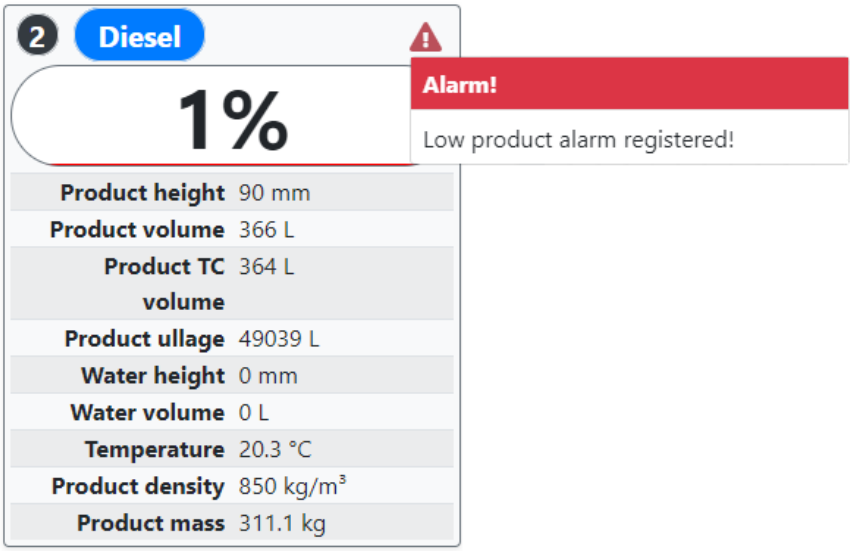


Tanks monitoring page

Tanks monitoring page allows to monitor all tanks and petroleum products parameters, measured by probes (list of parameters depend on the type of probes used).

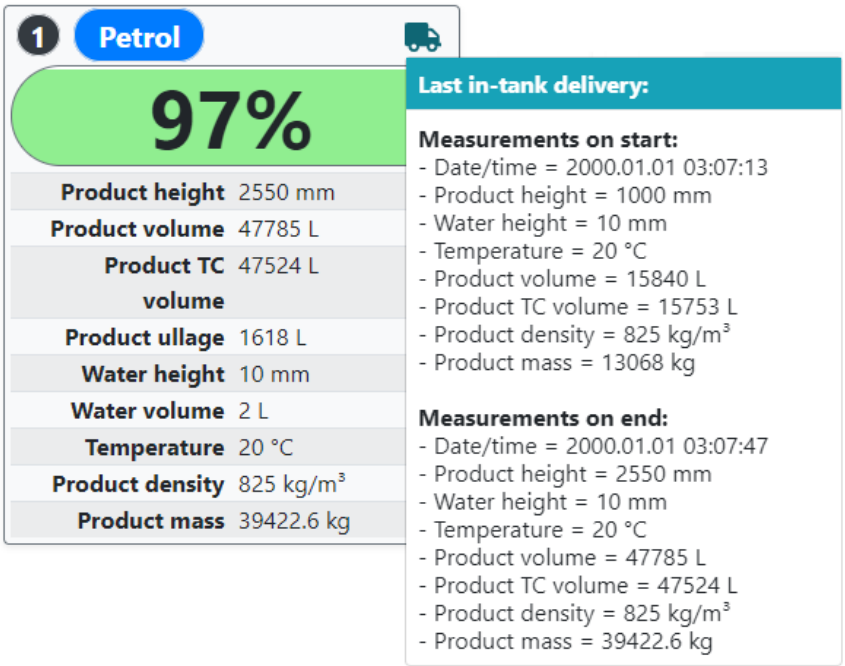


At this tank widget will show if there is any alert registered for tank, for example:



In case if there are several alerts preset – all of them will be shown as a list.

In case if automatic registration of in-tank deliveries is activated in parameters for probe – then information on the last registered in-tank delivery is displayed on the tank widget:



Reporting page

Reporting pages allows to generate and view reports for:

- pumps sales
- tanks measurements
- tanks reconciliation (comparison of fuel movements in tanks with pumps sales)
- GPS records

Reports can be generated and viewed in case if PTS-2 controller is configured to save records in database, which is configured in parameters of PTS-2 controller (please see section *PTS-2 controller parameters*). Other important thing is that clock in the PTS-2 controller should be configured to lead current time, which is set on *Configuration* page -> *Settings* tab, because each record is stored with specification of time. Also, presence of battery on the board of PTS-2 controller is necessary to keep the time when PTS-2 controller is powered off.

Reports include filters, which allow to find the data more precisely:

- pump or tank number
- date and time of period start
- date and time of period end
- fuel grade (for pumps only)
- user, which made the pump transaction (for pumps only)

Also, you can export generated report data to CSV and Excel files, copy or print.

Pumps tab

On this tab you can generate reports for pumps transactions performed.

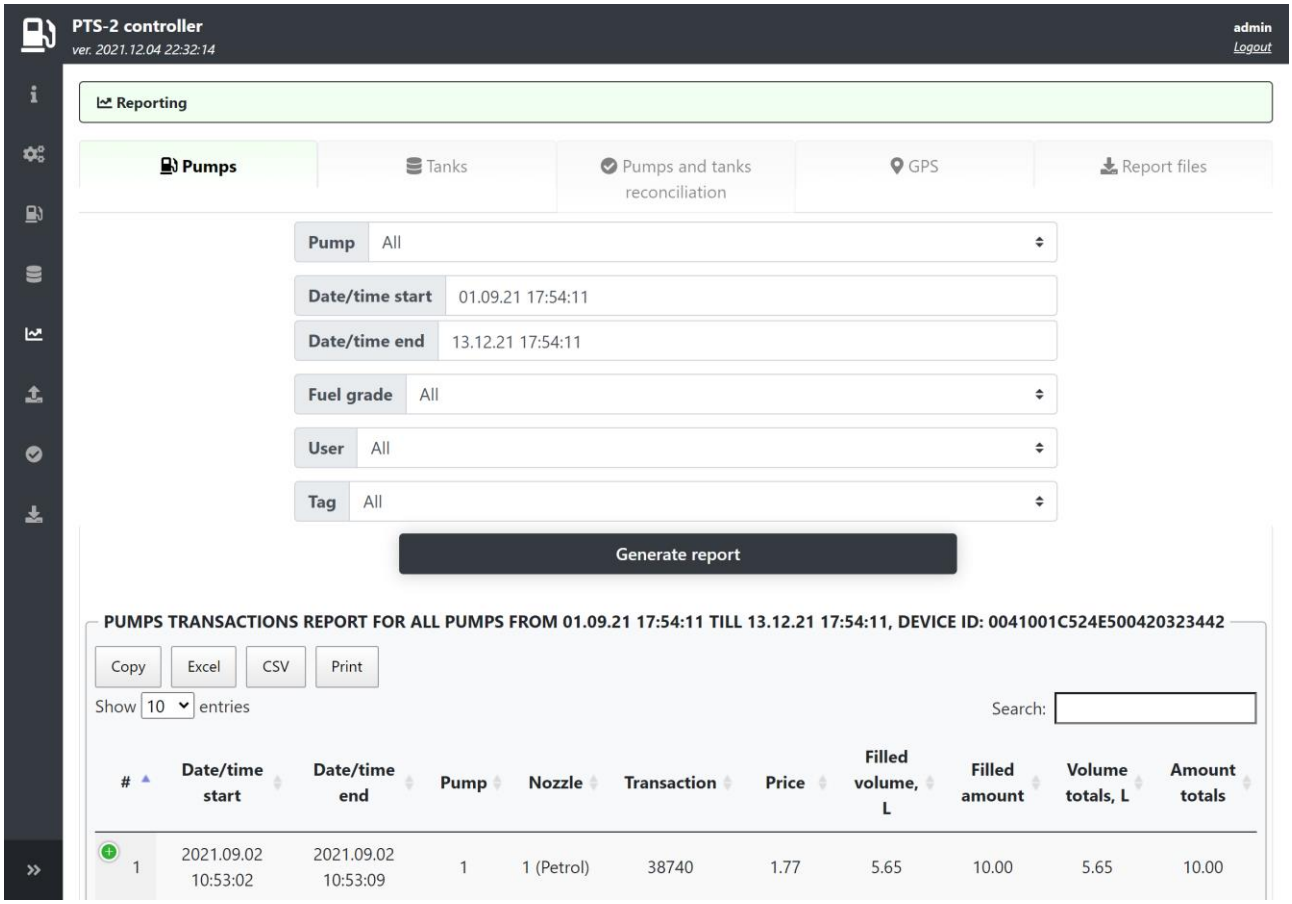
Records can be filtered on:

- pump number
- date and time of period start
- date and time of period end
- fuel grade
- user, which made the pump transaction
- tag ID of the fuel attendant servicing the sale or a corporate customer (if case of readers application)

Reports are represented in 2 tables:

- first table represents a list for all transactions with detailed information on each transaction
- seconds table groups all the transactions by pump nozzles, so it is possible to see how much product totally was dispensed by each nozzle. Also, in case if automatic readout of total counters is switched on in parameters for pumps – then here you can see starting and ending values for totals and their difference, this value is compared to total volume dispensed through pump nozzle – these values should match, if they do not match – then there were sales done while PTS-2 controller was disconnected.

Pumps transactions report:



PTS-2 controller
ver. 2021.12.04 22:32:14
admin
Logout

PUMPS TRANSACTIONS REPORT FOR ALL PUMPS FROM 01.09.21 17:54:11 TILL 13.12.21 17:54:11, DEVICE ID: 0041001C524E500420323442

Copy Excel CSV Print

Show 10 entries Search:

#	Date/time start	Date/time end	Pump	Nozzle	Transaction	Price	Filled volume, L	Filled amount	Volume totals, L	Amount totals
1	2021.09.02 10:53:02	2021.09.02 10:53:09	1	1 (Petrol)	38740	1.77	5.65	10.00	5.65	10.00
User	admin									
Tag	Mr. Black (9900AABBCCDDEEFF)									
2	2021.09.03 11:22:27	2021.09.03 11:22:30	1	1 (Petrol)	38228	1.77	2.82	5.00	2.82	5.00
3	2021.09.07 10:06:03	2021.09.07 10:06:05	2	2 (Diesel)	1997	1.15	2.61	3.00	2.61	3.00
4	2021.09.07 10:06:22	2021.09.07 10:06:33	3	1 (Petrol)	36421	1.77	6.21	11.00	0.00	0.00
5	2021.09.07 10:06:34	2021.09.07 10:06:47	3	1 (Petrol)	36422	1.77	11.00	19.47	0.00	0.00
6	2021.09.08 09:29:10	2021.09.08 09:29:21	1	1 (Petrol)	38740	1.77	10.00	17.70	10.00	17.70
7	2021.10.13 10:32:08	2021.10.13 10:32:12	1	1 (Petrol)	38228	1.77	3.00	5.31	3.00	5.31

Pumps nozzles summary report:

PTS-2 controller
ver. 2021.12.04 22:32:14
admin
Logout

	12:26:21	12:26:33								
10	2021.10.19 16:23:45	2021.10.19 16:23:57	1	1 (Petrol)	38740	1.77	10.00	17.70	10.00	17.70
						Total:	***138.03***	***221.60***		

Showing 1 to 10 of 18 entries Previous 1 2 Next

PUMPS NOZZLES SUMMARY REPORT FOR ALL PUMPS FROM 01.09.21 17:54:11 TILL 13.12.21 17:54:11, DEVICE ID: 0041001C524E500420323442

Copy Excel CSV Print

Search:

#	Pump	Nozzle	Summary filled volume, L	Summary filled amount	Volume totals on start, L	Volume totals on end, L	Volume totals difference, L	Amount totals on start	Amount totals on end	Amount totals difference
1	1	1 (Petrol)	84.16	148.98	0.00	10.00	10.00	0.00	17.70	17.70
Average filling speed, L/min 51.77										
2	2	2 (Diesel)	26.66	30.65	0.00	3.48	3.48	0.00	4.00	4.00
3	3	1 (Petrol)	17.21	30.47	0.00	0.00	0.00	0.00	0.00	0.00
4	4	2 (Diesel)	10.00	11.50	0.00	0.00	0.00	0.00	0.00	0.00
		Total:	***138.03***	***221.60***						

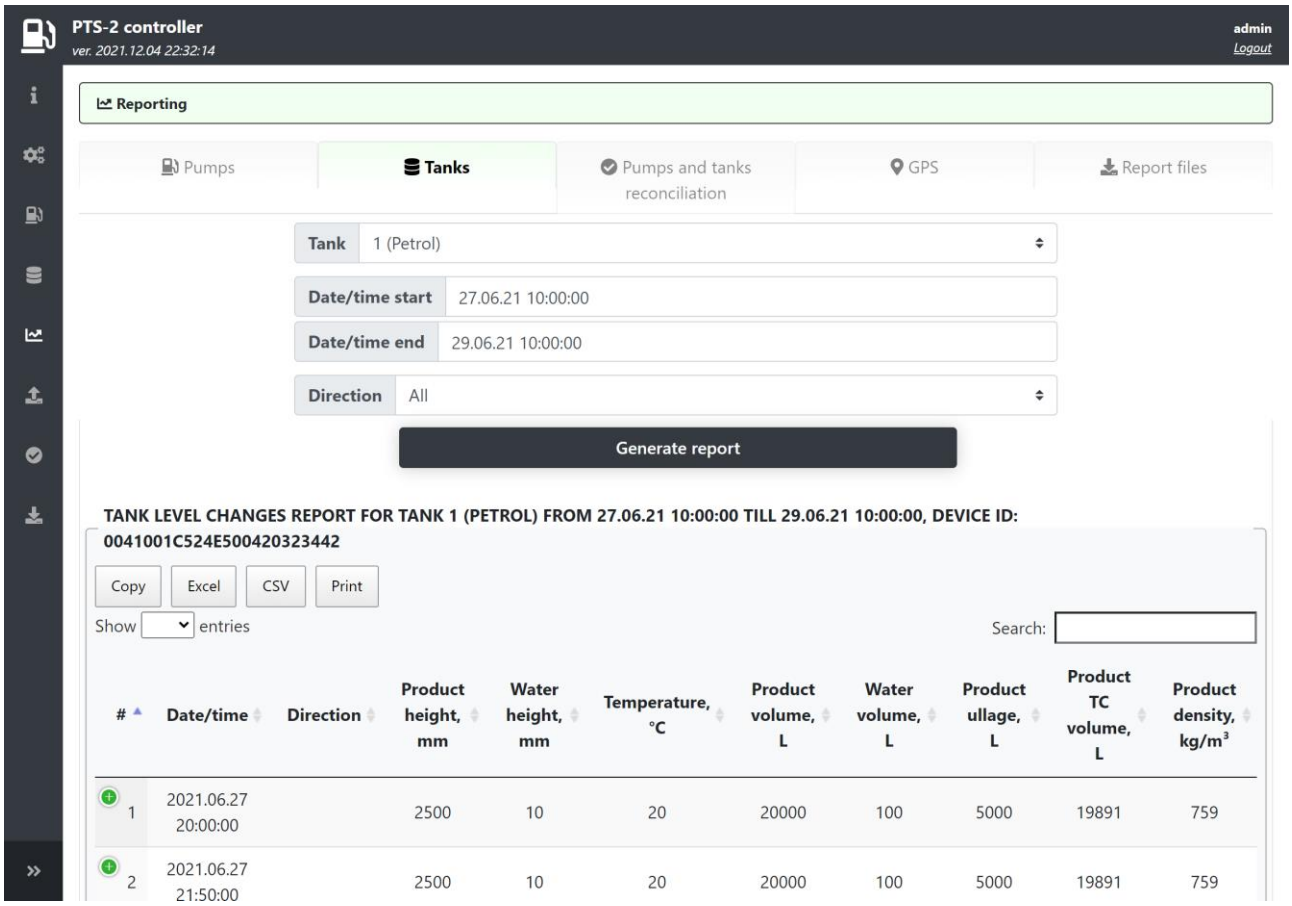
Tanks tab

On this tab you can generate reports for tanks measurements with generation of chart.

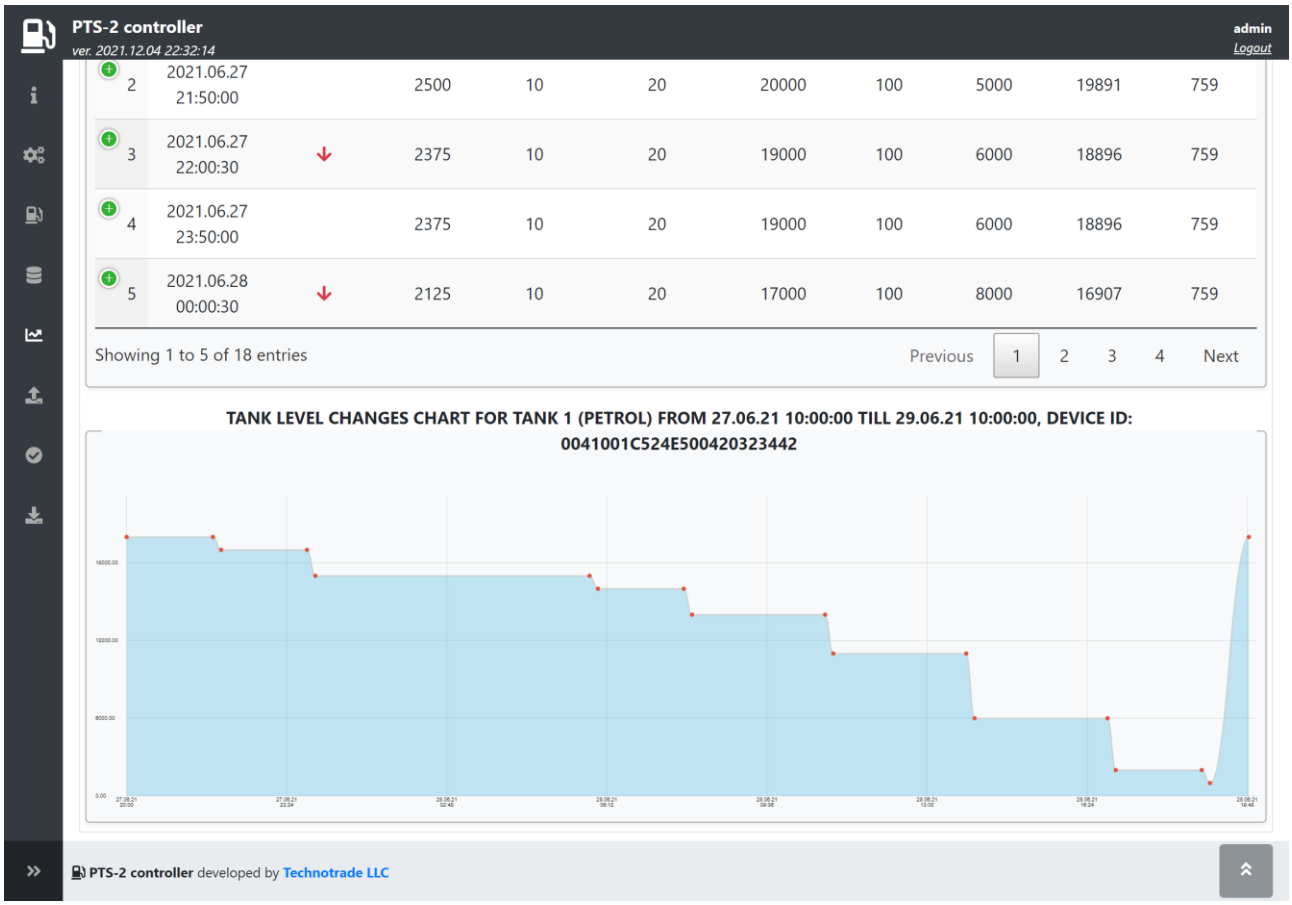
Records can be filtered on:

- tank number
- date and time of period start
- date and time of period end

Tank level changes report displays all the registered changes of level in tank with details on all the measurements. A threshold for saving a new level is configured in parameters for the probe (on *Configuration* page -> *Parameters* tab):



Tank level changes chart displays how the level was changed in the tank with time:



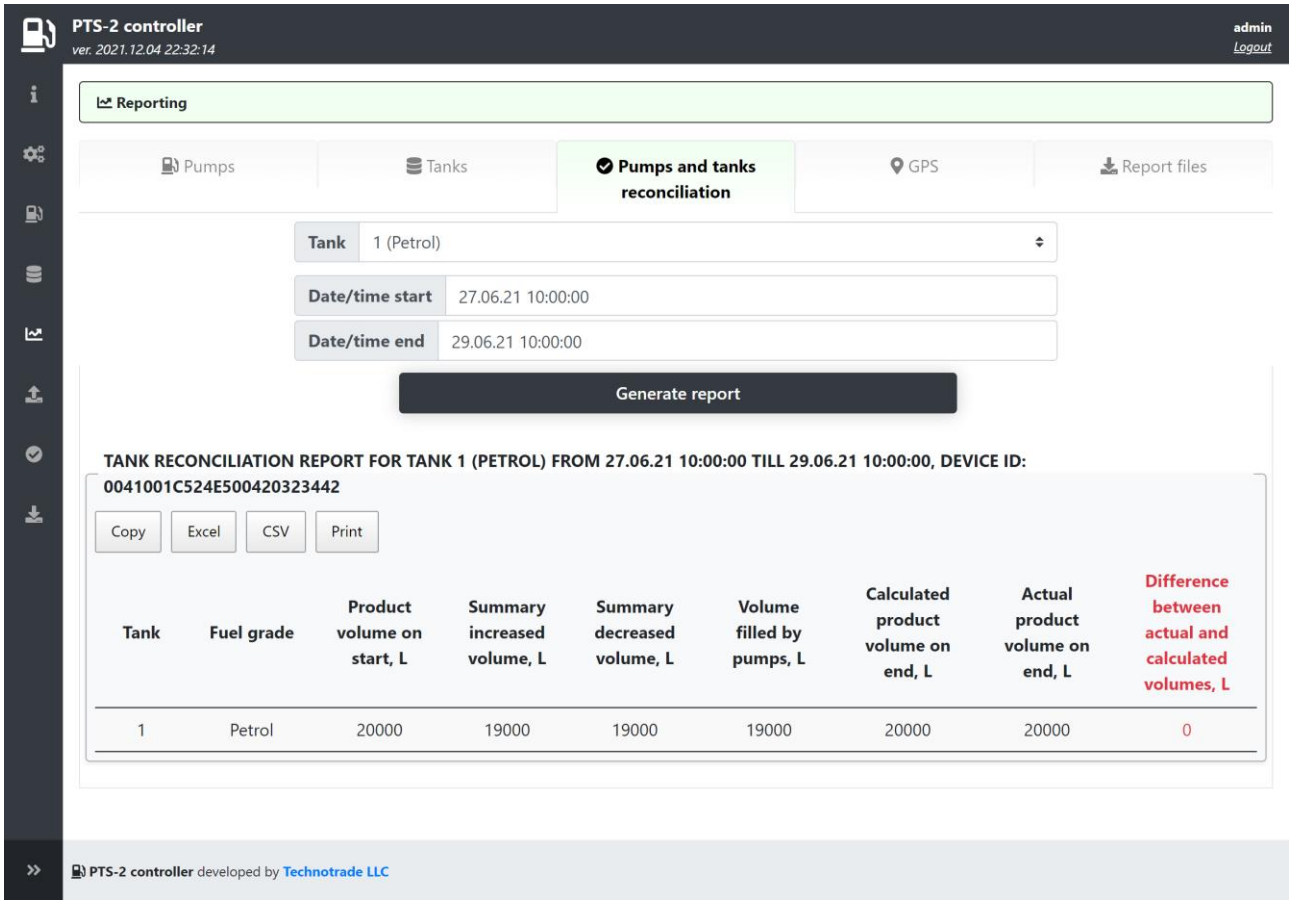
Pumps and tanks reconciliation tab

On this tab you can generate reports for tanks reconciliation.

Records can be filtered on:
- tank number
- date and time of period start
- date and time of period end

For making a tank reconciliation this report compares 2 things:
- fuel remains in tank on selected period start
- fuel in-tank deliveries in tank registered by measurement probe during selected period
- fuel dispensings from tank registered by measurement probe during selected period
- fuel dispensing from tank registered by fuel dispensers during selected period
- actual fuel remains in tank on selected period end
- calculated fuel remains in tank on selected period end (accounts from sales from dispensers)

In normal situation the actual remains of fuel in tank should equal to calculated fuel remains in tank meaning that all the fuel dispensed from tank was sold through the pumps. If there is a significant difference between these values – then there can be leakages from the tank (or pipes) or frauds (stealings) of fuel.



In order to generate this report you should have pumps nozzles configured to tanks and fuel grades (this is done on *Configuration* page -> *Nozzles* tab).

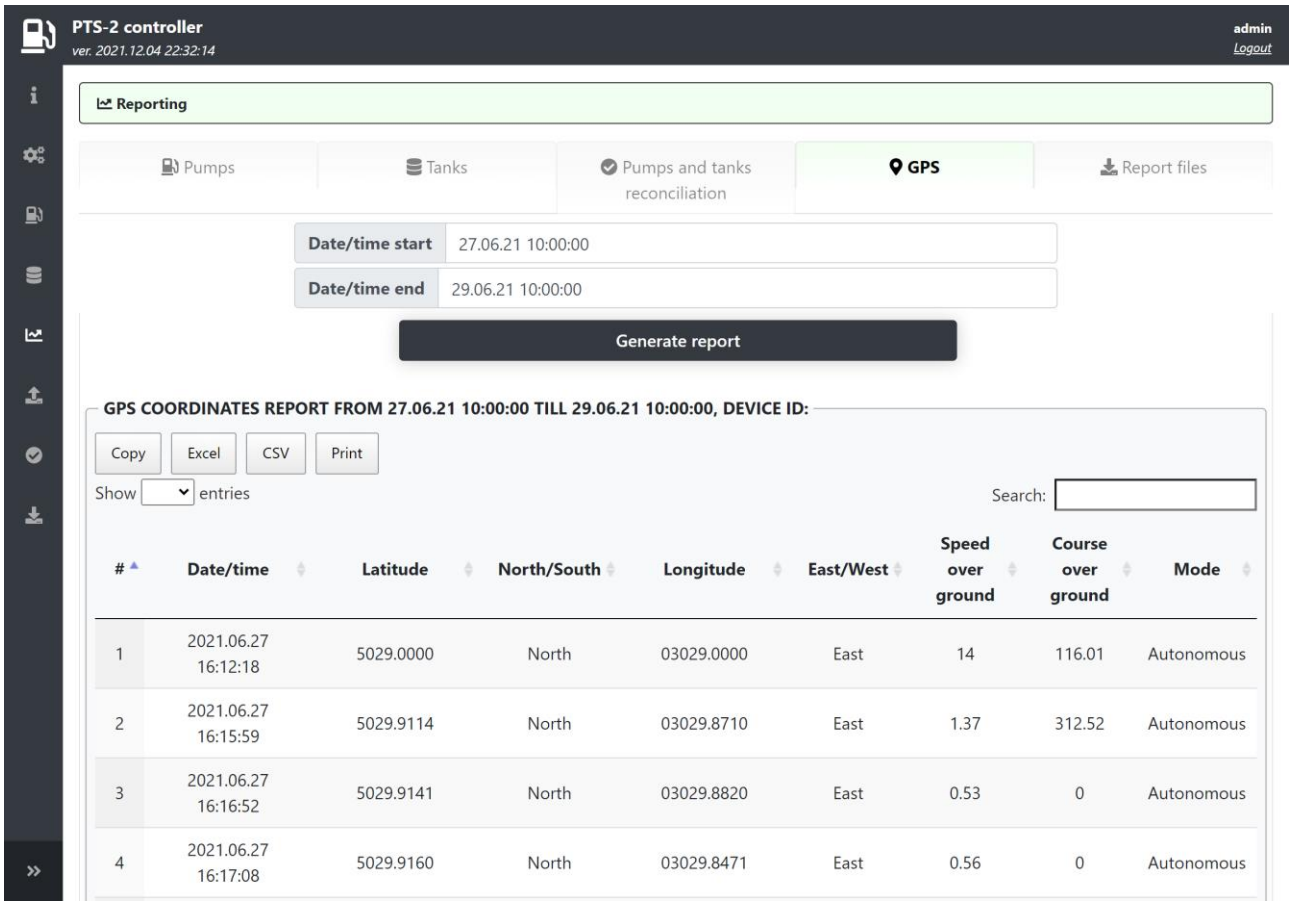
GPS tab

On this tab you can generate reports for GPS records registered.

Records can be filtered on:

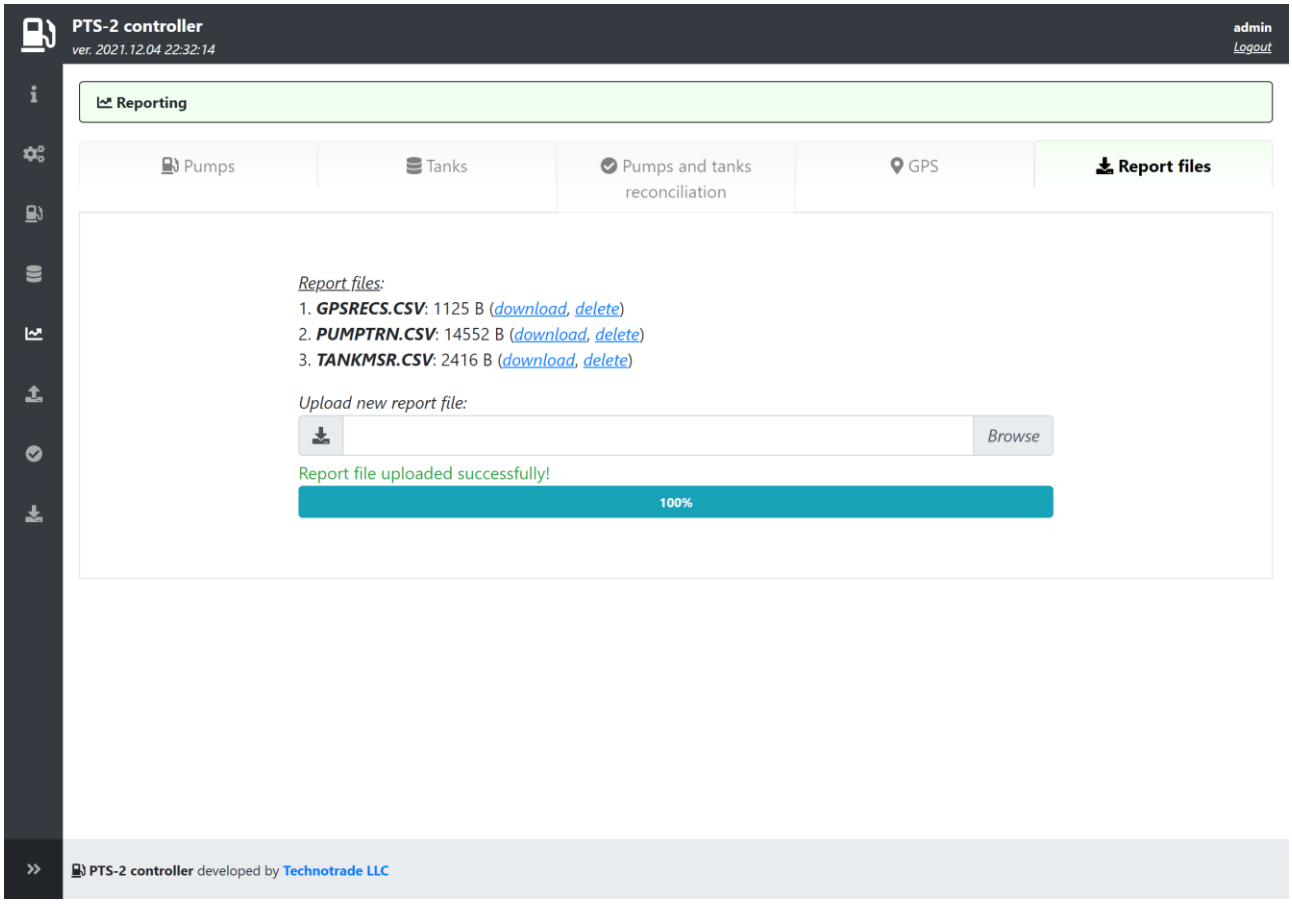
- date and time of period start
- date and time of period end

Report on GPS records allows to see all the registered GPS records for the points, where PTS-2 controller was moving (in case if it is installed inside the fuel tankers). Distance between GPS coordinates for saving to database for reporting is configured in parameters for PTS-2 controllers (on *Configuration* page -> *Parameters* tab).



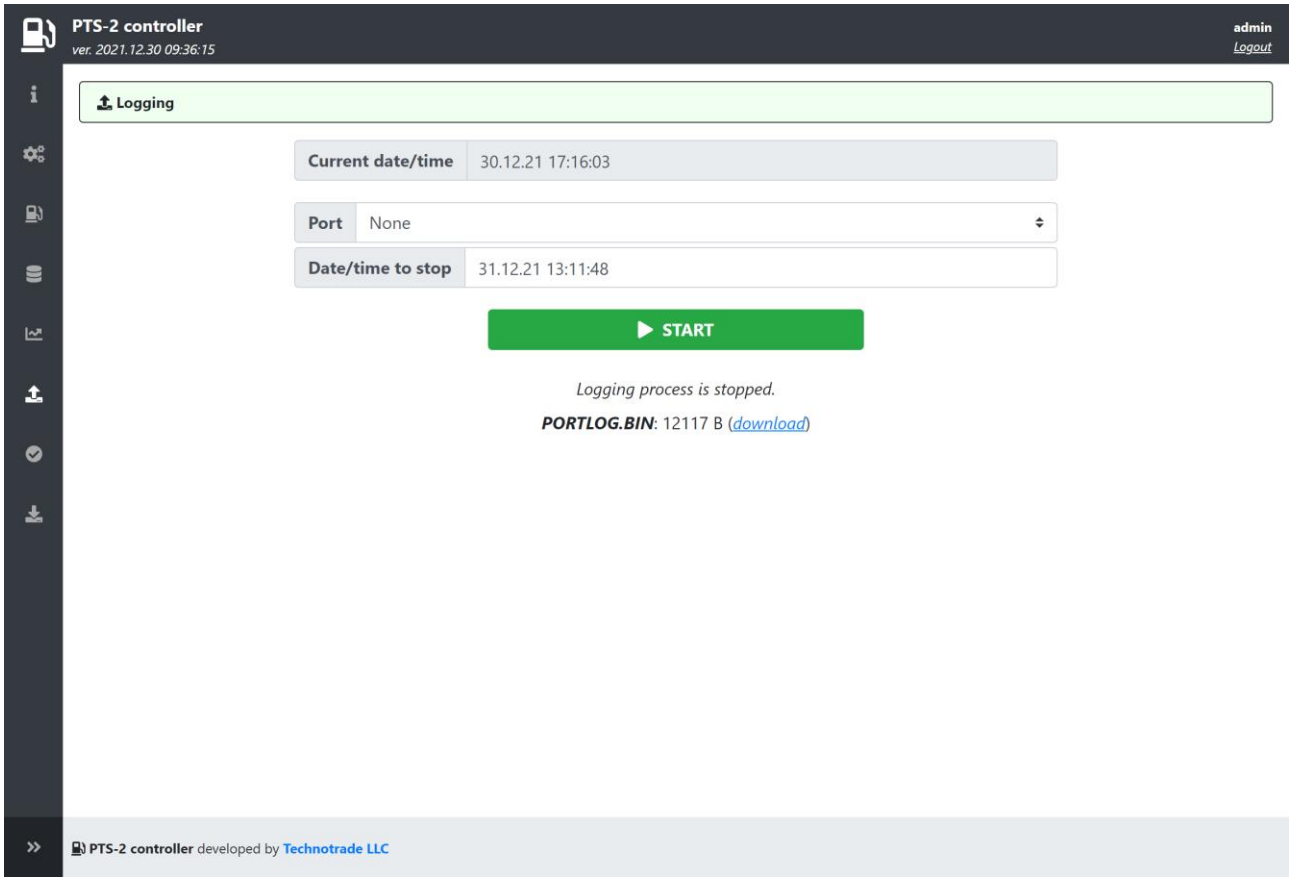
Report files tab

This tab allows to download and upload the report files.



Logging

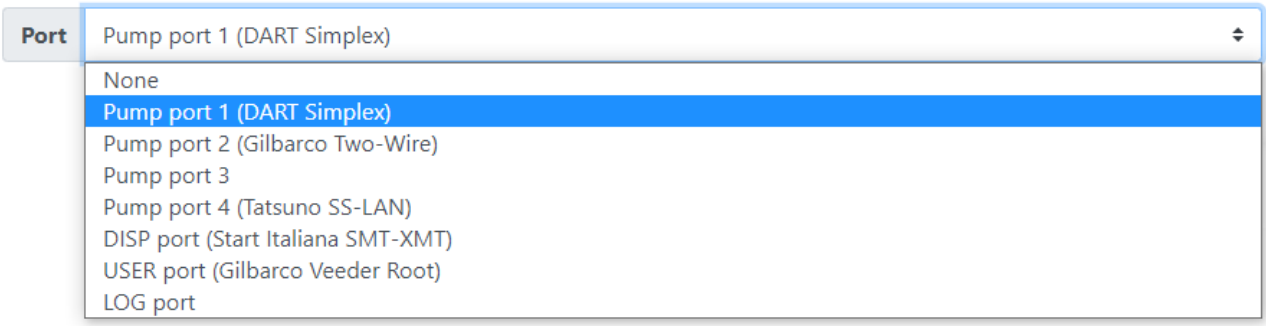
Logging page allows to record a log of communication with connected device to one of its ports.



The logging procedure is needed in order to track possible problems in communication and fix them.

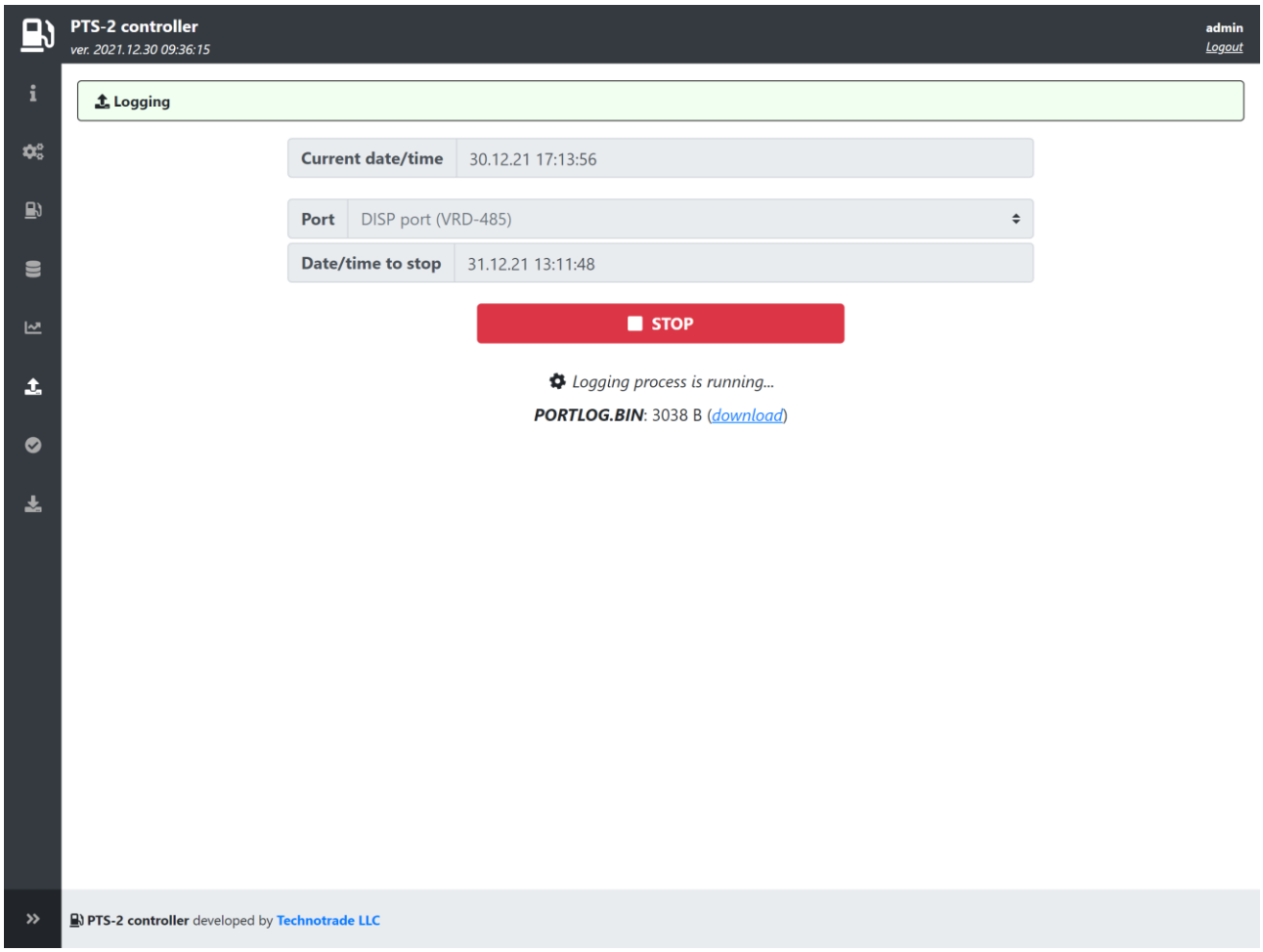
Procedure of taking a log includes the following steps:

1. Make sure that clock in PTS-2 controller is configured correctly, this is done on *Configuration* page -> *Settings* tab. You can see the current date and time in *Current date/time* field
2. In field *Port* select the port, which connects to the equipment, communication with which you want to log, for example:



3. In field *Date/time to stop* set date and time, when the log should be stopped, this date and time should later that current date and time. The log will be automatically stopped when this time is reaches.
4. Click *START* button to start logging.

To stop the log click *STOP* button.



This page is refreshed automatically within several seconds to update about generated log file size.

Generated log can be download from this page. During logging a file named *PortLog.bin* is generated in root of SD flash disk. If you download it through a web browser – then the downloaded file will be automatically assigned a name in format PORTLOG_yyyy_MM_dd_hh_mm_ss.BIN, where:

- yyyy – year
- MM – month
- dd – date
- hh – hours
- mm – minutes
- ss – seconds

These fields mean the date and time, when the log started, so that it is easy to understand what period it covers. For example, if the log-file is named PORTLOG_2021_07_08_11_29_23.BIN then it means that it started on 8th of July, 2021 at 11:29:23.

The log is accumulated in encrypted form, so once the log is recorded – it is required to pass obtained log-file to Technotrade LLC company for examining and elimination of possible problems, for reasons of which it was taken. When sending such a log-file please remember to additionally inform about all additional information, which could be helpful to find the problem and solve it: device address, exact time of the problem, problem description, etc.

Self-diagnostics page

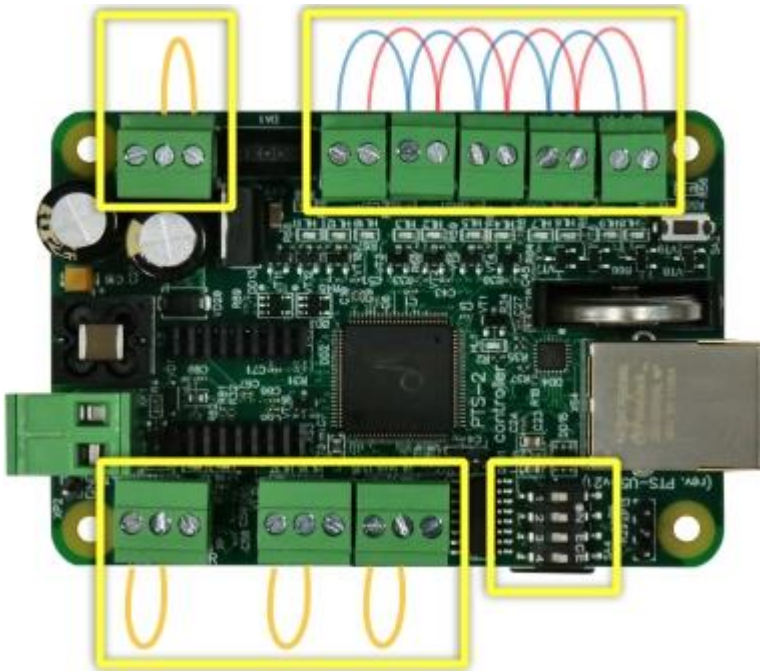
Self-diagnostics page allows to check state of peripheral equipment of the PTS-2 controller board:

- ports with RS-485 interface: pump ports and DISP (RS-485) port
- ports with RS-232 interface: DISP (RS-232), LOG, USER and PC ports
- configuration DIP-switch
- SD flash disk

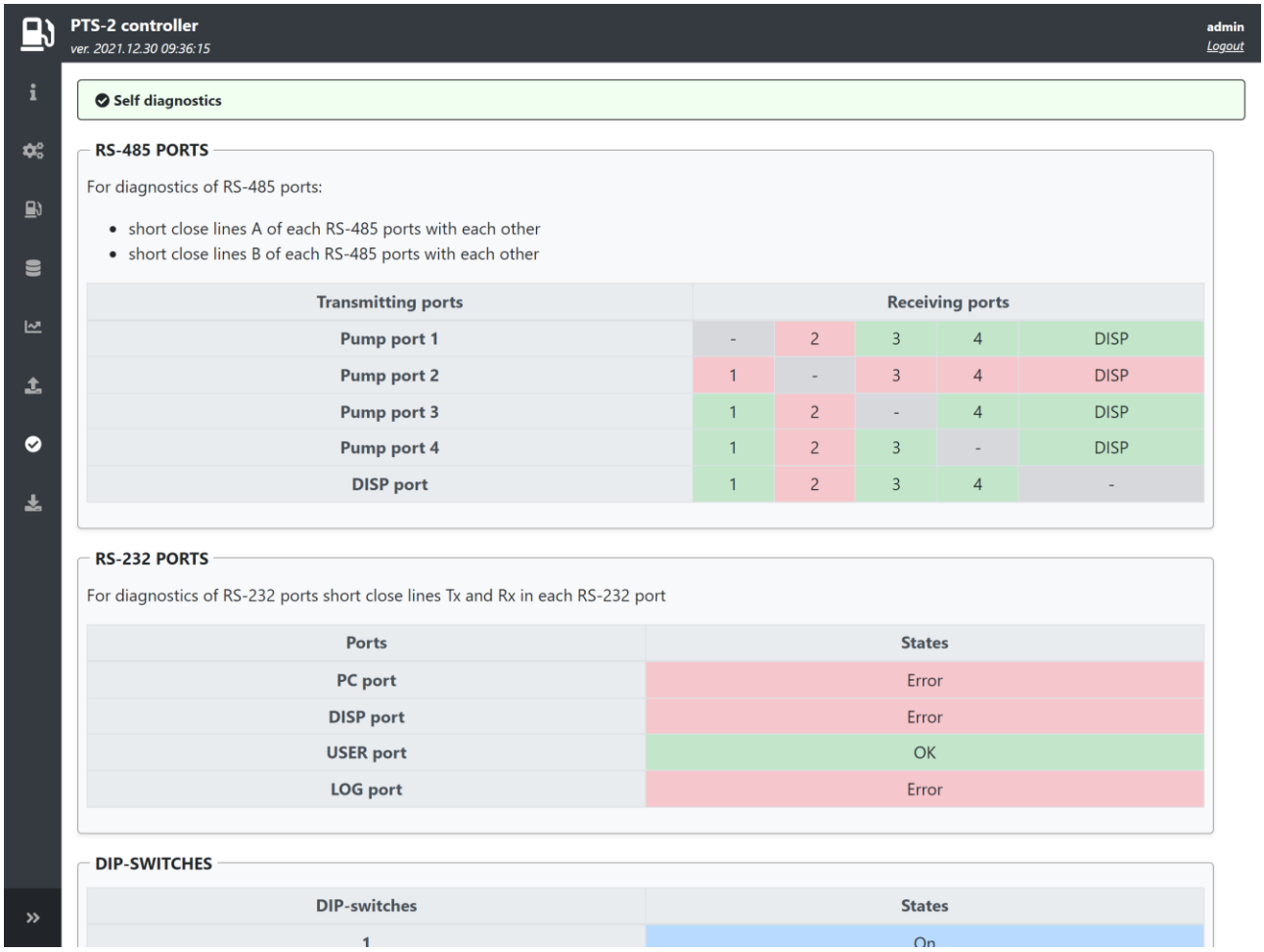
In order to perform self-diagnostics scheme of connections of the PTS-2 controller should be the following:

Lines “RS-485 A” in of each pump port and *DISP port (RS-485)* should be interconnected with each other, also lines “RS-485 B” in of each pump port and *DISP port (RS-485)* should be interconnected with each other as shown on the picture.

In *PC*, *LOG*, *USER* and *DISP (RS-232)* ports pin TxD should be shortened with pin RxD as shown on the picture.



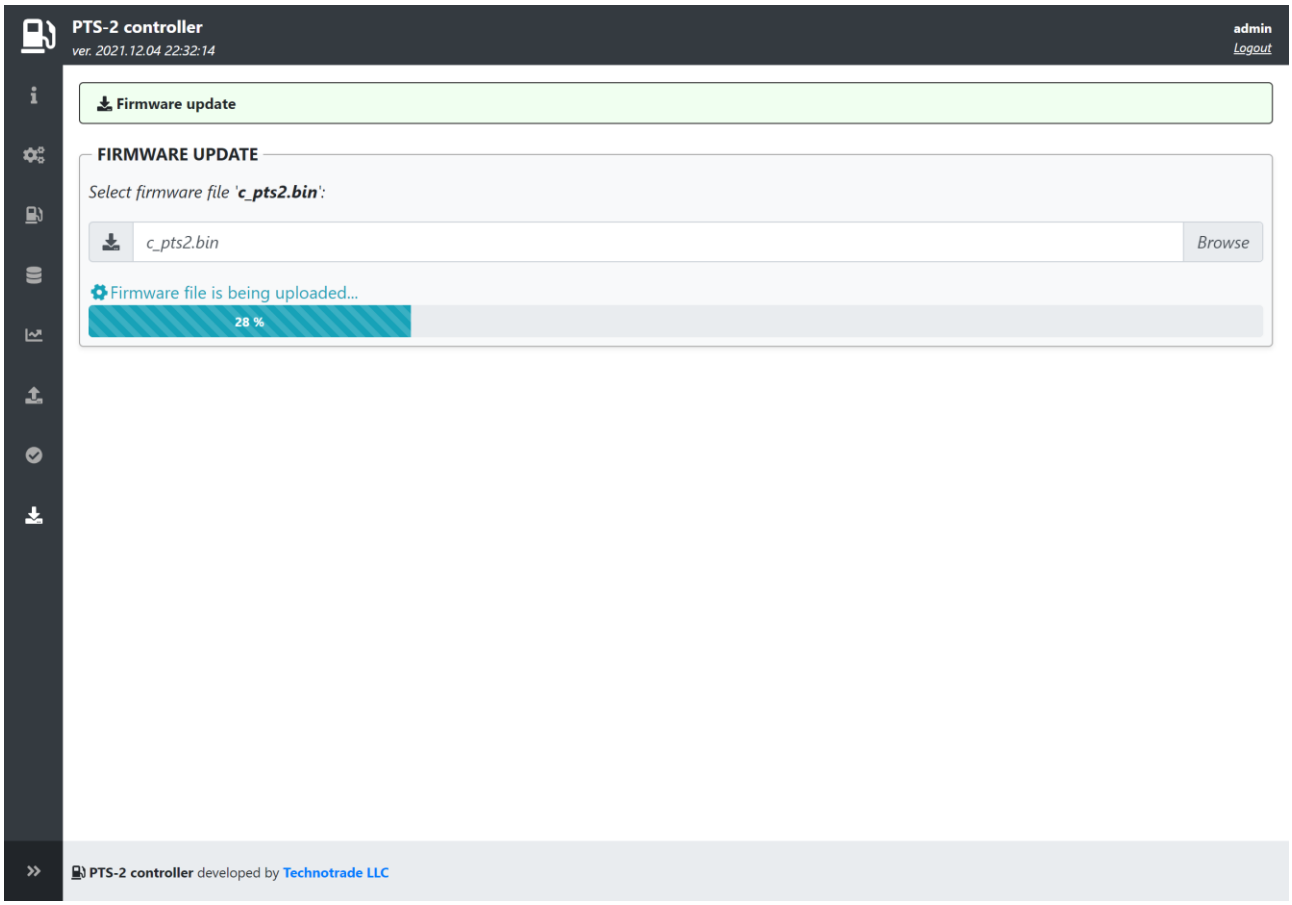
Results of diagnostics will be shown by color of labels. Green color means that correspondent port is working correctly (*OK*), red color – correspondent port is working incorrectly (*Error*).



Firmware update page

PTS-2 controller firmware is constantly being improved and new versions of firmware with new added communication protocols and fixed bugs of the previous firmware versions are proposed to be applied. New versions of PTS-2 controller's firmware are always available for downloading for customers.

Firmware update page allows to update firmware of PTS-2 controller. For this you should select path to *c_pts2.bin* file. At this firmware is saved to SD flash disk and will be automatically updated when upload of file is finished. After firmware update web-server will be automatically switched to *Device information* page to display currently installed firmware version.



Firmware update process normally takes less than 1 minute.

In case if it is needed to update the PTS-2 controller firmware and there is no access to the web-server – then it is needed to place *c_pts2.bin* firmware file to root of the SD flash disk and power on the PTS-2 controller. Firmware will be updated on start-up.

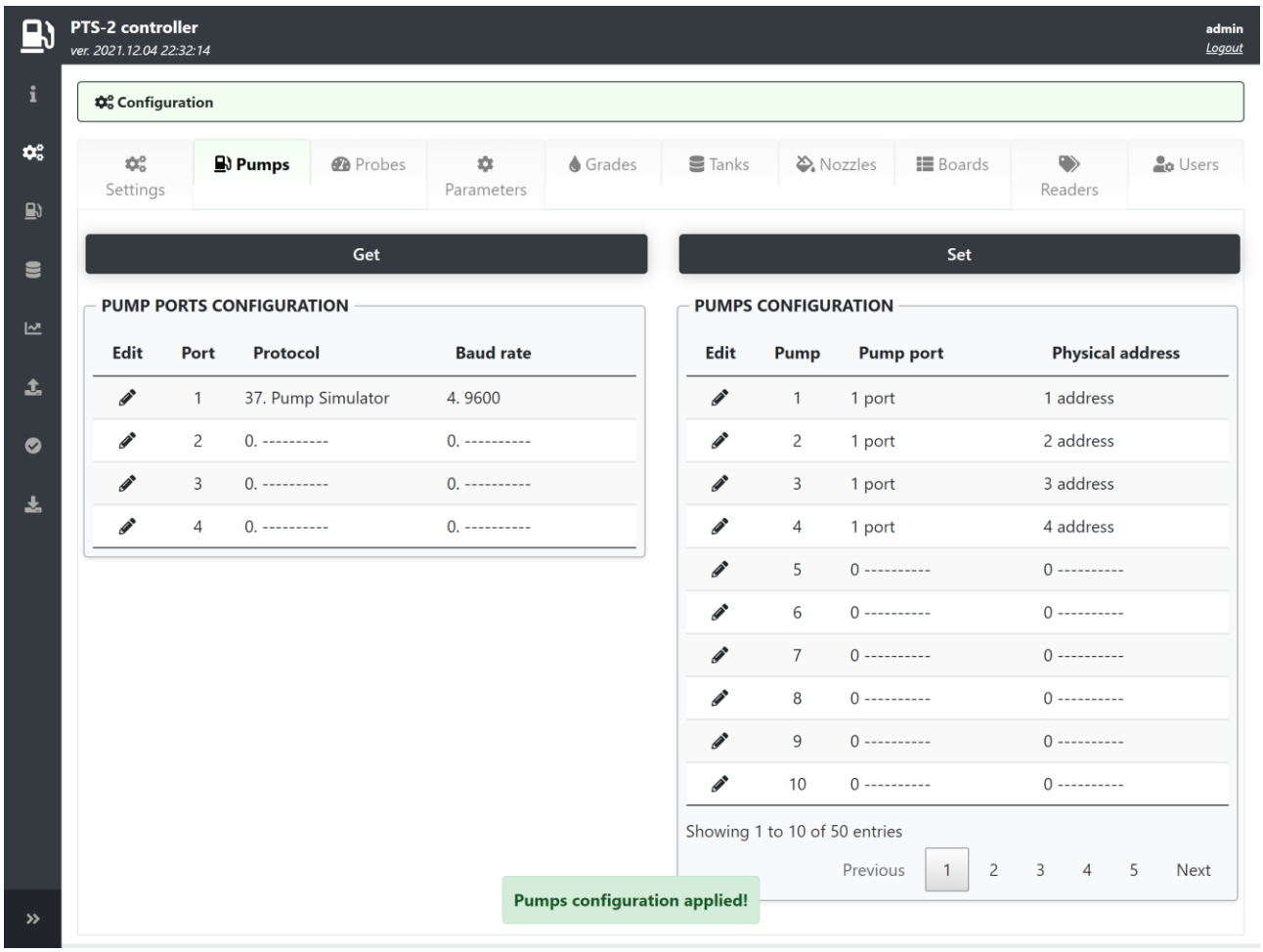
After firmware update is finished firmware file is automatically erased.

In case if the firmware file gets corrupted during upload process – then this file is not be applied and will be automatically erased on startup.

BUILT-IN PUMPS SIMULATOR

PTS-2 controller firmware between its pump protocols has a protocol "*37. Pump Simulator*", which allows to simulate presence of connected pumps. Baud rate for the pump port at this can be set to any possible.

It allows to make easy debugging of control over dispensers without real fuel dispensers connected.

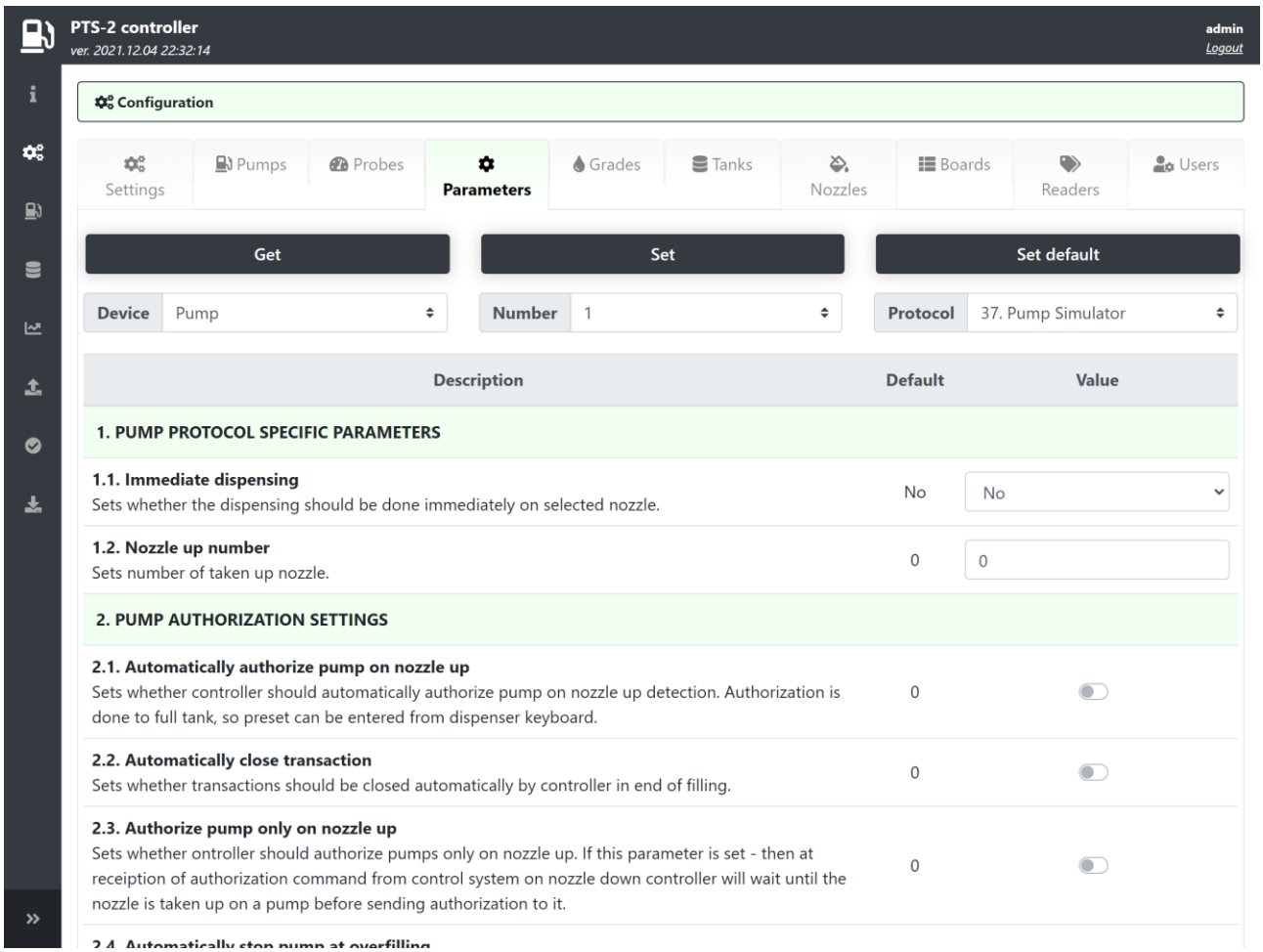


Purpose of the pump simulator protocols is to help developers in debugging of the control system software with PTS-2 controller at absence of real dispensers or pumpheads connected.

Using parameters for this pump protocol, it is possible to set the number of taken up nozzle for every pump and also set whether the dispensing should be done immediately or in full process. If the nozzle up number is set to 0 value in pump parameters – then it is possible to send authorization command with any nozzle number – upon reception it will be taken up automatically and dispensing will be simulated through it, after filling is completely the nozzle will be taken down.

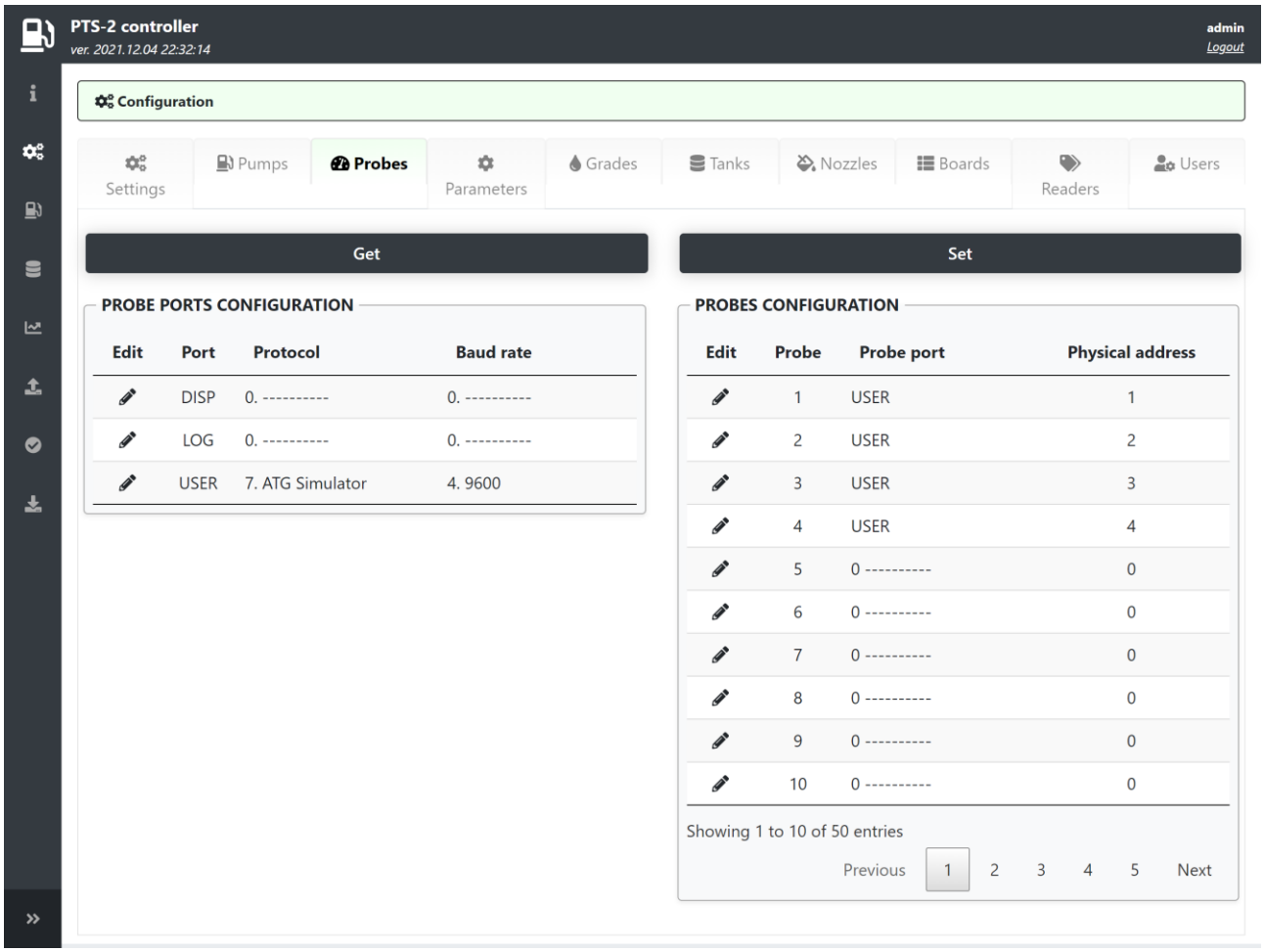
Pump simulators allow to:

- authorize a dispenser with preset volume or amount values
- simulate dispensing of fuel through this dispenser and stop it at necessity
- set prices to dispenser and get prices from dispenser
- read total counters values (both amount and volume) (total counters are lead on each of the nozzles separately and are dropped to zero at restart of the PTS-2 controller)
- set pause during dispensing and release (continue) dispensing after pause

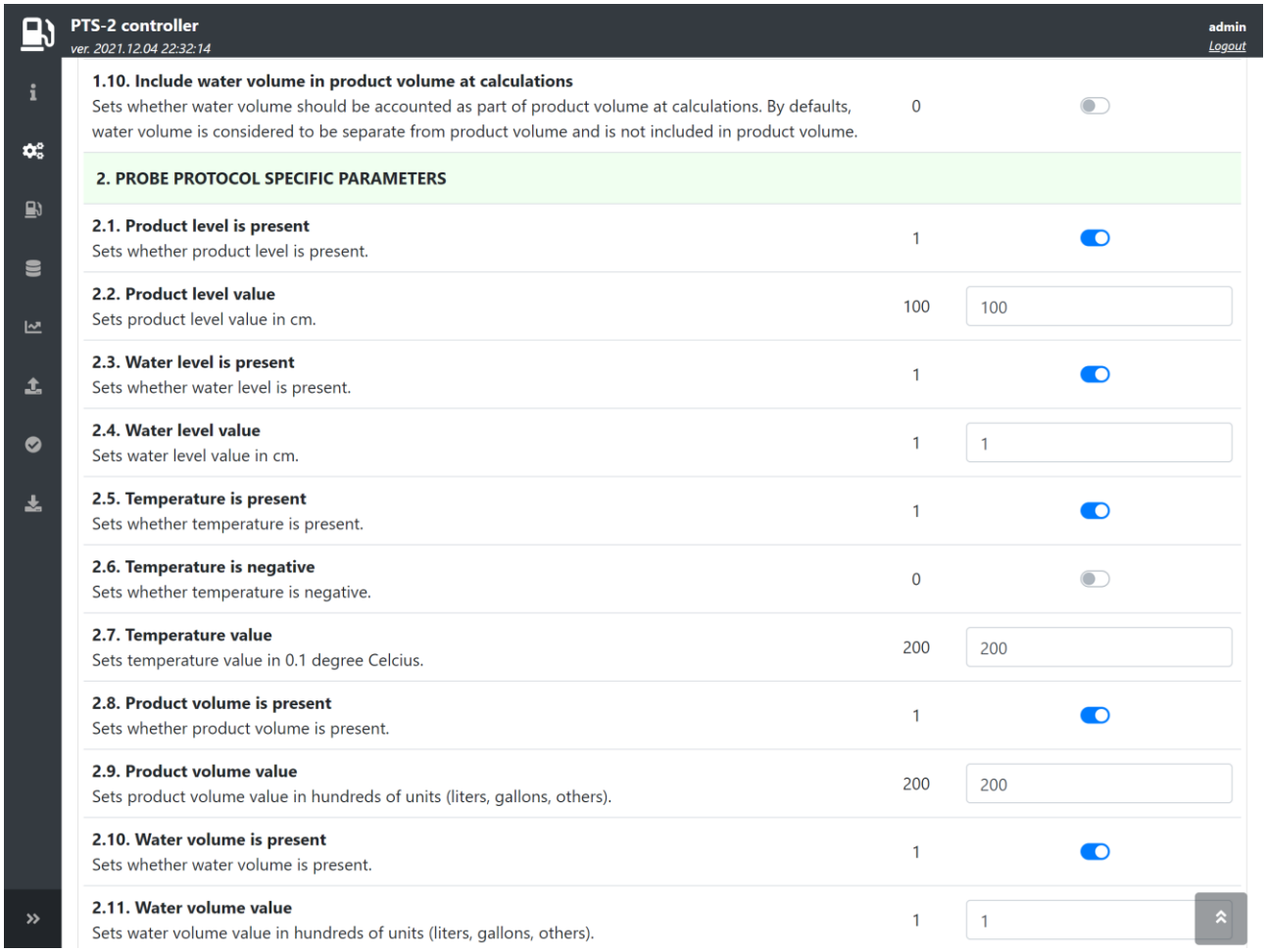


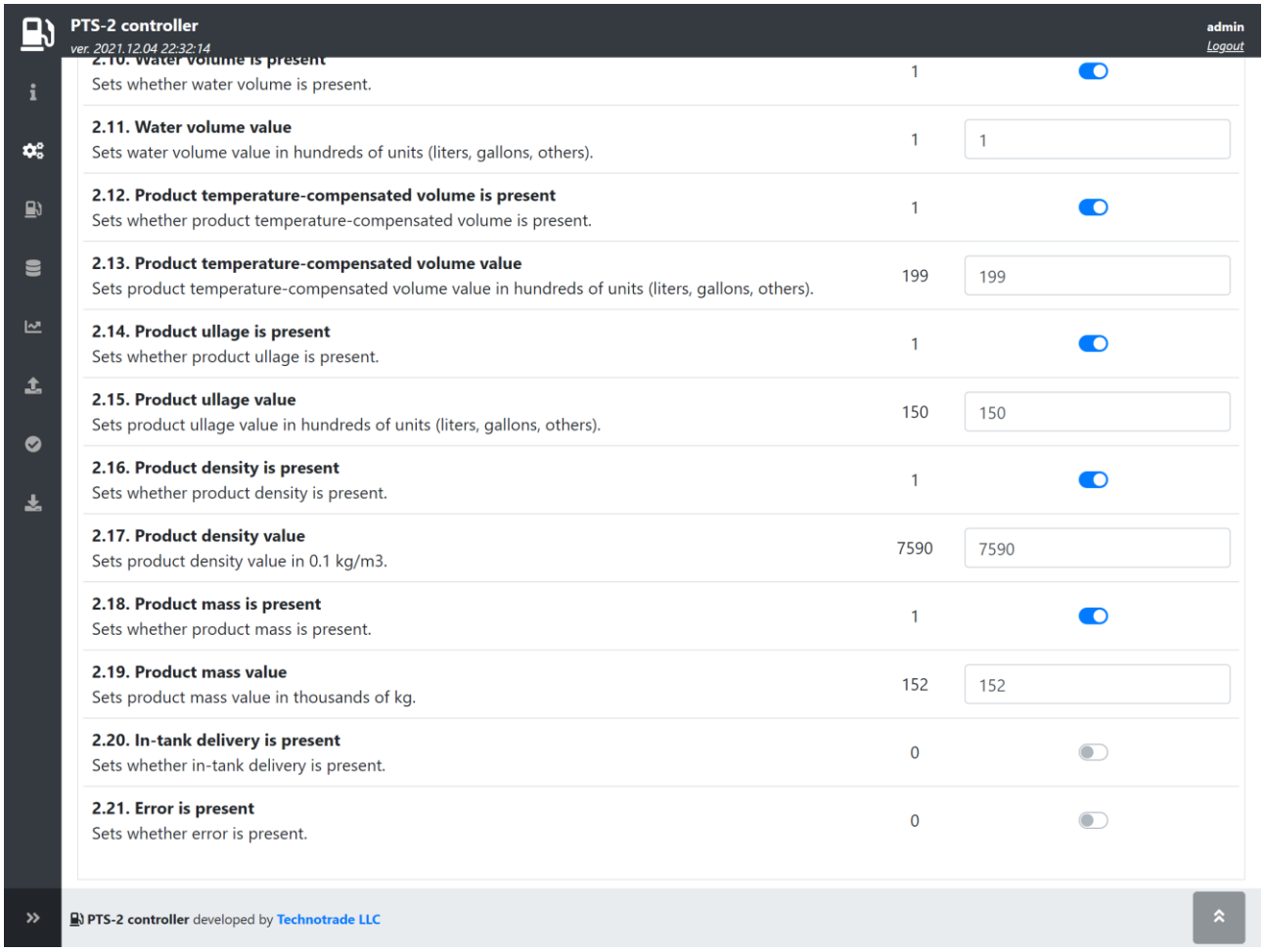
BUILT-IN ATG PROBES SIMULATOR

PTS-2 controller firmware between its ATG probes protocols has a protocol "*7. ATG Simulator*", which allows to simulate presence of connected ATG probe. Baud rate for the probe port at this can be set to any possible.



For each of the probes it is possible to activate any measurement values in probe parameters, which allows to simulate any measurements and debug operation with them. Also, it is possible to simulate in-tank deliveries and probe errors:


PTS-2 controller
ver. 2021.12.04 22:32:14
admin
Logout
1.10. Include water volume in product volume at calculations
Sets whether water volume should be accounted as part of product volume at calculations. By defaults, water volume is considered to be separate from product volume and is not included in product volume.
0
2. PROBE PROTOCOL SPECIFIC PARAMETERS
2.1. Product level is present
Sets whether product level is present.
1
2.2. Product level value
Sets product level value in cm.
100
100
2.3. Water level is present
Sets whether water level is present.
1
2.4. Water level value
Sets water level value in cm.
1
1
2.5. Temperature is present
Sets whether temperature is present.
1
2.6. Temperature is negative
Sets whether temperature is negative.
0
2.7. Temperature value
Sets temperature value in 0.1 degree Celcius.
200
200
2.8. Product volume is present
Sets whether product volume is present.
1
2.9. Product volume value
Sets product volume value in hundreds of units (liters, gallons, others).
200
200
2.10. Water volume is present
Sets whether water volume is present.
1
2.11. Water volume value
Sets water volume value in hundreds of units (liters, gallons, others).
1
1


PTS-2 controller
ver. 2021.12.04 22:32:14
admin
Logout
Sets whether water volume is present.
1
2.11. Water volume value
Sets water volume value in hundreds of units (liters, gallons, others).
1
1
2.12. Product temperature-compensated volume is present
Sets whether product temperature-compensated volume is present.
1
2.13. Product temperature-compensated volume value
Sets product temperature-compensated volume value in hundreds of units (liters, gallons, others).
199
199
2.14. Product ullage is present
Sets whether product ullage is present.
1
2.15. Product ullage value
Sets product ullage value in hundreds of units (liters, gallons, others).
150
150
2.16. Product density is present
Sets whether product density is present.
1
2.17. Product density value
Sets product density value in 0.1 kg/m3.
7590
7590
2.18. Product mass is present
Sets whether product mass is present.
1
2.19. Product mass value
Sets product mass value in thousands of kg.
152
152
2.20. In-tank delivery is present
Sets whether in-tank delivery is present.
0
2.21. Error is present
Sets whether error is present.
0
PTS-2 controller developed by Technotrade LLC

FILES STORED ON SD FLASH DISK

Files stored on SD flash disk:

- *c_pts2.bin* file used for update of PTS-2 controller firmware: if this file is placed in root of the disk – then PTS-2 controller checks it on startup and if the firmware file is OK – then firmware update starts automatically. The file is deleted automatically after startup.
- *Config.js* file used for backup and restore of PTS-2 controller configuration
- *GpsRecs.csv* file with saved GPS records
- *NNCalib.csv* files with tanks calibration charts, where NN – number of the tank (with leading zeroes, for example *01Calib.csv* file is used for tank 1)
- *PortLog.bin* file containing communication with connected device, is used for recording communication exchange with connected equipment
- *PtsLog.txt* file with PTS-2 controller system log
- *PumpTrn.csv* file with saved pumps transactions
- *SD_test.txt* file used for self-diagnostics (normally should be deleted automatically after self-diagnostics is finished)
- *Tags.csv* file with saved tags list
- *TankMsr.csv* file with saved tanks measurements

Files *PumpTrn.csv, TankMsr.csv* and *GpsRecs.csv* are classical CSV (comma separated values) files with column names in a first row.

Note!

CR and **LF** characters shown on examples below mean special control characters used for bringing text to a new line. They are used to mark a line break in a text file, they are not to be typed manually. You can use a text editor as *Notepad++* (https://notepad-plus-plus.org/) in order to inspect the files format, which you have.

Example of *PumpTrn.csv* file:

```
DateTime,Pump,Nozzle,Transaction,UserId,Volume,Amount,Price,VolumeTotal,AmountTotal,DateTimeStart,TCVolume.Tag CR LF
21.06.27 22:00:00,01,1,00001,01,0001000.00,0010000.00,0000010.00,0000000000123456.70,0000000000567890.10,21.06.27 21:50:00,0000985.00,000000140027e917CR LF
21.06.28 00:00:00,02,1,00001,01,0002000.00,0020000.00,0000010.00,0000000000234567.80,0000000000678901.20,21.06.27 23:50:00,0001992.50,000000140027e917CR LF
21.06.28 06:00:00,01,1,00002,01,0001000.00,0010000.00,0000010.00,0000000000124456.70,0000000000577890.10,21.06.28 05:50:00,0000985.00,000000140027e917CR LF
21.06.28 08:00:00,02,1,00002,01,0002000.00,0020000.00,0000010.00,0000000000236567.80,0000000000698901.20,21.06.28 07:50:00,0001992.50,000000140027e917CR LF
21.06.28 11:00:00,01,1,00003,01,0003000.00,0030000.00,0000010.00,0000000000127456.70,0000000000607890.10,21.06.28 10:50:00,0002985.00,000000140027e917CR LF
```

Example of *TankMsr.csv* file:

```
DateTime,Probe,Status,Alarms,ProductHeight,WaterHeight,Temperature,ProductVolume,WaterVolume,Ullage,ProductTCVolume,Density,Mass CR LF
21.06.27 20:00:00,01,0,00,00002500.0,00000010.0,+00000020.0,0000020000,0000000100,0000005000,0000019891,00000759.0,00015180.0 CR LF
21.06.27 21:50:00,01,0,00,00002500.0,00000010.0,+00000020.0,0000020000,0000000100,0000005000,0000019891,00000759.0,00015180.0 CR LF
21.06.27 22:00:30,01,0,00,00002375.0,00000010.0,+00000020.0,0000019000,0000000100,0000006000,0000018896,00000759.0,00014421.0 CR LF
21.06.27 23:50:00,01,0,00,00002375.0,00000010.0,+00000020.0,0000019000,0000000100,0000006000,0000018896,00000759.0,00014421.0 CR LF
21.06.28 00:00:30,01,0,00,00002125.0,00000010.0,+00000020.0,0000017000,0000000100,0000008000,0000016907,00000759.0,00012903.0 CR LF
```

Example of *GpsRecs.csv* file:

```
DateTime,Latitude,NorthSouthIndicator,Longitude,EastWestIndicator,SpeedOverGround,CourseOverGround,Mode CR LF
21.06.27 16:12:18,5029.0000,N,03029.0000,E,014.00,116.01,A CR LF
21.06.27 16:15:59,5029.9114,N,03029.8710,E,001.37,312.52,A CR LF
21.06.27 16:16:52,5029.9141,N,03029.8820,E,000.53,000.00,A CR LF
21.06.27 16:17:08,5029.9160,N,03029.8471,E,000.56,000.00,A CR LF
```

21.06.27 17:28:36,5029.9133,N,03029.8838,E,000.28,296.52,A CR LF

Tags list file Tags.csv is a CSV file without header in a first row:

Example of *Tags.csv* file:

0123456789ABCDEF,1,Joan Great CR LF
1122334455667788,0,Will Smith CR LF
9900AABBCCDDEEFF,1,Mr. Black CR LF

Tank calibration chart file *NNCalib.csv* is CSV file without header in a first row (where NN – number of the tank (with leading zeroes, for example *01Calib.csv* file is used for tank 1)). First value in each row is tank level in 0.1 mm, second value is volume in volume units (liters, gallons, other depending on the units used for account) corresponding to given level. Each value should be 9 digits width (filled with leading zeroes).

Example of tank calibration chart file:

000000000,000000000 CR LF
000000010,000000010 CR LF
000000030,000000020 CR LF
000000040,000000030 CR LF
000000050,000000040 CR LF
000000060,000000050 CR LF
000000080,000000060 CR LF
000000090,000000070 CR LF
000000100,000000080 CR LF
000000110,000000090 CR LF
000000130,000000100 CR LF

For example, in third line the file states that 3 mm level corresponds to 20 volume units (liters, gallons, other depending on the units used for account).

In order to prepare a tank calibration chart file with correct format you can use Microsoft Excel or any similar software. There are 3 things you should take care about:

1. Prepare the data in file: first value in each row is tank level in 0.1 mm, second value is volume in volume units (liters, gallons, other) corresponding to given level, for example:

	A	B
1	0	0
2	31	200
3	85	600
4	125	1000
5	219	2000
6	296	3000
7	365	4000
8	434	5000
9	491	6000
10	554	7000

2. Format cells to add leading zeros, so that totally you have 9 digits in each cell. This is possible to make if you set format type to 000000000 for each cell:

	A	B
1	000000000	000000000
2	000000031	000000200
3	000000085	000000600
4	000000125	000001000
5	000000219	000002000
6	000000296	000003000
7	000000365	000004000
8	000000434	000005000
9	000000491	000006000
10	000000554	000007000

3. Save the created file in CSV format (comma separated values) for MS-DOS. Here MS-DOS format is needed in order to prevent putting a byte order mark in start of the document (please read about byte order mark preambula here: https://en.wikipedia.org/wiki/Byte_order_mark).

GPS MODULE

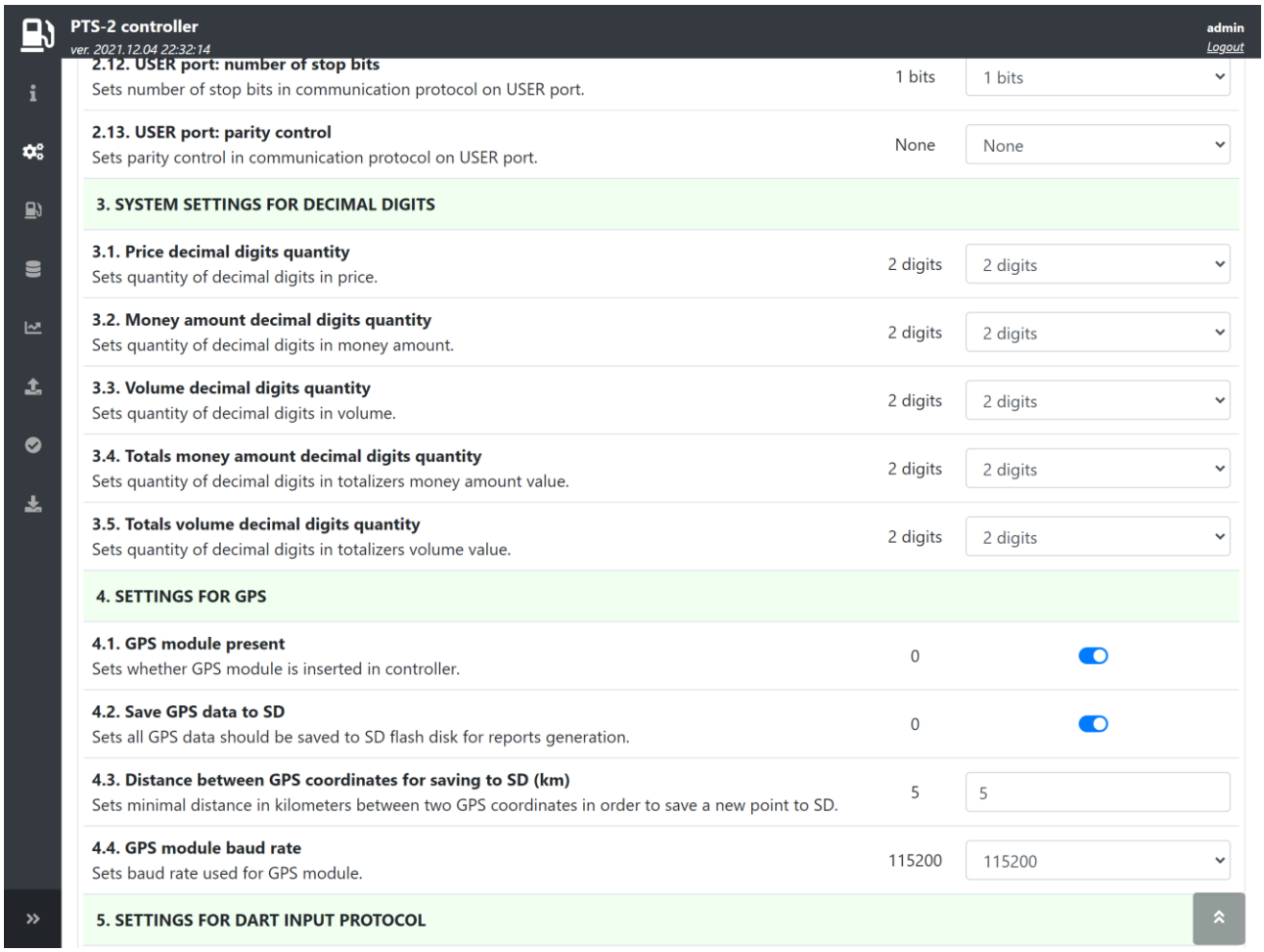
GPS module is a separate small board to be inserted in the socked on the board of PTS-2 controller.

GPS module Is used for tracking of fuel tankers' location:

- tracking of the present location
- tracking of the whole route covered for specified period
- tracking of the fuel level in tanks while the fuel tanker was moving on route
- tracking of places, where fuel level in tanks was changed (tank should be equipped with the probe)
- tracking of places, in which fuel was dispensed through the flowmeter

Having this information, it is possible to know present location of the fuel tanker on the route and the, most important, to know possible frauds done with fuel while the tanker is on the route because PTS-2 controller records GPS places if any change of fuel level in tank is done, PTS-2 controller automatically sends this data to a remote server for processing and analysis.

Configuration of operation with GPS module is done in parameters of PTS-2 controller ('*Configuration'* page '*Parameters'* tab):



GPS module needs time to start operation after power on, which normally takes 2-3 minutes. After signal from satellites is well received – then a LED on the PS module starts blinking showing that the module switched to operation mode.

Information on data received from the GPS module can be viewed in the PTS-2 controller web-server on '*General information*' page:

GPS RECEIVER DATA

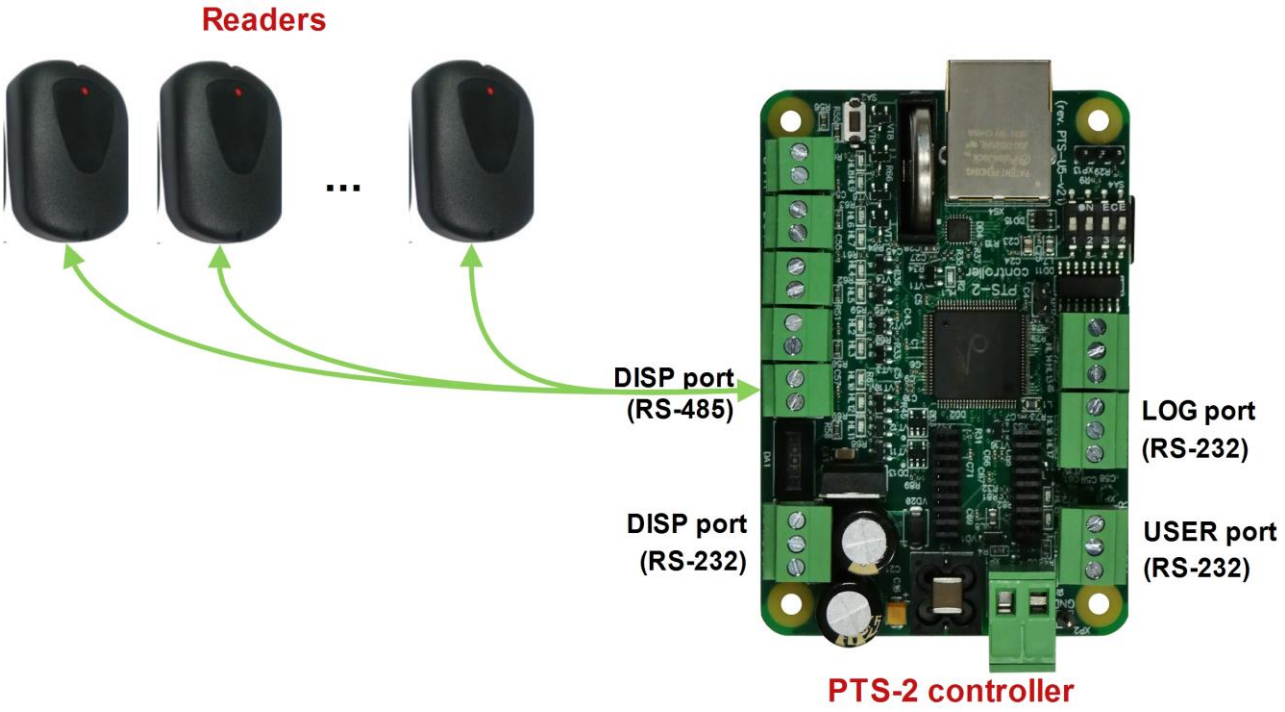
Date/time: 13.12.2021 08:52:52
Latitude: 5030.5179 DD°MM.mmmm' North
Longitude: 03027.1472 DDD°MM.mmmm' East
Speed over ground: 0.31 km/h
Course over ground: 103.03°
Mode: Autonomous

RFID READERS

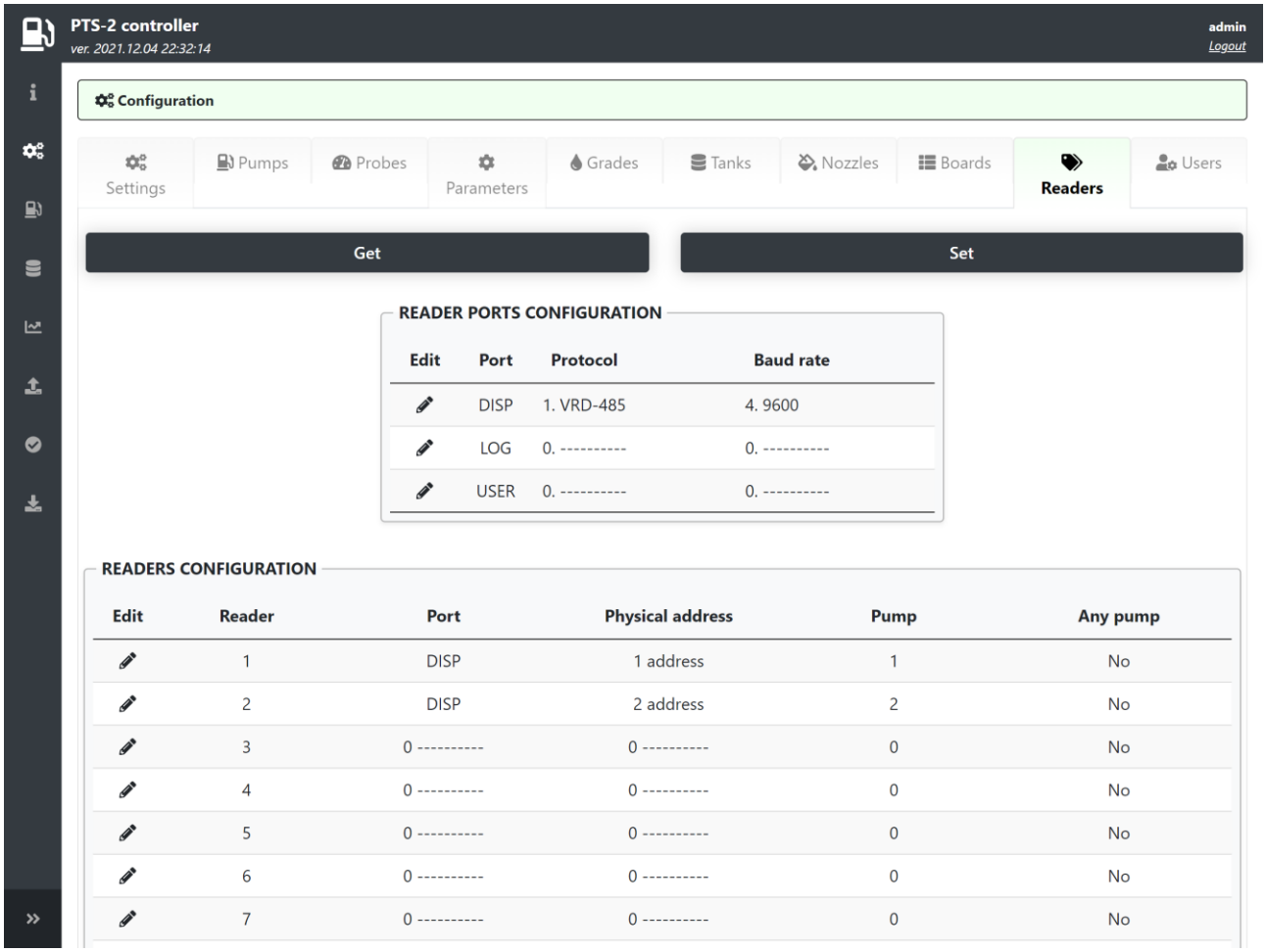
RFID readers can be used for verification of the customer or fuel attendant before the dispensing by pump and also for leading account of all the sales performed by the customer or fuel attendant with generation of detailed and summary reports.

VRD-485 RFID reader is the first model supported by the PTS-2 controller for this purpose (more information on VRD-485 RFID reader can be found on its web-page: https://www.technotrade.ua/vrd-485-reader.html)

Connection of the reader can be done to any of the ports *DISP, LOG, USER.* As the VRD-485 reader is using RS-485 interface, so for direct connection to PTS-2 controller connection to DISP (RS-485) should be made.

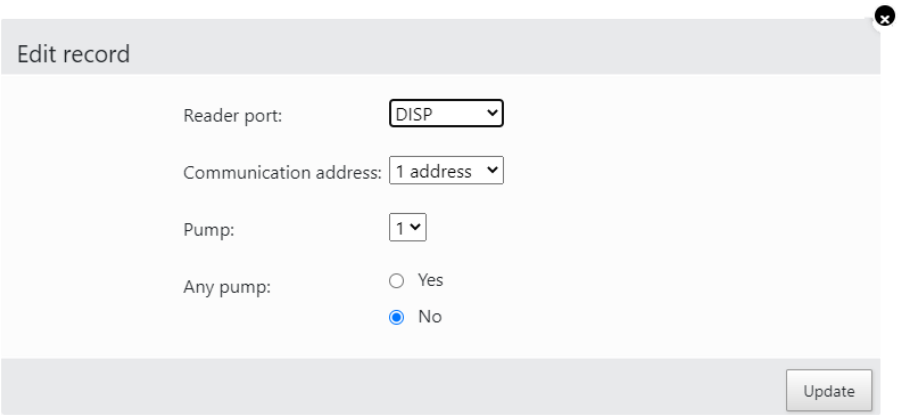


Configuration of the readers in done in the PTS-2 controller web-server on '*Configuration*' page '*Readers*' tab. On this tab you can configure ports for communication with readers, you can configure each of the readers (up to 50) to its own port and assign it a physical address (communication address configured inside the reader).



Configuration of ports includes setting of communication protocol and baud rate for each of the ports and also assigning the readers to each of the ports.

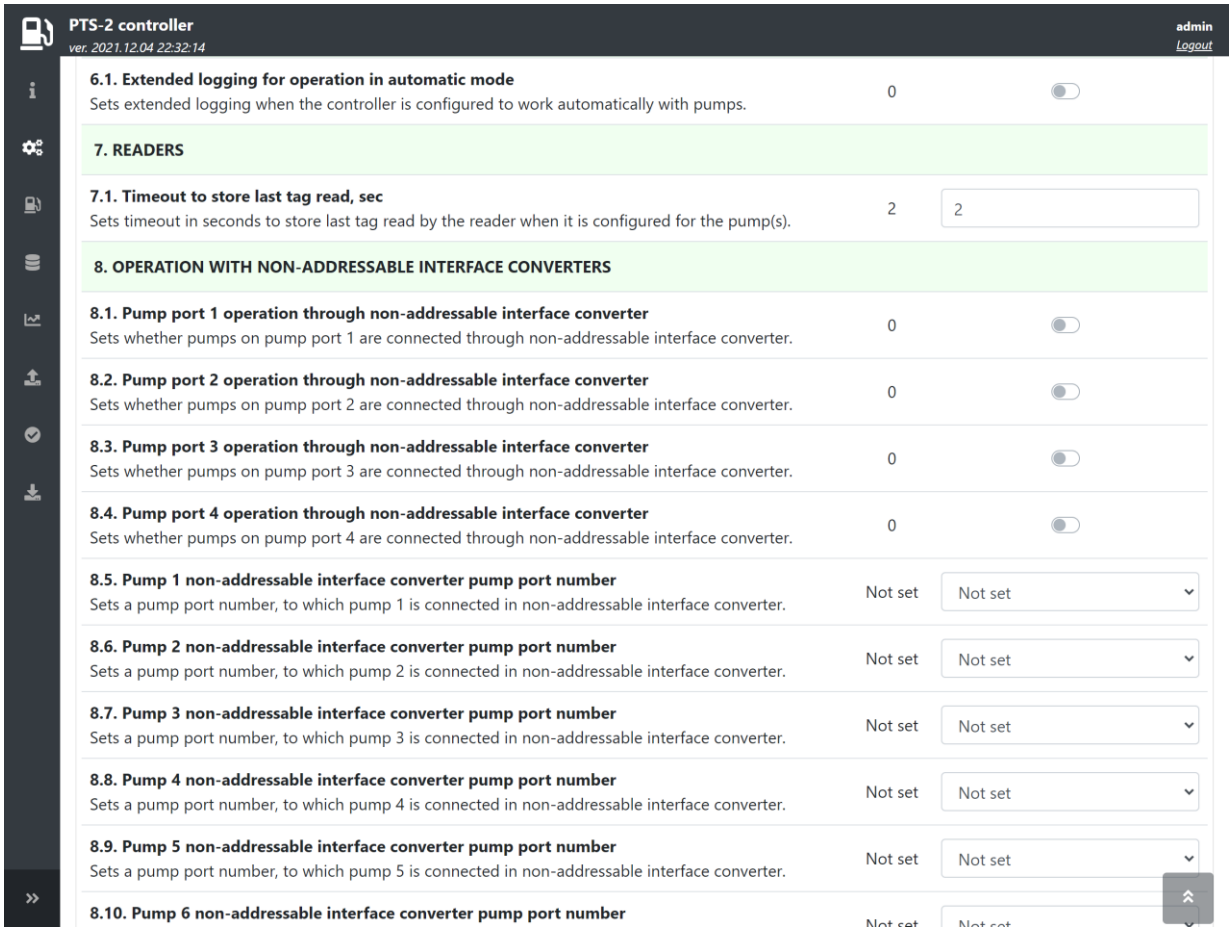
Each of the readers should be also assigned a specific pump or otherwise can be set to serve any pump:



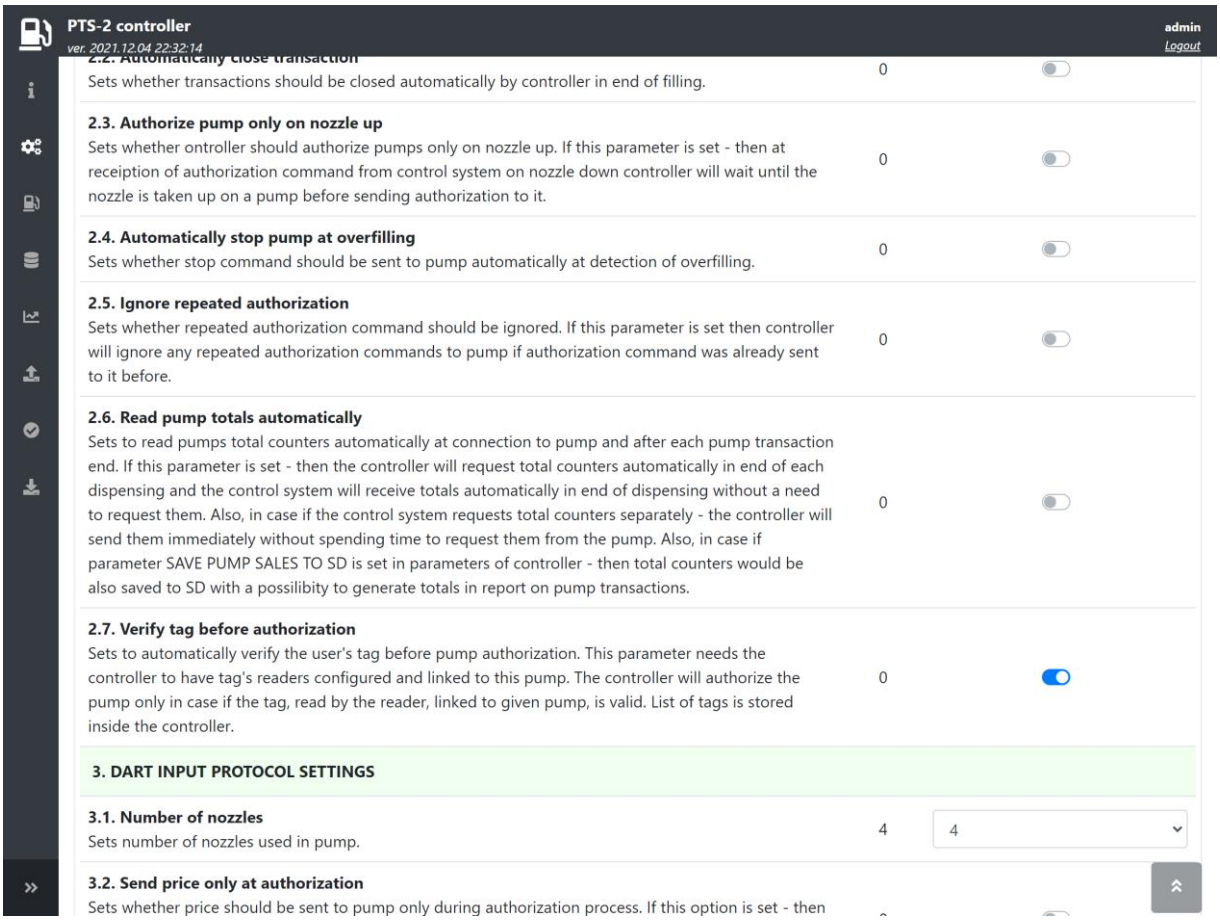
Also, same page contains configuration of the tags, which can be used by fuel attendants or corporate customers.

In the PTS-2 controller web-server on '*Configuration*' page '*Parameters*' tab in a list of parameters for the PTS-2 controller there are settings related for communication with the readers in '*Readers*' section:

- '*Timeout to store last tag read, sec*' – it sets timeout in seconds to store last tag read by the reader when it is configured for the pump(s).



Additionally, for automatic application of the reader with the pump it is necessary to activate a parameter '*Verify tag before authorization*' in parameters for each pump, which is made in PTS-2 controller web-server on '*Configuration'* page '*Parameters'* tab when Pump is selected as a device.



PTS-2 CONTROLLER SOFTWARE DEVELOPMENT KIT (SDK)

PTS-2 controller SDK appointment

PTS-2 controller SDK (Software Development Kit) is intended for developers of POS management software for petrol stations that needs to provide control fuel dispensers and ATG systems.

PTS-2 controller SDK includes a PTS-2 controller and RS485-4 interface converter board, which allow to run software simulators of fuel dispensers and ATG systems on personal computer and debug operation of control systems software with PTS-2 controller on it without a necessity to connect to real fuel dispensers and ATG systems. Thus, it is convenient to work in office or at home rather than on a working petrol station being connected to real equipment.

PTS-2 controller SDK allows developers to:

1. Study operation with the PTS-2 controller.
2. Implement the PTS-2 controller into own developed POS system, OPT, server, mobile or desktop software application for control over fuel dispensers and ATG level measurement systems for petrol stations.
3. Debug own software application to correctly provide control over various popular fuel dispensers locally (on the workplace) without a necessity to go to the petrol station and connect to real fuel dispensers and ATG probes using supplied with PTS-2 controller SDK fuel dispensers and ATG probes software simulators.

PTS-2 controller SDK structure

HARDWARE:

1. PTS-2 controller over fuel dispensers and ATG systems for petrol stations: 1 pcs
2. Interface converter RS485-4 (RS-485 / RS-232): 1 pcs
3. Cabling

SOFTWARE:

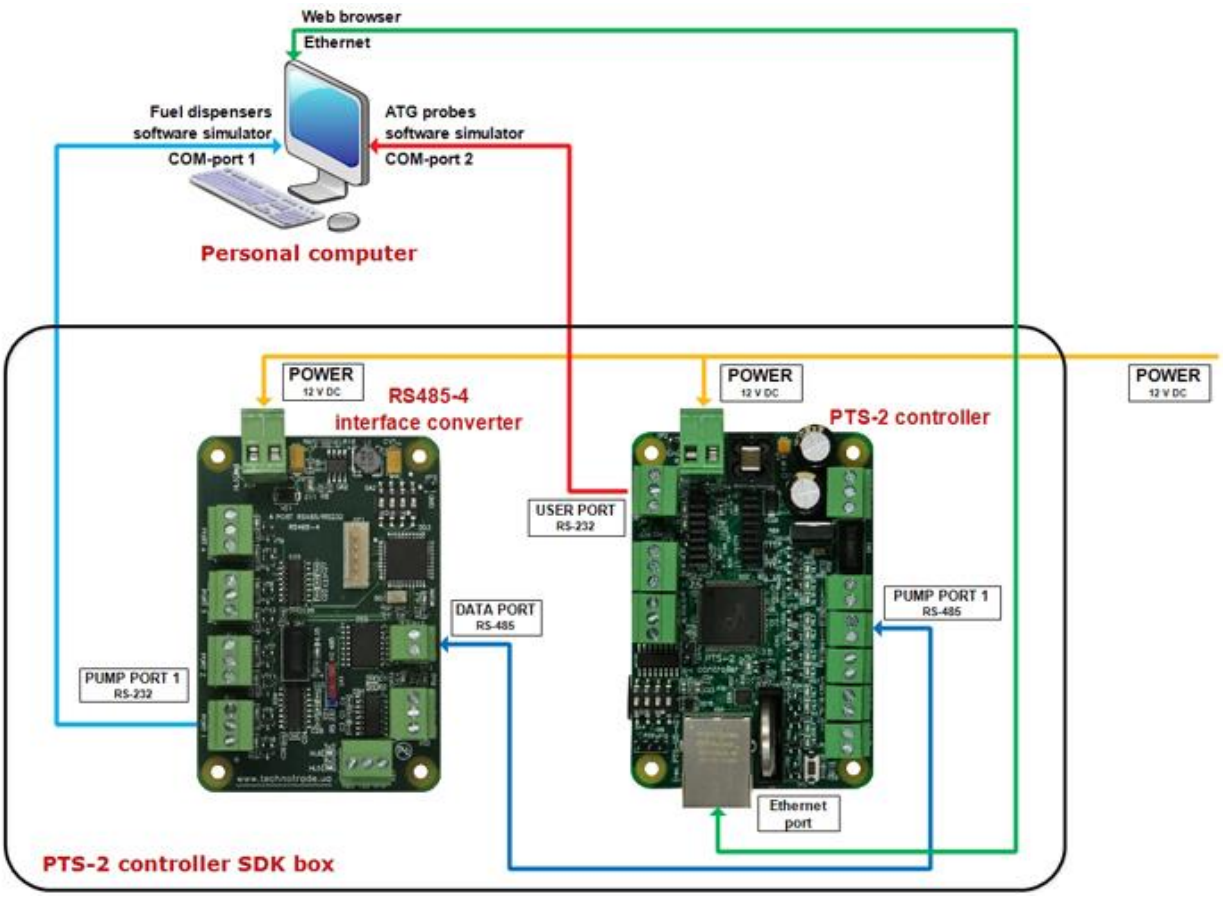
1. Software simulator of fuel dispensers
2. Software simulator of ATG systems (probes)
3. API for developers

PTS-2 controller SDK technical features

Specification

##	PARAMETER	VALUE
1	**Voltage**	12 V DC
2	**Current consumption**	850 mA max
3	**Temperature range**	-40°C ÷ +80°C
4	**Weight**	600 g
5	**Overall dimensions**	160 x 160 x 85 mm

PTS-2 controller SDK connections scheme



PTS-2 controller SDK box includes 2 boards mounted inside of a plastic case:

- PTS-2 controller board
- RS485-4 (RS-485/RS-232) interface converter board

Also, it includes cablings for communication and jack for connection to power supply.

Control systems, which uses jsonPTS communication protocol, connects to Ethernet port of PTS-2 controller.

RS-232/RS-485 interface converter board is used in order to convert signals coming from PTS-2 controller pump ports in RS-485 interface into signals of RS-232 interface for the fuel dispenser software simulator, which runs on personal computer and communicates through a COM-port 1.

Connection to ATG software simulators is made through USER port of PTS-2 controller (RS-232 interface), which is connected to personal computer through a COM-port 2.

Thus, it is possible to debug a correct operation of software, being developed, with the PTS-2 controller without a necessity to connect to real fuel dispensers and ATG systems, but using fuel dispenser's software simulators and ATG system's software simulators.

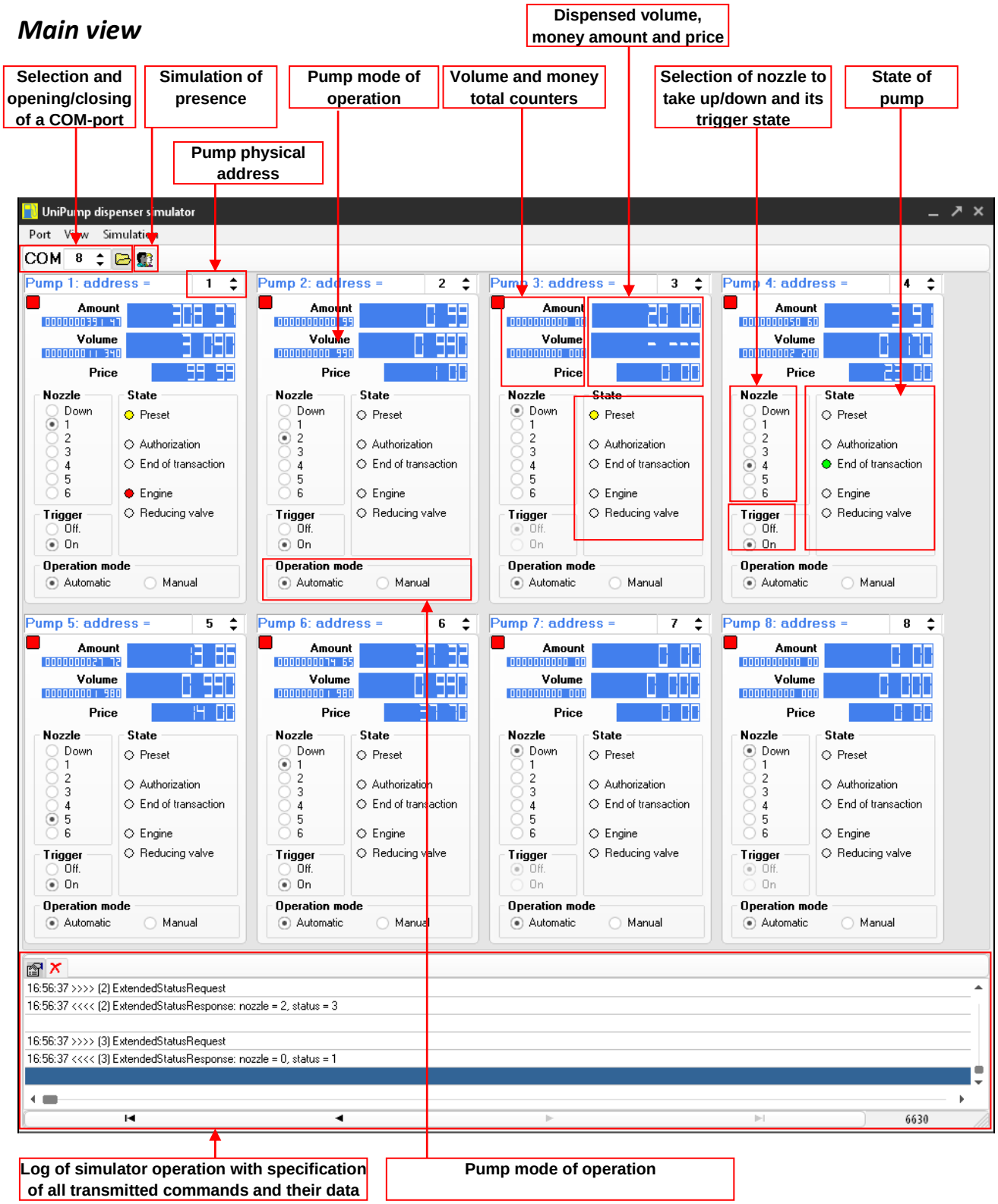
More technical information regarding RS485-4 dispenser interface converter (RS-485 to RS-232) can be found in technical guide on: *http://www.technotrade.ua/rs485-to-rs232-converter.html*.

UniPump pumps software simulator

Purpose

PTS-2 controller SDK includes a pumps software simulator with a purpose to enable debugging of PTS-2 controller implementation in third party software. Purpose of software simulators is to debug operation of control system software (cash register, POS system, OPT, etc) over fuel dispensers through PTS-2 controller without a necessity to connect to real fuel dispensers.

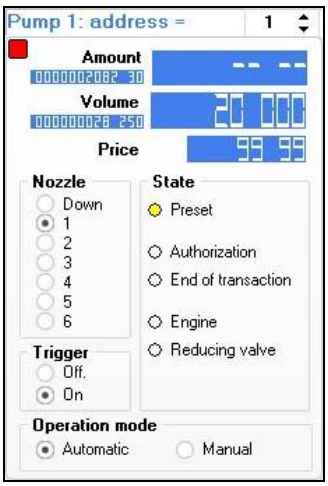
Main view



Pumps software simulator main view

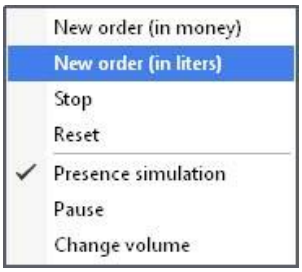
In pumps simulator it is possible to add up to 99 pumps giving each a unique physical address. Each of the pumps leads separately its total counters (volume and money amount) and prices for each of its 6 nozzles. Total counter values as well as prices are stored in Windows system register. Each of the nozzles has a trigger.

Each of the pumps can be transferred to automatic mode of operation (controlled from the control system) or manual mode of operation (controlled manually and does not response to control system).



Pump control in pumps software simulator

In right-click mouse menu it is possible to preset the pump with money amount or volume value, stop the pump, reset, pause and change volume:



Pump right-button mouse menu

Volume preset menu for pump

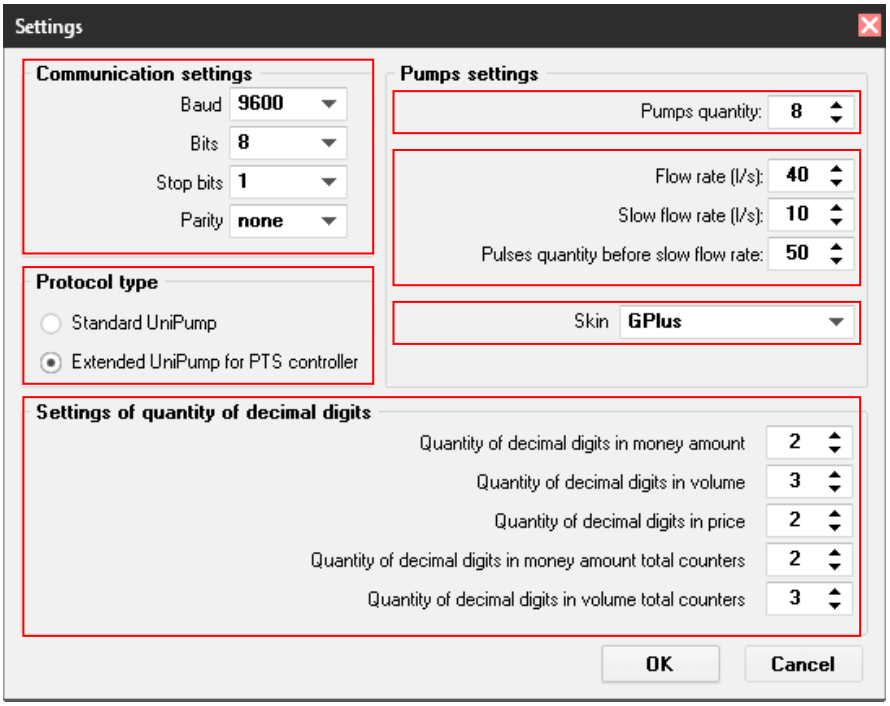
Configuration

Configuration of the pumps simulator includes configuration of:

- communication settings, which include setting of baud rate, number of data bits and stop bits, parity control
- quantity of pumps (physical address is set on each pump control independently)
- technical characteristics of the pumps in simulator (flow rate, slow flow rate (when flowdown valve is on), quantity of pulses before the flowdown valve is switched on
- protocol type: selection between standard UniPump communication protocol and extended UniPump communicatin protocol for PTS-2 controller
- setting quantity of digits in values of volume, money amount, price and total counters
- selection of graphical skin

Pumps simulator can simulate presence at the pumps – take up nozzles and make dispensing in random way thus making it possible to debug control system software as if it was operating on real petrol station.

Log window of the pumps simulator enables to see all the requests and responses in communication and their respective data.



Settings of pumps simulator

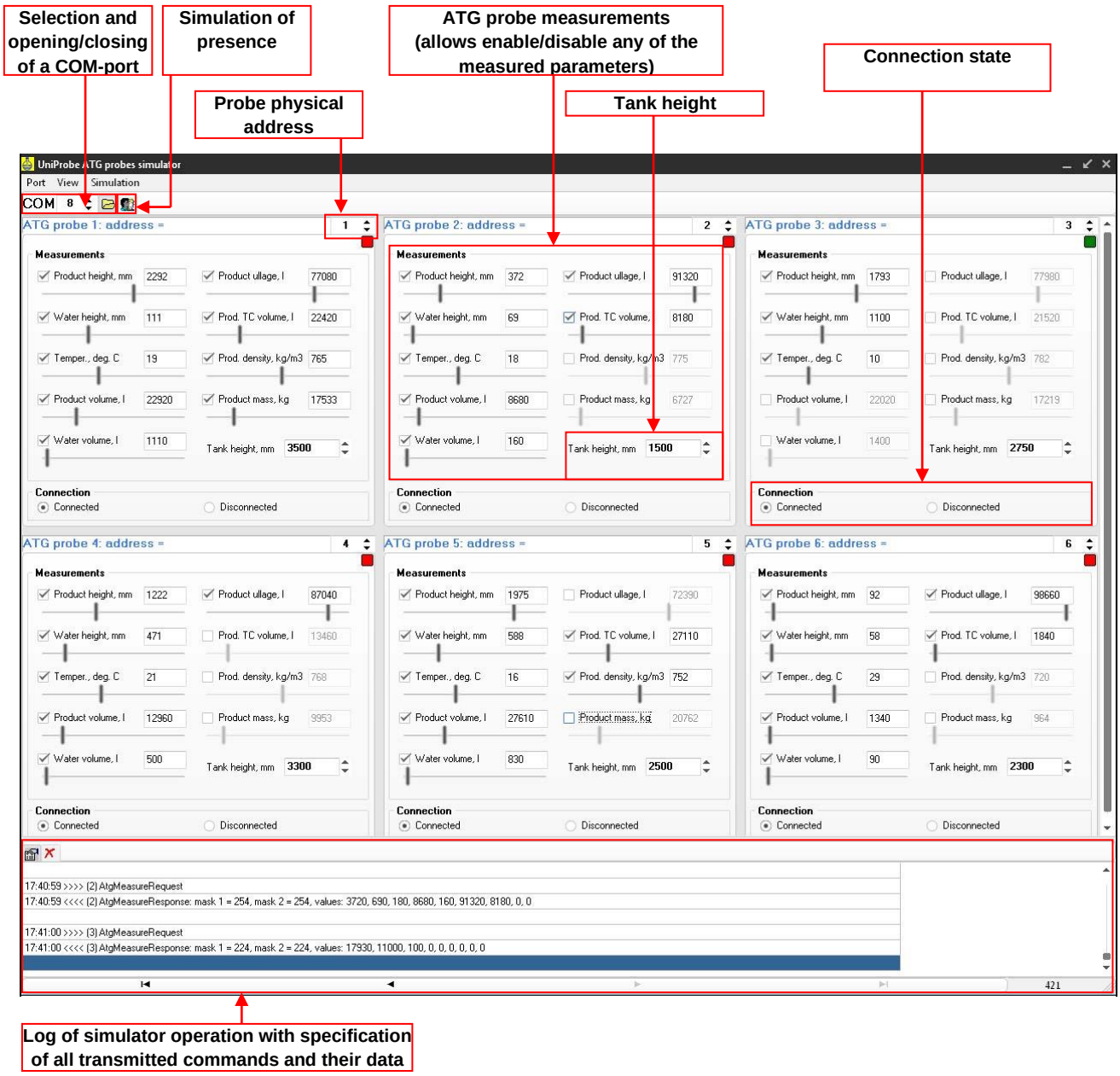
For communication of PTS-2 controller with the UniPump pumps software simulator it is necessary to select in PTS-2 controller configuration of the pump port communication protocol "*2. UniPump*" and select appropriate baud rate (equal to set in simulator (9600 baud rate by defaults) and set pumps physical addresses equal to those, which are set for pumps in simulator.

UniProbe ATG probes software simulator

Purpose

PTS- controller SDK includes a ATG probes software simulator with a purpose to enable debugging of PTS-2 controller implementation in third party software. Purpose of software simulators is to debug operation of control system software (cash register, POS system, OPT, etc) over ATG systems through PTS-2 controller without a necessity to connect to real ATG systems or probes.

Main view



ATG probes software simulator main view

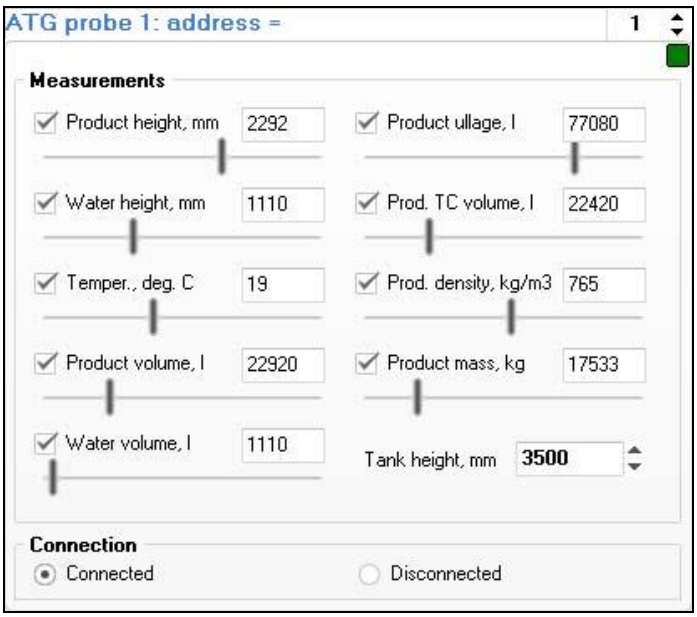
In ATG probes simulator it is possible to set measurements of the following parameters:

- Products height
- Water height
- Temperature
- Product volume

- Water volume
- Product ullage
- Product temperature compensated volume
- Product density
- Product mass

Any of the specified parameters can be switched on or off.
Also, it is possible to set height of tank in the system.

Each of the ATG probes can be transferred to connected (responses to PTS-2 controller) or disconnected (does not response to PTS-2 controller) state.

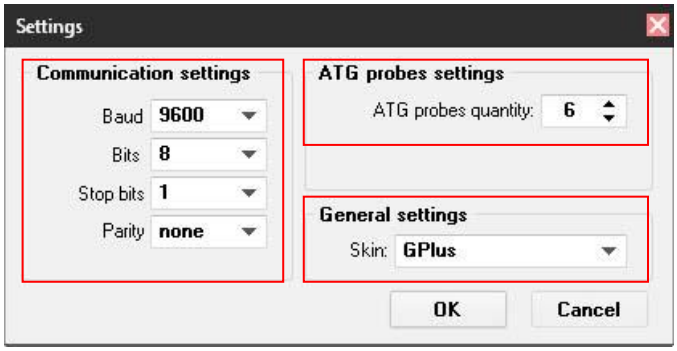


Probe control in ATG probes software simulator

Configuration

Configuration of the pumps simulator includes configuration of:

- communication settings, which include setting of baud rate, number of data bits and stop bits, parity control
- quantity of ATG probes (physical address is set on each probe control independently)
- selection of graphical skin



Settings of probes simulator

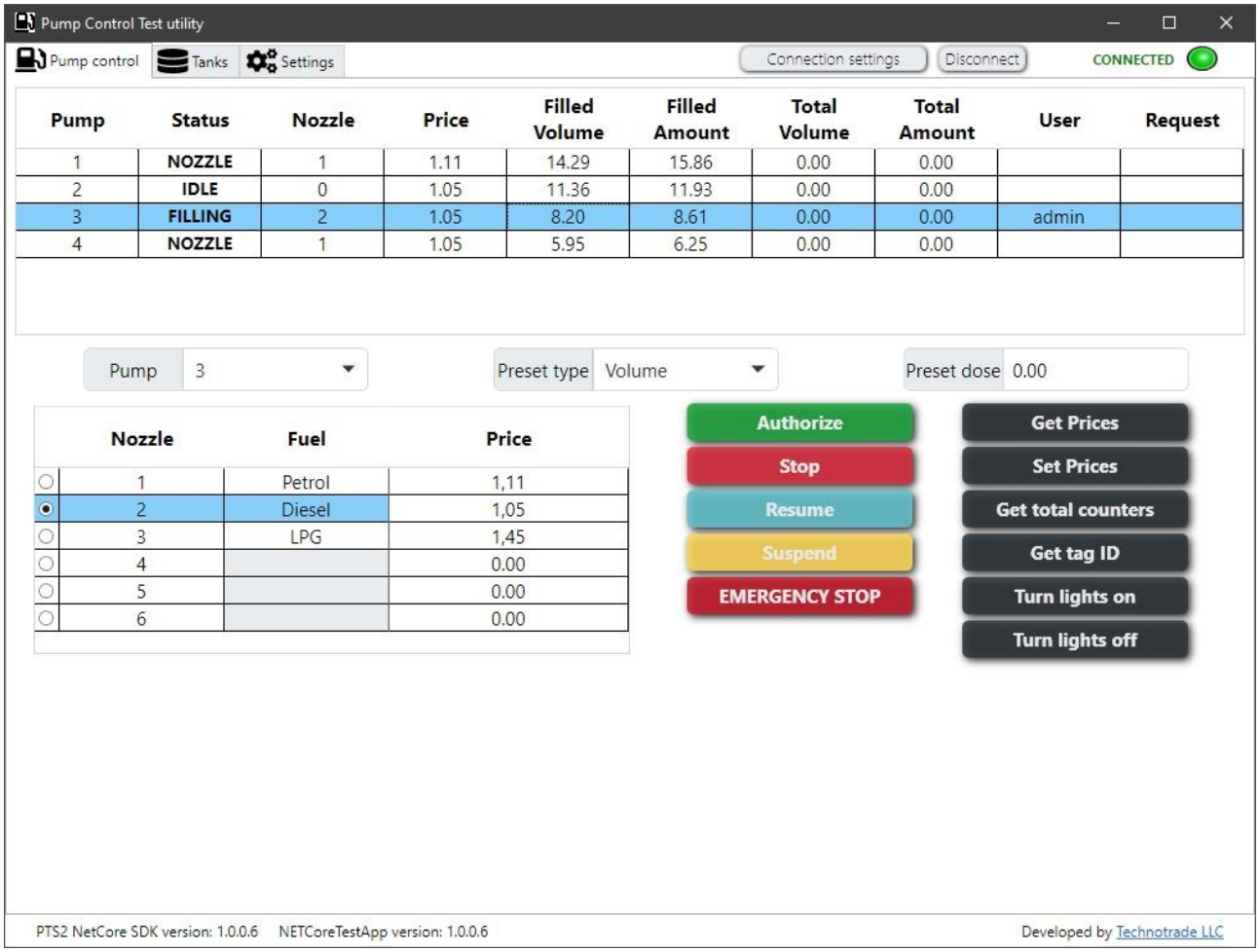
Probes simulator can simulate presence of liquids in tanks – change height and volume of fuel, temperature mass in random way thus making it possible to debug control system software as if it was operating on real petrol station.

Log window of the probes simulator enables to see all the requests and responses in communication and their respective data.

For communication of the PTS-2 controller with UniProbe ATG probes software simulator it is necessary to select in PTS-2 controller configuration of the probe port communication protocol "*9. UniProbe*" and select appropriate baud rate (equal to set in simulator (9600 baud rate by defaults) and set probes physical addresses equal to those, which are set for probes in simulator.

.NET Core API and open-source application

PTS-2 controller SDK includes .NET Core API library and an open-source application compatible with various operating systems (Windows, Linux, MacOS) with different processor architectures. Communication with PTS-2 controller is made using commands and responses described in jsonPTS communication protocol (own proprietary protocol of Technotrade LLC) – see document "*jsonPTS communication protocol specification for PTS-2 controller*" for more information. Developers can use it in their projects without any limitation.



Step-by-step configuration of the PTS-2 controller SDK

Purpose

This step-by-step instruction is provided in order to simplify understanding of PTS-2 controller SDK operation and assembling. It describes basic steps to be made with PTS-2 controller SDK to assemble it correctly and also to install and configure software coming in its structure.

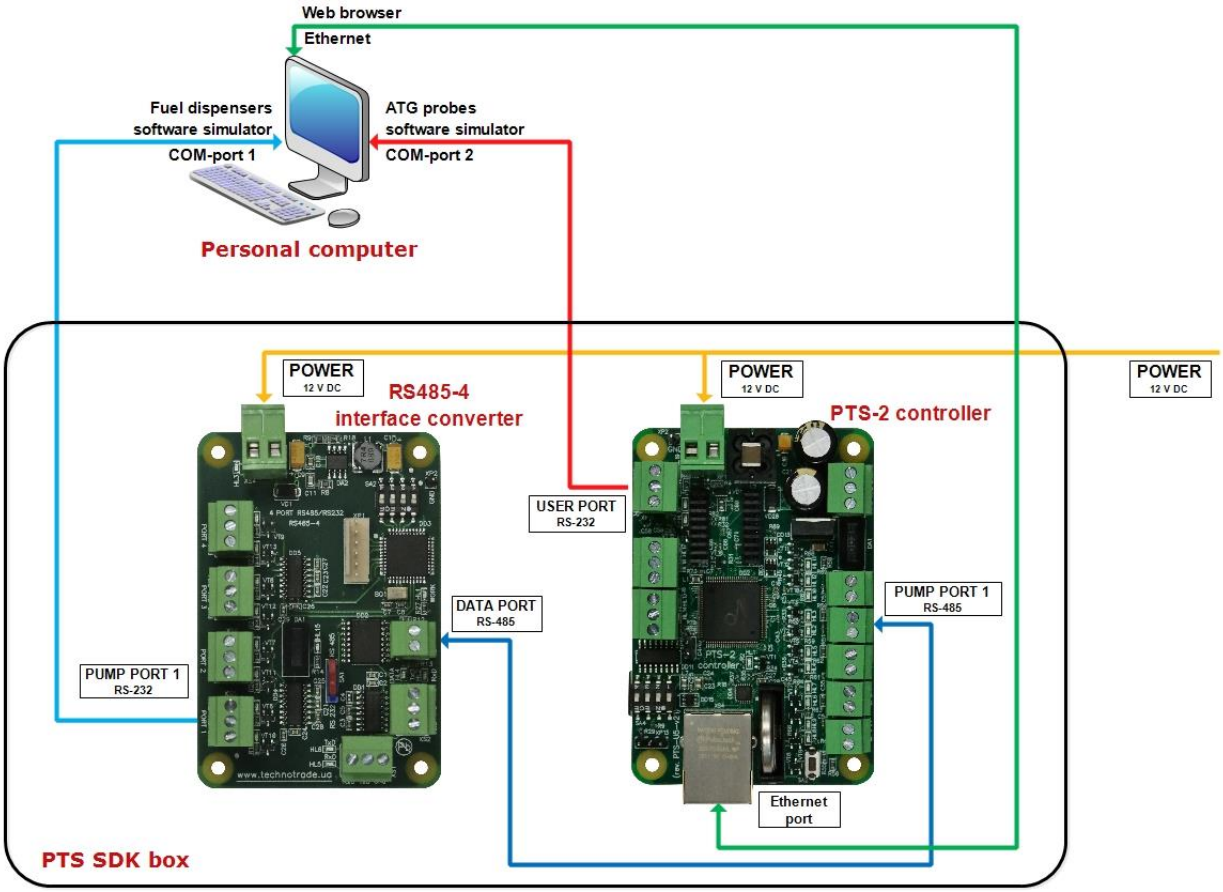
Step 1. Assembling PTS-2 controller SDK cabling and connection to PC

For connection of PTS-2 controller SDK cabling it is necessary to have at least 1 COM-port available in PC (for fuel dispenser software simulator or ATG probe software simulator). In case of absence of native COM-ports in the PC motherboard it is possible to use any standard interface converters to RS-232 interface: USB-to-COM, Ethernet-to-COM, PCI-to-COM, Bluetooth-to-COM, other possible. Visit this link for possible solution: *http://www.technotrade.ua/usb-to-rs-232-interface-converter.html.*

USB-to-COM interface converter cable

PTS-2 controller SDK is generally supplied in a mounting box, in which the PTS-2 controller and RS485-4 interface converter boards are mounted. All cables inside the PTS-2 controller SDK are already connected. In order to start operation, it is necessary to connect interfaces to Ethernet port and COM-ports and power on the PTS-2 controller SDK. So, it is necessary to make all the cablings connections correctly for the system to start operation.

In this step-by-step instruction we will connect 1 pump simulator and 1 ATG probes simulator. Scheme of connections should be the following:



1. Connection of PC with PTS-2 controller: connect cable coming from Ethernet port of PTS-2 controller to Ethernet port of PC.
2. Connection of RS485-4 interface converter to PC: connect cable coming from PUMP PORT 1 of RS485-4 interface converter to COM-port 1 of PC, on which the pump software simulator is to be launched.
3. Make sure that PUMP PORT 1 of PTS-2 controller is connected to DATA PORT (RS-485) of RS485-4 interface converter.
4. Make sure that all switches of configuration DIP-switch of PTS-2 controller are set into position OFF.
5. Make sure that power supply cable is connected to POWER connector of PTS-2 controller and POWER connector of RS485-4 interface converter.
6. (Optional, may be skipped) In order to use software simulator of ATG system connect USER port of PTS-2 controller to COM-port 2 of PC, on which the ATG system software simulator is to be launched.
7. Switch on (power on) the PTS-2 controller SDK (requires 12 V DC power supply source).

It is worth to mention that only 1 application can work with a specific COM-port at the time, 2 applications can not share the same COM-port.

Step 2. Starting of PTS-2 controller web-server

By defaults PTS-2 controller is configured to use the following communication settings for Ethernet:

- IP-address: 192.168.1.117
- Network mask: 255.255.255.0
- Gateway: 192.168.1.13

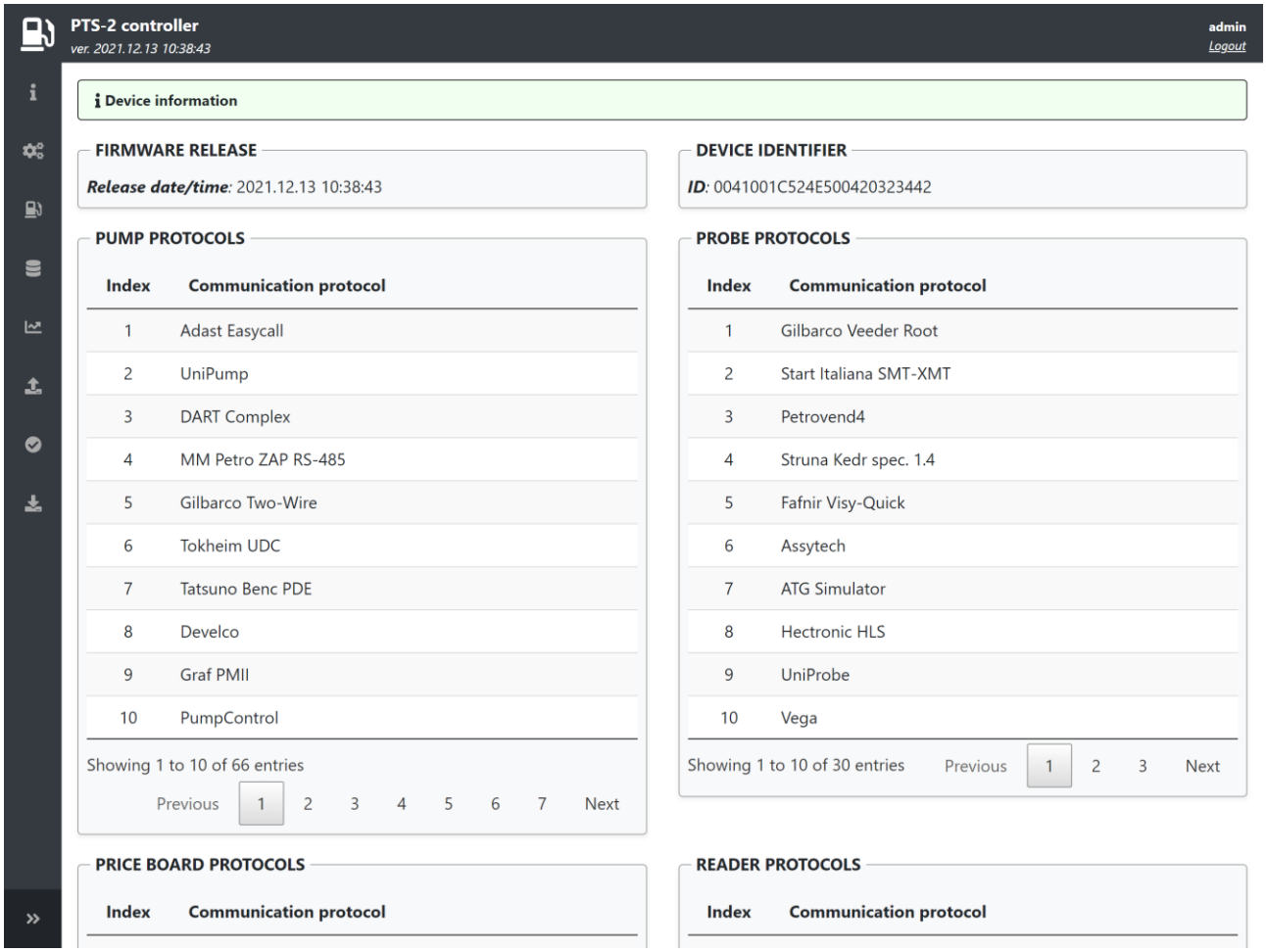
These settings can be changed in PTS-2 controller's web-server, however in order to initially connect to PTS-2 controller web-server it is needed to set Ethernet IPv4 settings of PC to be in same network. So, on the first stage configure Ethernet settings in the PC to be in same network, for example:

- IP-address: 192.168.1.10
- Network mask: 255.255.255.0
- Gateway: 192.168.1.113

After that open some standard web-browser (recommended web-browsers are Google Chrome and Mozilla Firefox) and type in the address line http://192.168.1.117 (for HTTP if configuration DIP-switch 1 is set to ON position) or https://192.168.1.117 (for HTTPS if configuration DIP-switch 1 is set to OFF position).

At request of authorization use default settings:

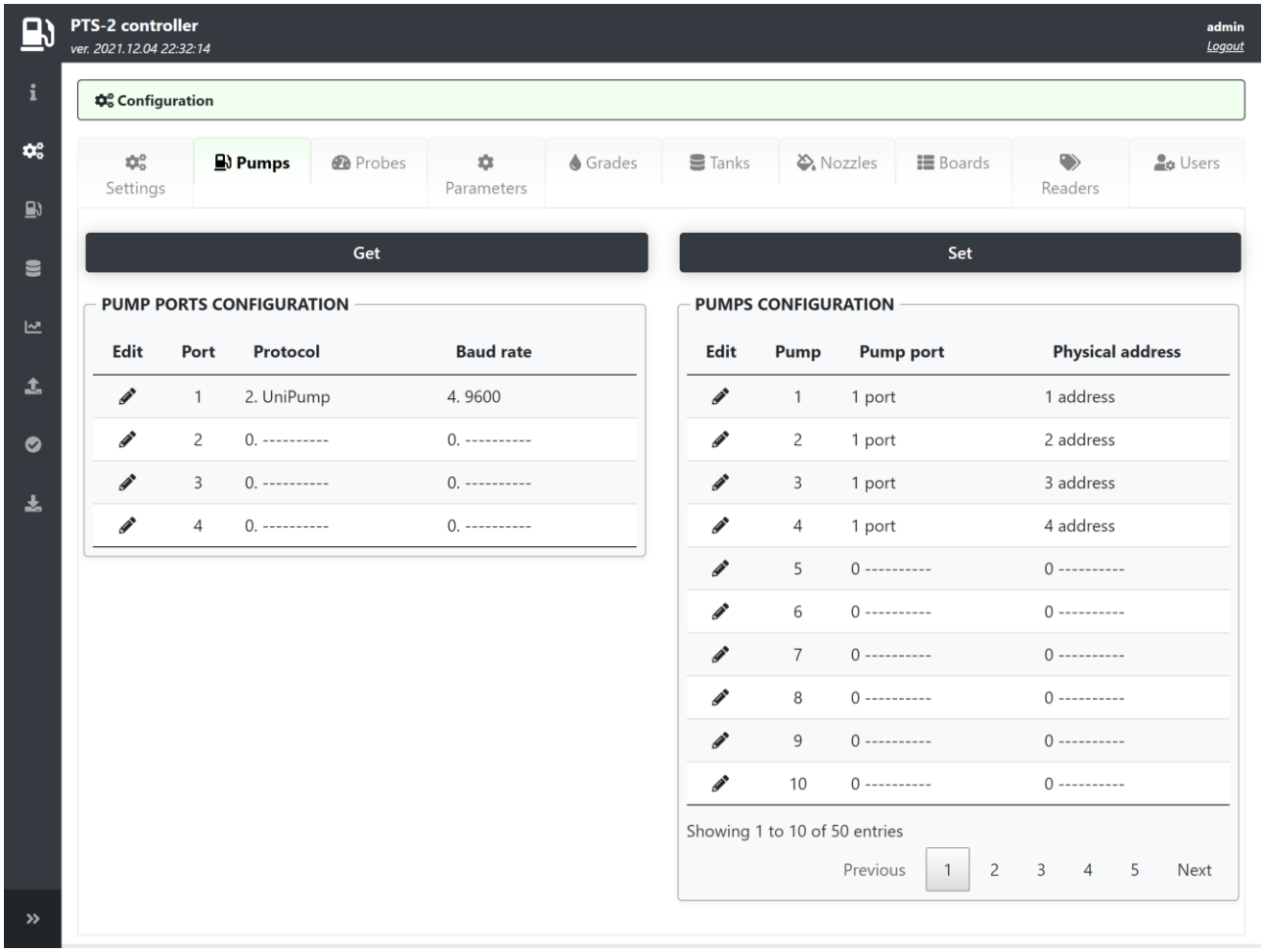
- login: admin
- password: admin



Step 3. Configuration of pump ports

Go to *Configuration* page to *Pumps* tab and set pumps ports configuration as shown on below screenshot. Set protocol "*2. UniPump*" for pump port 1 and baud rate "*4. 9600*". Assign this pump port to pumps 1 - 4, set the physical addresses of these pumps also 1 – 4.

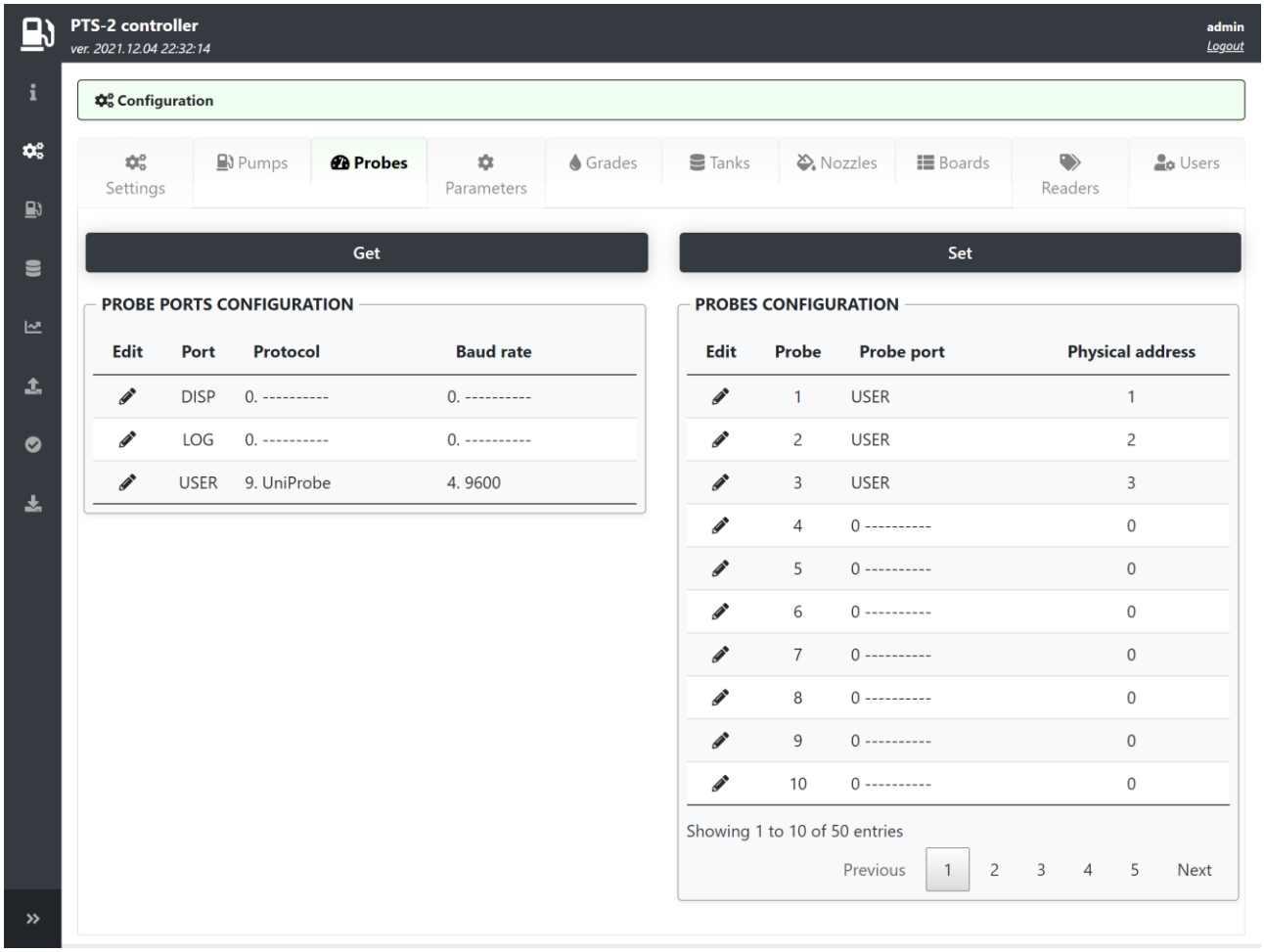
Click the button *Set* to save configuration in PTS-2 controller.



Step 4. Configuration of probes ports

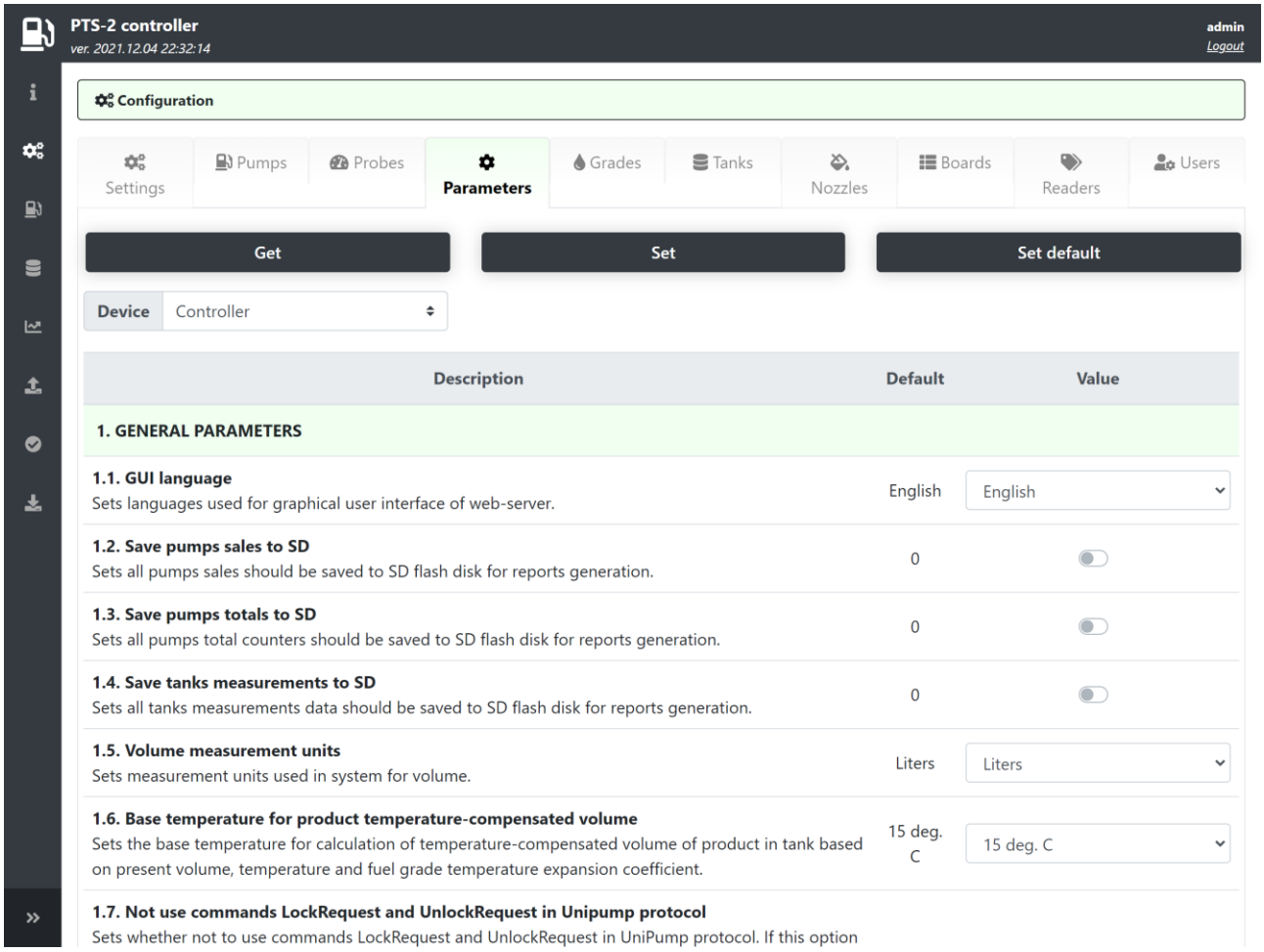
Go to *Configuration* page to *Probes* tab and set probes ports configuration as shown on below screenshot. Set protocol "*9. UniProbe*" for probe port *USER* and baud rate "*4. 9600*". Assign this probe port to probes 1 - 3, set the physical addresses of these probes also 1 – 3.

Click the button *Set* to save configuration in PTS-2 controller.



Step 5. Configuration of PTS-2 controller parameters

Go to *Configuration* page *Parameters* tab and select from a device list item "*PTS*", click on a button *Default*.

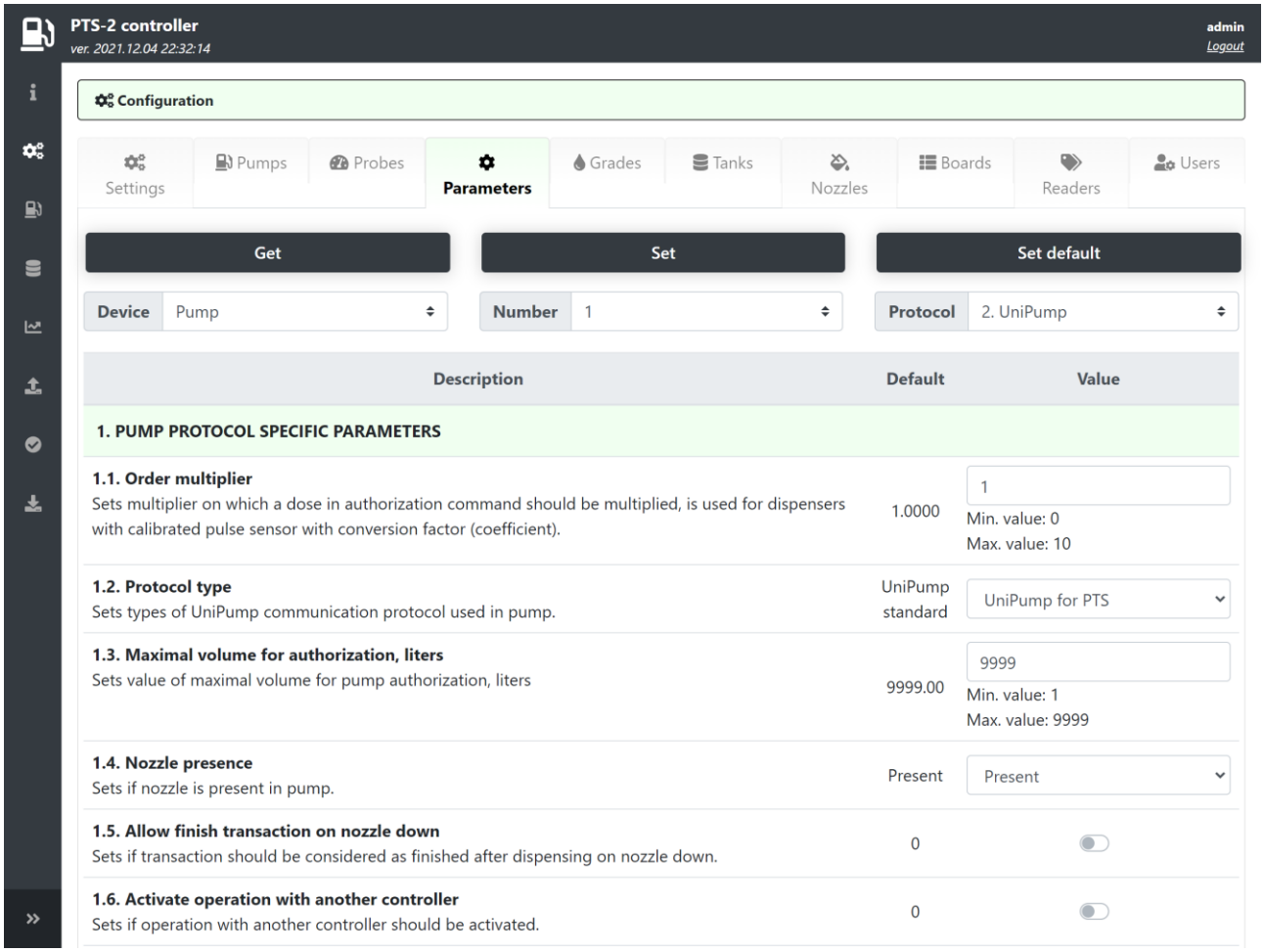


Step 6. Configuration of pumps parameters

On *Configuration* page *Parameters* tab select from a device list item "*Pump*", in a field "*Number*" select pump 1, in a protocol list – "*2. UniPump*" (which means configuration of UniPump protocol parameters for pump 1).

Click on a button *Default* to write default values. Change the parameter with index 2. "*Protocol type*" to value "*UniPump for PTS*" as it is shown on below screenshot.

Save current configuration for each of 4 pumps (select pumps one by one using field "*Number*").

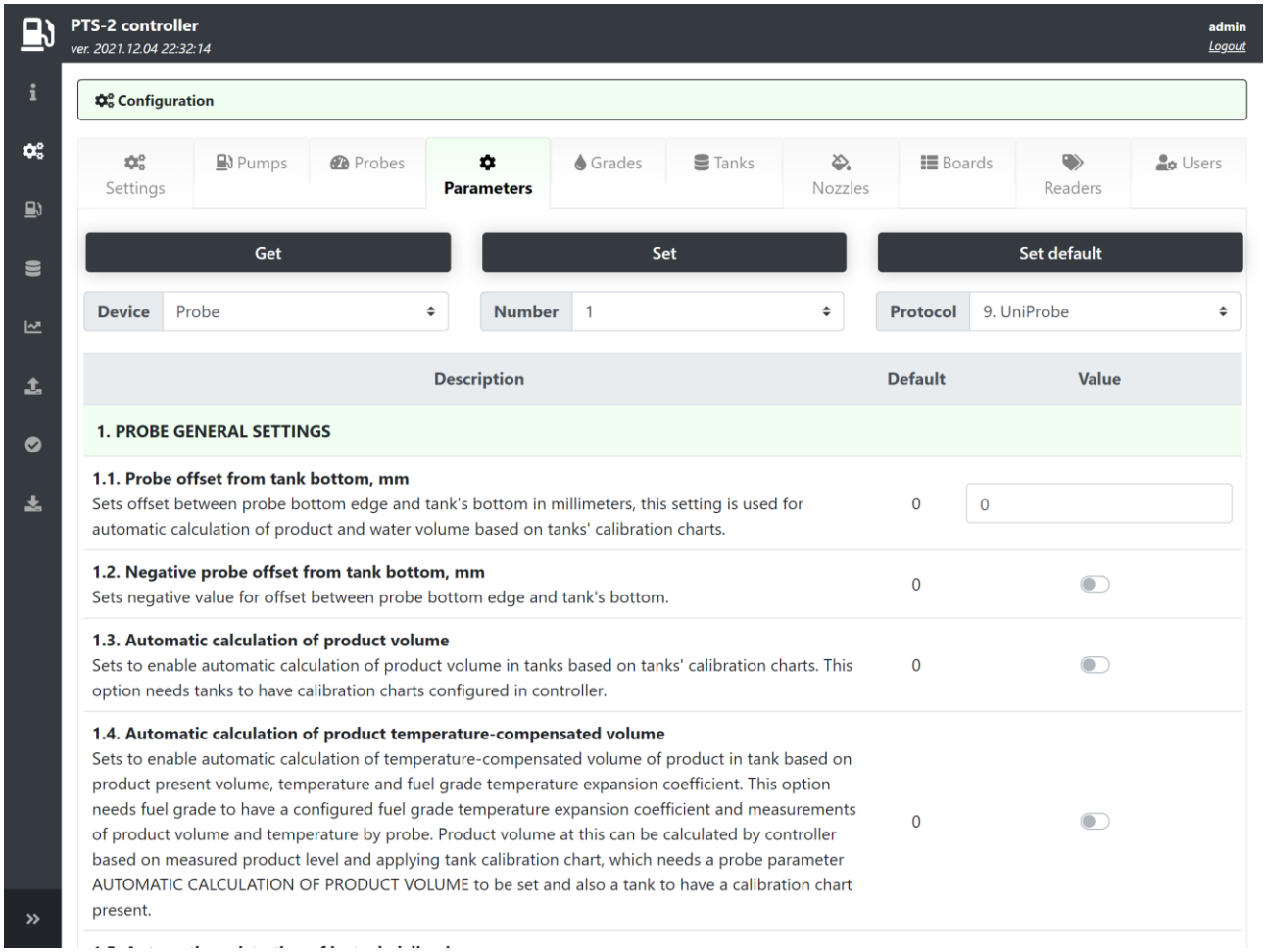


Step 7. Configuration of probe parameters

On *Configuration* page *Parameters* tab select from a device list item "*Probe*", in a field "*Number*" select probe 1, in a protocol list – "*2. UniProbe*" (which means configuration of UniProbe protocol parameters for probe 1).

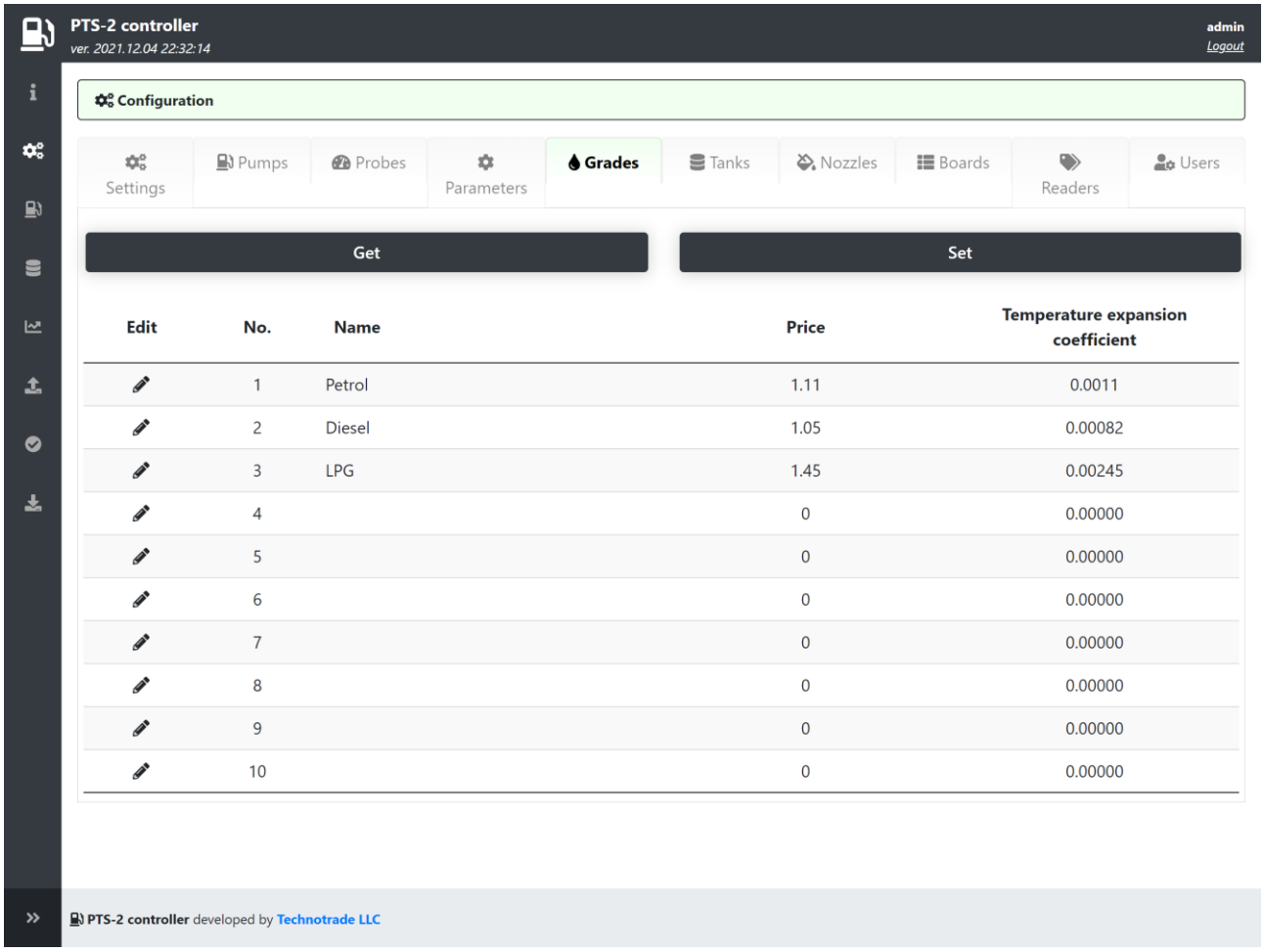
Click on a button *Default* to write default values as it is shown on below screenshot.

Save current configuration for each of 4 probes (select probes one by one using field "*Number*").



Step 8. Configuration of fuel grades

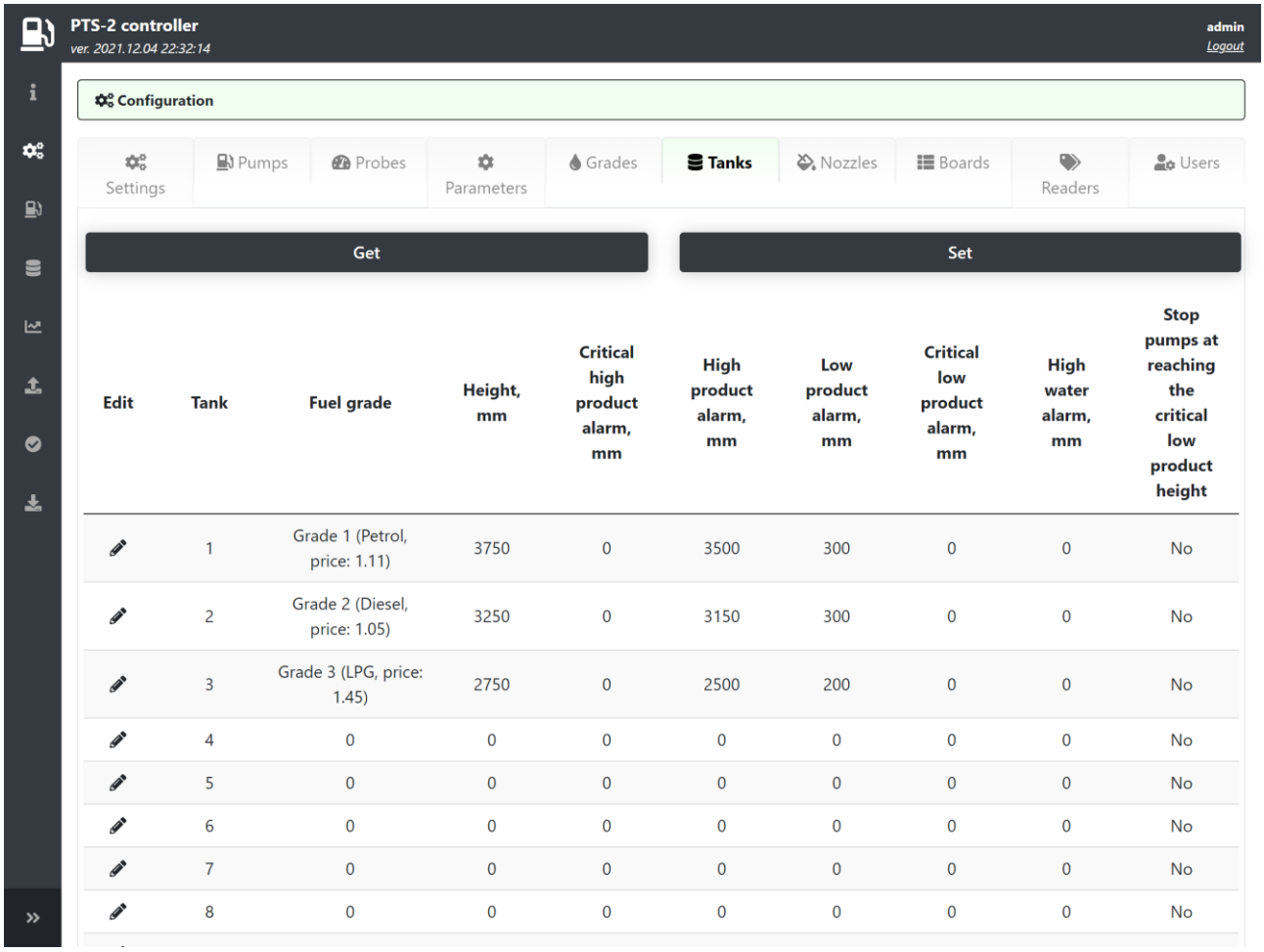
On *Configuration* page *Fuel grades* tab configure fuel grades used in pumps. Click *Set* button to save the changes.



Edit	No.	Name	Price	Temperature expansion coefficient
	1	Petrol	1.11	0.0011
	2	Diesel	1.05	0.00082
	3	LPG	1.45	0.00245
	4		0	0.00000
	5		0	0.00000
	6		0	0.00000
	7		0	0.00000
	8		0	0.00000
	9		0	0.00000
	10		0	0.00000

Step 9. Configuration of tanks

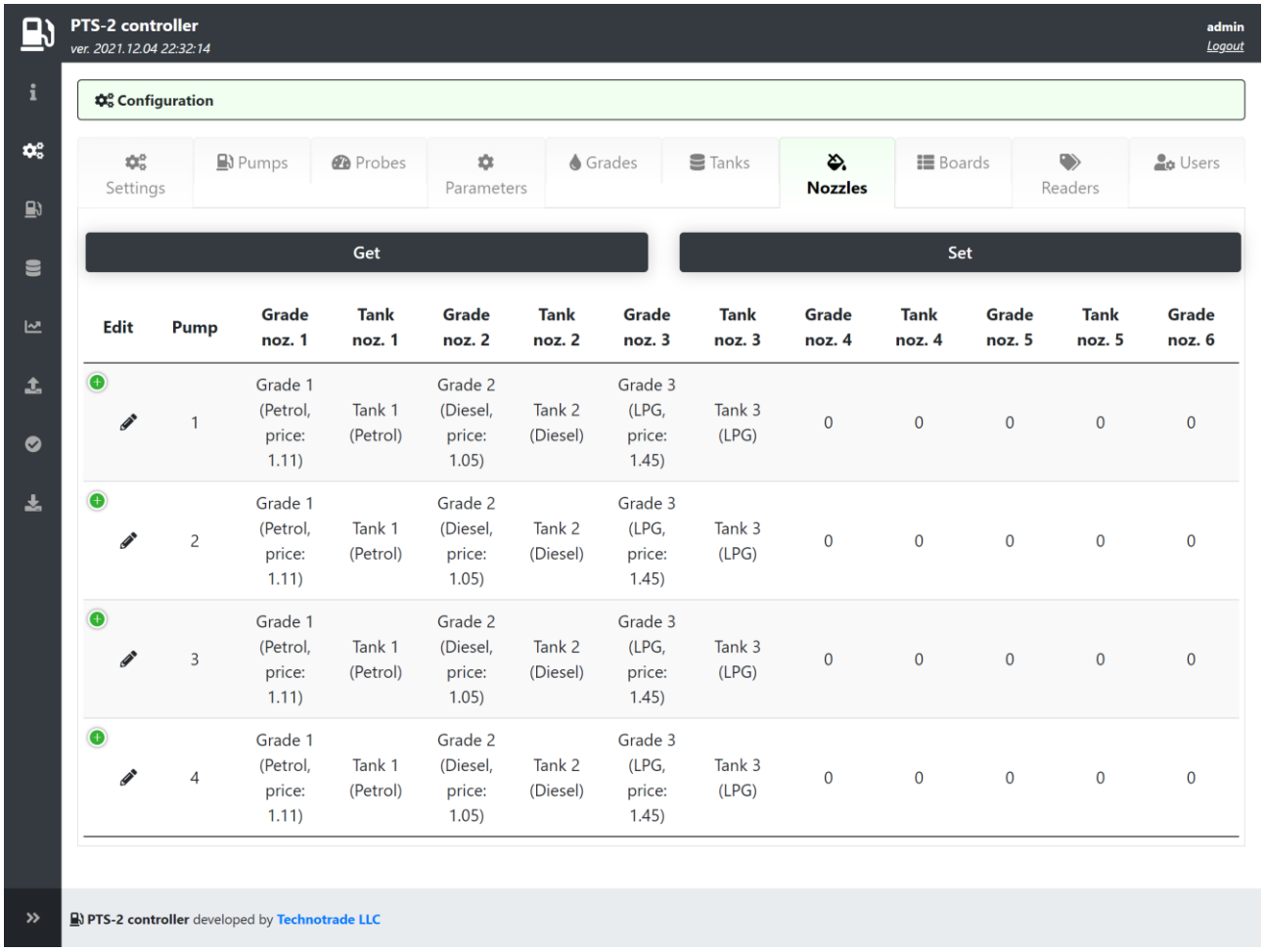
On *Configuration* page *Tanks* tab configure tanks fuel grades and height. Click *Set* button to save the changes.



Edit	Tank	Fuel grade	Height, mm	Critical high product alarm, mm	High product alarm, mm	Low product alarm, mm	Critical low product alarm, mm	High water alarm, mm	Stop pumps at reaching the critical low product height
	1	Grade 1 (Petrol, price: 1.11)	3750	0	3500	300	0	0	No
	2	Grade 2 (Diesel, price: 1.05)	3250	0	3150	300	0	0	No
	3	Grade 3 (LPG, price: 1.45)	2750	0	2500	200	0	0	No
	4	0	0	0	0	0	0	0	No
	5	0	0	0	0	0	0	0	No
	6	0	0	0	0	0	0	0	No
	7	0	0	0	0	0	0	0	No
	8	0	0	0	0	0	0	0	No

Step 10. Configuration of pump nozzles

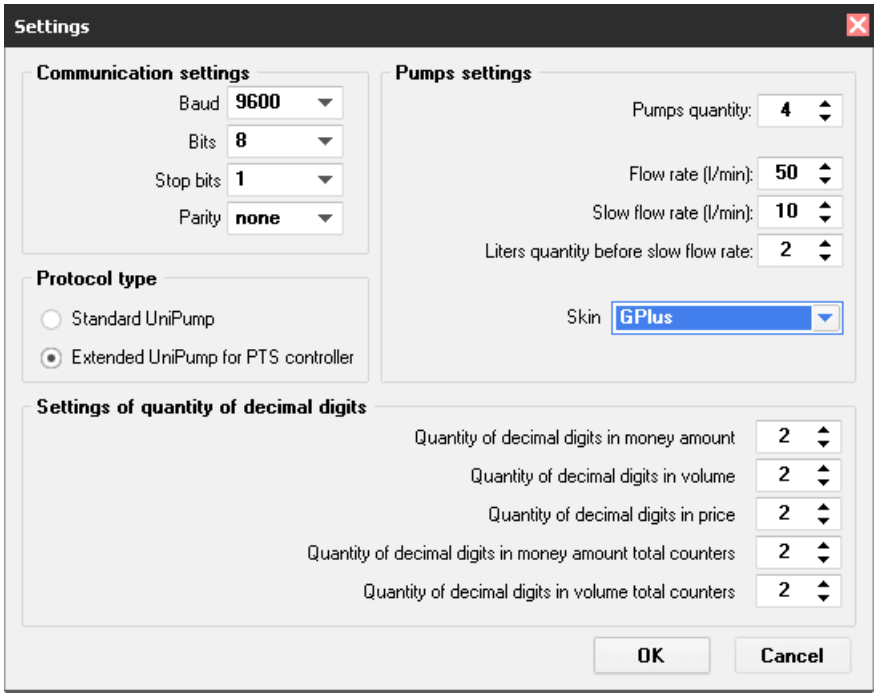
On *Configuration* page *Pump nozzles* tab configure nozzles foe each pump. Click *Set* button to save the changes.



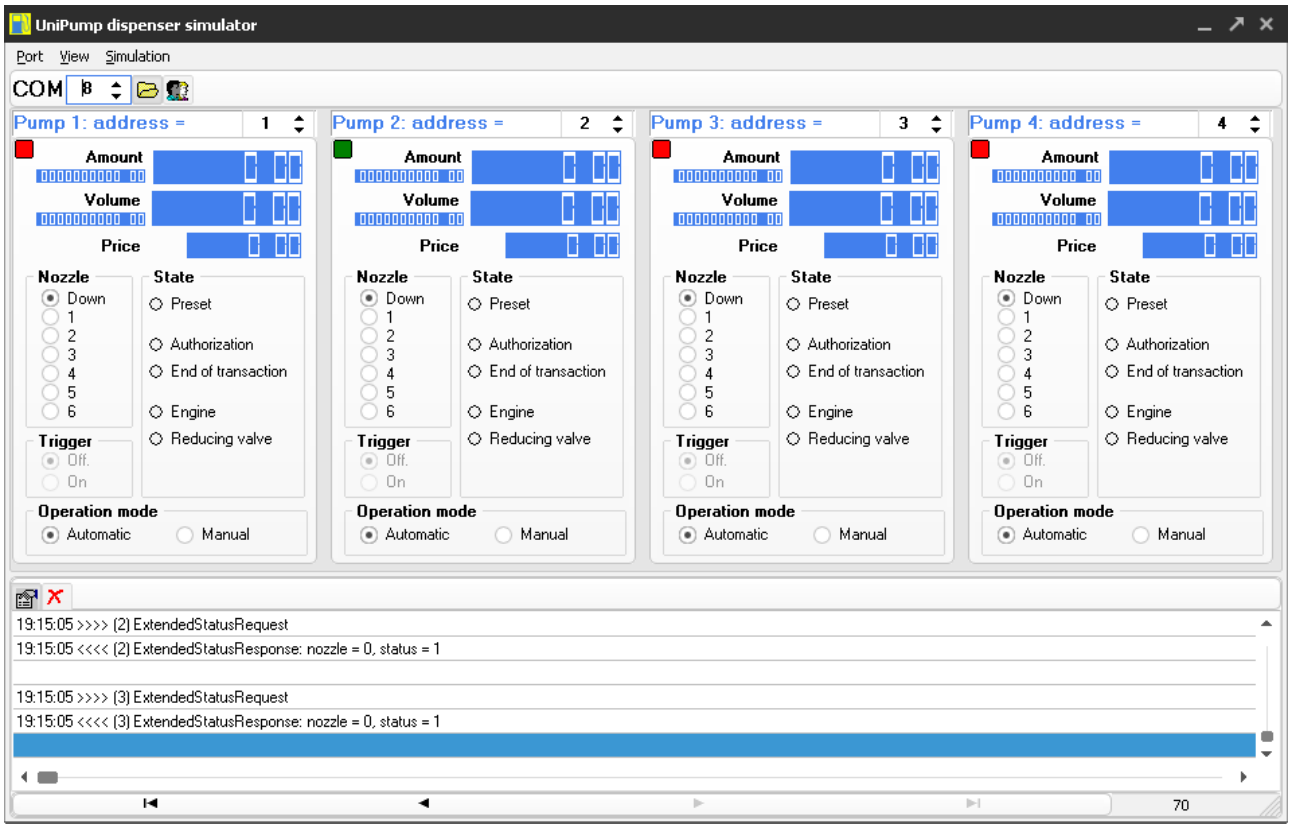
Edit	Pump	Grade noz. 1	Tank noz. 1	Grade noz. 2	Tank noz. 2	Grade noz. 3	Tank noz. 3	Grade noz. 4	Tank noz. 4	Grade noz. 5	Tank noz. 5	Grade noz. 6
	1	Grade 1 (Petrol, price: 1.11)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.05)	Tank 2 (Diesel)	Grade 3 (LPG, price: 1.45)	Tank 3 (LPG)	0	0	0	0	0
	2	Grade 1 (Petrol, price: 1.11)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.05)	Tank 2 (Diesel)	Grade 3 (LPG, price: 1.45)	Tank 3 (LPG)	0	0	0	0	0
	3	Grade 1 (Petrol, price: 1.11)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.05)	Tank 2 (Diesel)	Grade 3 (LPG, price: 1.45)	Tank 3 (LPG)	0	0	0	0	0
	4	Grade 1 (Petrol, price: 1.11)	Tank 1 (Petrol)	Grade 2 (Diesel, price: 1.05)	Tank 2 (Diesel)	Grade 3 (LPG, price: 1.45)	Tank 3 (LPG)	0	0	0	0	0

Step 11. Configuration of pumps software simulator

Run *SimUniPump.exe* and go to configuration of its properties. Set properties as shown on screenshot:



After properties are set click OK and on the main form select a COM-port, to which pump port of RS485-4 interface converter board is connected, and click "*Open*" button:



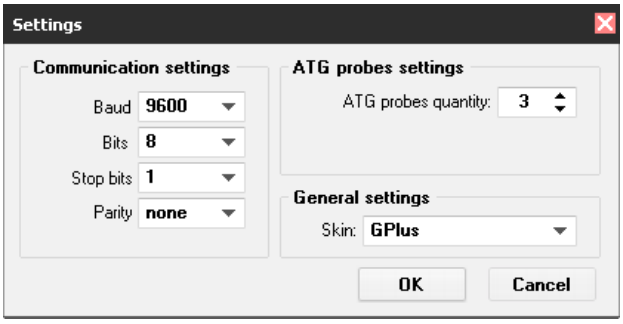
After COM-port is opened in case if there is communication between the PTS-2 controller and pump simulator – you should see blinking of red squares located in left top corner of pump icons in pump simulator, and communication will be logged in log window of the simulator.

At this in PTS-2 controller on pump port 1 green and red LEDs will begin to blink. Blinking of the green LED means that PTS-2 controller is sending requests to the pump, blinking of the red LED means that the PTS-2 controller receives responses from the pump.

In case if only green LED is blinking on pump port 1 – there is a mistake in wiring connection or configuration of the equipment (PTS-2 controller or pump).

Step 12. Configuration of ATG probes software simulator

Run *SimUniProbe.exe* and go to configuration of its properties. Set properties as shown on screenshot:

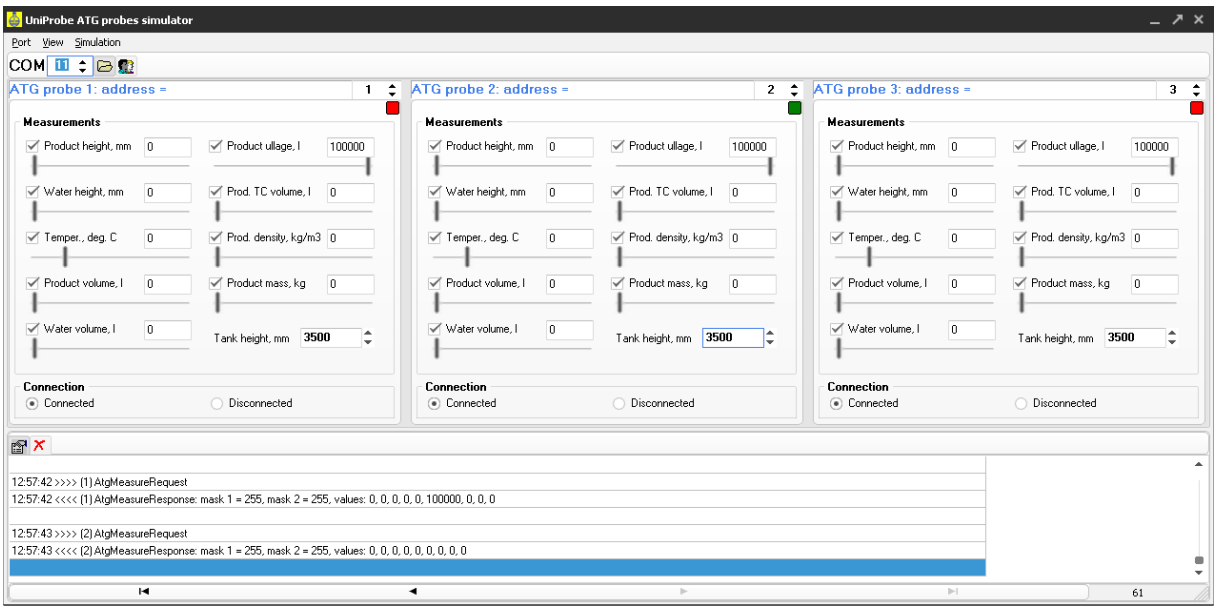


After properties are set click OK and on the main form select a COM-port, to which USER port of PTS-2 controller is connected, and click "*Open*" button.

After COM-port is opened in case if there is communication between the PTS-2 controller and ATG probes simulator – you should see blinking of red squares located in left top corner of ATG probes icons in ATG probes simulator, and communication will be logged in log window of the simulator.

At this in PTS-2 controller on USER port green and red LEDs will begin to blink once per second. Blinking of the green LED means that PTS-2 controller is sending requests to the ATG, blinking of the red LED means that the PTS-2 controller receives responses from the ATG.

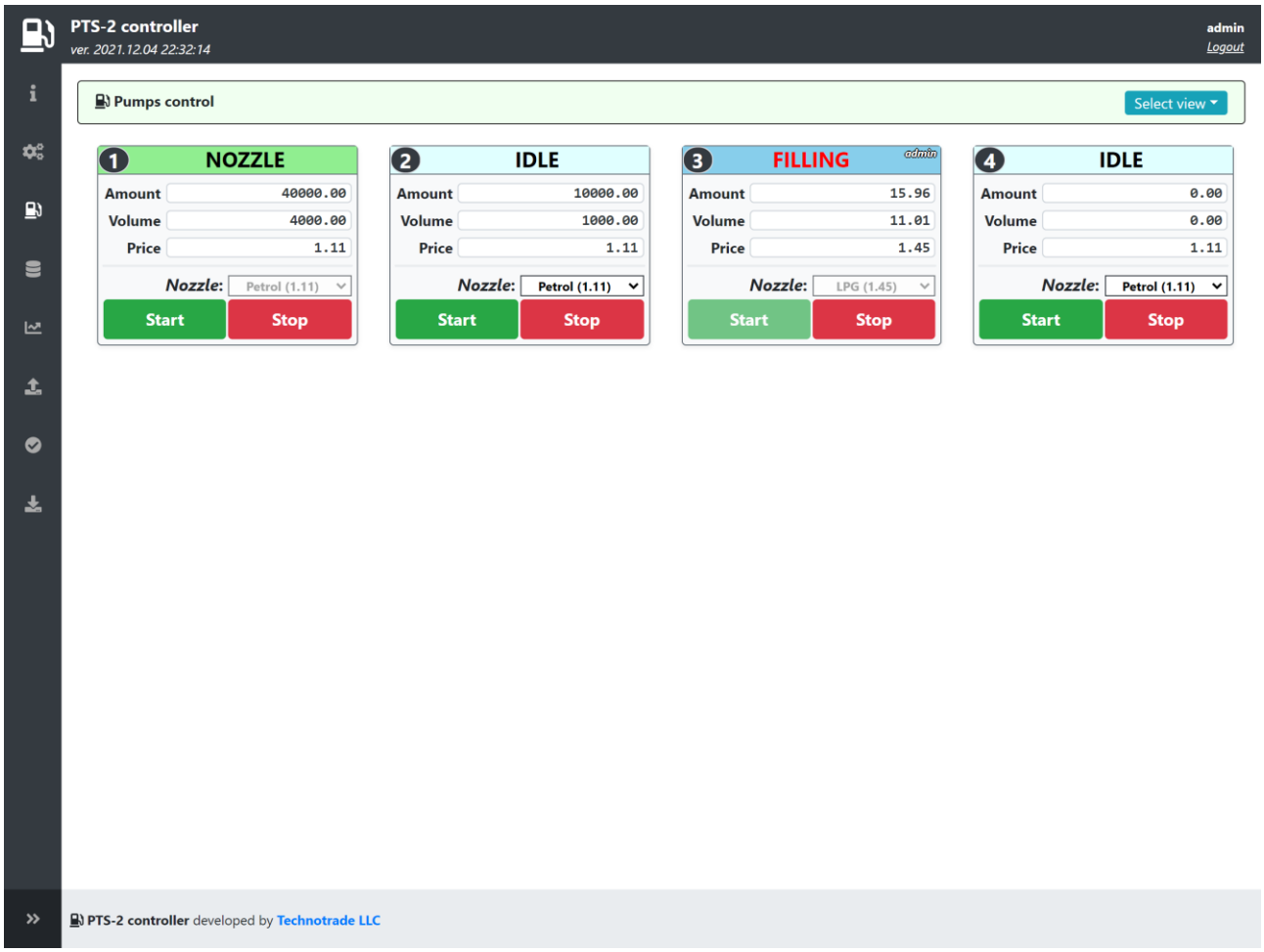
In case if only green LED is blinking on USER port – there is a mistake in wiring connection or configuration of the equipment (PTS-2 controller or ATG).

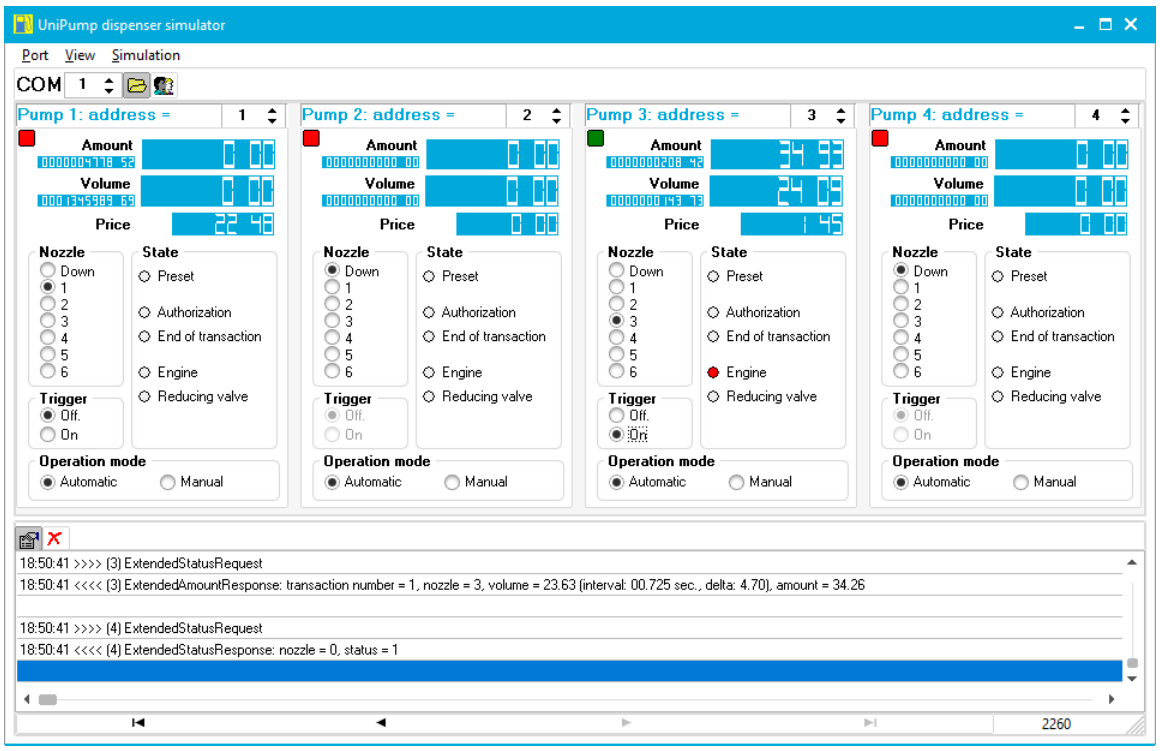


Step 13. Control over pumps and ATG probes

Go to *Pumps control* page in web-browser, you should see all the pumps.

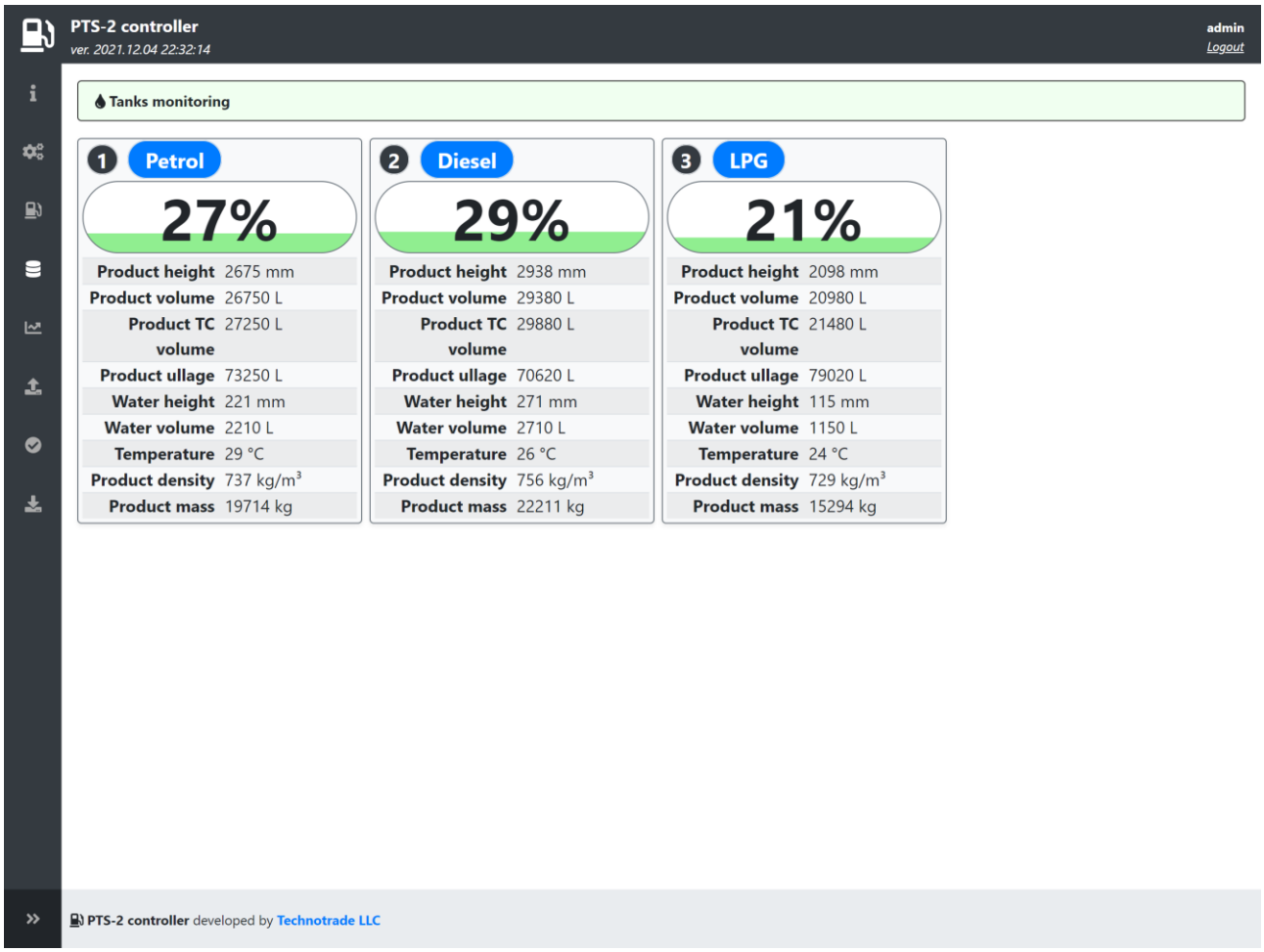
Set initial values in the pump simulator to display them in the web-browser. Take up nozzles on some pumps. In the web-browser you will see these changes. Now you are able to provide full control over the pumps:



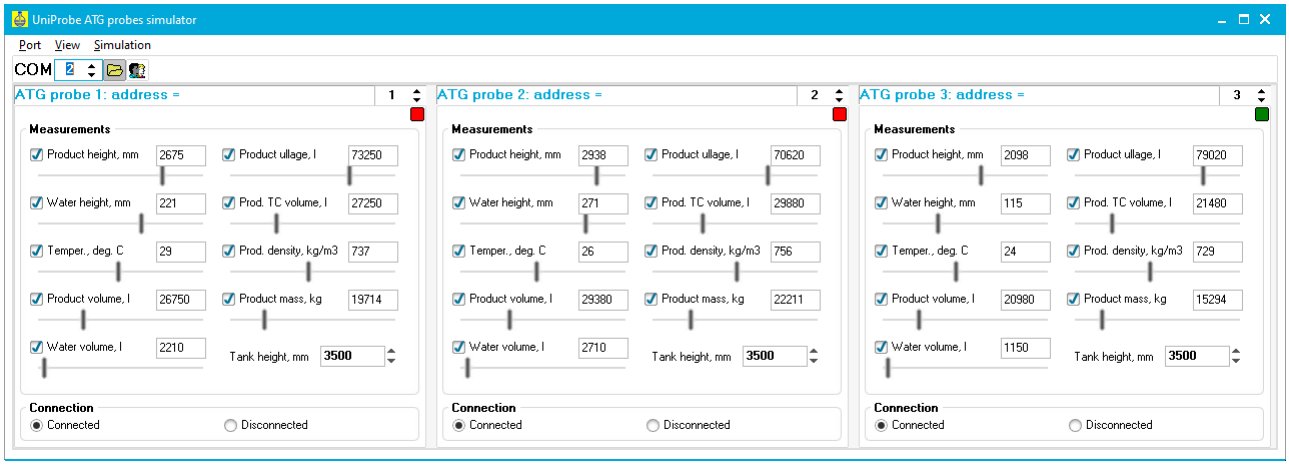


Go to Tanks monitoring page in web-browser, you should see all the tanks.

Set initial values in the ATG probes simulator to display them in the web-browser. Set values for the ATG probes (there is a possibility to emulate presence in the simulator to make them work if there was really process going on). In the web-browser you should see these changes. Now you are able to receive data from the ATG probes:



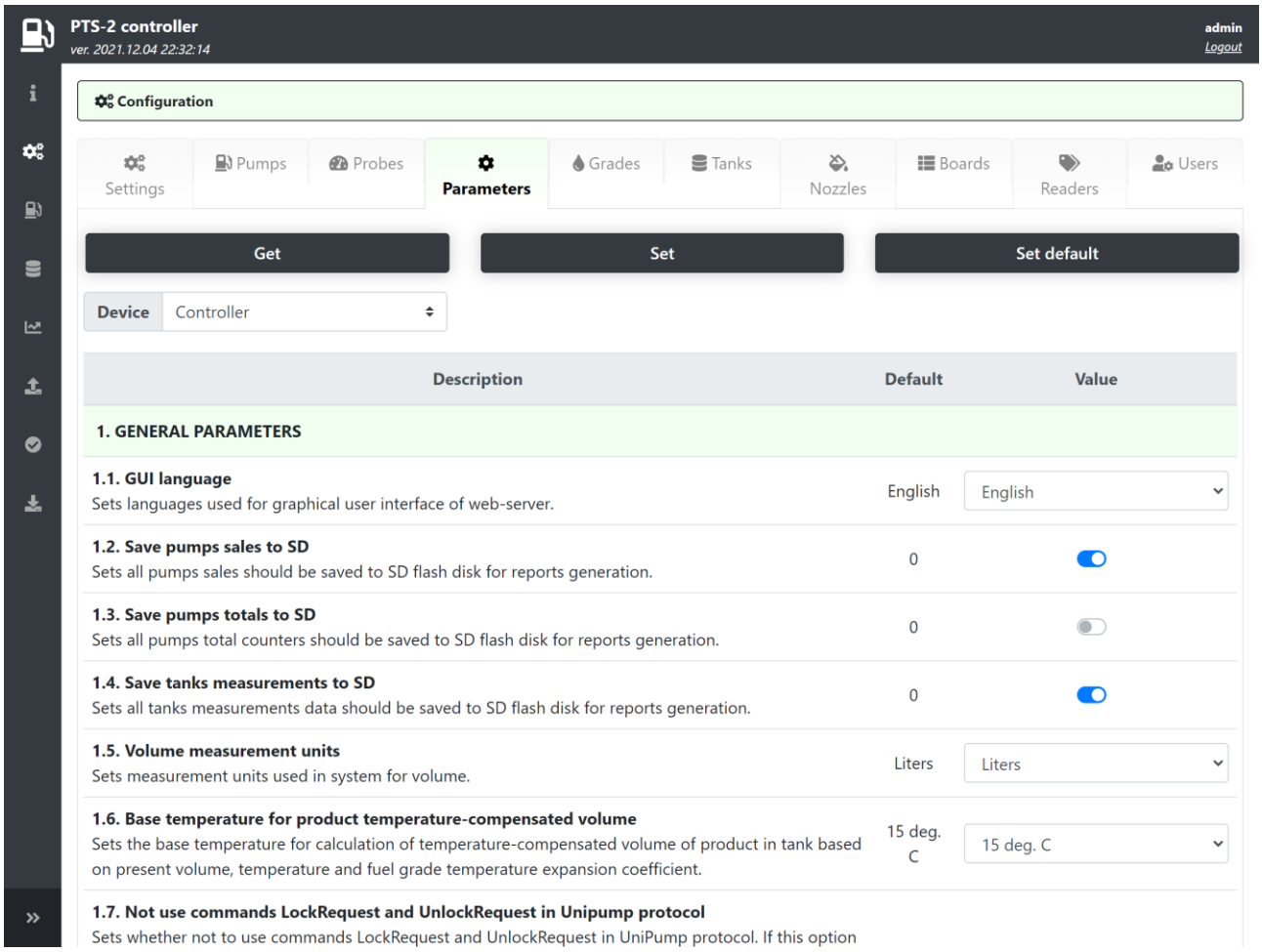
Try to change the measured values of fuel in tanks and see how soon they are updated in web-browser.



At this stage we can provide control over pumps and monitor tanks, in web-browser we can open Web Developer Tools and see on tab Network the requests sent to PTS-2 controller and responses received.

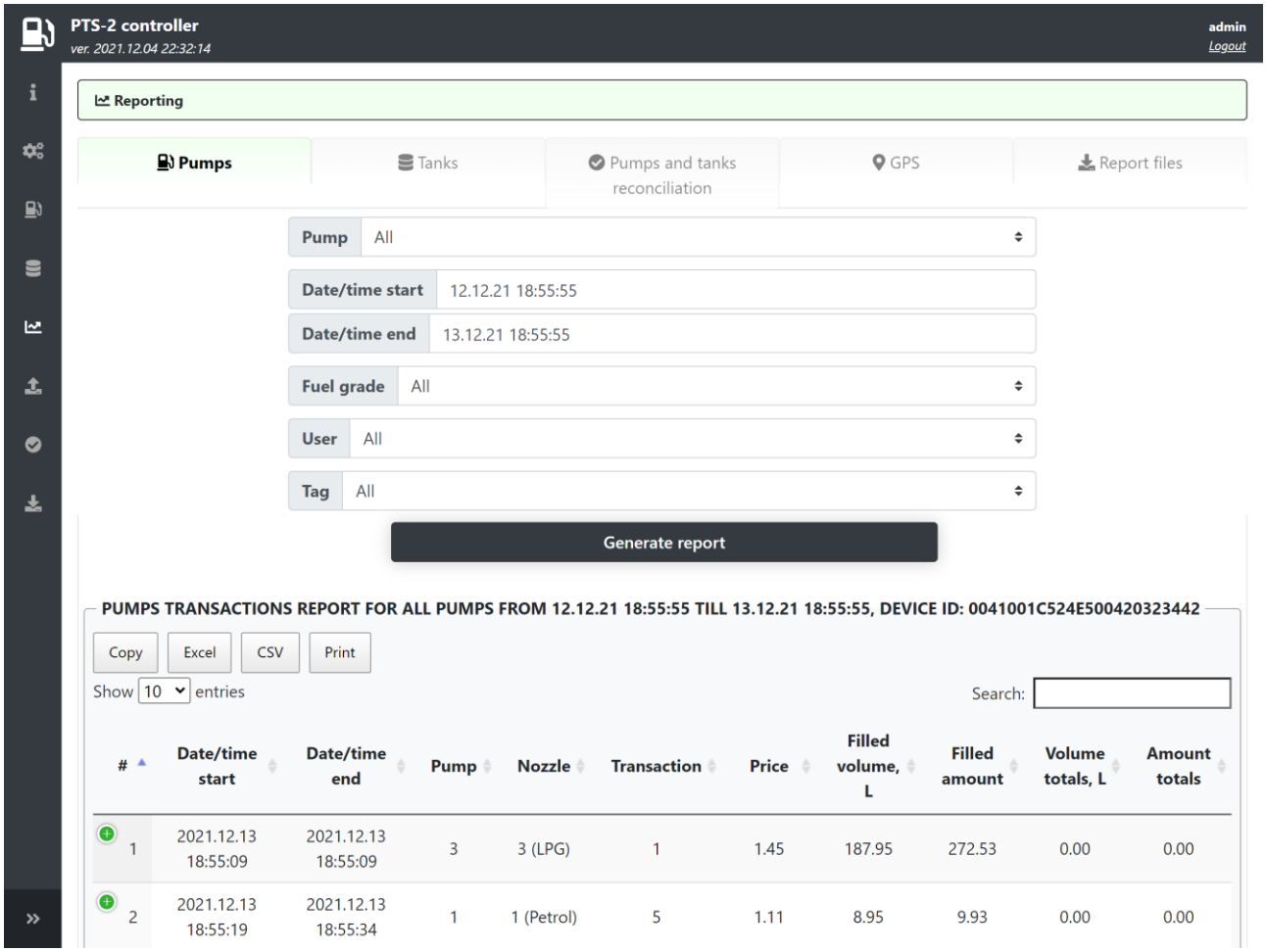
Step 14. Saving of pumps sales and tank measurements to database with reports generation

Go to *Configuration* page and there to *Parameters* tab, select Device as PTS-2 controller and select checkboxes to save pumps sales to SD and also to save tanks measurements to SD as shown on screenshot below. Click *Set* button to save the changes.

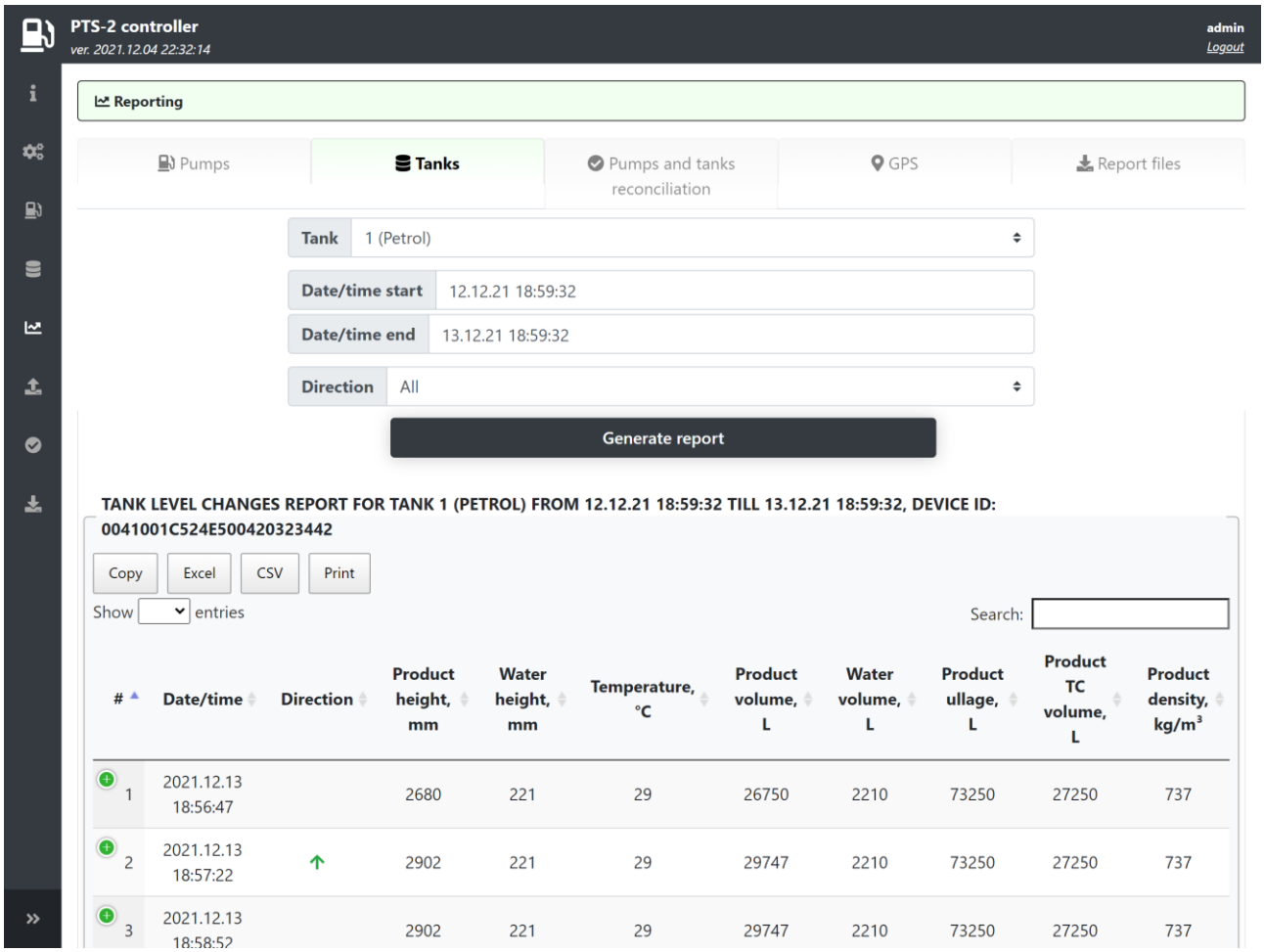


Now PTS-2 controller will save all the pumps sales and tanks measurements to SD flash disk and it will allow us to view the saved records in reports.

Try to make same sales and change levels of products in tanks and review them in reports.



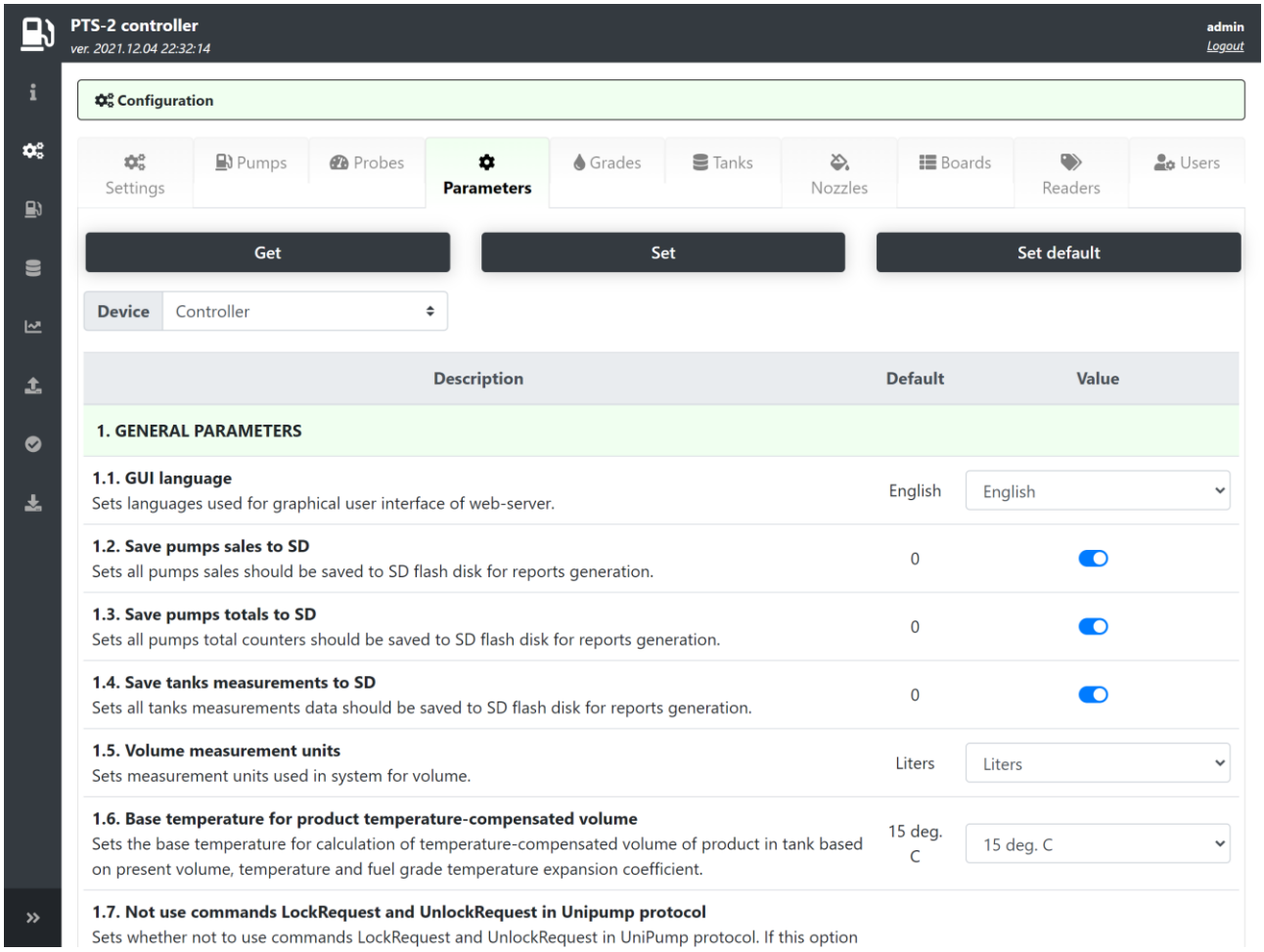
#	Date/time start	Date/time end	Pump	Nozzle	Transaction	Price	Filled volume, L	Filled amount	Volume totals, L	Amount totals
1	2021.12.13 18:55:09	2021.12.13 18:55:09	3	3 (LPG)	1	1.45	187.95	272.53	0.00	0.00
2	2021.12.13 18:55:19	2021.12.13 18:55:34	1	1 (Petrol)	5	1.11	8.95	9.93	0.00	0.00



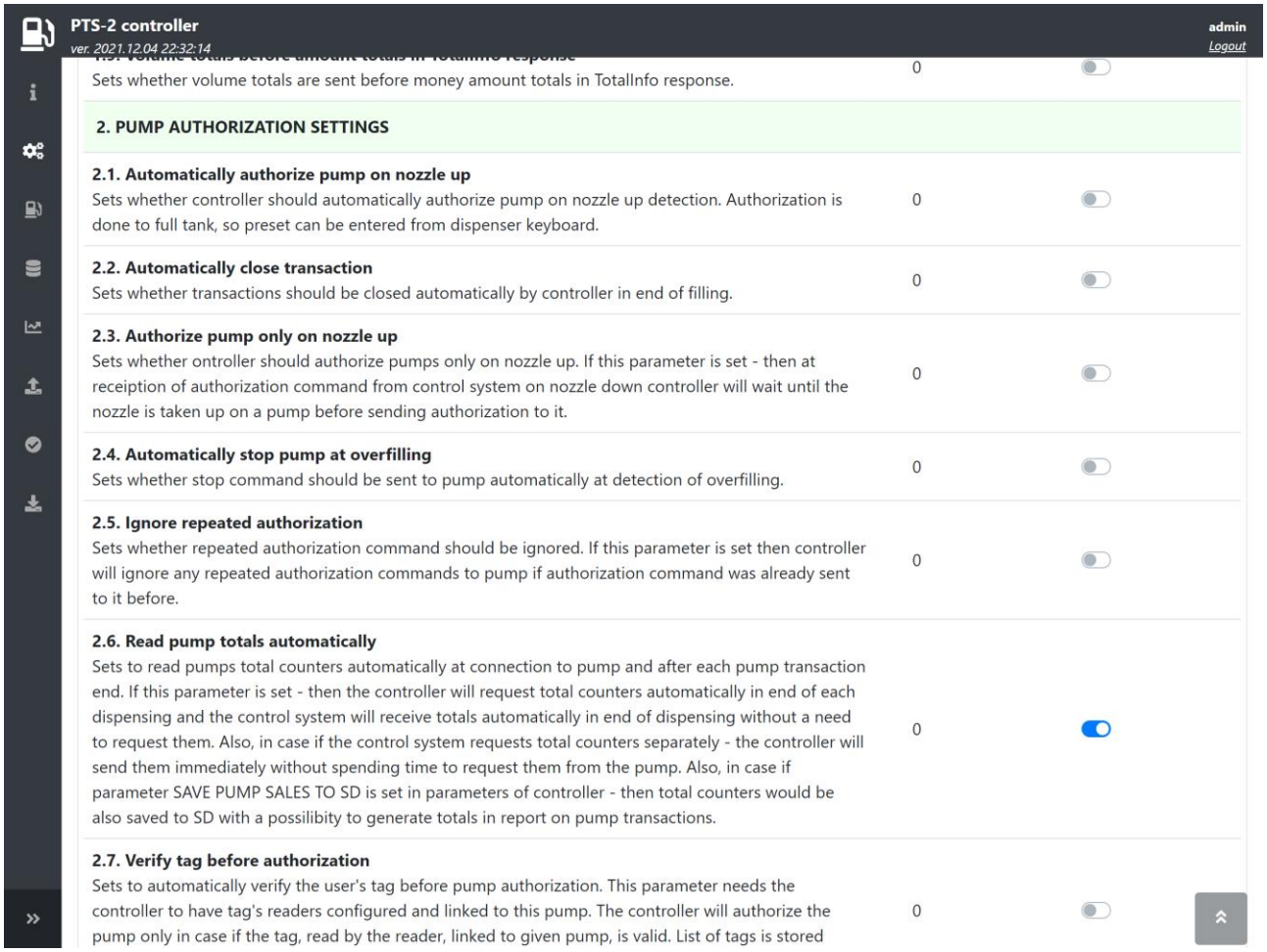
#	Date/time	Direction	Product height, mm	Water height, mm	Temperature, °C	Product volume, L	Water volume, L	Product ullage, L	Product TC volume, L	Product density, kg/m³
1	2021.12.13 18:56:47		2680	221	29	26750	2210	73250	27250	737
2	2021.12.13 18:57:22	↑	2902	221	29	29747	2210	73250	27250	737
3	2021.12.13 18:58:52		2902	221	29	29747	2210	73250	27250	737

Step 15. Reading of pump totals automatically in end of filling

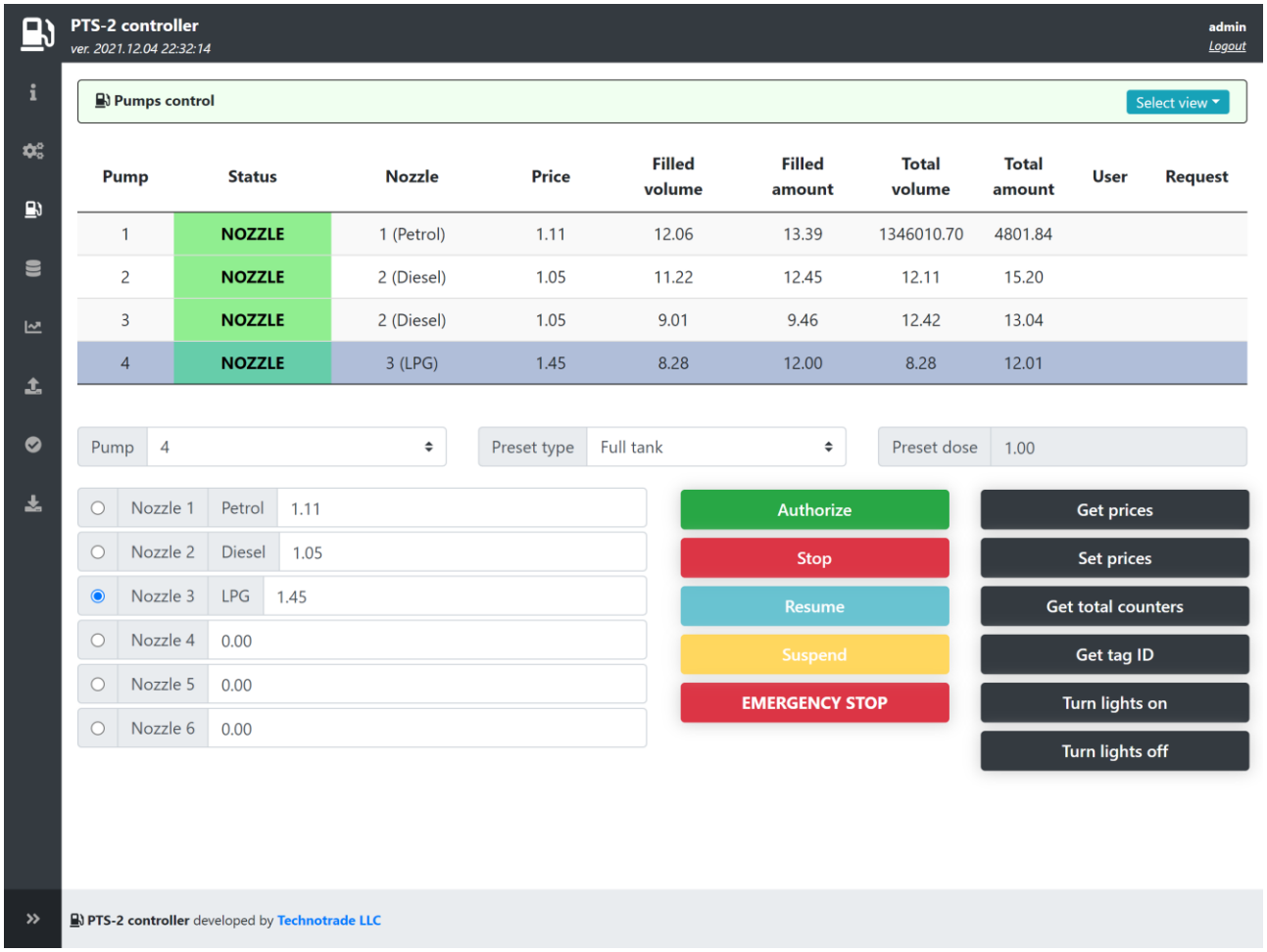
Go to *Configuration* page and there to *Parameters* tab, select Device as PTS-2 controller and select checkboxes to save pumps totals to SD as shown on screenshot below. Click *Set* button to save the changes.

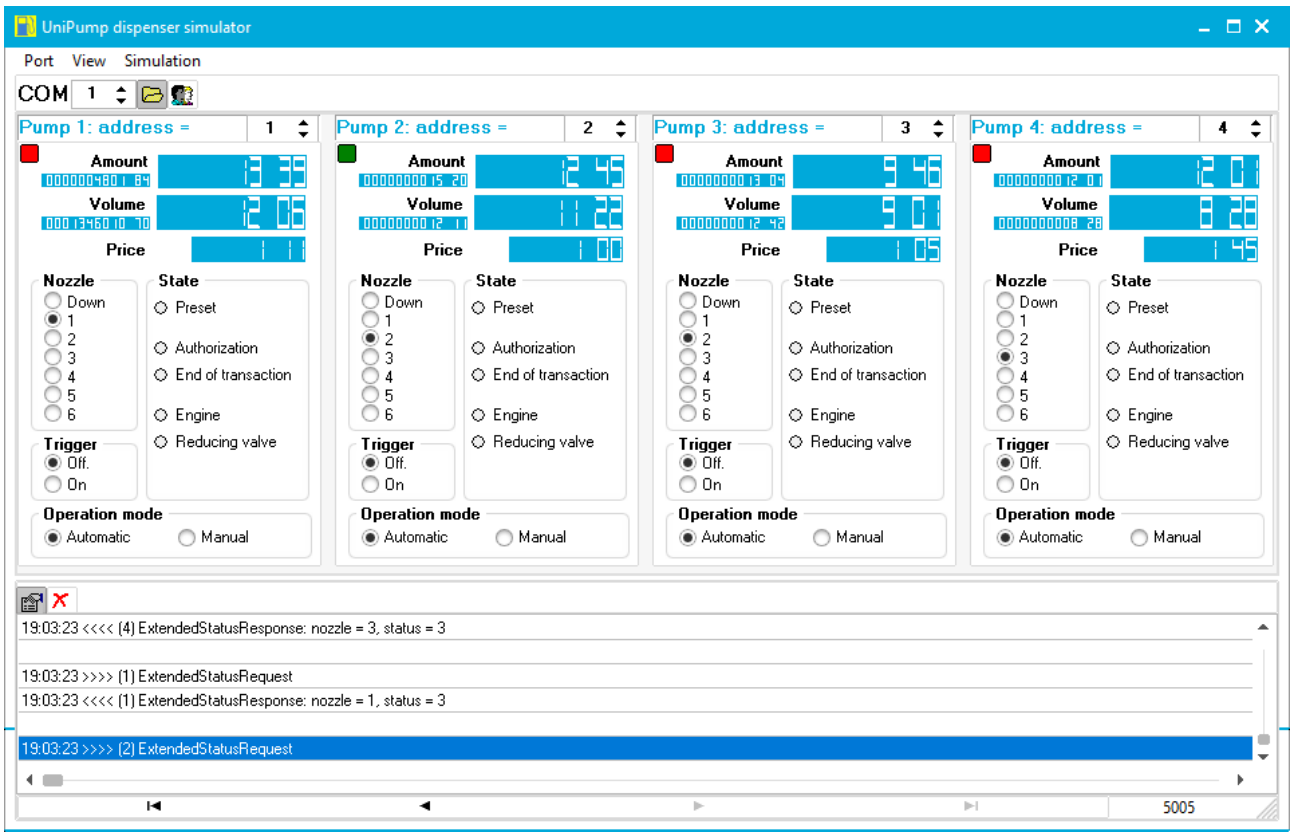


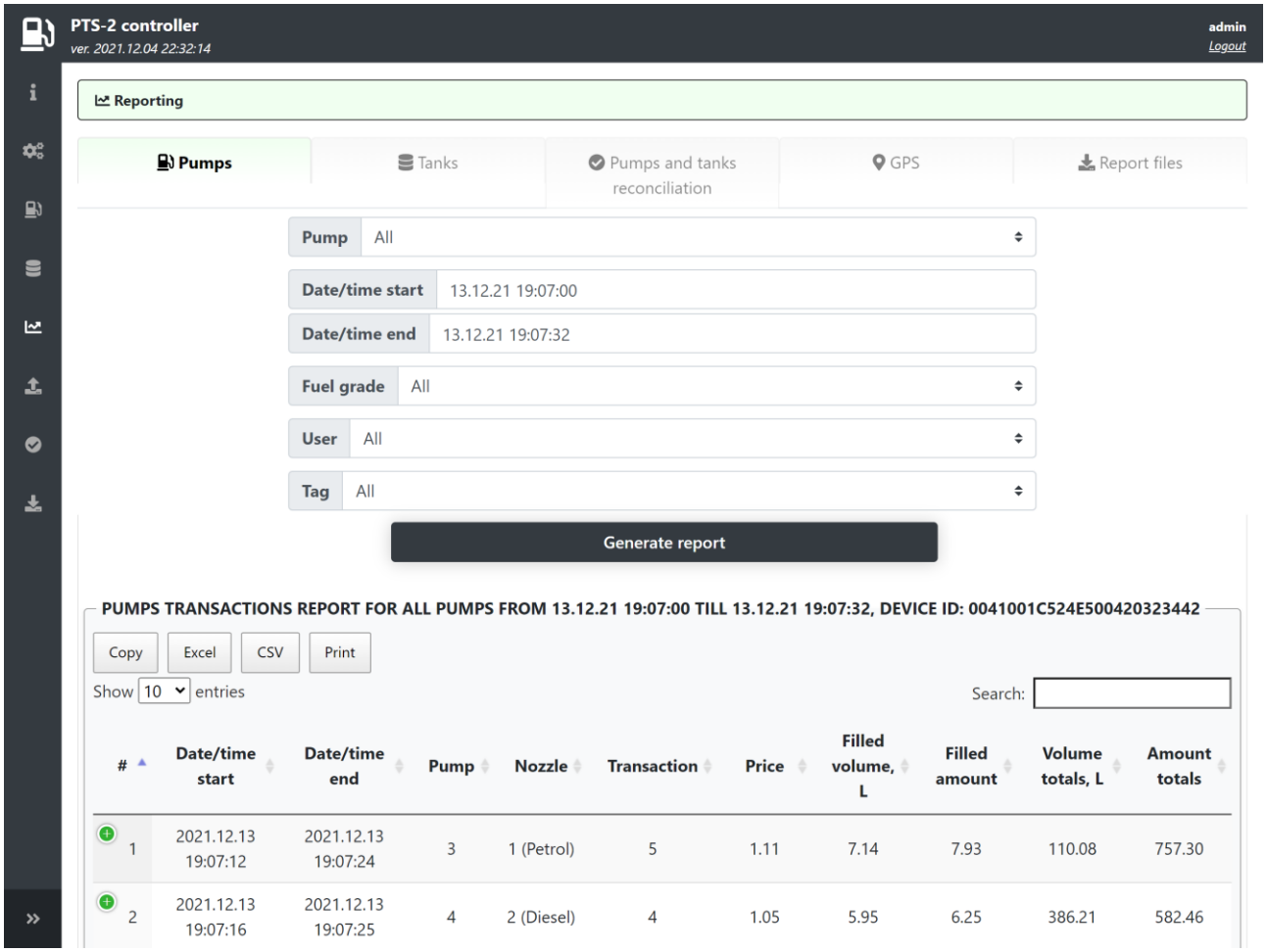
Also, on the same tab select Device as pump and set for each pump a parameter to read pump totals automatically as shown on the image below. Click *Set* button to save the changes.



After these options are set PTS-2 controller should be reading totals automatically after each sale and save them to database. So, at generation of reports we should see the transactions reports together with totals.


PTS-2 controller
ver. 2021.12.04 22:32:14
admin
Logout
Pumps control
Select view
Pump
Status
Nozzle
Price
Filled volume
Filled amount
Total volume
Total amount
User
Request
1 NOZZLE 1 (Petrol) 1.11 12.06 13.39 1346010.70 4801.84
2 NOZZLE 2 (Diesel) 1.05 11.22 12.45 12.11 15.20
3 NOZZLE 2 (Diesel) 1.05 9.01 9.46 12.42 13.04
4 NOZZLE 3 (LPG) 1.45 8.28 12.00 8.28 12.01
Pump 4
Preset type Full tank
Preset dose 1.00
Nozzle 1 Petrol 1.11
Nozzle 2 Diesel 1.05
Nozzle 3 LPG 1.45
Nozzle 4 0.00
Nozzle 5 0.00
Nozzle 6 0.00
Authorize
Stop
Resume
Suspend
EMERGENCY STOP
Get prices
Set prices
Get total counters
Get tag ID
Turn lights on
Turn lights off
PTS-2 controller developed by Technotrade LLC

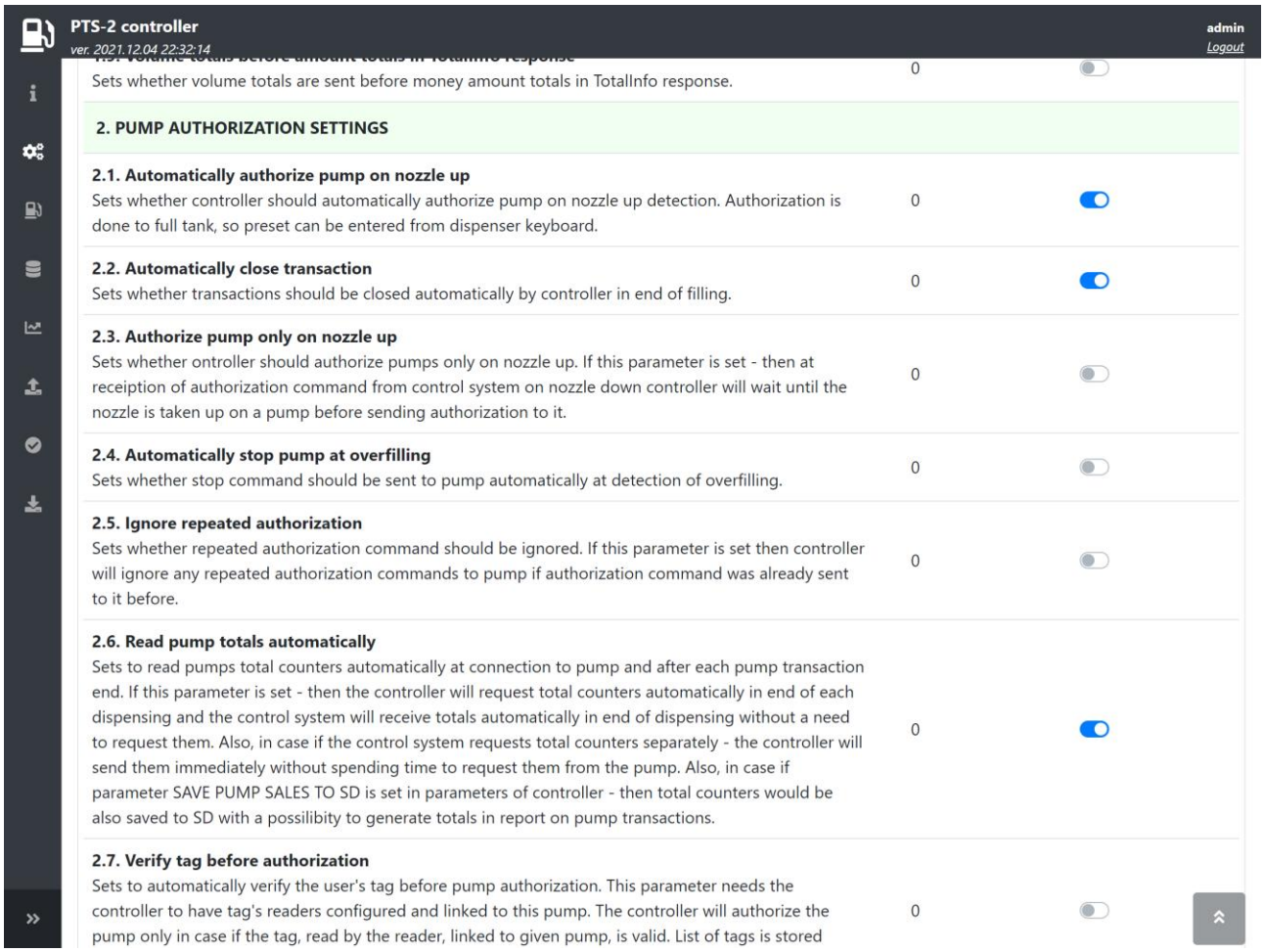

UniPump dispenser simulator
Port View Simulation
COM 1
Pump 1: address = 1
Pump 2: address = 2
Pump 3: address = 3
Pump 4: address = 4
Amount
Volume
Price
Nozzle
Down
1
2
3
4
5
6
State
Preset
Authorization
End of transaction
Engine
Reducing valve
Trigger
Off.
On
Operation mode
Automatic
Manual
19:03:23 <<<< (4) ExtendedStatusResponse: nozzle = 3, status = 3
19:03:23 >>>> (1) ExtendedStatusRequest
19:03:23 <<<< (1) ExtendedStatusResponse: nozzle = 1, status = 3
19:03:23 >>>> (2) ExtendedStatusRequest
5005



#	Date/time start	Date/time end	Pump	Nozzle	Transaction	Price	Filled volume, L	Filled amount	Volume totals, L	Amount totals
1	2021.12.13 19:07:12	2021.12.13 19:07:24	3	1 (Petrol)	5	1.11	7.14	7.93	110.08	757.30
2	2021.12.13 19:07:16	2021.12.13 19:07:25	4	2 (Diesel)	4	1.05	5.95	6.25	386.21	582.46

Step 16. Automatic pumps authorization on nozzle up

In order to make pumps work automatically as if in manual mode with saving of all sales to database we will additionally set checkboxes to automatically authorize pump on nozzle up and also to automatically close transaction in parameters for each pump as shown on screenshot below.



Now, the pump automatically gets authorized by PTS-2 controller once a nozzle is taken up. At this each transaction is saved to SD flash disk and is seen in reports. The dispenser now works as in manual mode and preset can be entered from dispenser keyboard.

In this scheme we can additionally enable automatic upload of pumps sales to remote server to make operation of the dispensers be completely automatic with reception of reports in remote server.

Step 17. Testing of operation with PTS-2 controller from Postman utility

Postman utility provided by Postman, Inc (https://www.postman.com/) is a great tool to test communication with PTS-2 controller. Please refer to document *"jsonPTS communication protocol specification for PTS-2 controller"* for information on how to configure Postman utility and use it for testing of communication with PTS-2 controller.

EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES

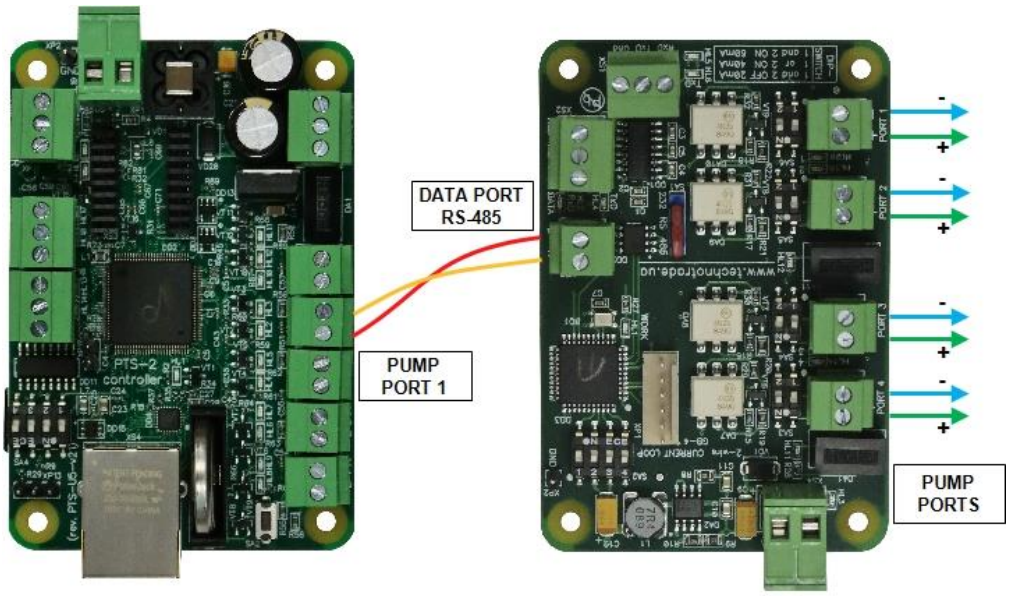
Below sections show examples of connection to various brands of fuel dispensers. This information is provided as an example. For reception of detailed information on connection to various brands of fuel dispensers, configuration of the fuel dispensers and configuration of PTS-2 controller please refer to our support mailbox *support_1a@technotrade.ua.*

As it is seen from below connection examples some brands of fuel dispensers have RS-485 interface on board and thus are directly connected to PTS-2 controller, others do not have RS-485 interface and thus require additional interface converter for connection to PTS-2 controller. In some cases, various models of same brand of fuel dispensers have RS-485 interface, others – no. In such a way the best way to check how your fuel dispenser is connected is to take its mainboard photos and send to us on our support mailbox *support_1a@technotrade.ua.* Mainboard is normally located inside the fuel dispenser pumphead behind the displays.

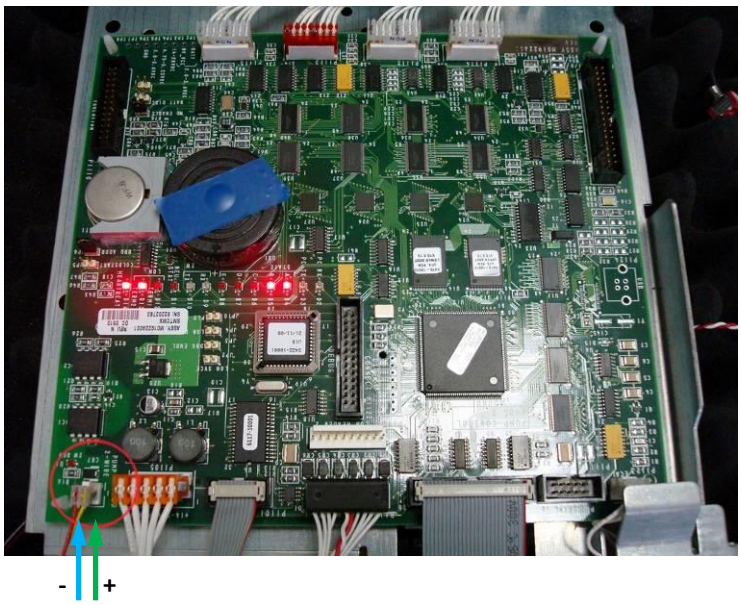
Gilbarco dispenser connection scheme

Connection to Gilbarco dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*5. GILBARCO Two-Wire*", baud rate "*3. 5787*".

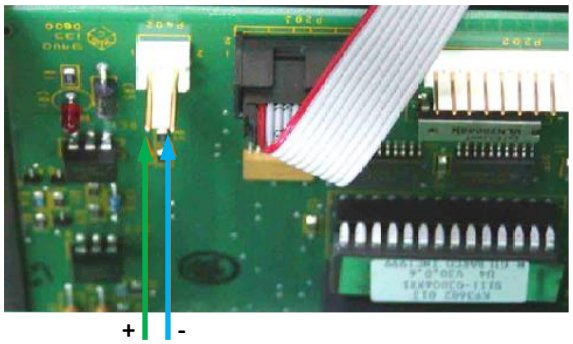


Gilbarco Encore 500 dispenser board

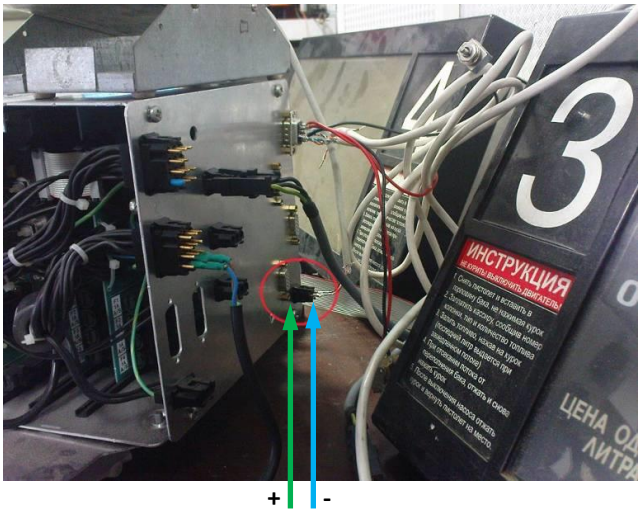


Gilbarco dispenser ASSY M06104A001 rev. B board

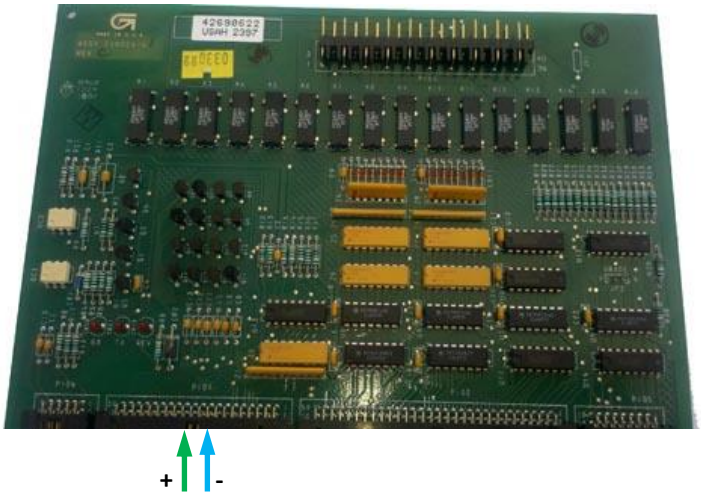
Gilbarco dispenser board



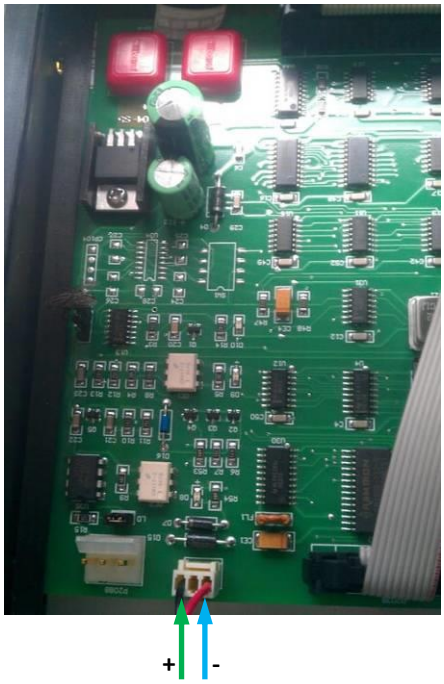
Gilbarco Euroline dispenser board



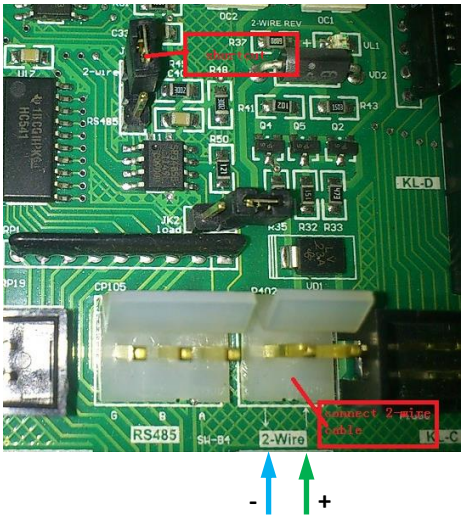
Gilbarco Highline / Dimension Assy dispenser board

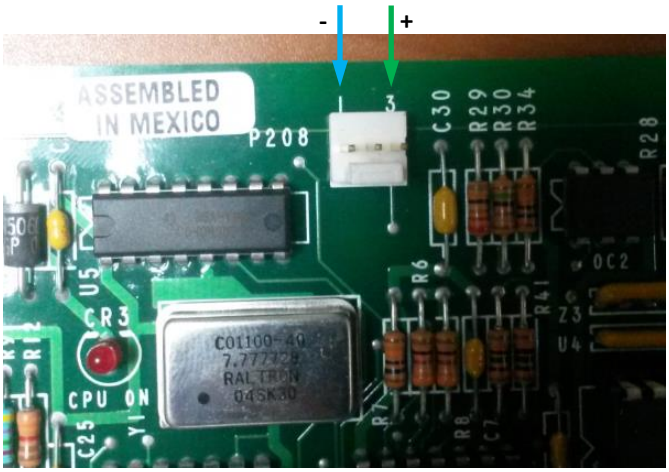


Gilbarco Endeavor dispenser board

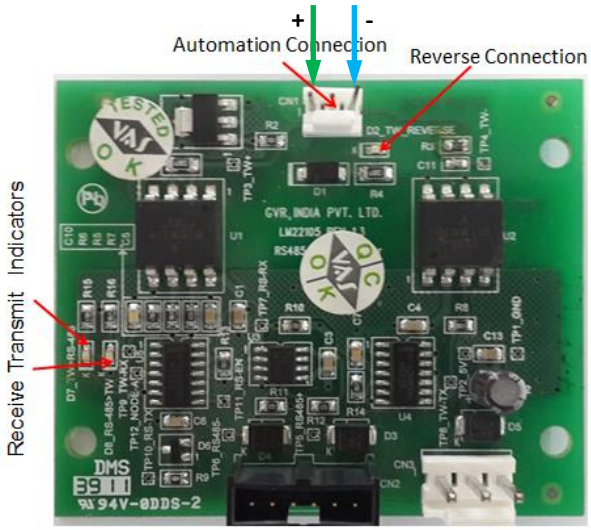


Gilbarco 3202 series dispenser board

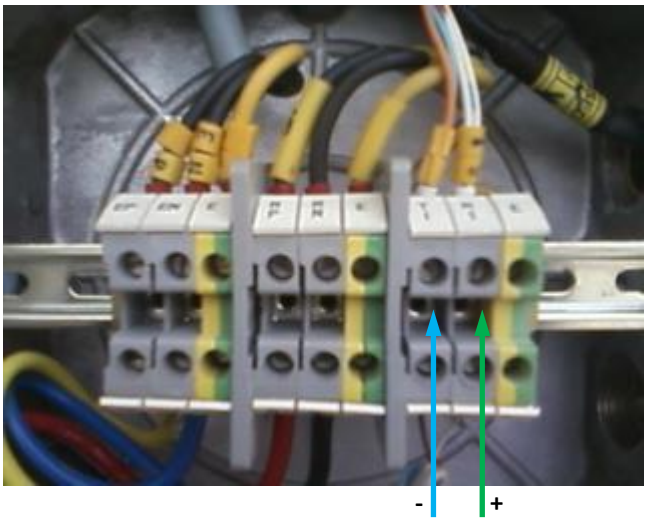




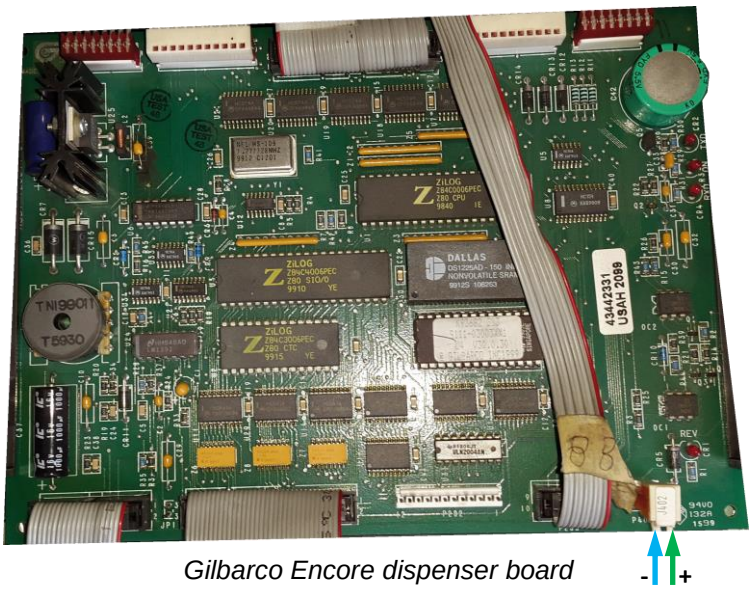
Gilbarco Endeavor dispenser board



Gilbarco Frontier dispenser board



Gilbarco Advantage China motherboard

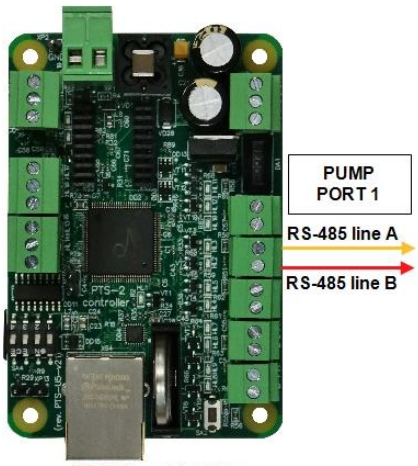


Gilbarco Encore dispenser board

Wayne Dresser dispenser connection scheme (RS-485 interface)

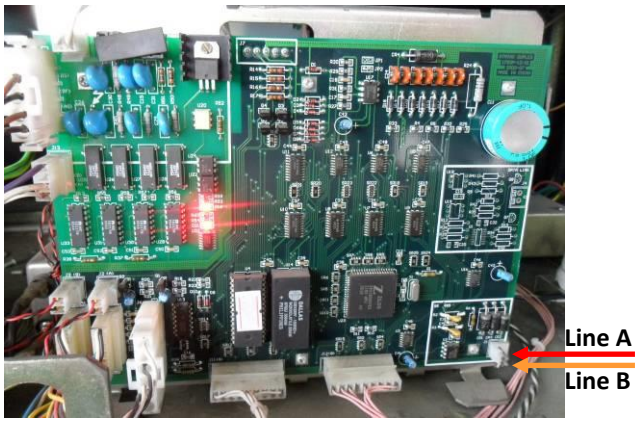
Connection to Wayne Dresser dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*3. WAYNE Dart*", baud rate "*4. 9600*".



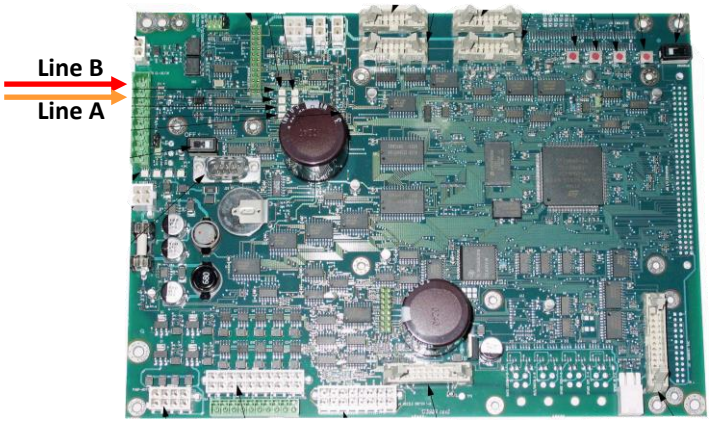
PTS-2 controller

Wayne Dresser iGEM dispenser board



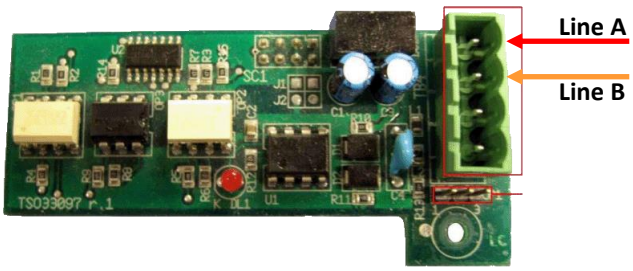
Wayne Dresser STMTAX Duplex dispenser

Wayne Dresser iGEM2 dispenser board



Wayne Dresser x2000/x2003 dispenser interface board

Wayne Dresser V387 dispenser board

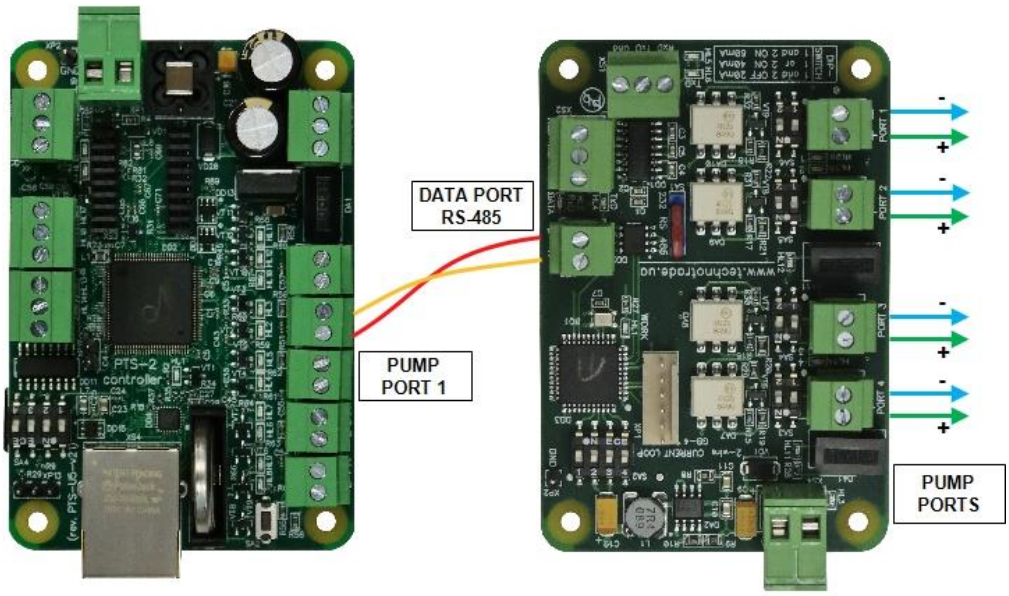


Wayne Dresser Global Vista CNG dispenser interface board

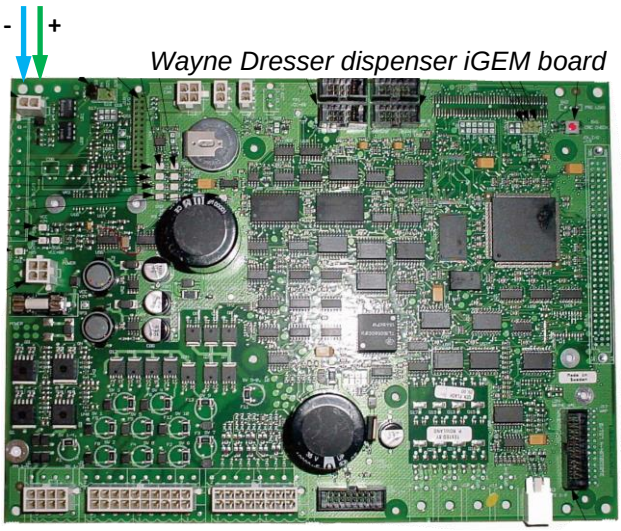
Wayne Dresser dispenser connection scheme (current loop interface)

Connection to Wayne Dresser dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

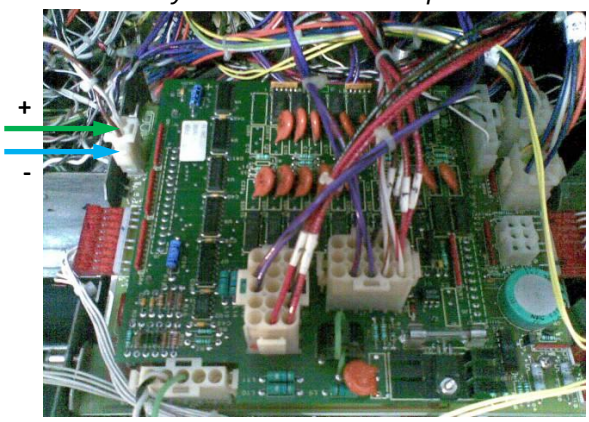
Configuration of PTS-2 controller pump port: protocol "*23. WAYNE USCL*", baud rate "*4. 9600*".



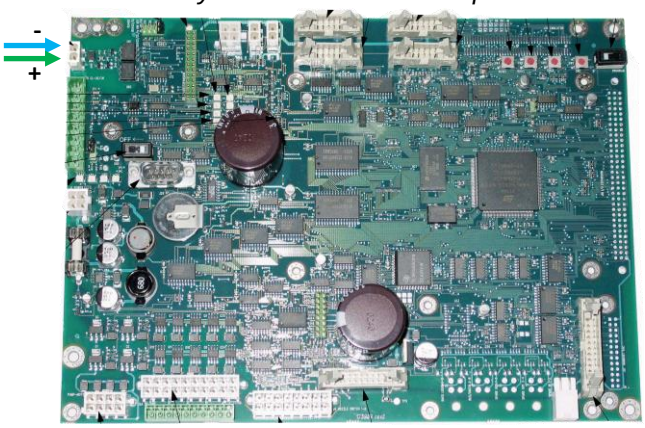
Wayne Dresser dispenser iGEM board



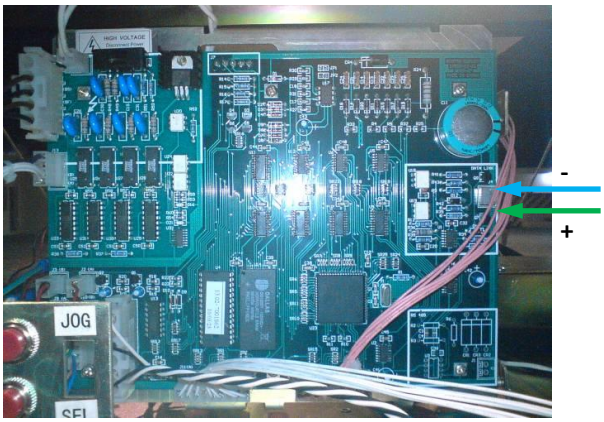
Wayne Dresser V387 dispenser board



Wayne Dresser iGEM2 dispenser board

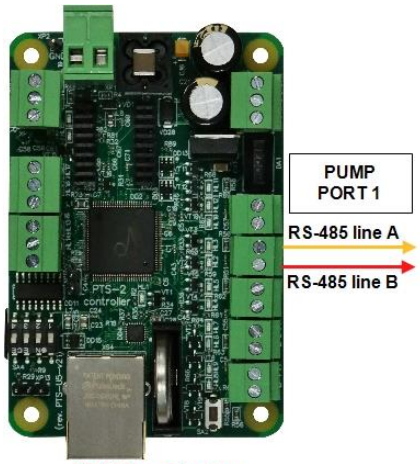


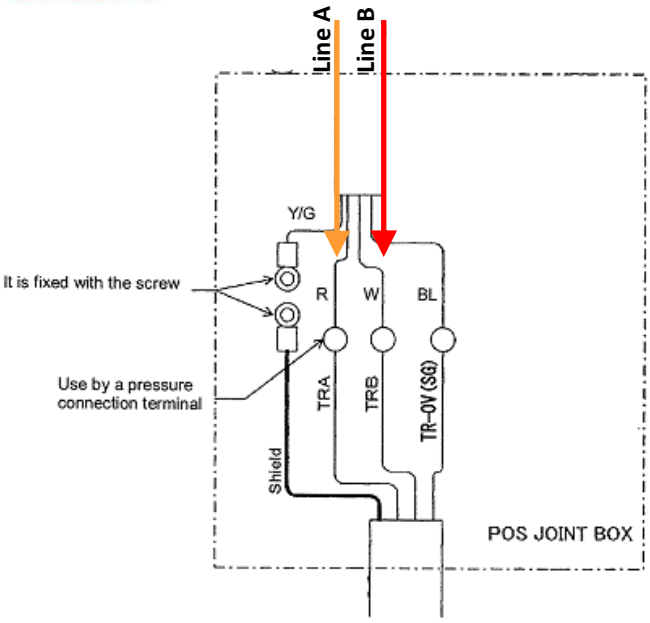
Wayne Dresser STMTAX Duplex dispenser



Tatsuno (Japan) dispenser connection scheme

Connection to TATSUNO (Japan) dispenser is made directly without any interface converter.
Configuration of PTS-2 controller pump port: protocol "*15. TATSUNO SS-LAN*", baud rate "5*. 19200*".

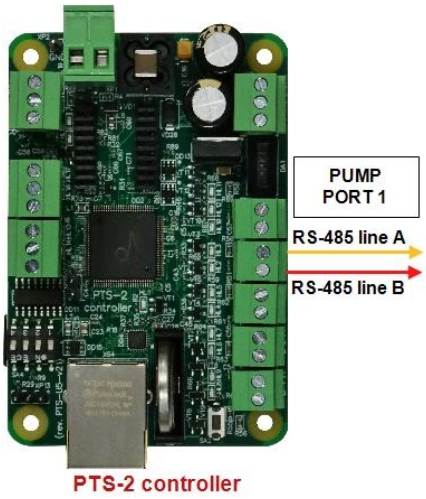


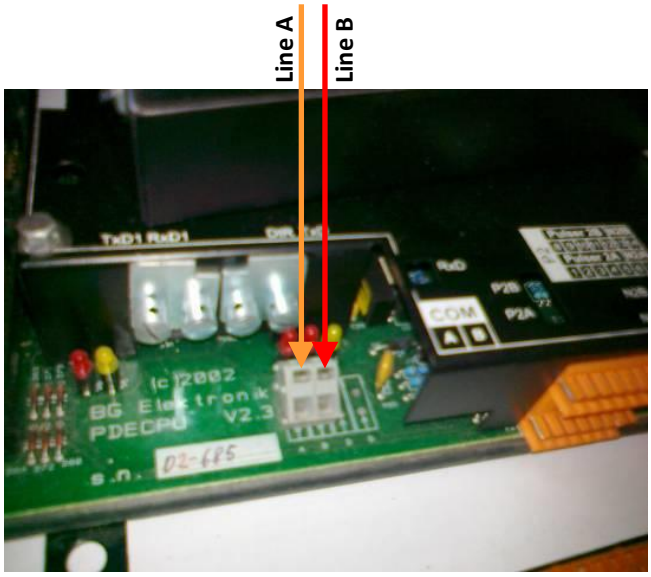


TATSUNO POS joint box

Tatsuno Europe (former Benc) dispenser connection scheme

Connection to TATSUNO Benc (Europe) dispenser is made directly without any interface converter.
Configuration of PTS-2 controller pump port: protocol "*7. TATSUNO Benc PDE*", baud rate "5*. 19200*".



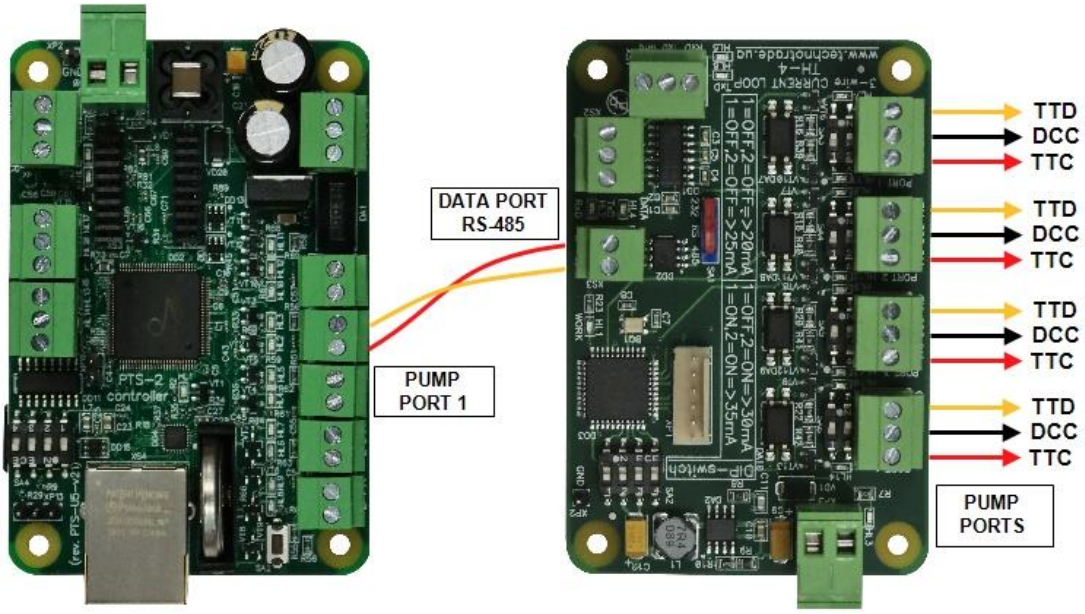


TATSUNO Benc pumphead

Tokheim dispenser connection scheme

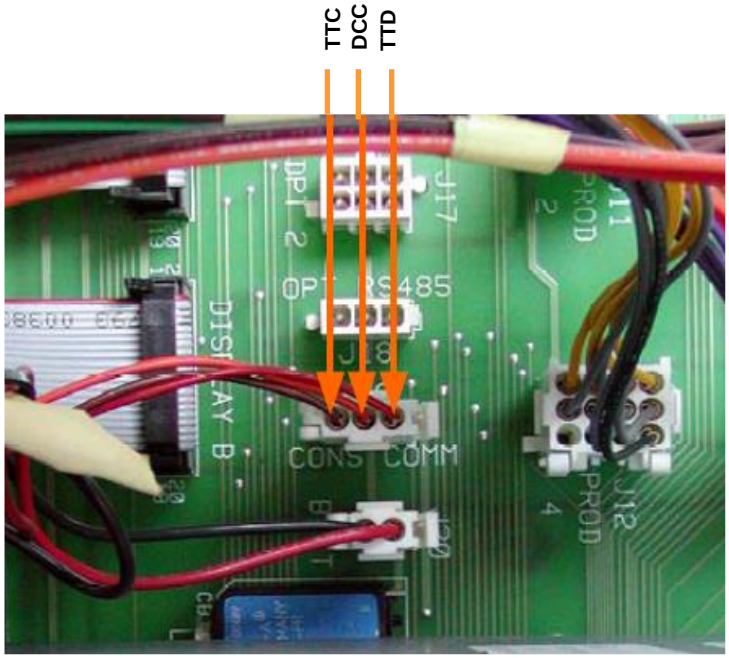
Connection to Tokheim dispenser is made through 3-wire TH interface converter (*http://www.technotrade.ua/tokheim-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 3-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*6. TOKHEIM*", baud rate "*4. 9600*".

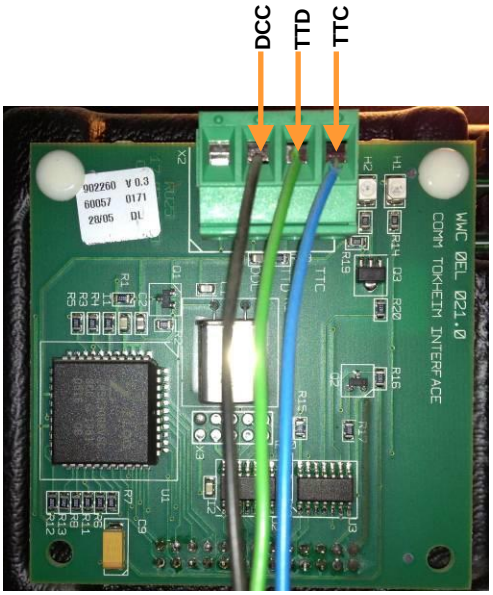


PTS-2 controller TH-4 interface converter

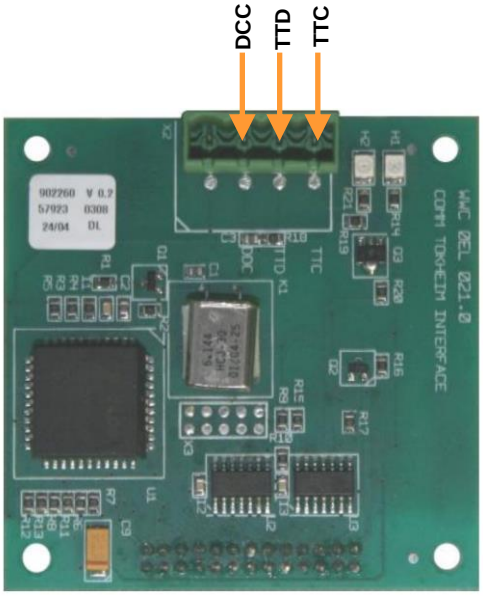
Tokheim dispenser board



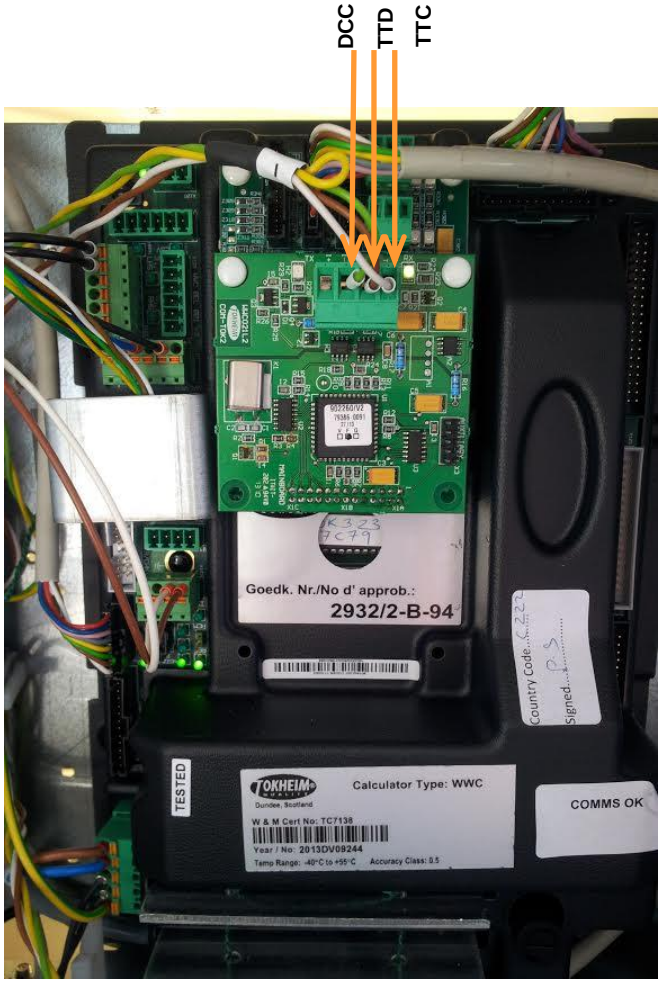
Tokheim dispenser board



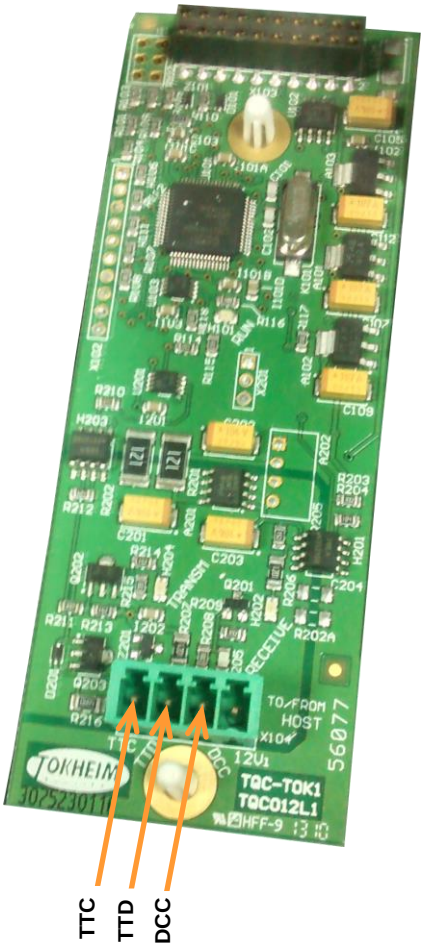
Tokheim dispenser interface board



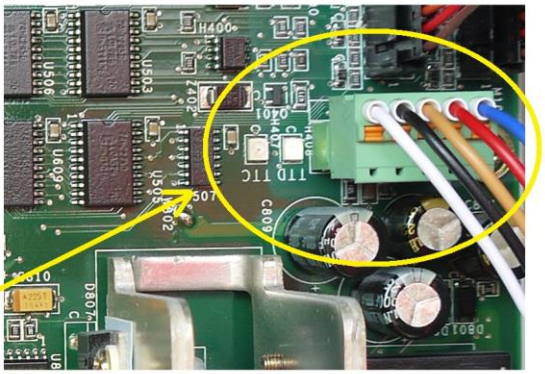
Tokheim dispenser interface board



Tokheim dispenser calculator with interface board



Tokheim dispenser interface board

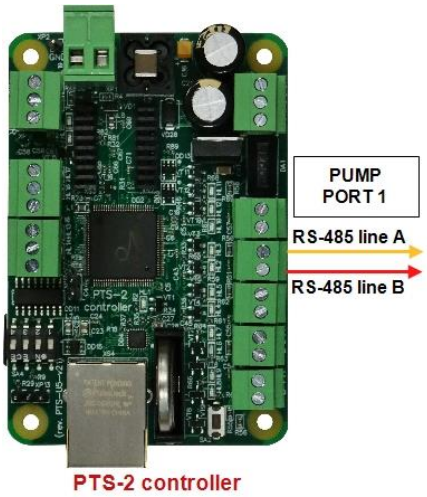


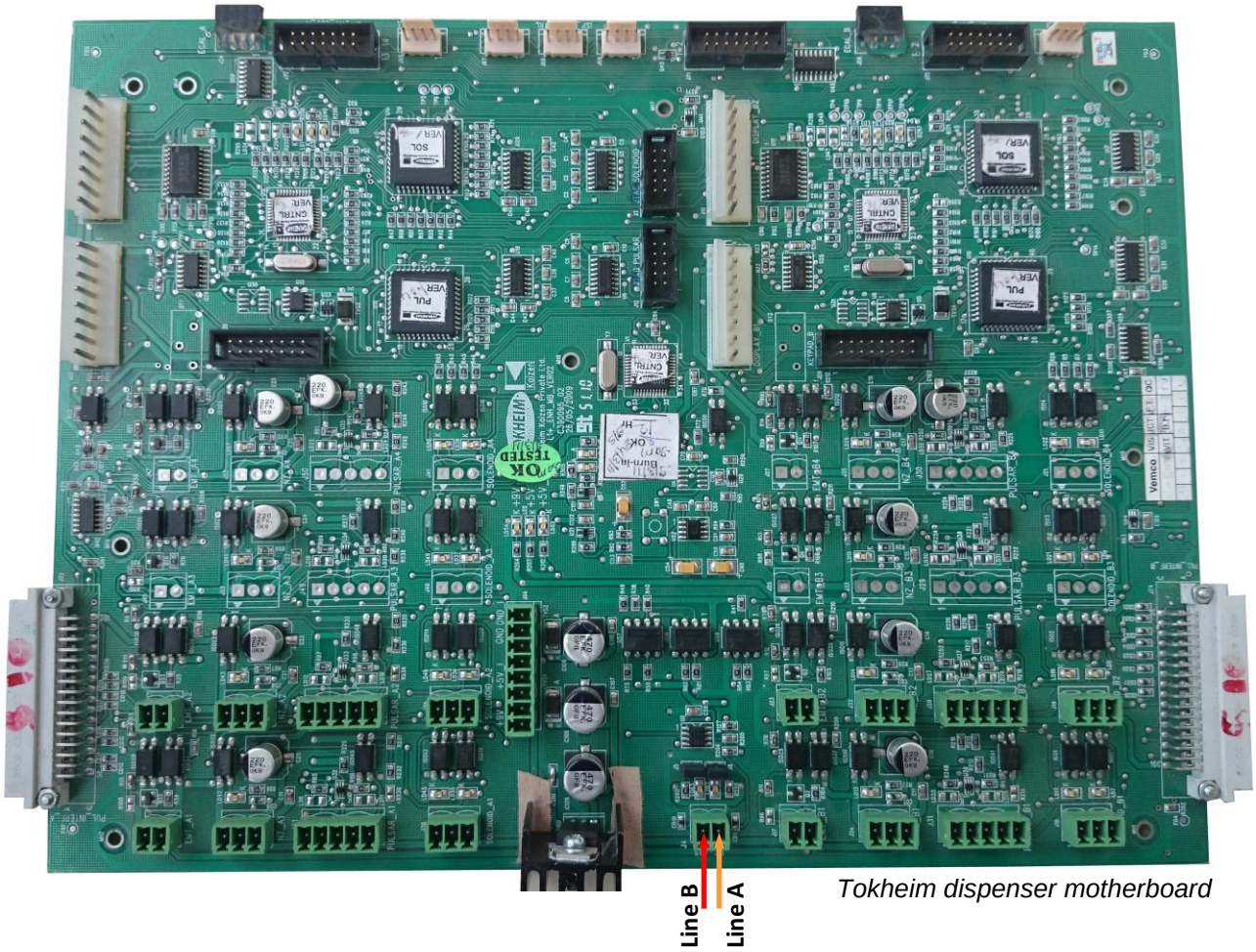
Tokheim Q320T dispenser calculator

Tokheim dispenser connection scheme (RS-485 interface)

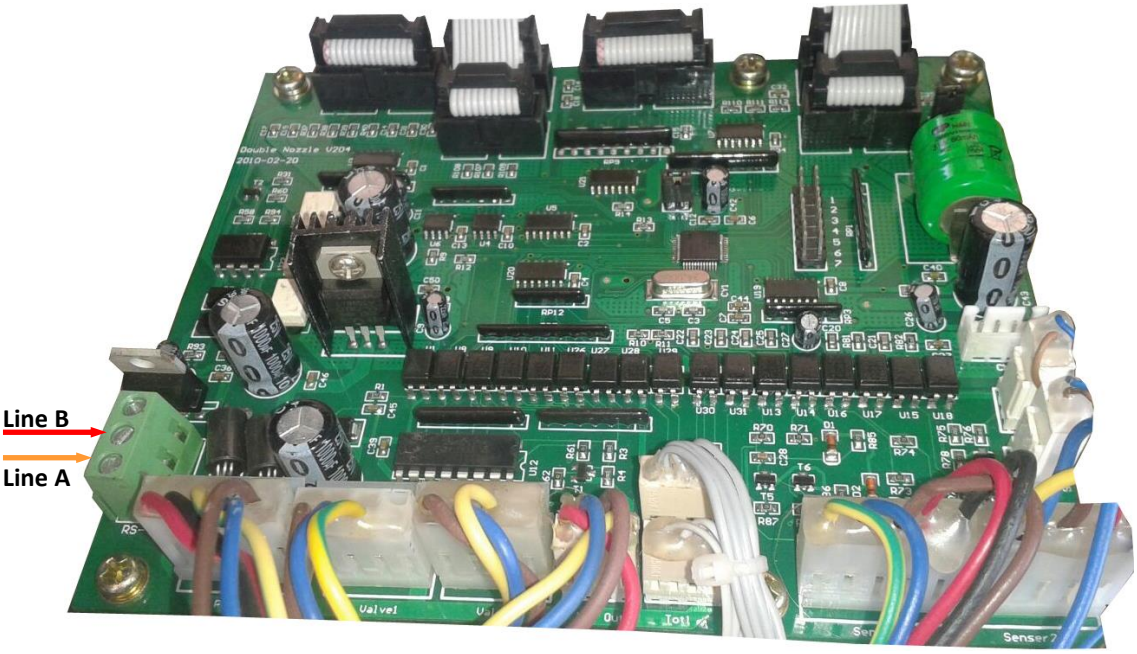
Connection to Tokheim dispenser through RS-485 interface is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*6. TOKHEIM*", baud rate "*4. 9600*".





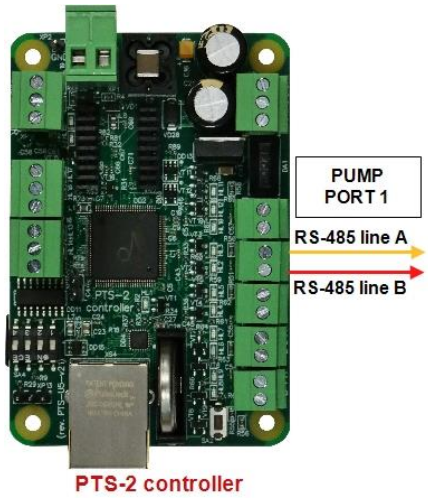
Tokheim dispenser motherboard

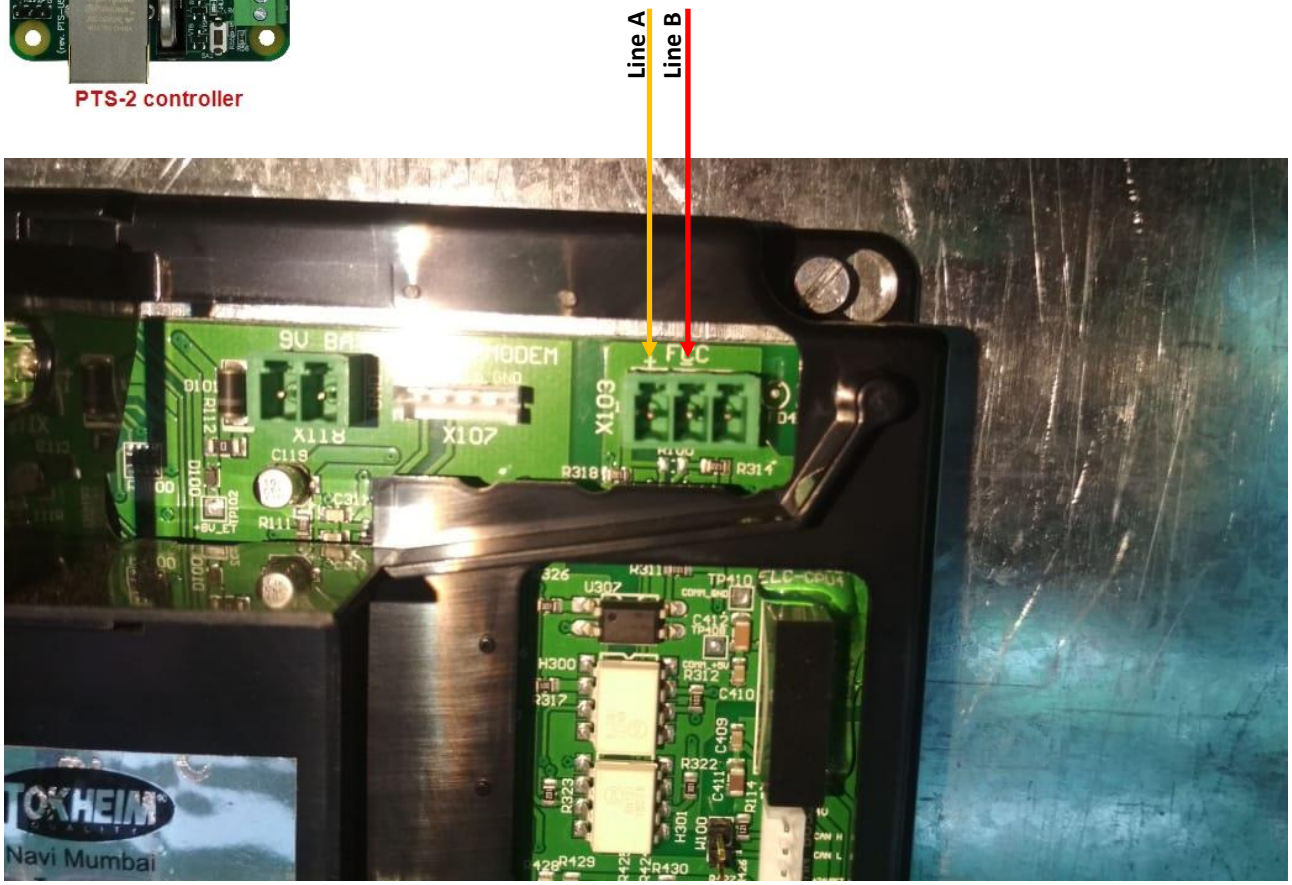


Tokheim dispenser motherboard

Tokheim India dispenser connection scheme

Connection to Tokheim India dispenser is made directly without any interface converter. Configuration of PTS-2 controller pump port: protocol “59*. Tokheim TQCL*”, baud rate “*4. 9600*”.

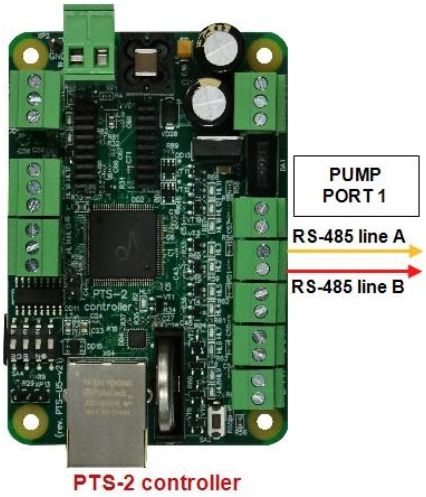


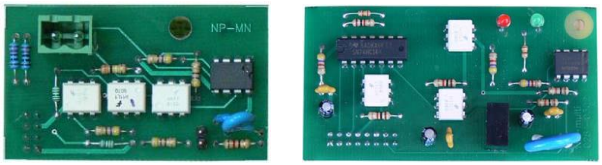


Nuovo Pignone dispenser connection scheme (RS-485 interface)

Connection to Nuovo Pignone dispensers with RS-485 interface is made directly without any interface converter. At this Nuovo Pignone dispenser should have an interface board for RS-485 interface and should be adjusted to have Wayne Dart protocol.

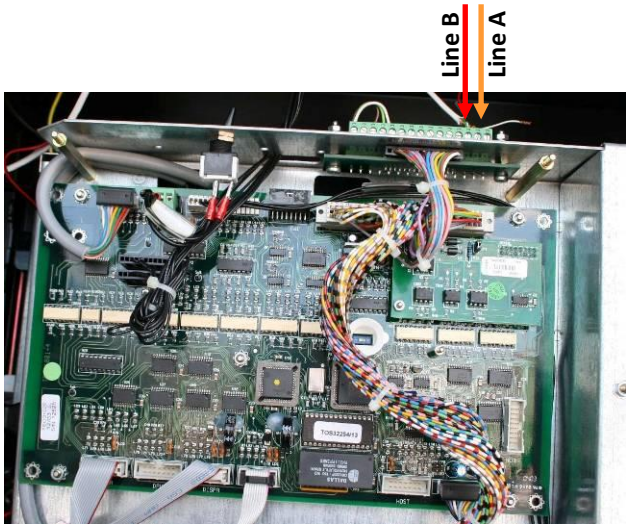
Configuration of PTS-2 controller pump port: protocol "*3. WAYNE Dart*", baud rate "4*. 9600*".





Nuovo Pignone interface boards for RS-485 interface for monoproduct and multiproducts dispensers
More info can be found on:
http://www.technotrade.ua/nuovo_pignone_interface_converter.html

Nuovo Pignone monoproduct dispenser board

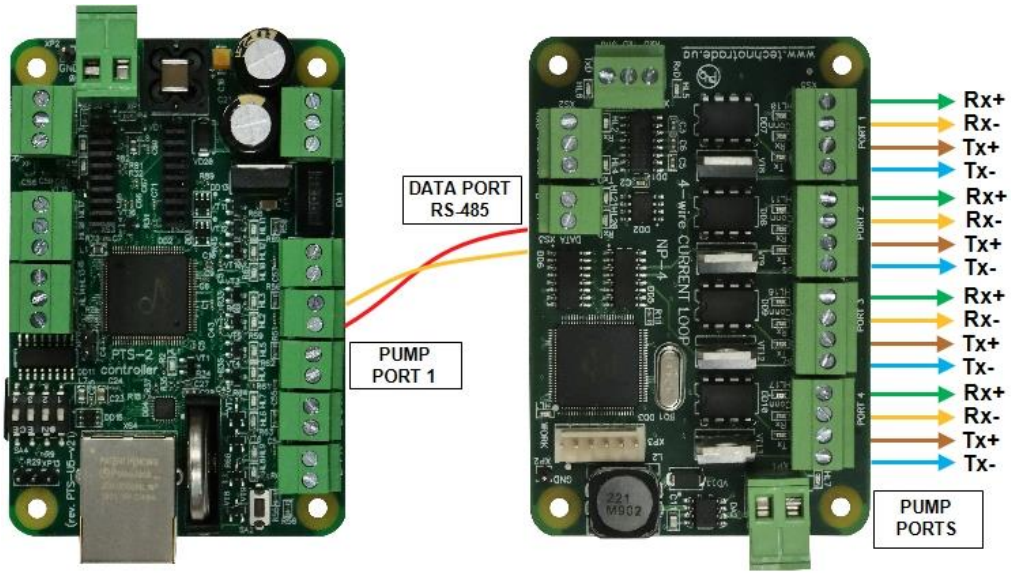


Nuovo Pignone multiproduct dispenser board

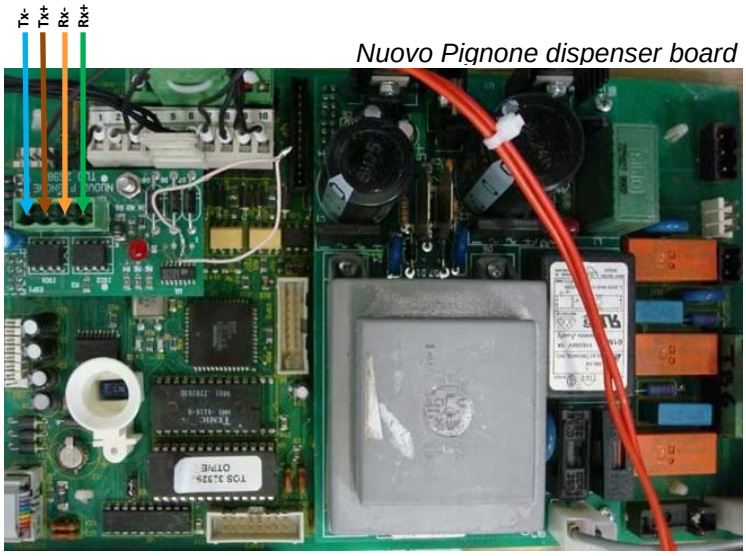
Nuovo Pignone dispenser connection scheme (4-wire current loop interface)

Connection to Nuovo Pignone dispensers with 4-wire current loop interface is made through 4-wire NP interface converter (*http://www.technotrade.ua/nuovo_pignone_interface_converter.html*), which provides connection of RS-232/RS-485 interfaces to 4-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*24. NUOVO PIGNONE CL*", baud rate "*1. 2400*".



PTS-2 controller NP-4 interface converter



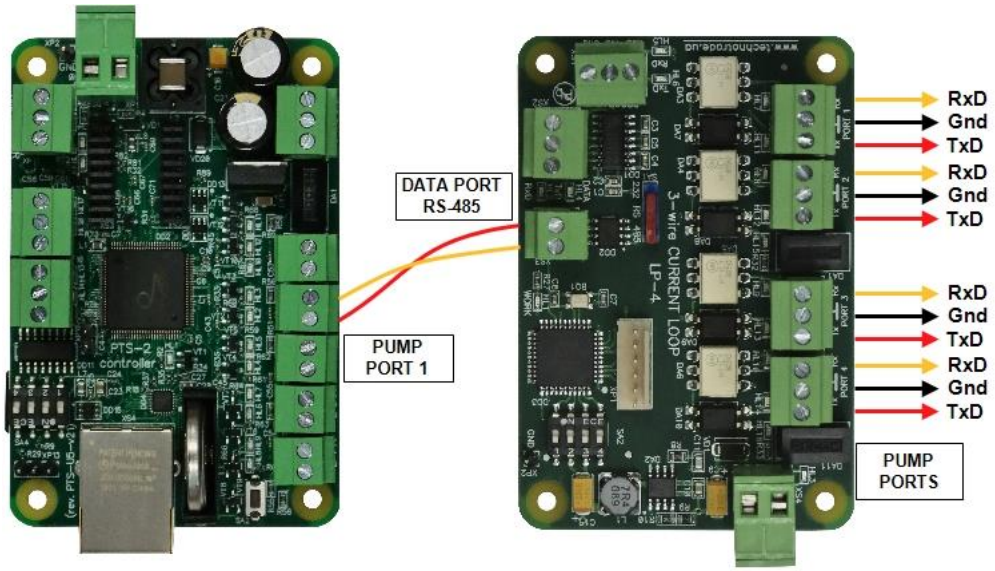
Nuovo Pignone dispenser board

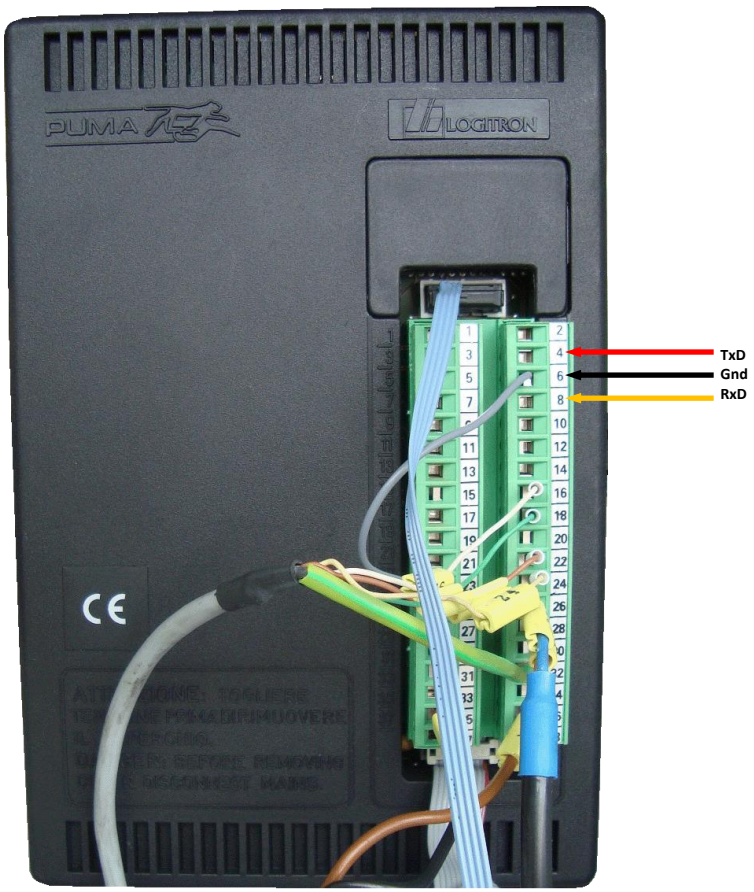
Nuovo Pignone dispenser board

Logitron dispenser connection scheme (3-wire current loop interface)

Connection to Logitron dispensers with 3-wire current loop interface is made through 3-wire LP interface converter (*http://www.technotrade.ua/logitron-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 3-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*19. PUMALAN Marconi*", baud rate "*1. 4800*".

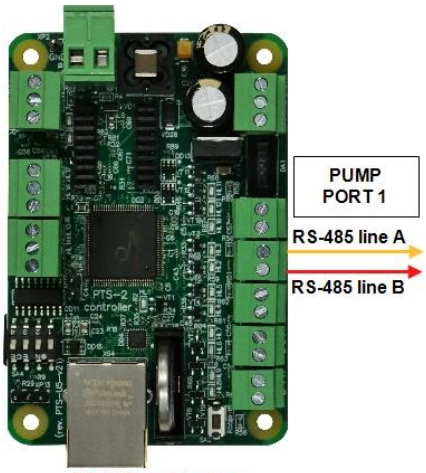




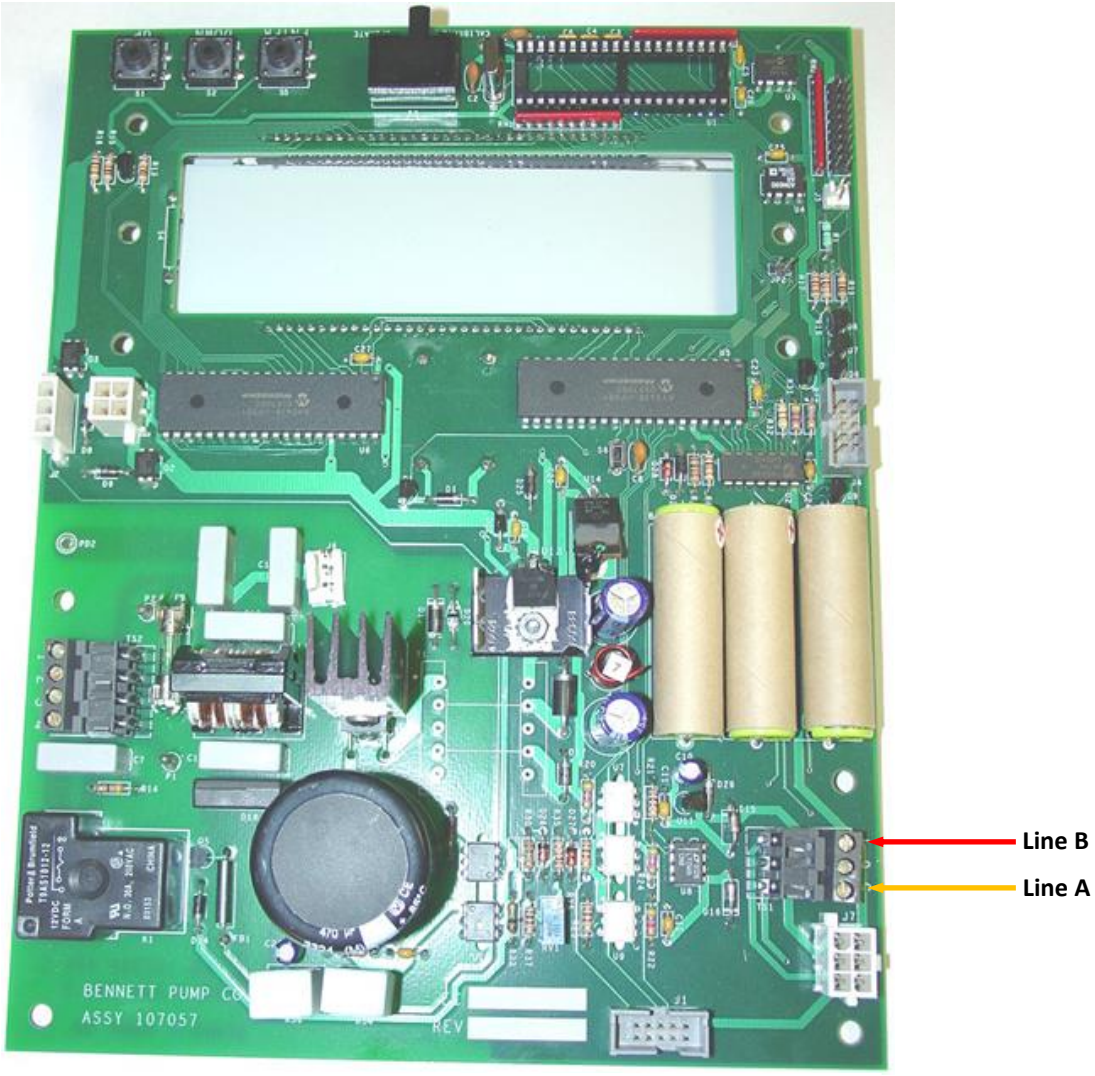
PUMA Logitron computer

Bennett dispenser connection scheme (RS-485 interface)

Connection to Bennett dispensers with RS-485 interface is made directly without any interface converter. Configuration of PTS-2 controller pump port: protocol “22. *BENNETT 485*”, baud rate “2.*4800*”.



PTS-2 controller

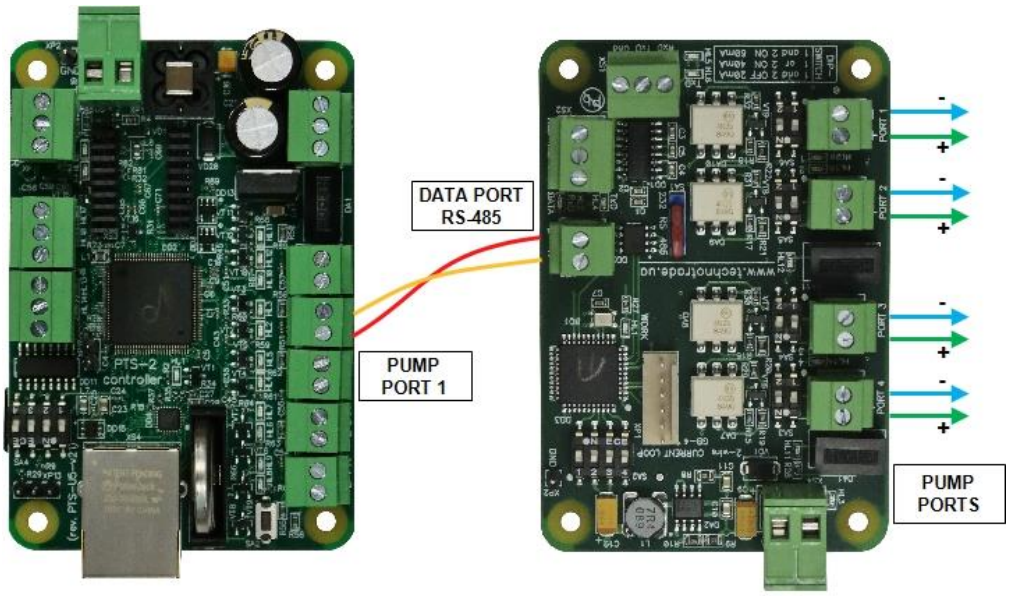


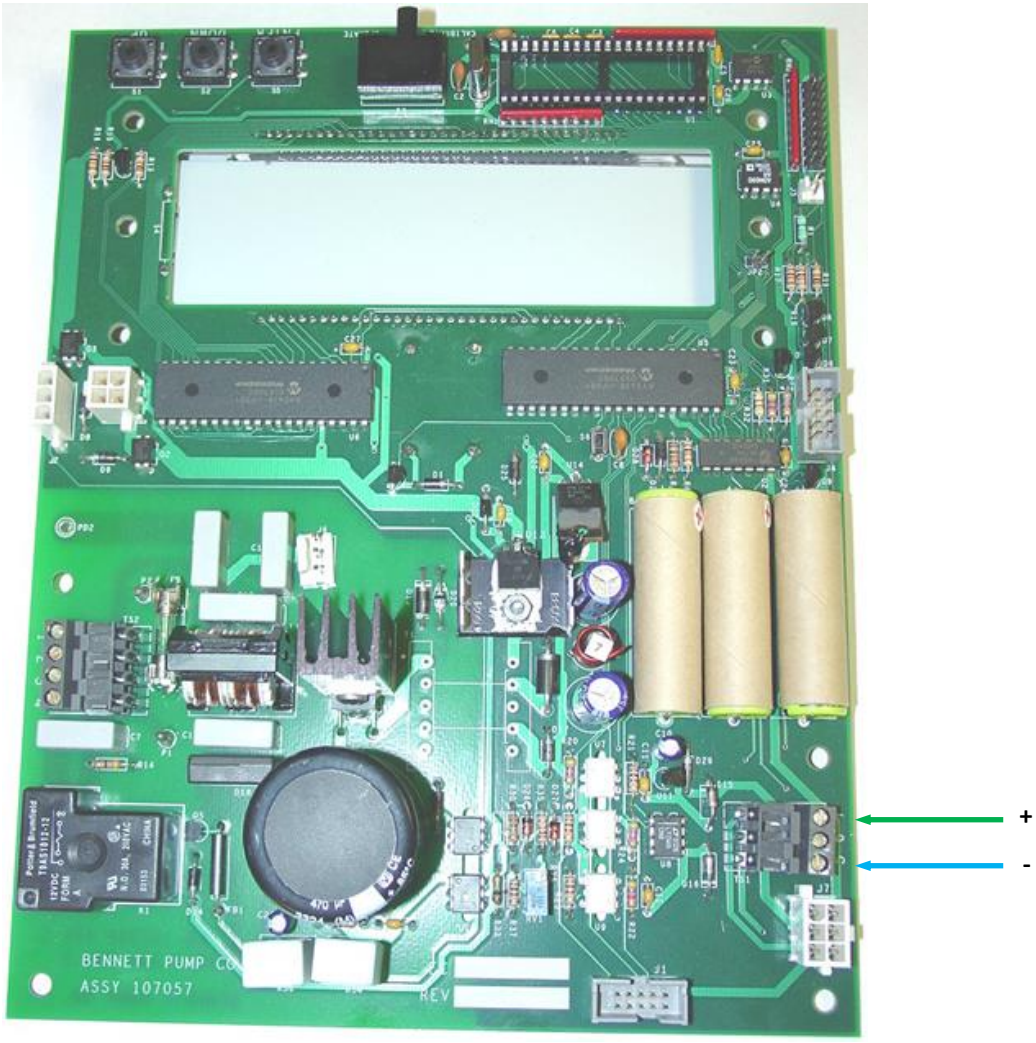
Bennett dispenser board

Bennett dispenser connection scheme (2-wire current loop interface)

Connection to Bennett dispensers with 2-wire current loop interface is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "21. *BENNETT*", baud rate "2.*4800*".



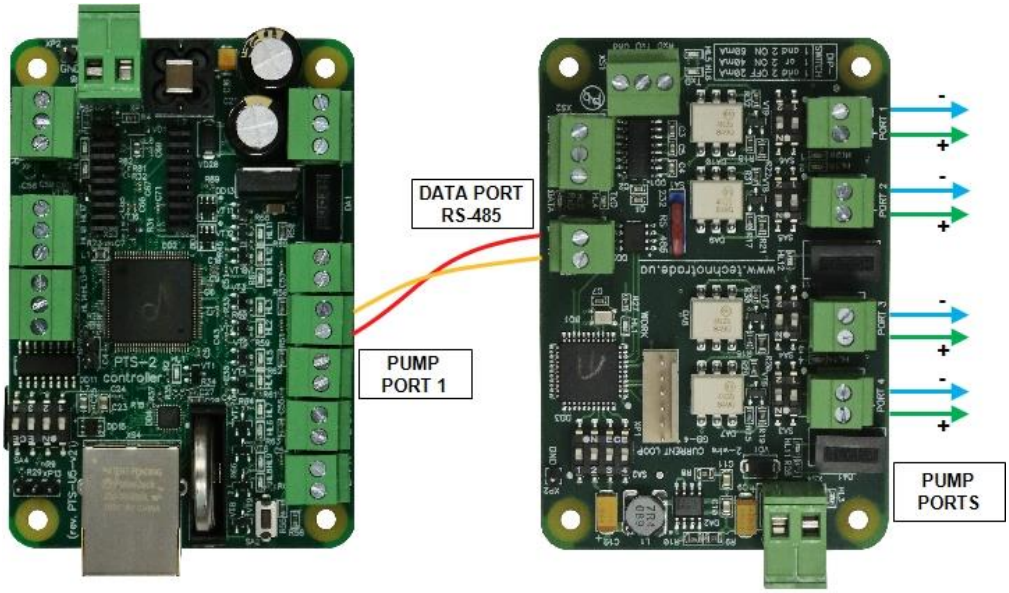


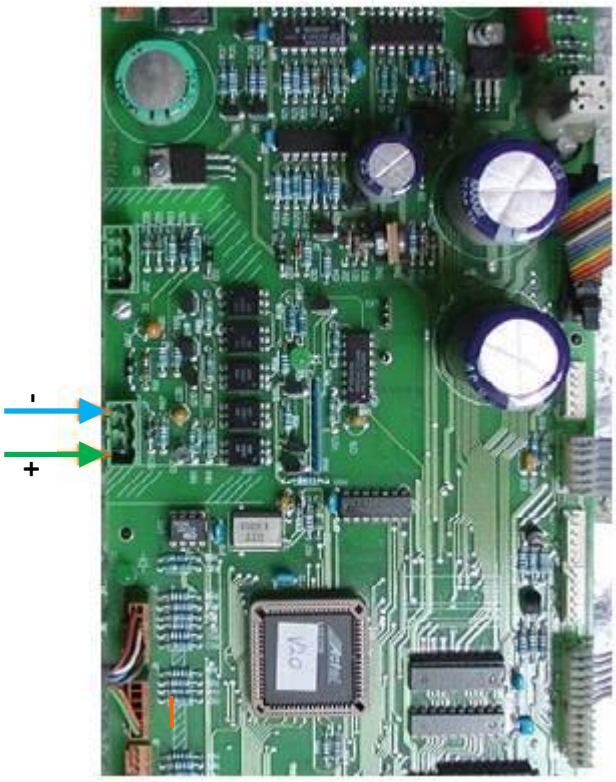
Bennett dispenser board

Batchen Email dispenser connection scheme

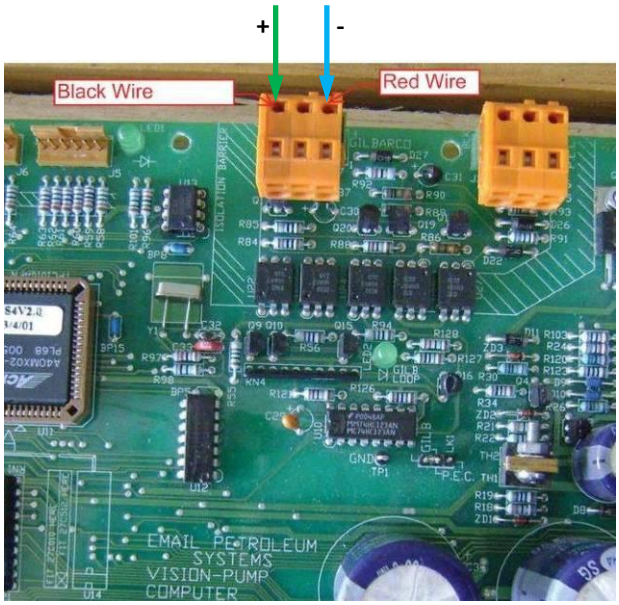
Connection to Batchen dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*18. BATCHEN Electroline*" (for single-product dispensers) or "*39. BATCHEN MPP*" (for multi-product dispensers), baud rate "*2. 4800*".





Batchen dispenser board

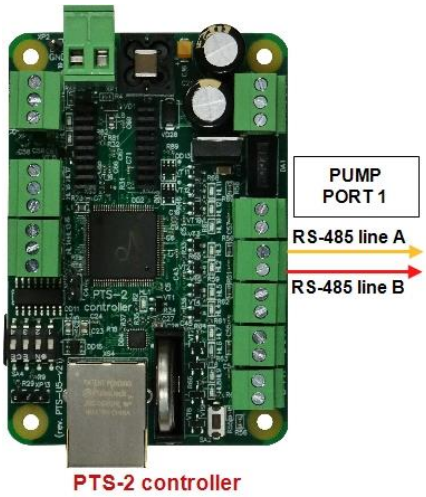


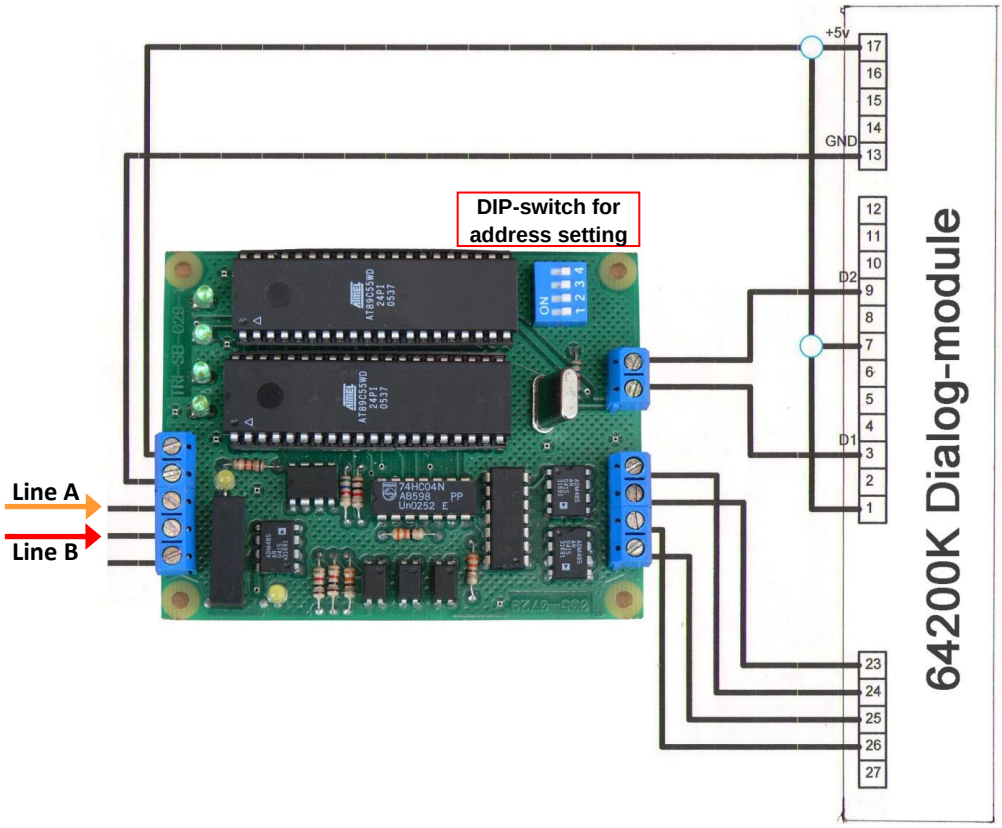
Batchen dispenser board

Scheidt & Bachmann T20 dispenser connection scheme

Connection to Scheidt&Bachmann T20 dispenser is made through S&B T20 interface converter board.

Configuration of PTS-2 controller pump port: protocol "*2. UniPump*", baud rate "*4. 9600*".



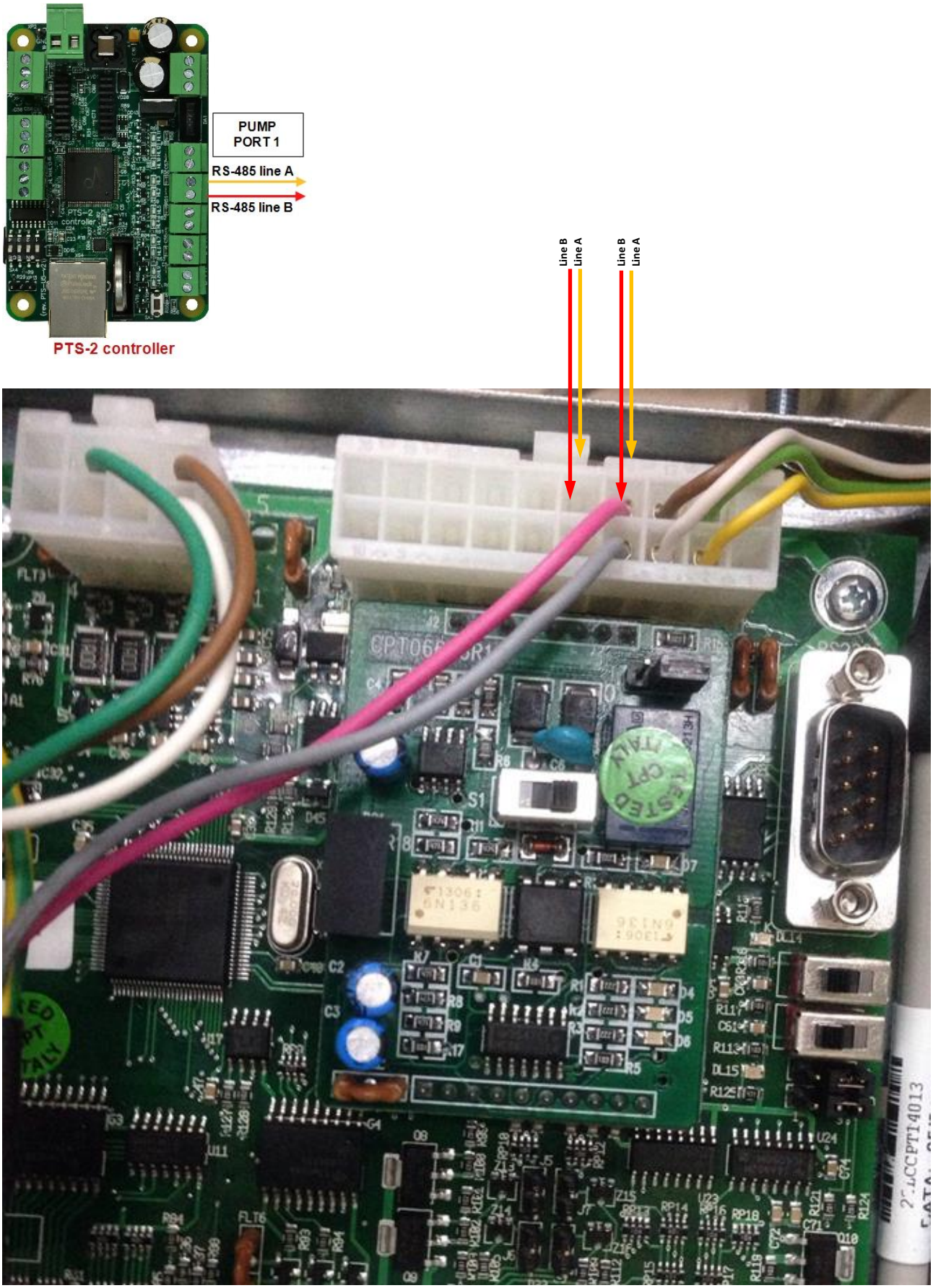


Address setting on S&B T20 interface converter board using a DIP-switch

Address	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10	11 & 12	13 & 14	15 & 16
DIP 1	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIP 2	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIP 3	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIP 4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Coptron dispenser connection scheme

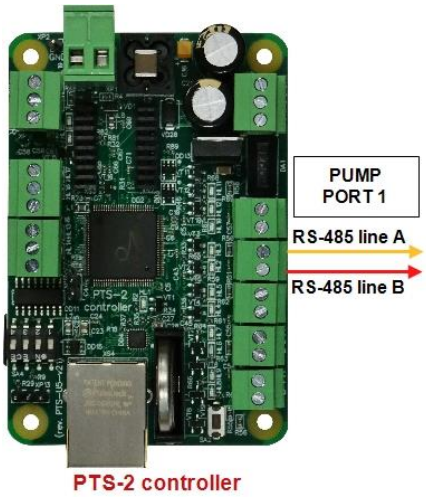
Connection to Coptron pumphead is made directly without any interface converter. Configuration of PTS-2 controller pump port: “33. *DART Simplex*”, baud rate “4. *9600*”.

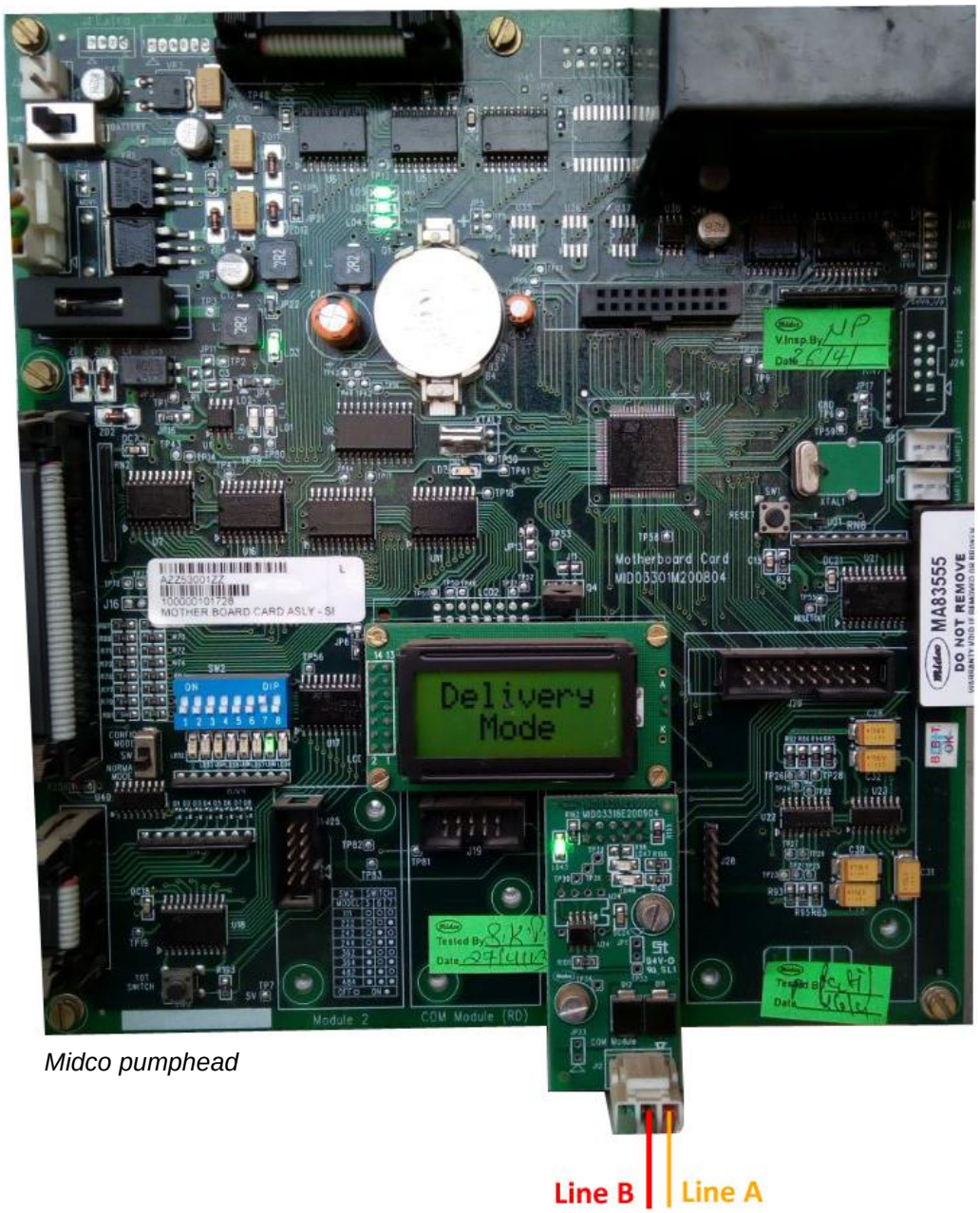


Coptron pumphead

Midco dispenser connection scheme

Connection to Midco pumphead is made directly without any interface converter. Configuration of PTS-2 controller pump port: protocol “49. *Midco*”, baud rate “4. *9600*”.



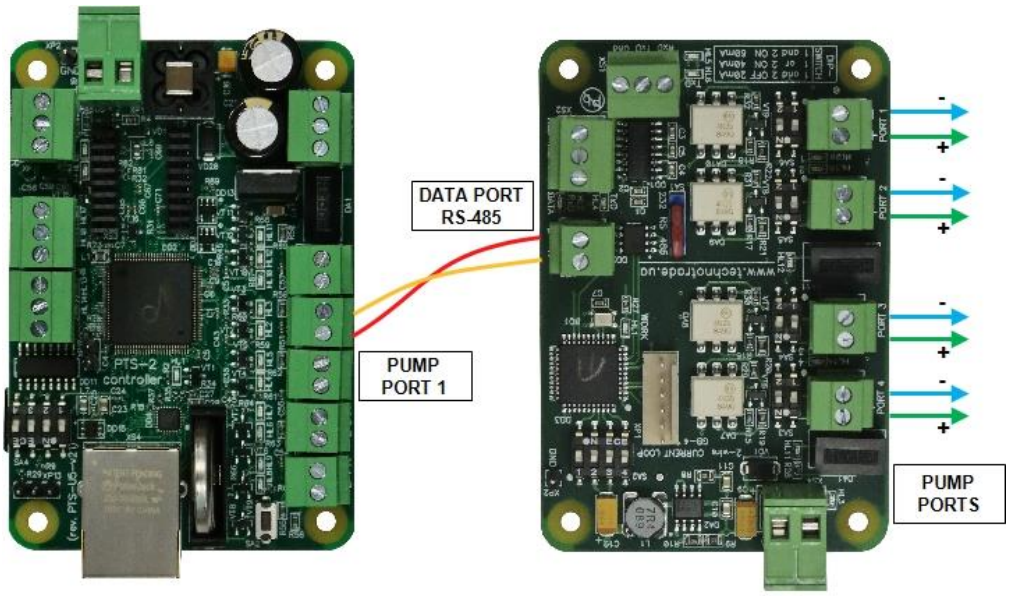


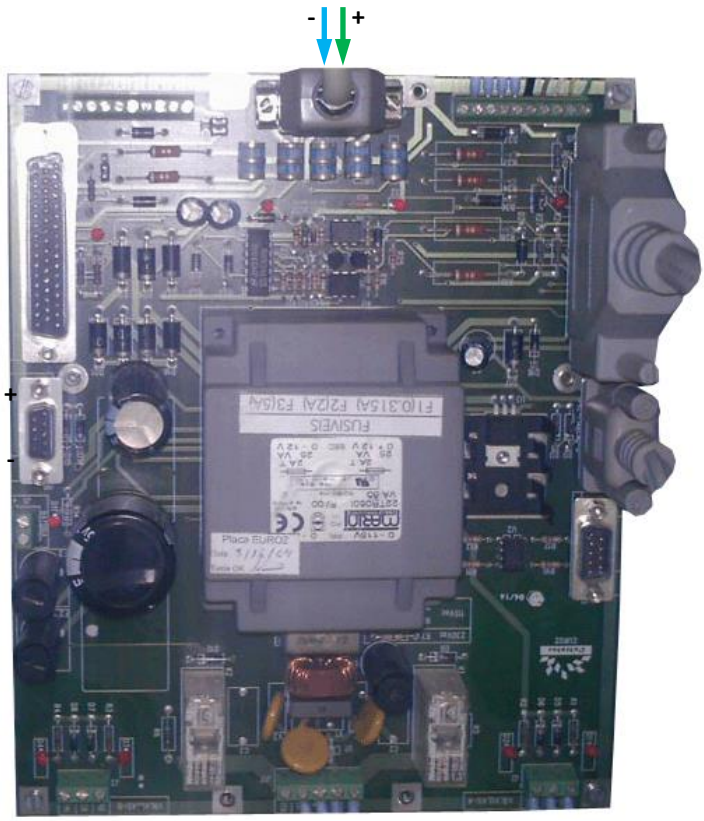
Midco pumphead

Petrotec dispenser connection scheme

Connection to Petrotec dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol “5. *Gilbarco Two-Wire*”, baud rate “3. *5787*”.



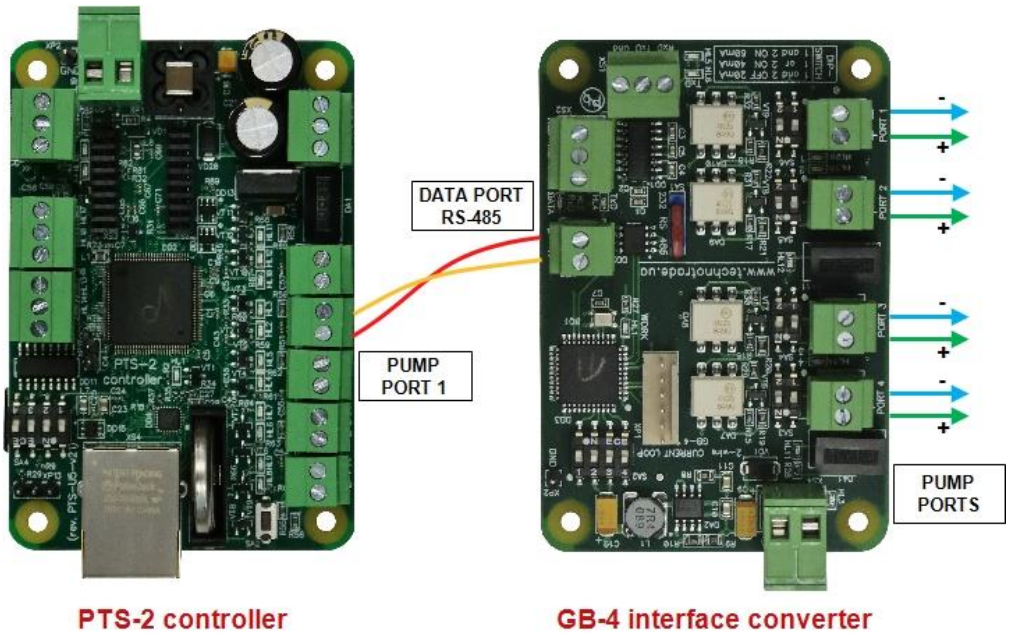


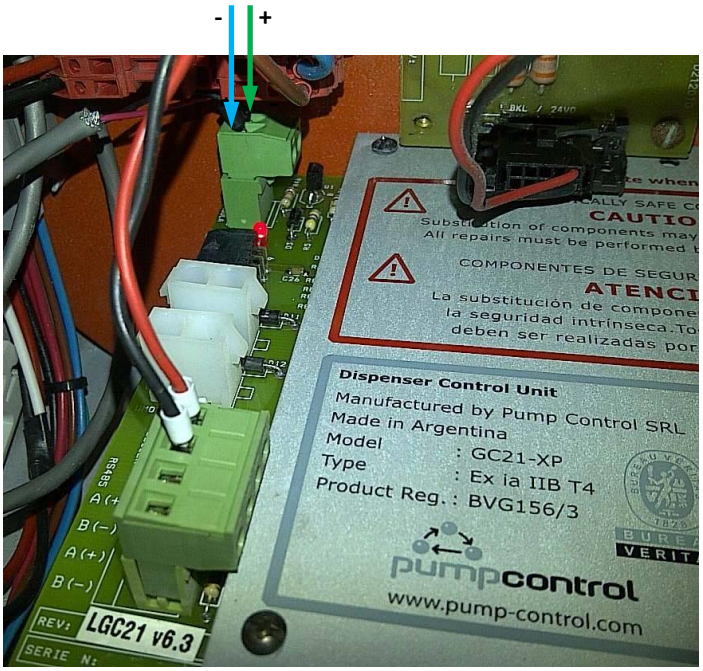
Petrotec dispenser board

Galileo dispenser connection scheme

Connection to Galileo dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*10. GALILEO PumpControl*", baud rate "*2. 4800*".



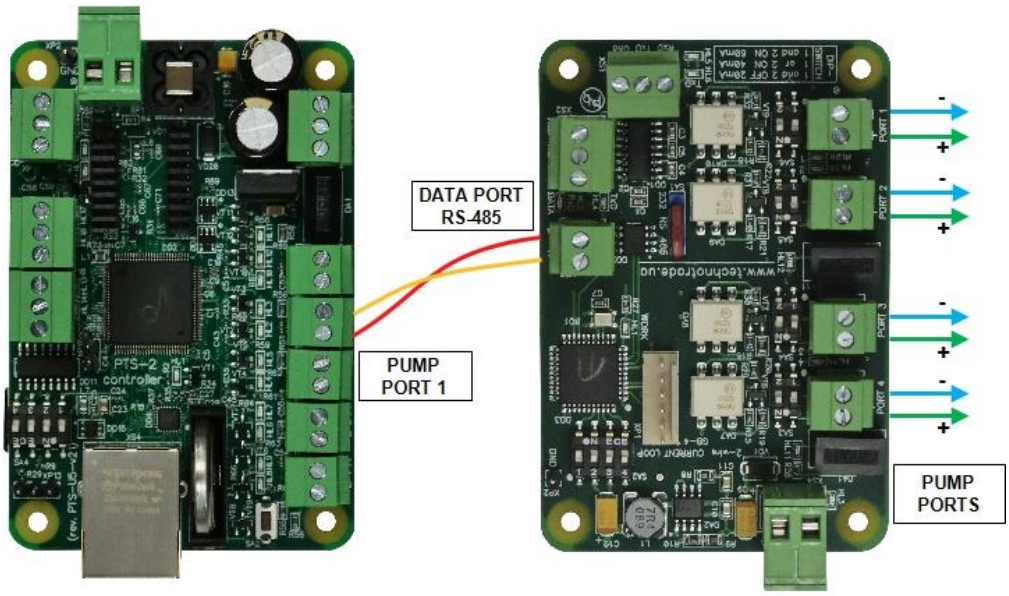


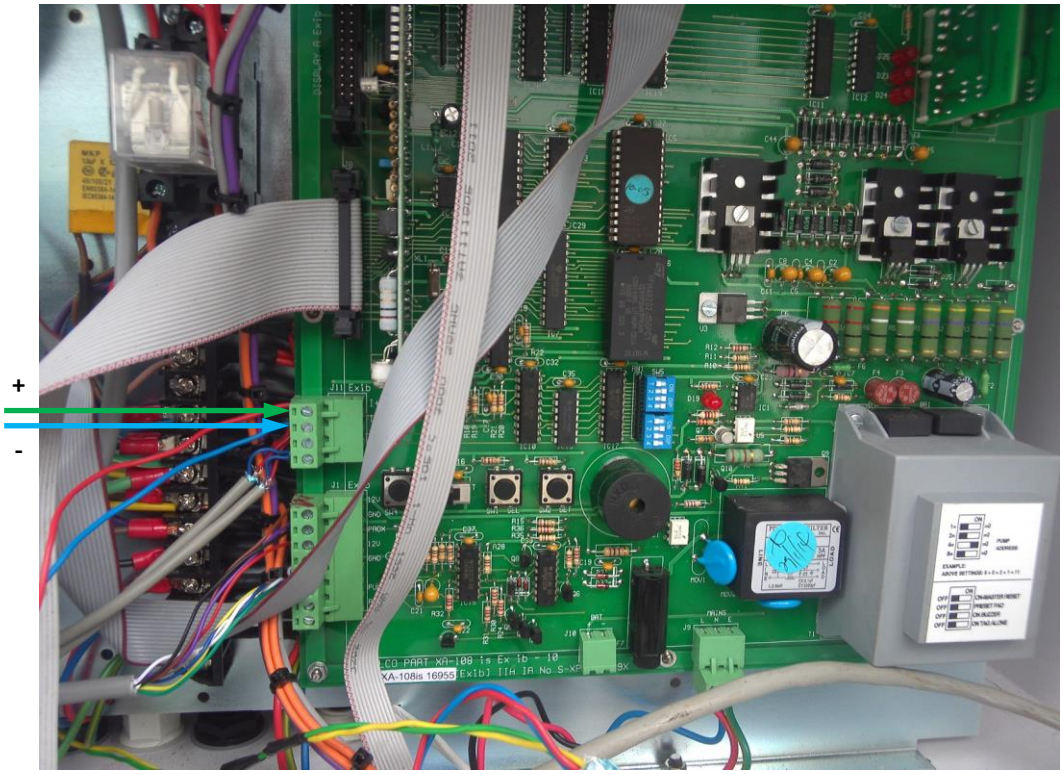
Galileo dispenser board

Prowalco dispenser connection scheme

Connection to Prowalco dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*27. PROWALCO*", baud rate "*2. 4800*".



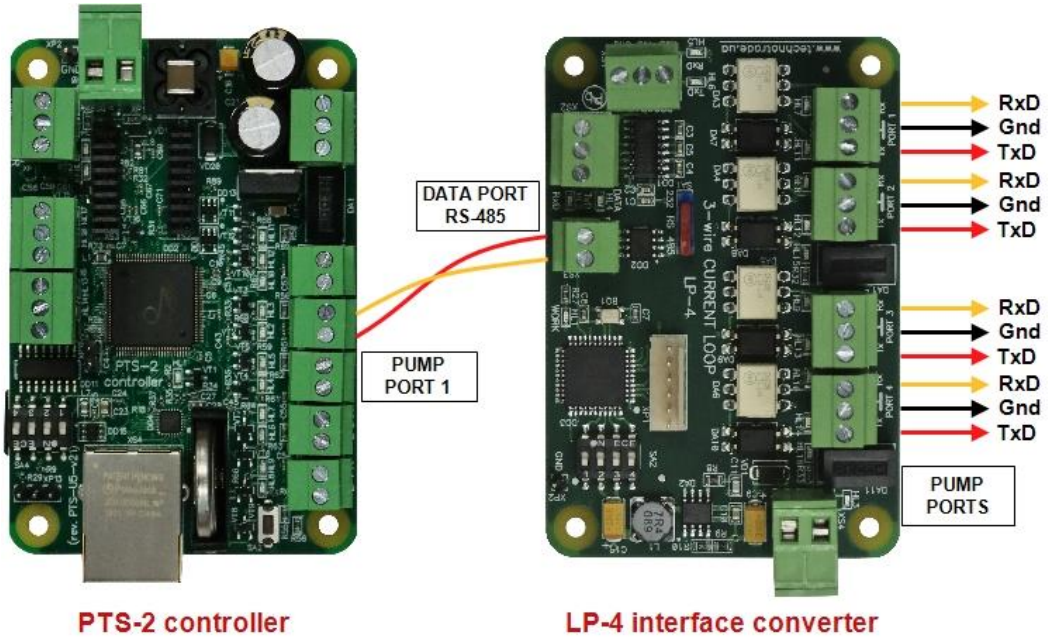


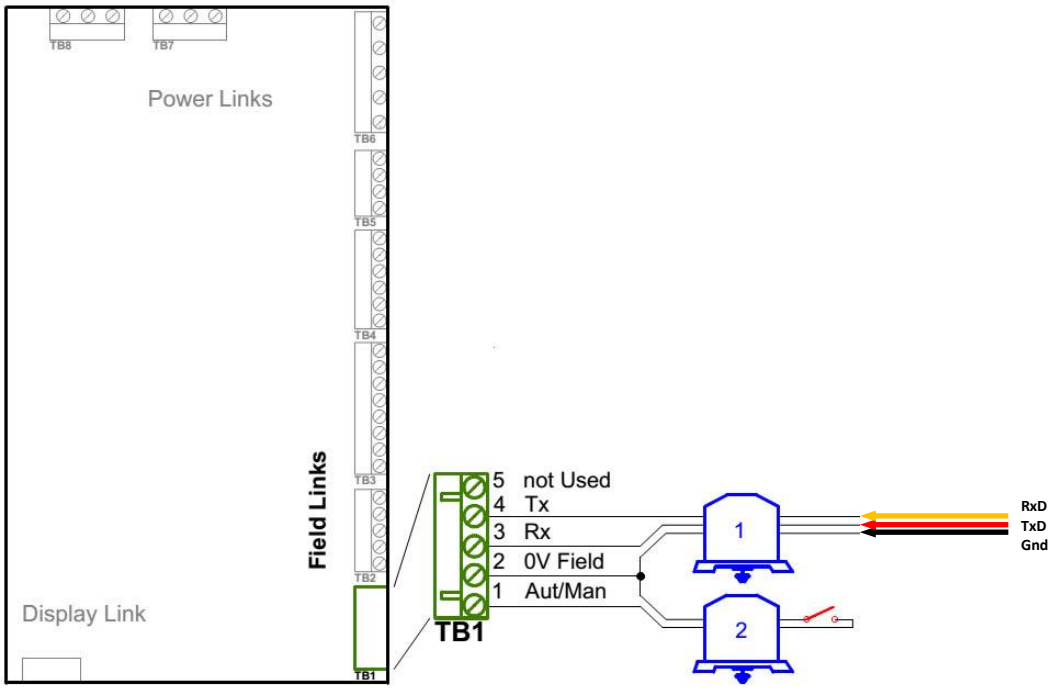
Prowalco dispenser board

Emgaz Dragon / Fornovo LPG dispenser with EsiWelma pumphead connection scheme

Connection to EsiWelma pumphead is made through 3-wire LP interface converter (*http://www.technotrade.ua/logitron-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 3-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*19. PUMALAN Marconi*", baud rate "*2. 4800*".



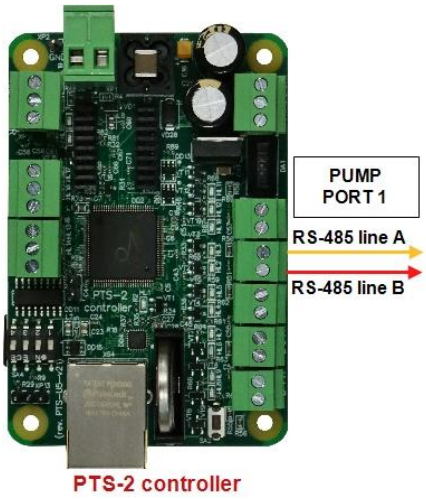


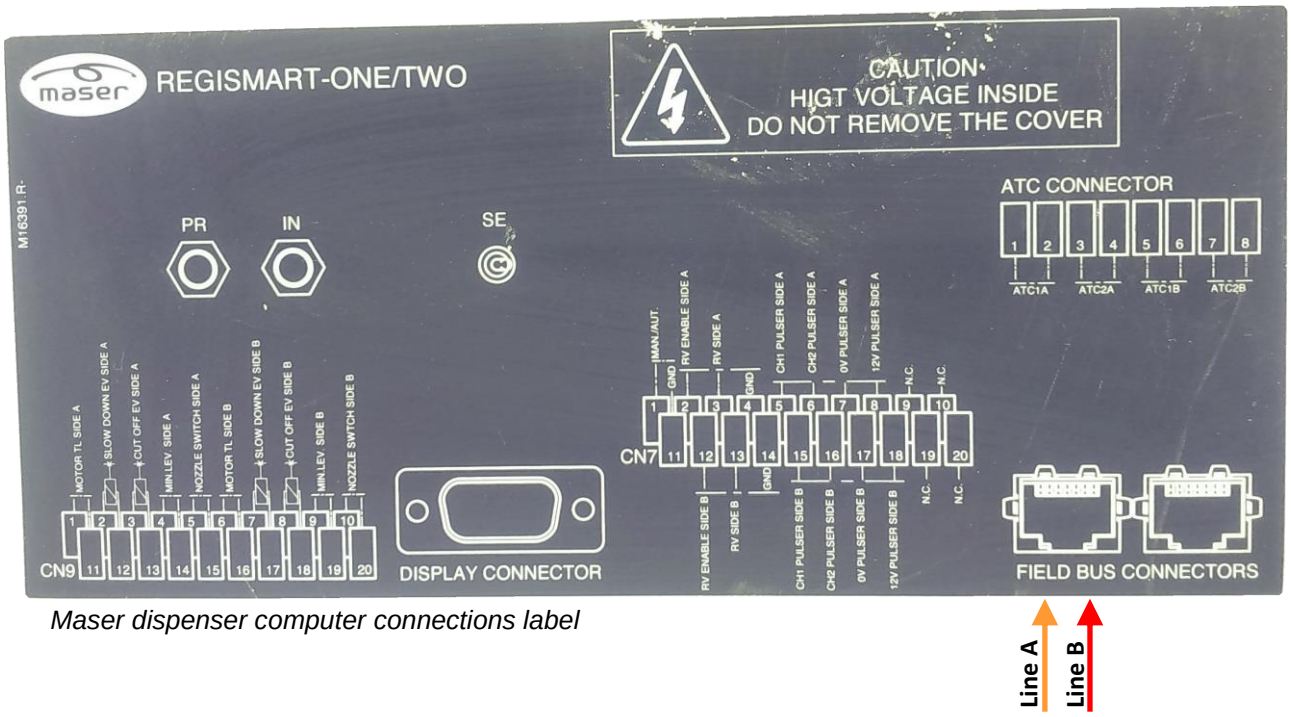
EsiWelma pumphead

Maser dispenser connection scheme

Connection to Maser dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol “45. *MASER GMS*”, baud rate “*4. 9600*”.



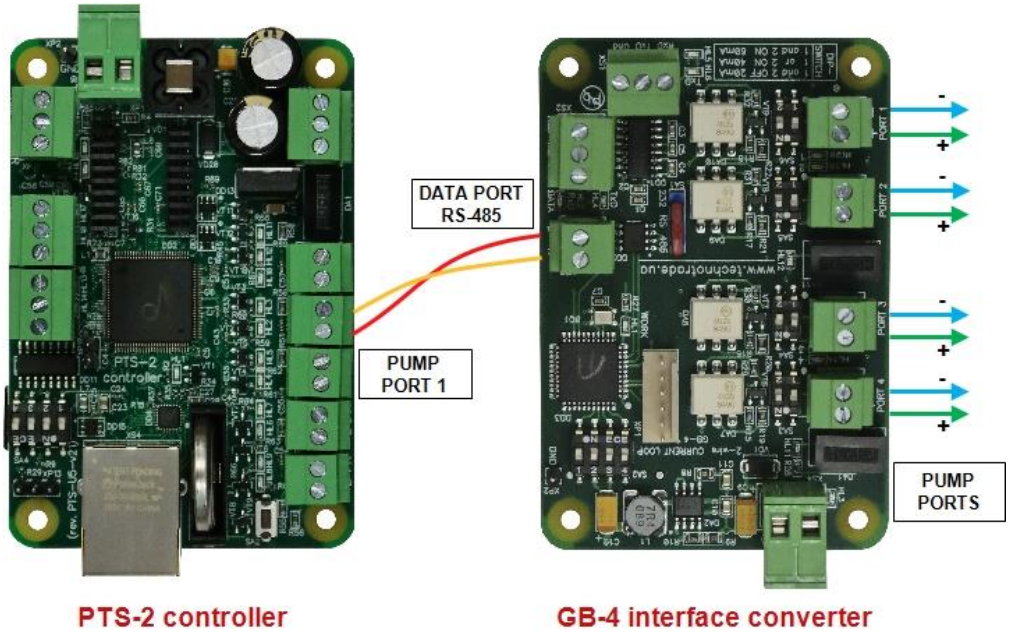


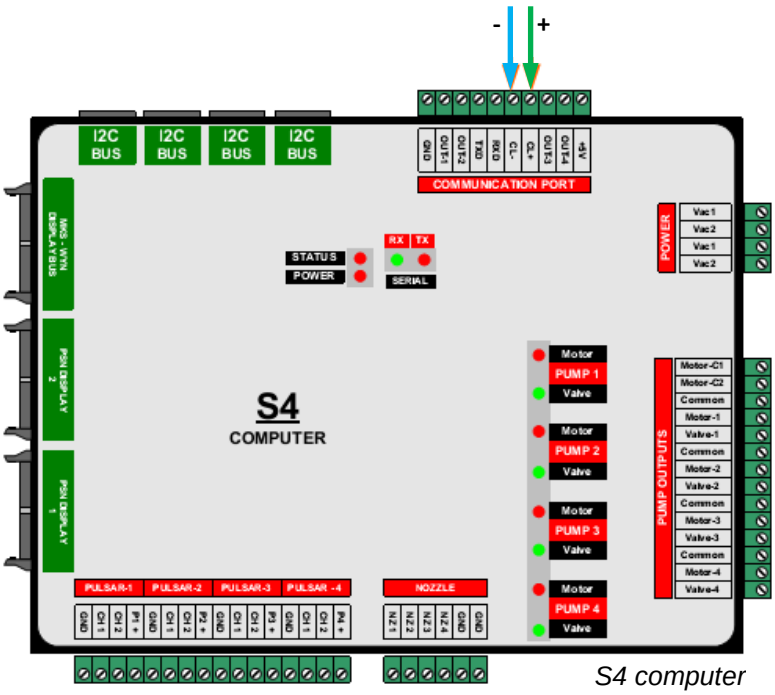
Maser dispenser computer connections label

Petposan-S4 / Meksan-S4 / Europump-S4 / Yenen dispensers connection scheme

Connection to S4 computer is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



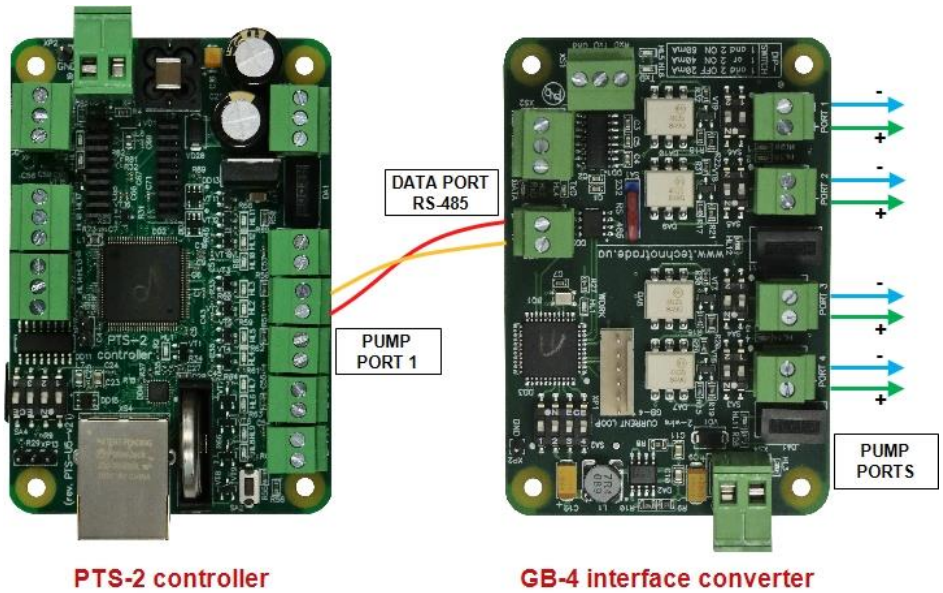


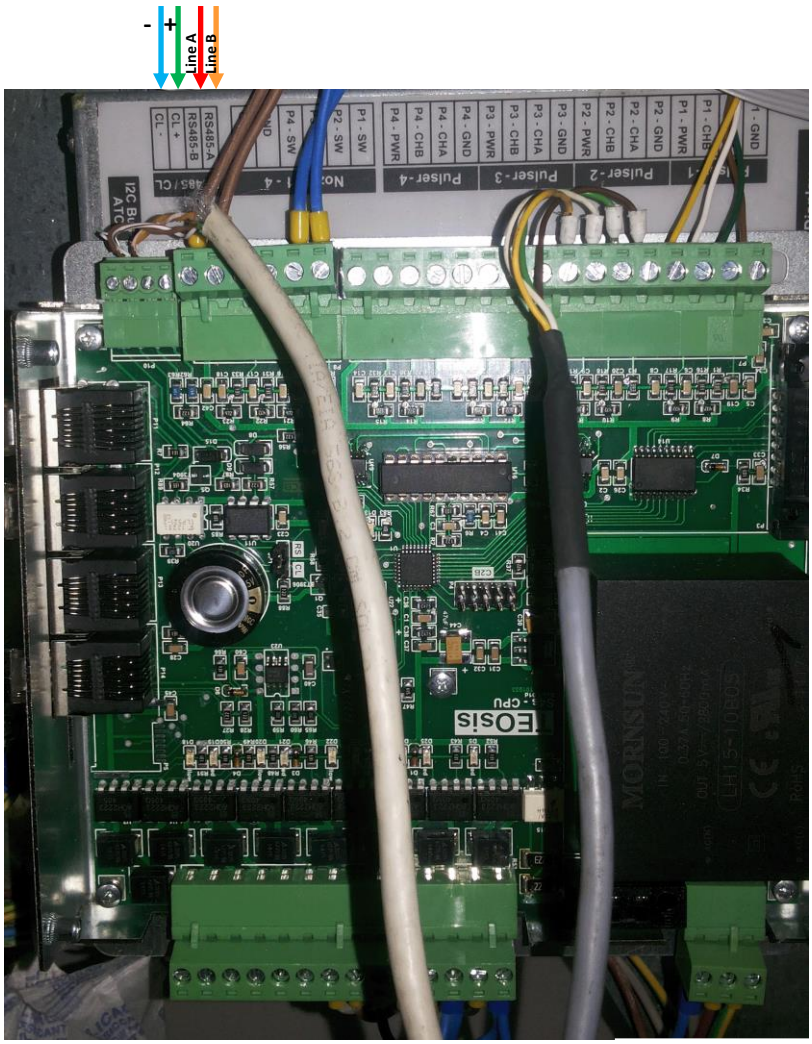
S4 computer

Yenen dispensers connection scheme

Connection to S4s computer is made either directly from the PTS-2 controller using RS-485 interface (no additional interface converter is required) or through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



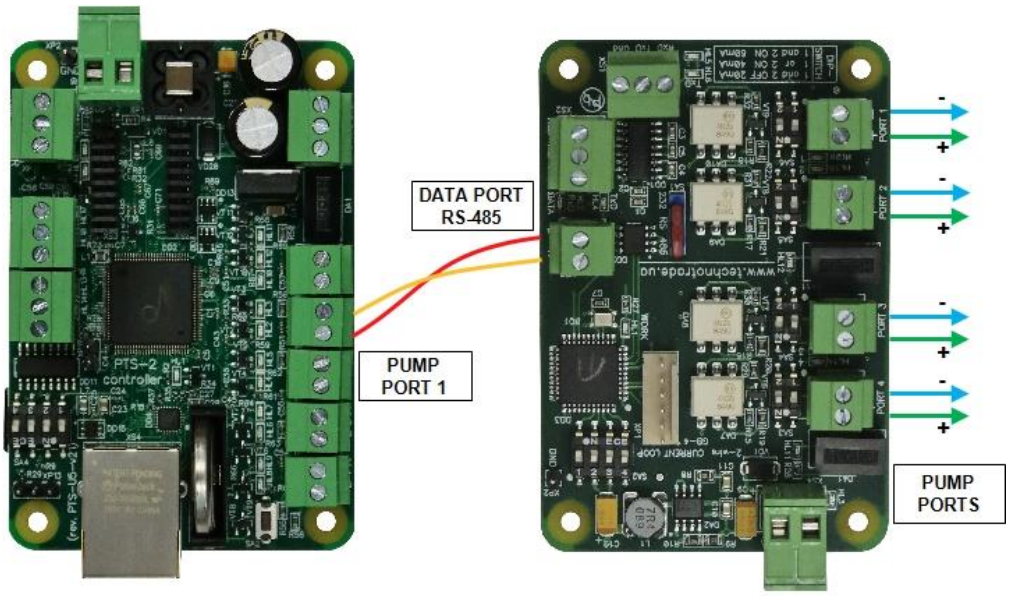


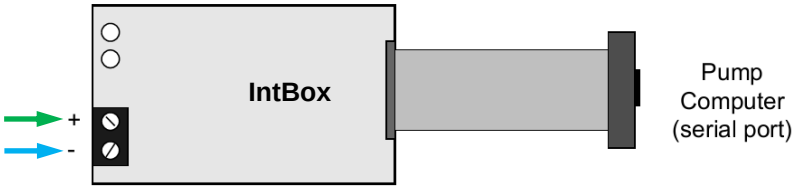
S4s computer

Petposan-Beta / Europump-Beta dispensers connection scheme

Connection to Beta computer is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



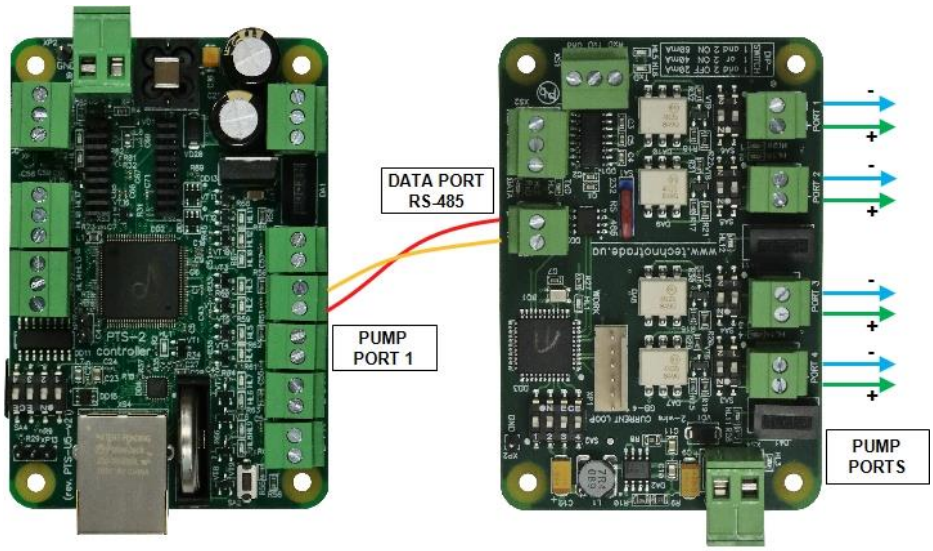


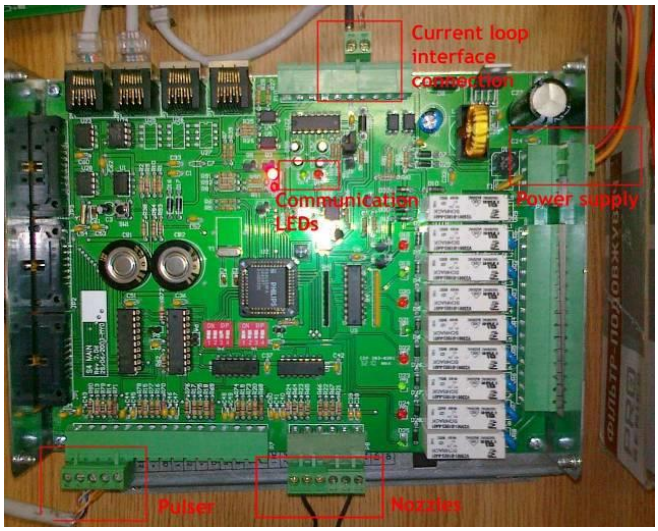
Petposan-Beta CPU

EuroPump dispenser connection scheme

Connection to EuroPump dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

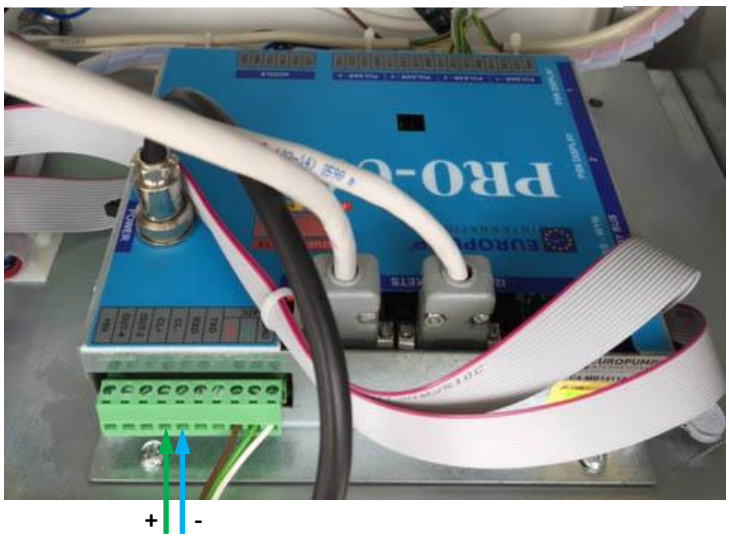
Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".





EuroPump EUROSTAR E2-SL dispenser computer

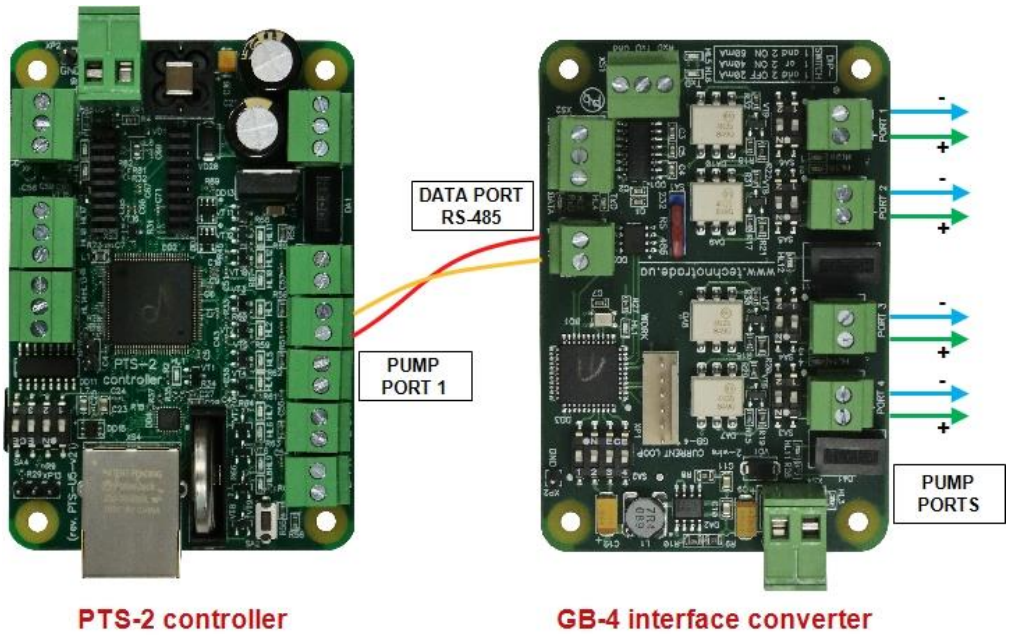
EuroPump dispenser computer

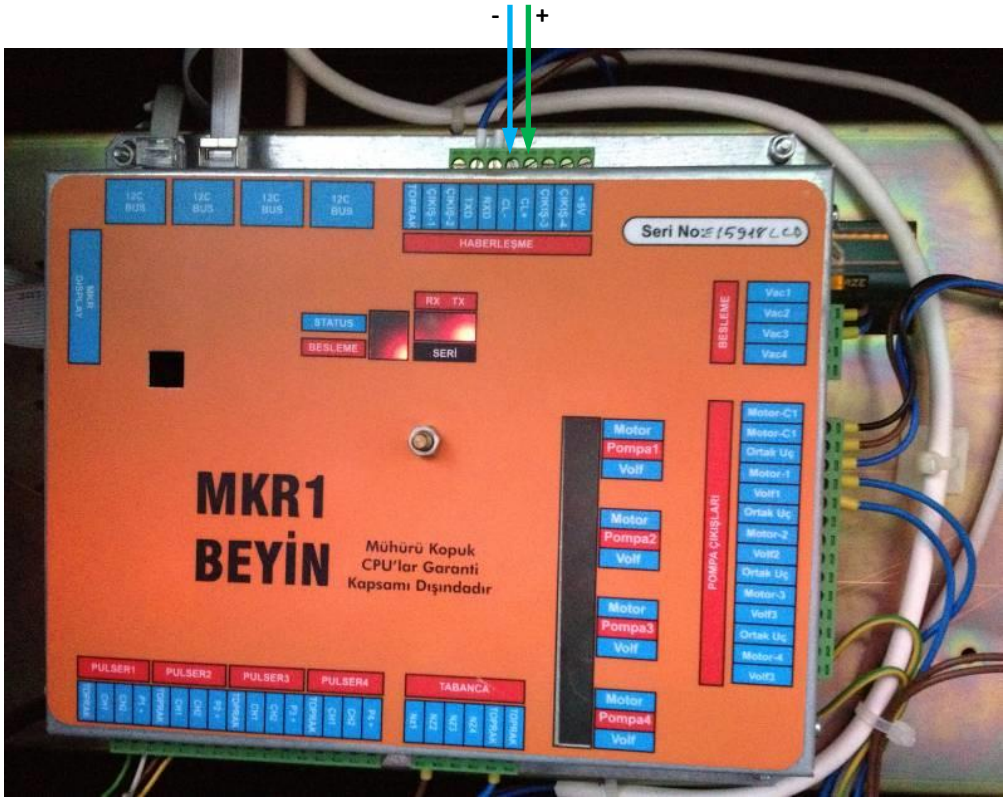


Mekser dispenser connection scheme

Connection to Mekser dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



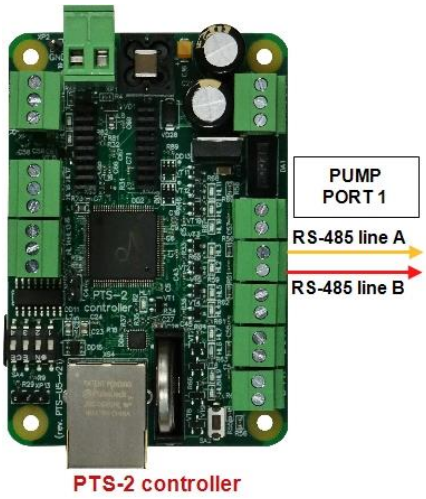


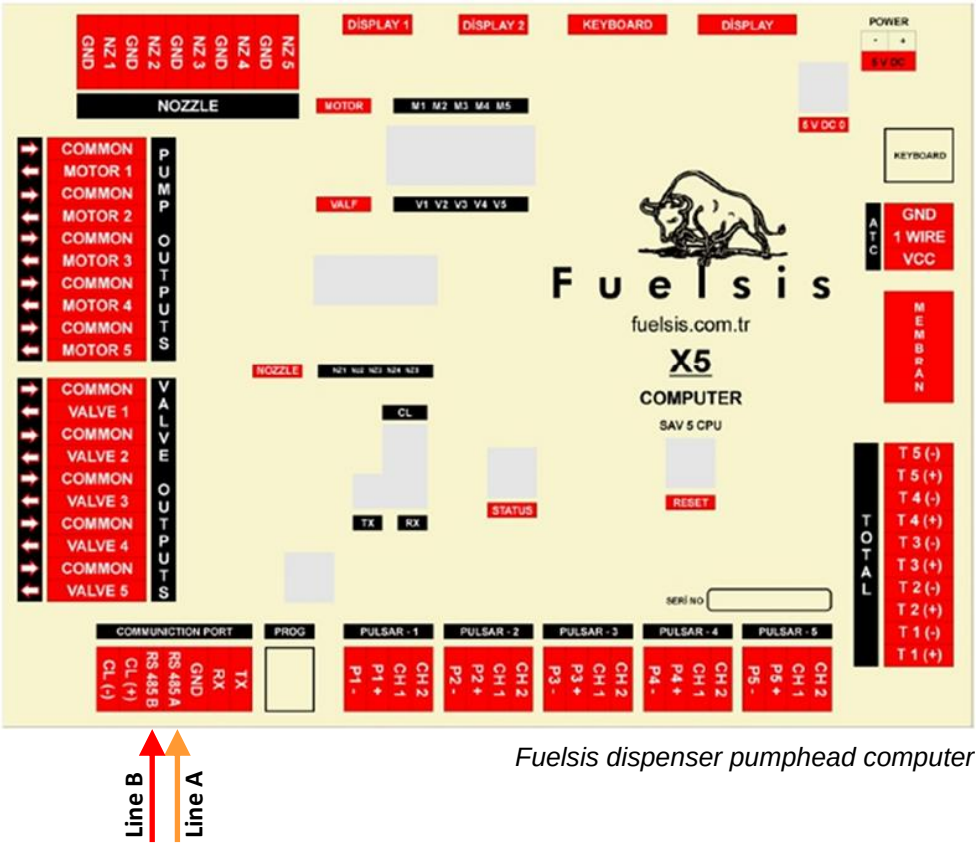
Mekser dispenser board

Fuelsis dispenser connection scheme

Connection to Fuelsis dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



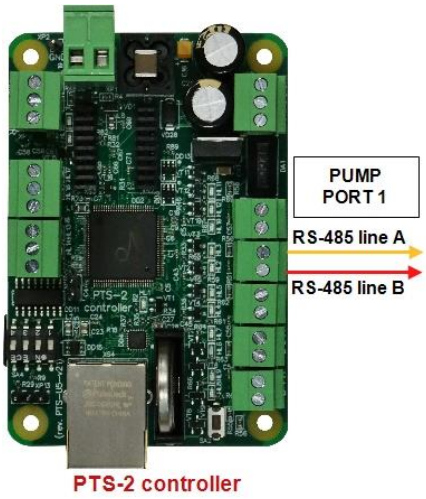


Fuelsis dispenser pumphead computer

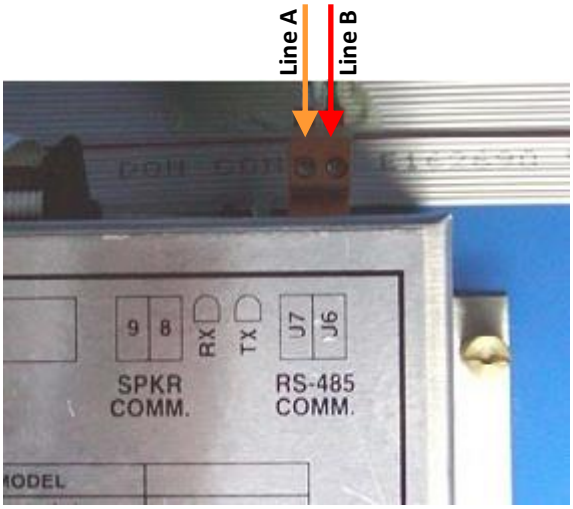
Mepsan Unimep dispenser connection scheme

Connection to Mepsan dispenser is made directly without any interface converter.

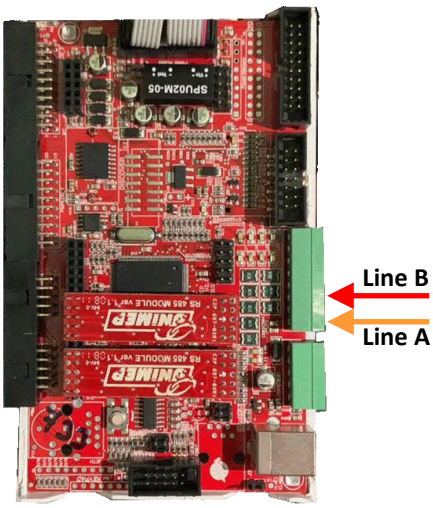
Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



Mepsan Unimep dispenser calculator



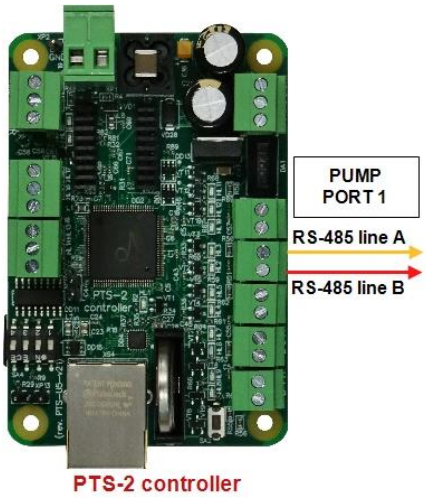
Mepsan Unimep dispenser calculator

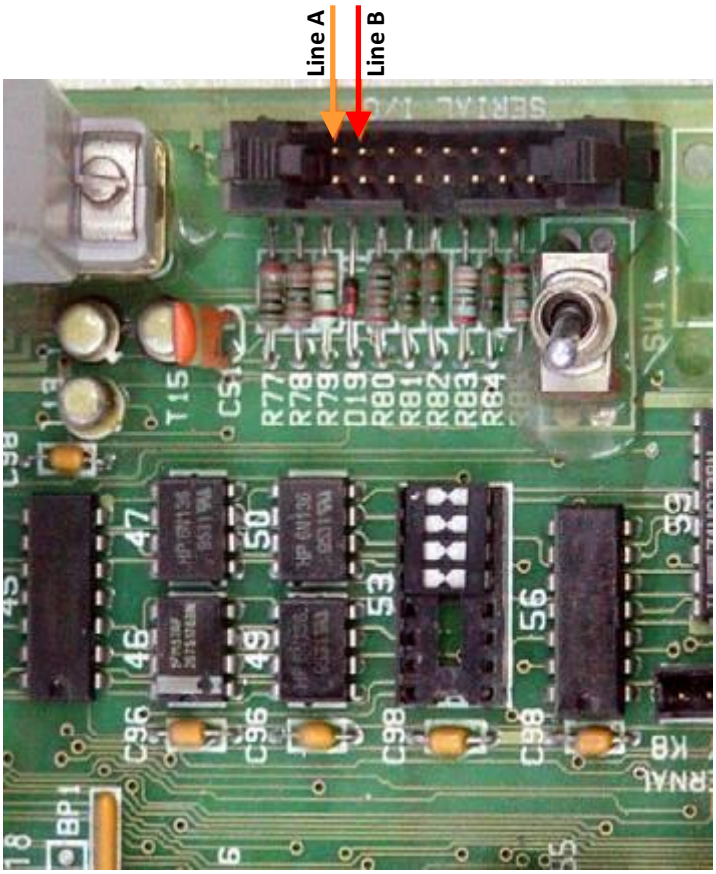


Mepsan dispenser board

Meksan / Wayne SU86 dispenser connection scheme

Connection to Meksan / Wayne SU86 dispenser is made directly without any interface converter.
Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



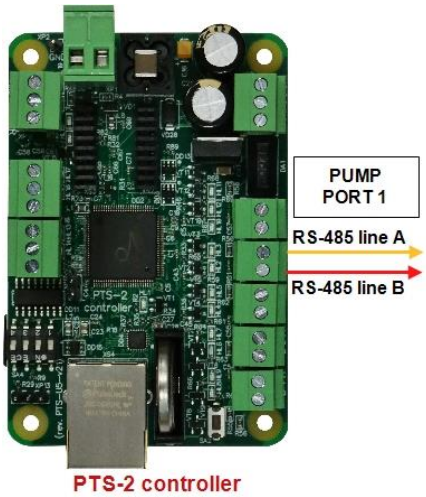


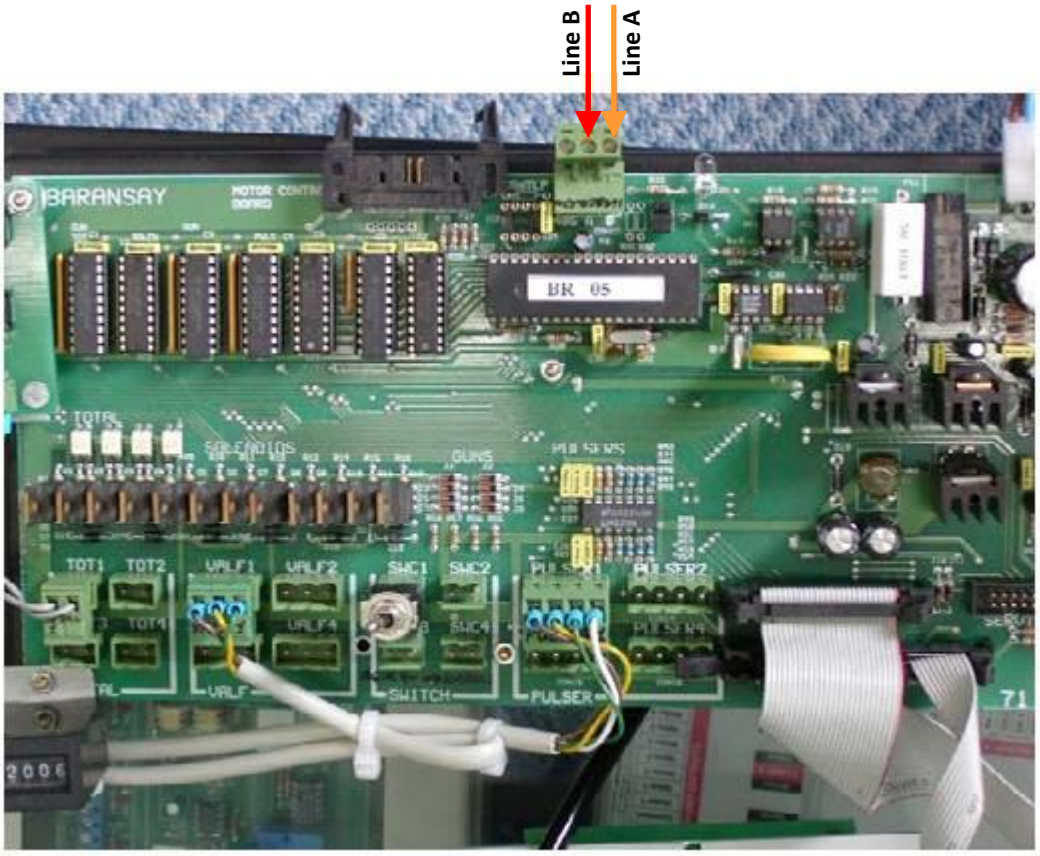
MEKSAN / WAYNE SU86 dispenser board

Baransay dispenser connection scheme

Connection to Baransay dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



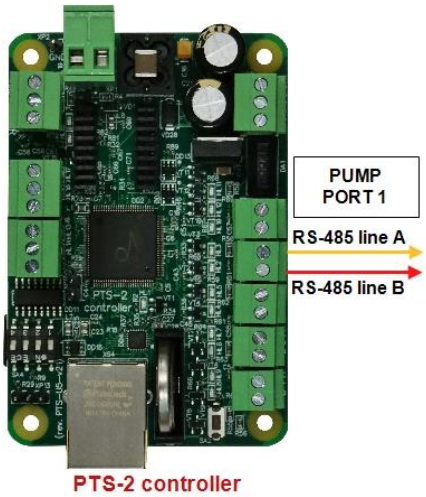


Baransay dispenser board

2A LPG dispenser connection scheme

Connection to 2A dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".

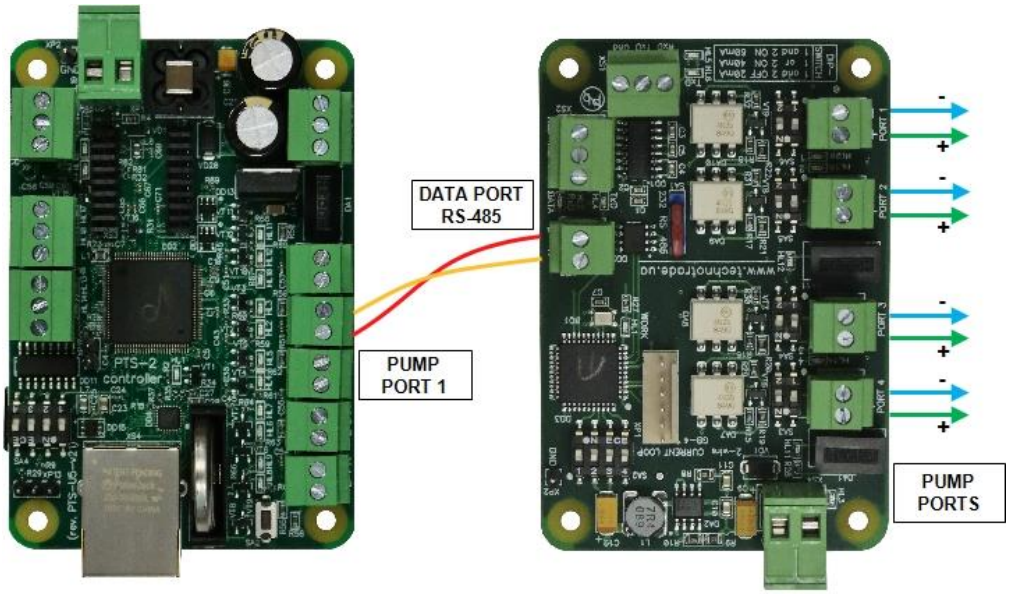


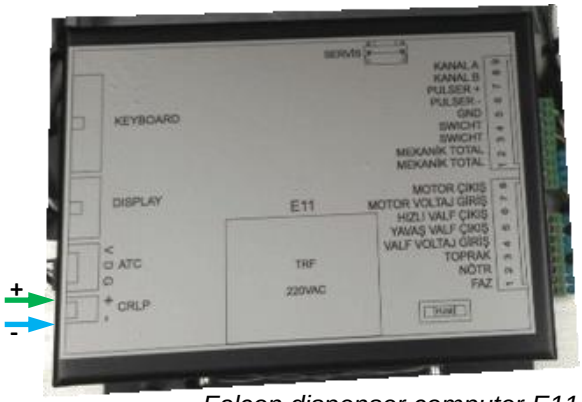
2A dispenser computer

Falcon dispenser connection scheme

Connection to Falcon dispenser is made through 2-wire GB interface converter (*http://www.technotrade.ua/gilbarco-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*43. FALCON LPG*", baud rate "3*. 5787*".



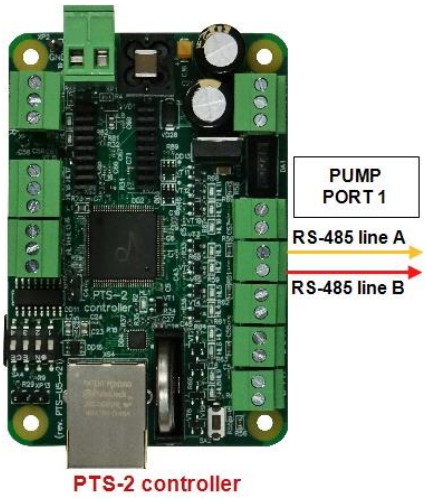


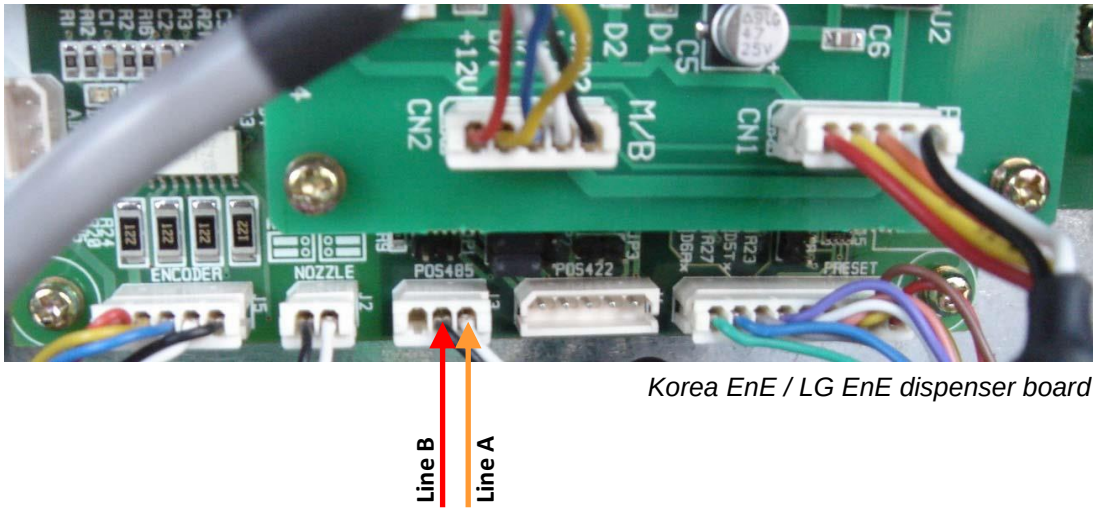
Falcon dispenser computer E11

Falcon dispenser computer E22

Korea EnE (LG EnE) dispenser connection scheme

Connection to Korea EnE (LG EnE) dispenser is made directly without any interface converter.
Configuration of PTS-2 controller pump port: protocol "*20. EnE Korea*", baud rate "*4. 9600*".



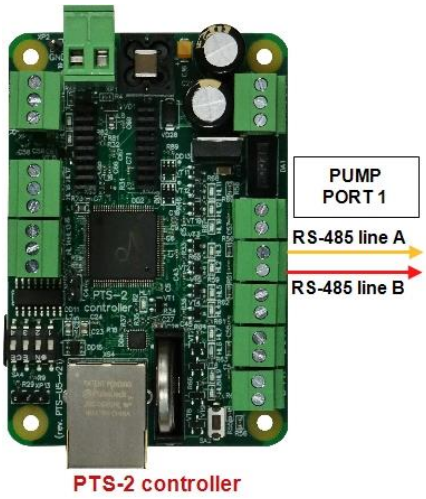


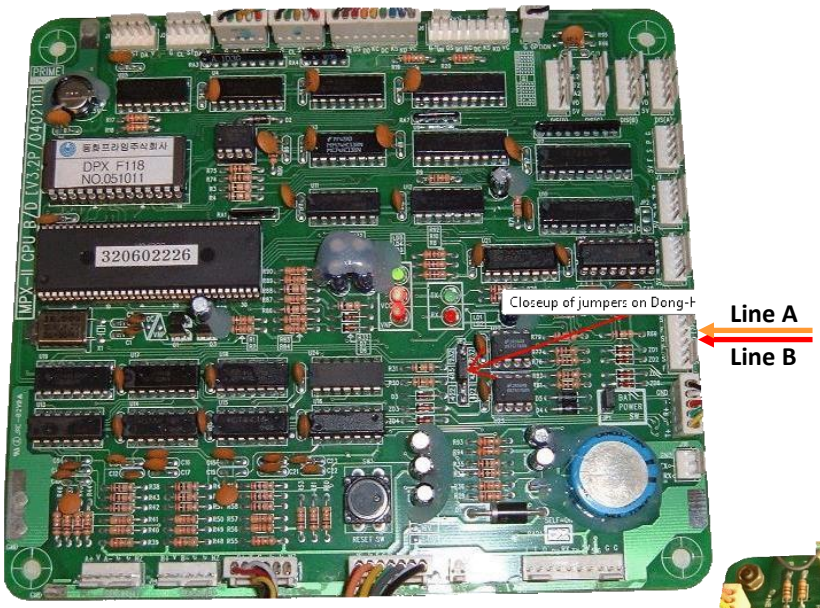
Korea EnE / LG EnE dispenser board

Dong Hwa Prime dispenser connection scheme

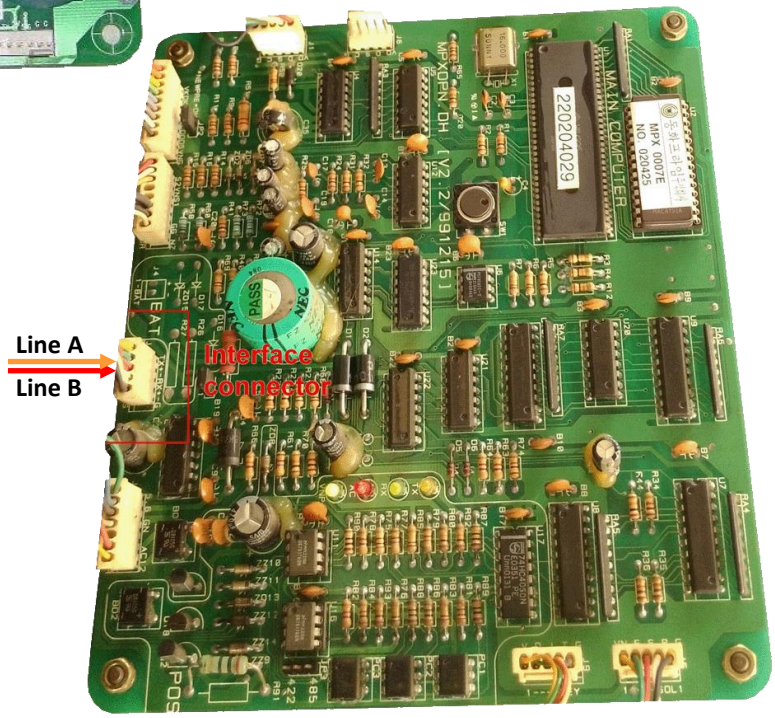
Connection to Dong Hwa dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol “31. *DONG HWA Prime*”, baud rate “*4. 9600*”.





Dong Hwa dispenser board



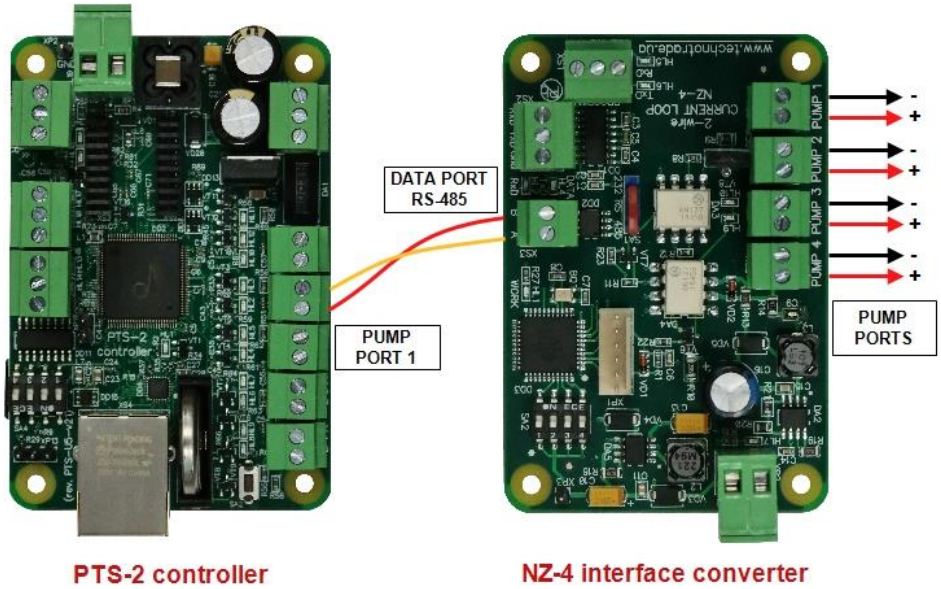
Dong Hwa dispenser board

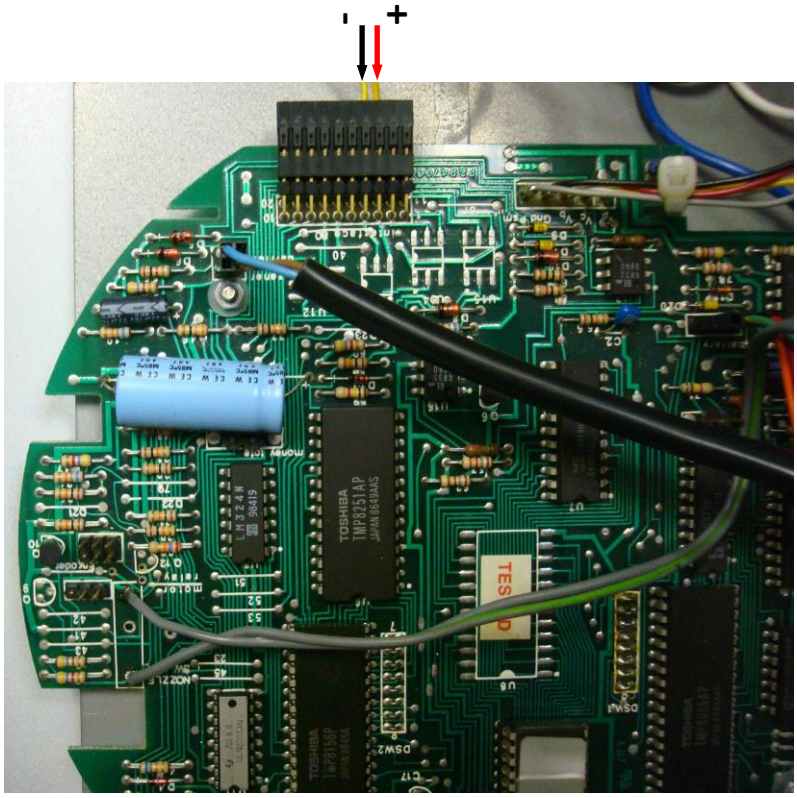
Dong Hwa dispenser board

Gallagher (PEC) dispenser connection scheme

Connection to PEC dispenser is made through 2-wire NZ interface converter (*http://technotrade.kiev.ua/compac-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "25. *GALLAGHER (PEC)*", baud rate "*6. 1200*".



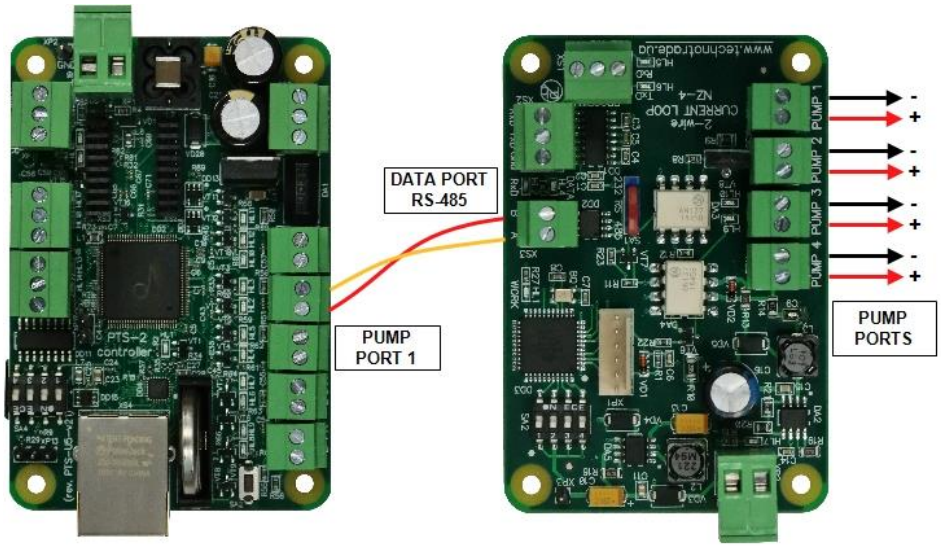


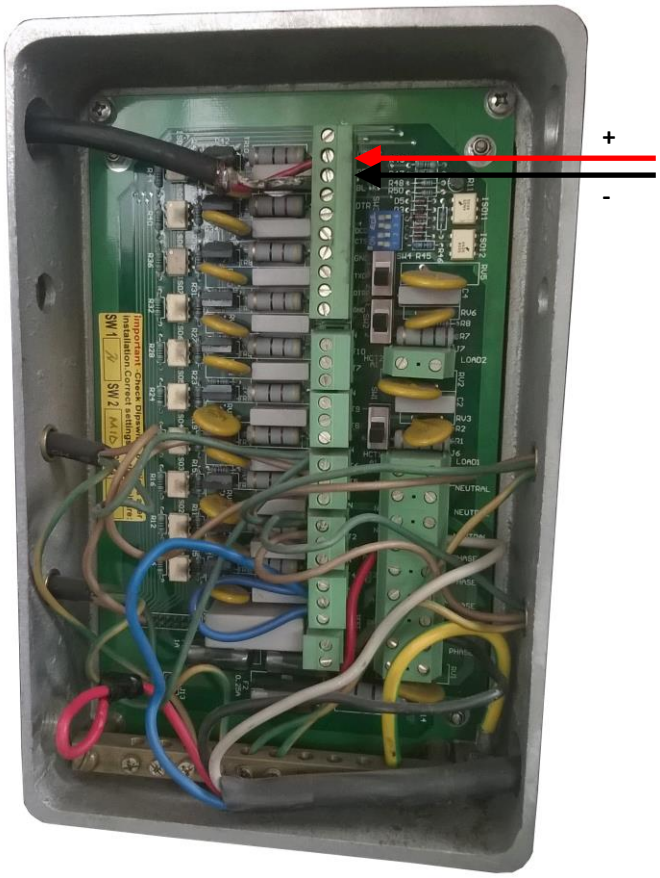
Retron 80 dispenser board connection

Compac dispenser connection scheme

Connection to Compac dispenser is made through 2-wire NZ interface converter (*http://technotrade.kiev.ua/compac-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 2-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "25. *GALLAGHER (PEC)*", baud rate "*6. 1200*".



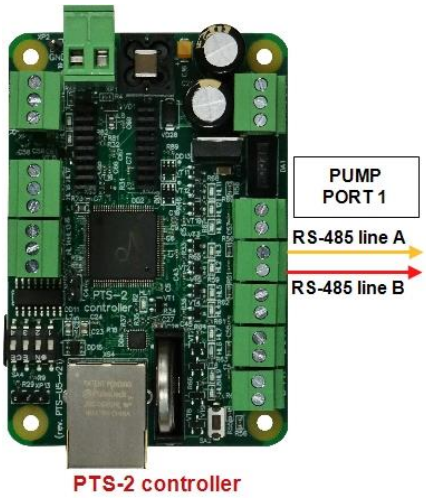


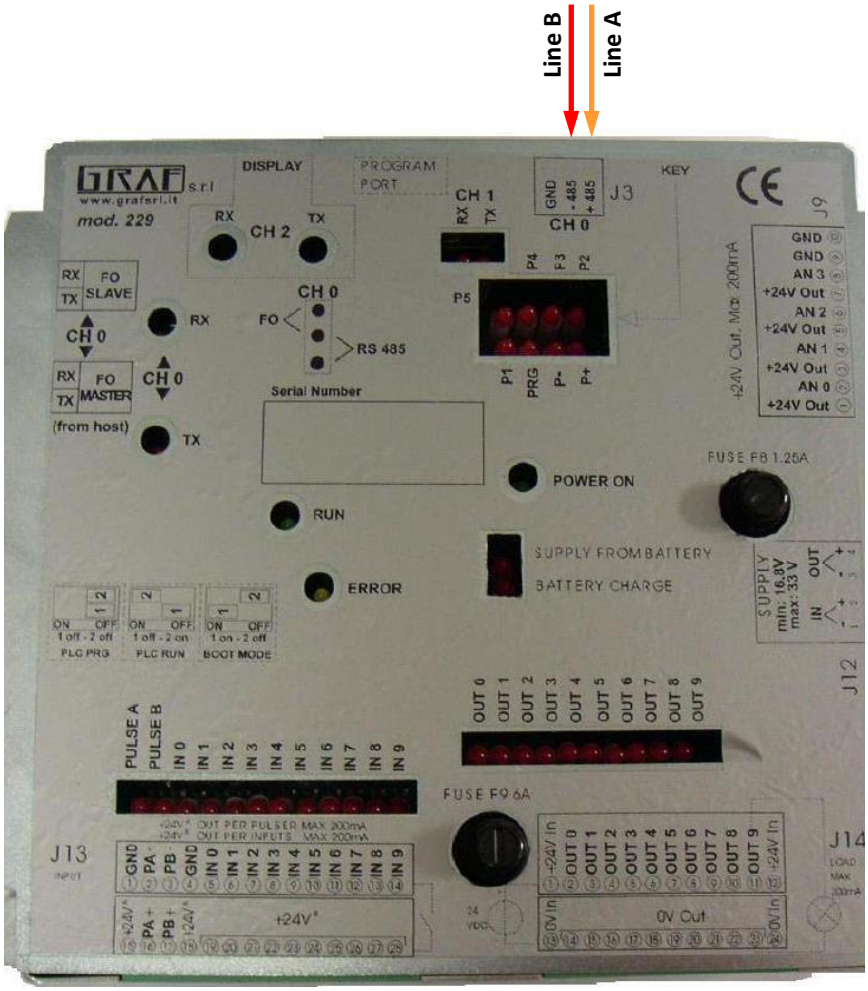
Compac dispenser junction box

Safe dispenser connection scheme

Connection to SAFE dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*9. SAFE Graf*", baud rate "*4. 9600*".



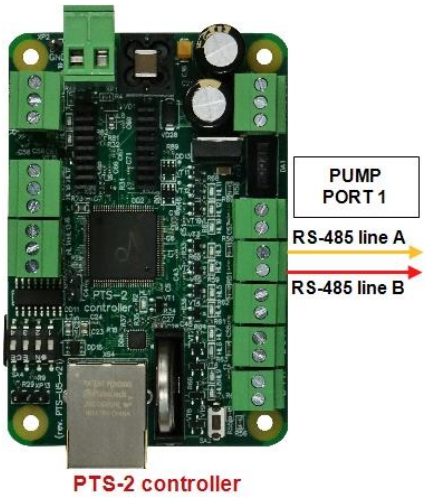


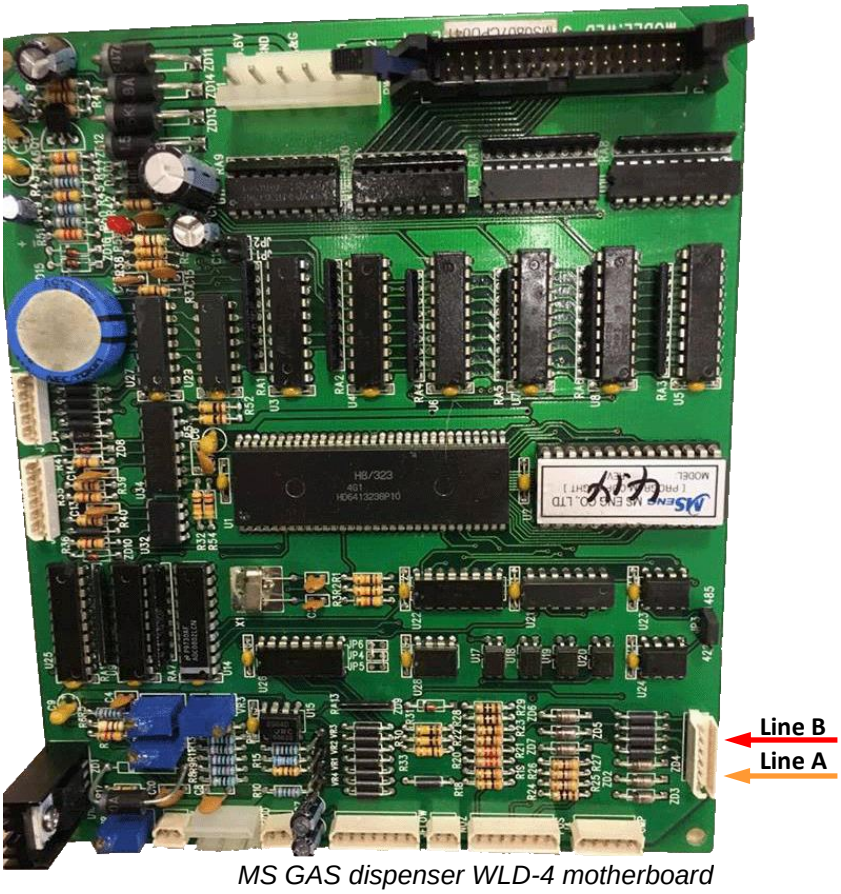
SAFE Graf electronic head PMII

MS Gas dispenser connection scheme

Connection to MS GAS dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*53. KOREA CNG*", baud rate "*4. 9600*".



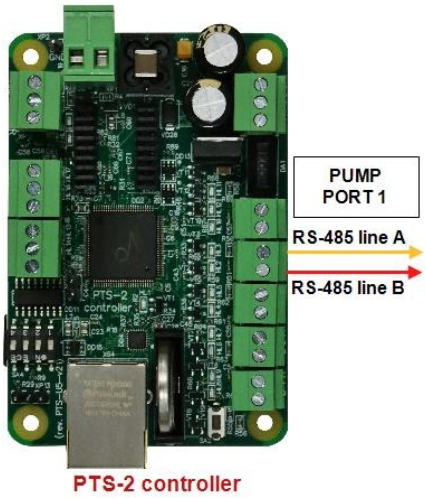


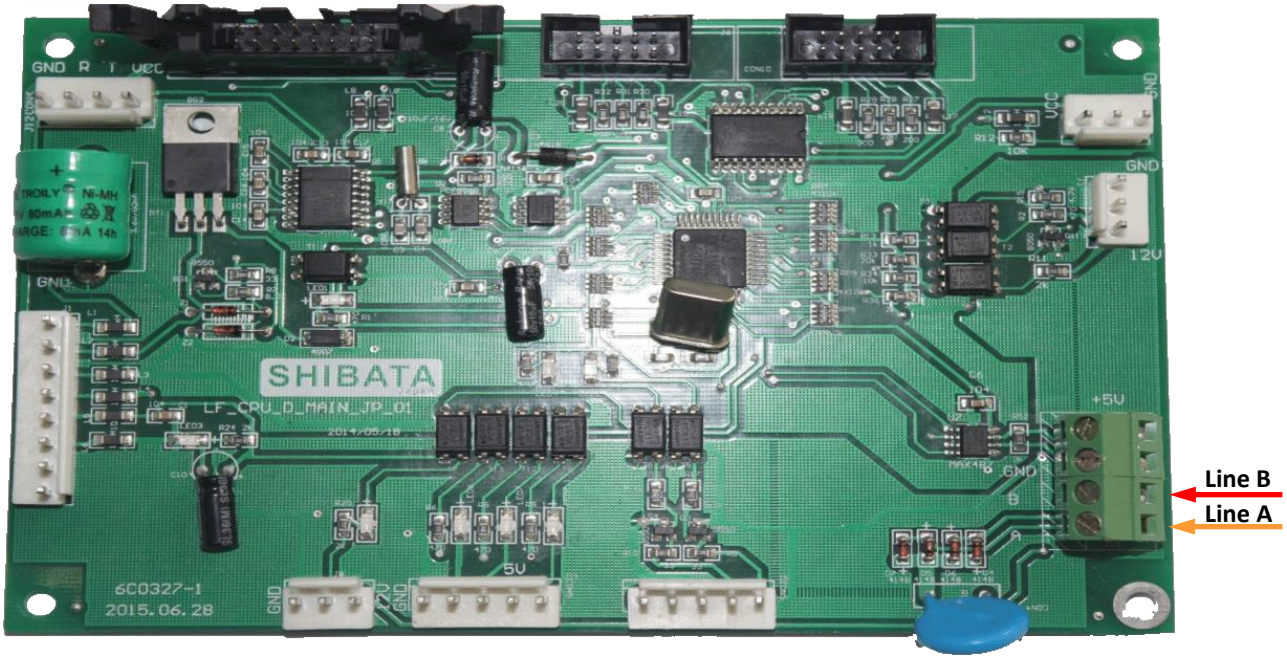
MS GAS dispenser WLD-4 motherboard

Shibata dispenser connection scheme

Connection to SHIBATA dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*15. SS-LAN*", baud rate "5. *19200*".

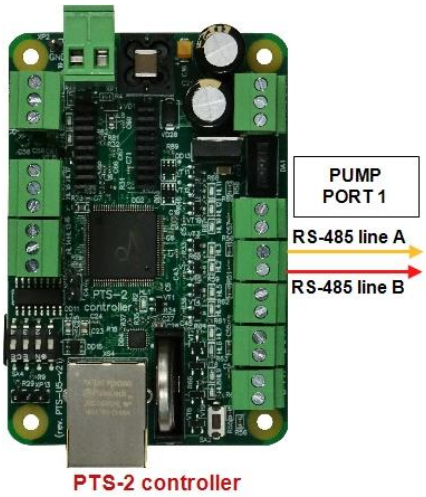


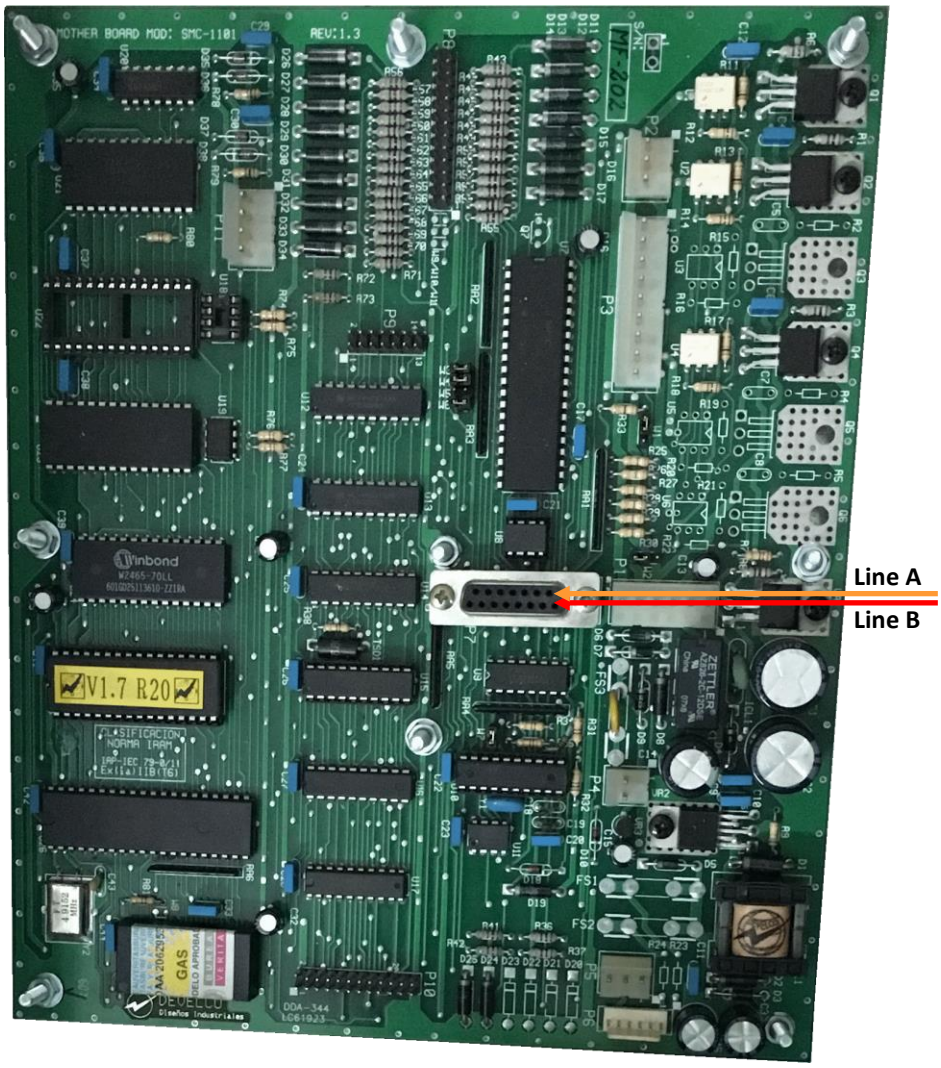


SHIBATA dispenser motherboard

Aspro Develco dispenser connection scheme

Connection to Aspro Develco dispenser is made directly without any interface converter.
Configuration of PTS-2 controller pump port: protocol "*8. DEVELCO*", baud rate "2. *4800*".



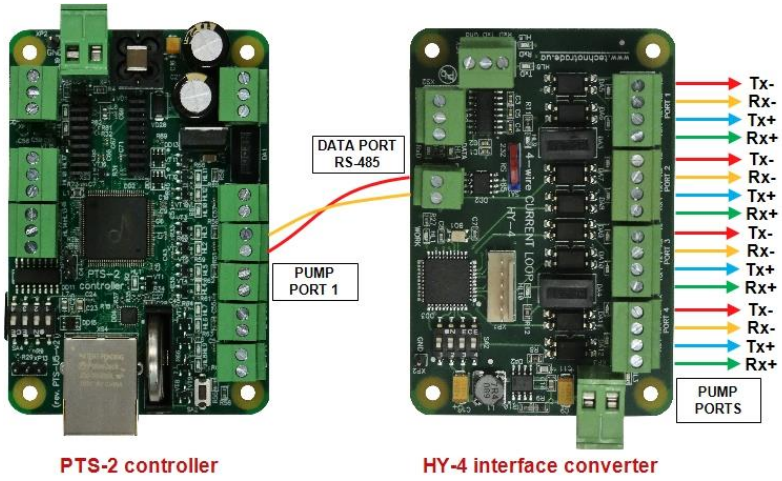


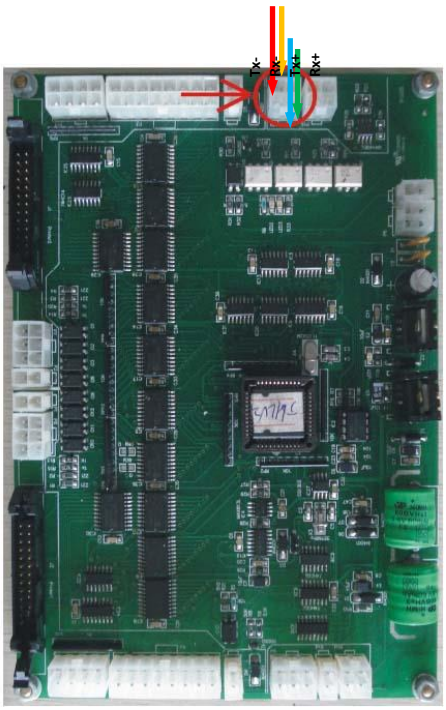
Develco dispenser motherboard

HongYang dispenser connection scheme

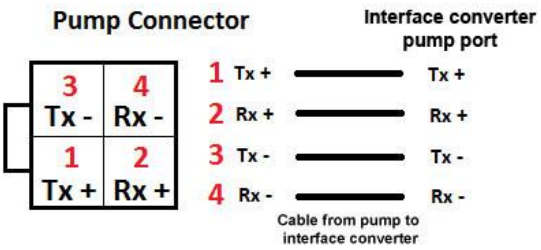
Connection to HongYang dispenser dispenser is made through 4-wire HY interface converter (*http://www.technotrade.ua/hongyang-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 4-wire current loop interface.

Configuration of PTS-2 controller pump port: protocol "*38. HongYang 886*" (in case of single-product dispenser) or "*42. HongYang MPD 886*" (in case of multi-product dispenser), baud rate "*1. 2400*".





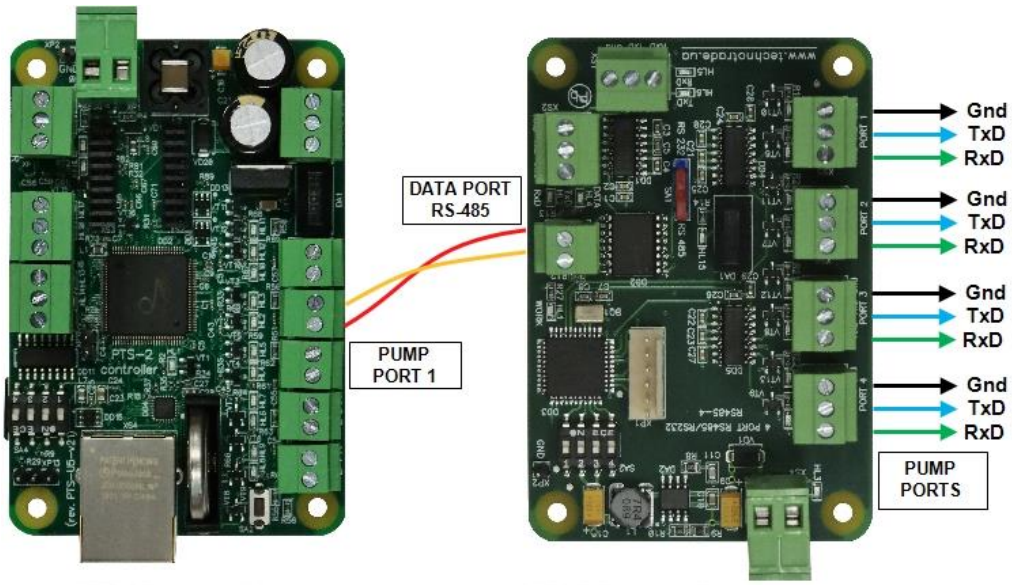
HongYang dispenser boards



Lanfeng dispenser connection scheme

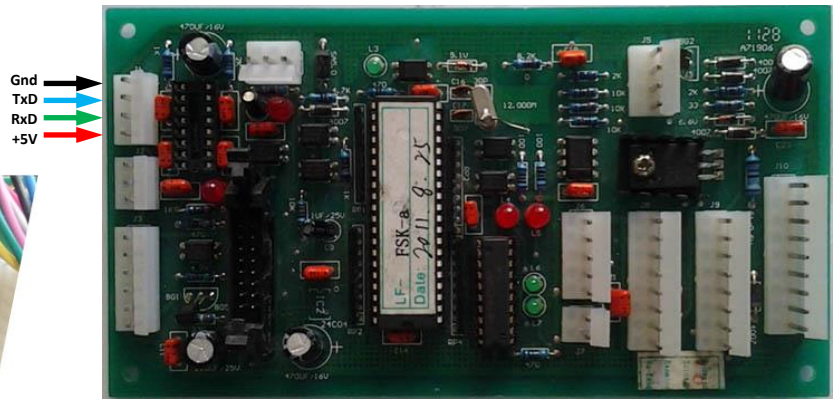
Connection to Lanfeng dispenser can be made either directly using RS-485 interface or using RS-232 interface through RS-485/RS-232 interface converter (*http://www.technotrade.ua/rs485-to-rs232-converter.html*) (depending on the model of Lanfeng dispenser motherboard).

Configuration of PTS-2 controller pump port: protocol "*30. LANFENG*", baud rate "*4. 9600*".



PTS-2 controller RS485-4 interface converter

Lanfeng RS-485 dispenser board



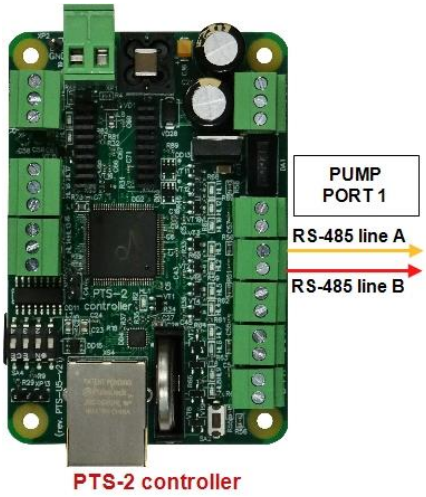
Lanfeng RS-232 dispenser board

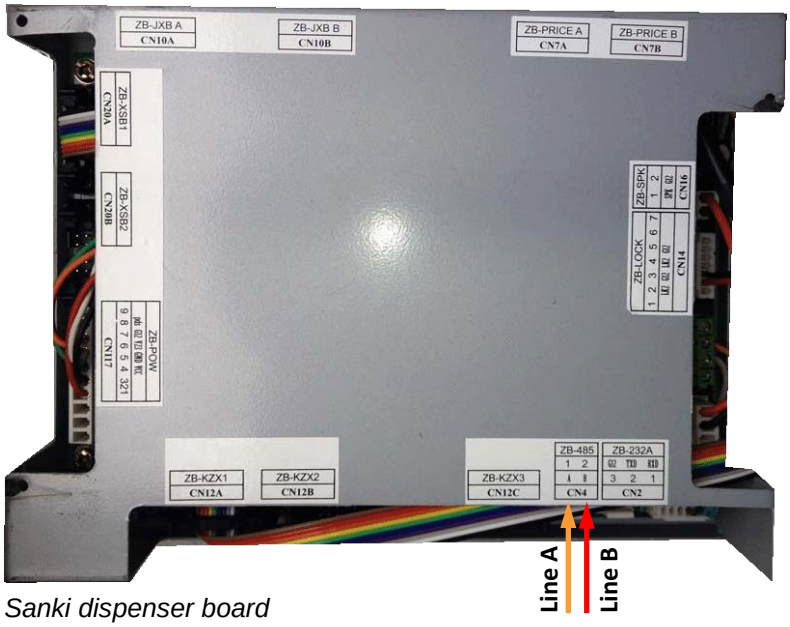
Lanfeng RS-485 dispenser board

Sanki dispenser connection scheme

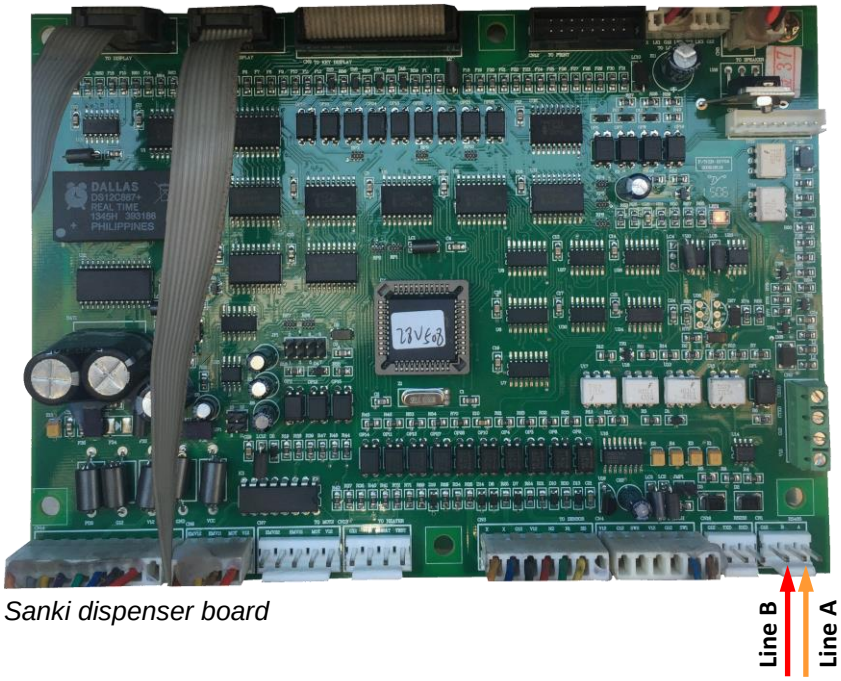
Connection to Sanki dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*52. SANKI NG*", baud rate "*4. 9600*".

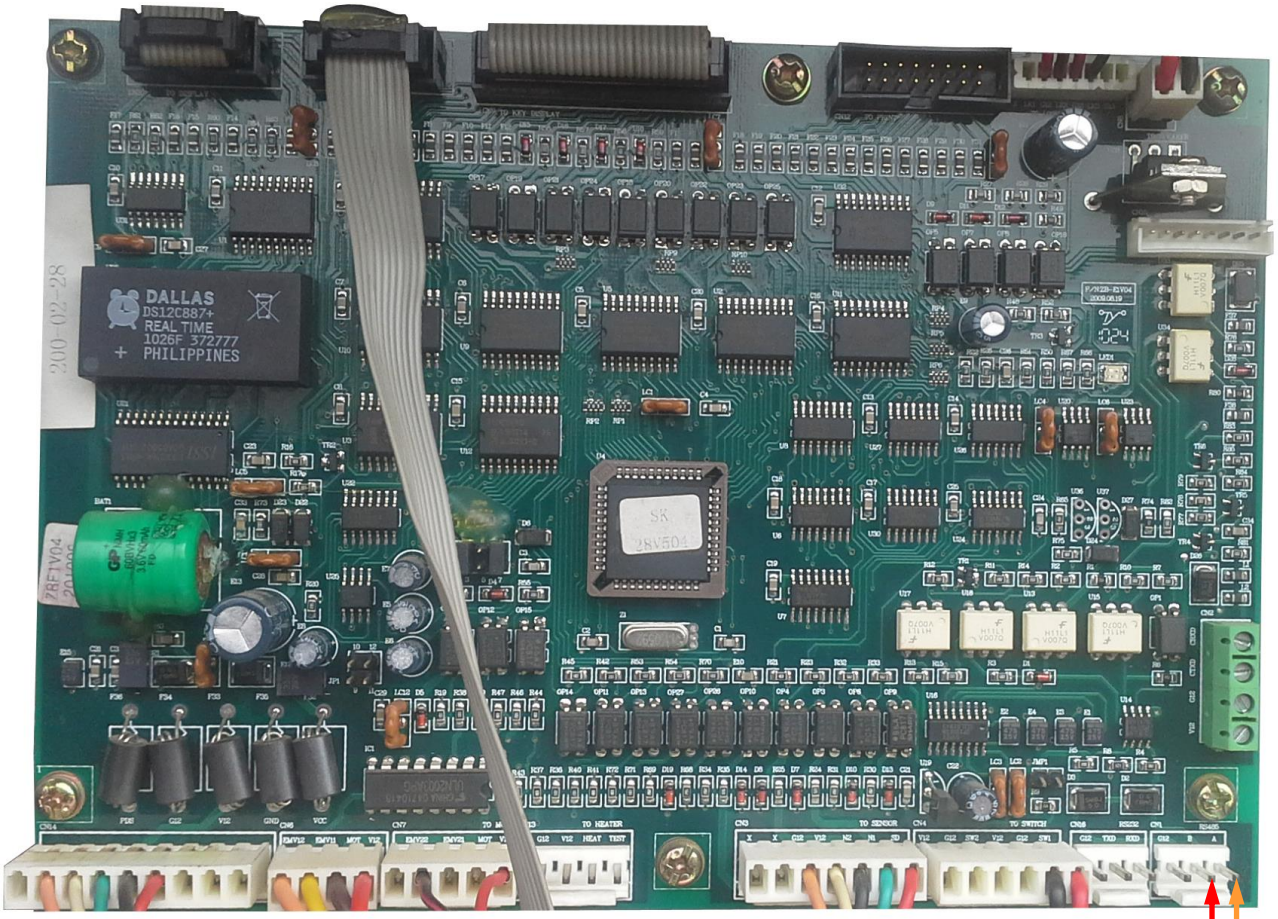




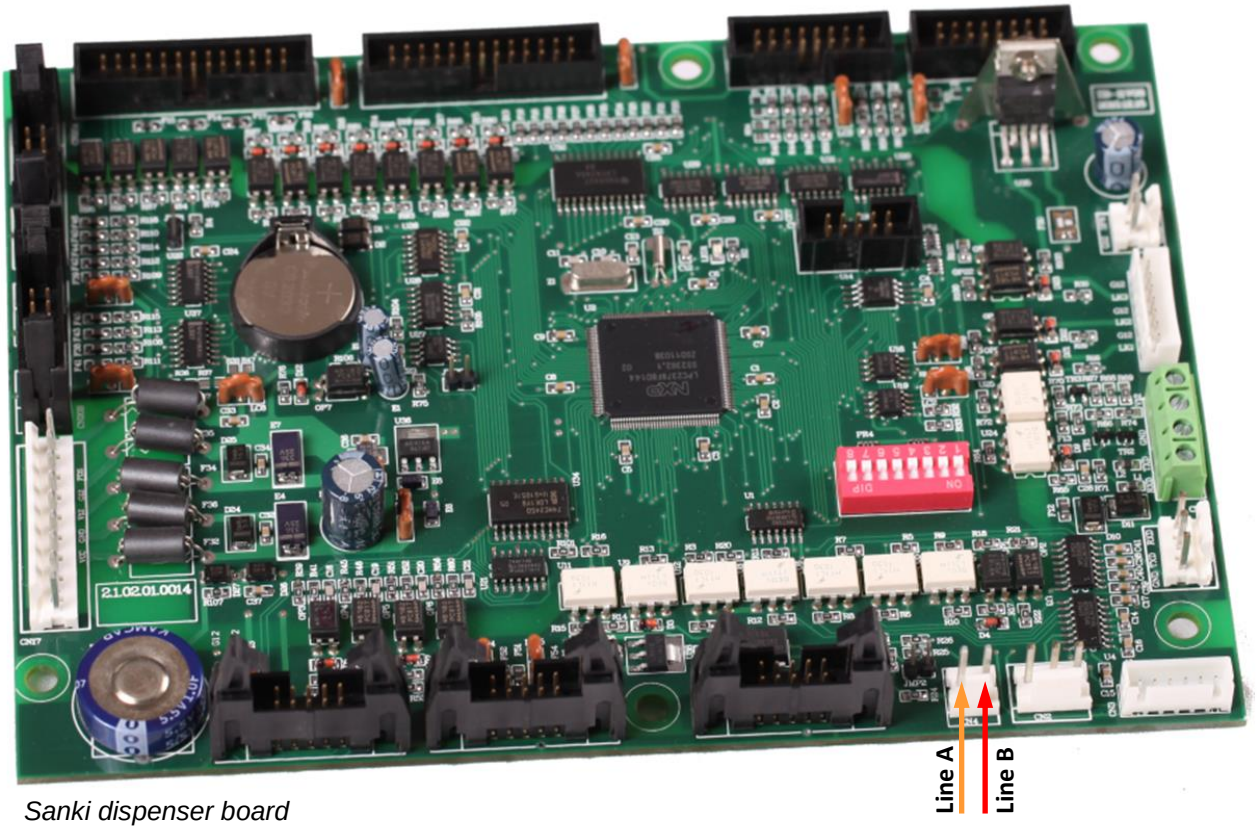
Sanki dispenser board



Sanki dispenser board



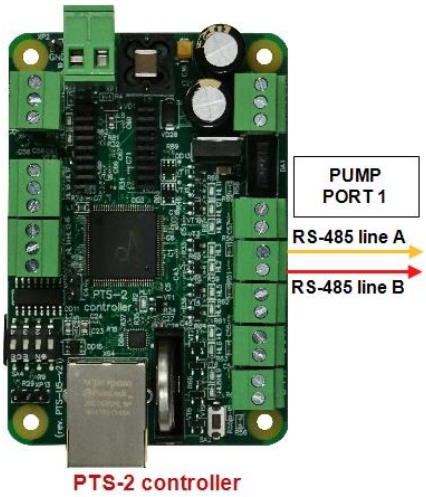
Sanki dispenser board

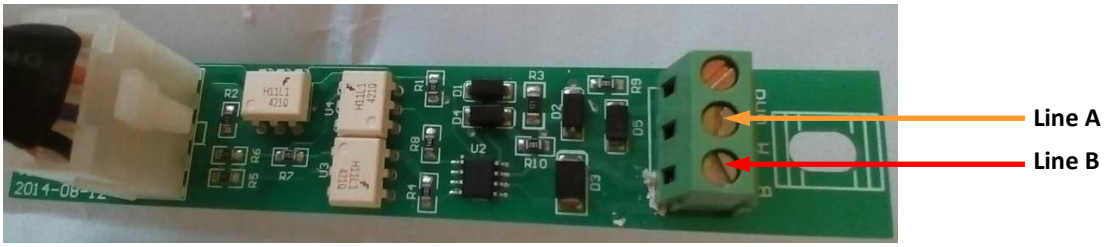


Sanki dispenser board

Datian Machines dispenser connection scheme

Connection to Datian Machines dispenser is made directly without any interface converter.
Configuration of PTS-2 controller pump port: protocol "*52. SANKI NG*", baud rate "*4. 9600*".



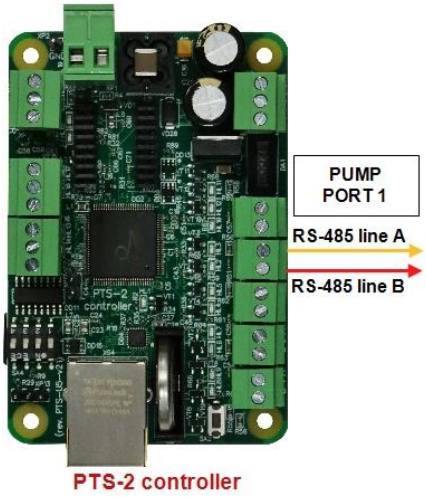


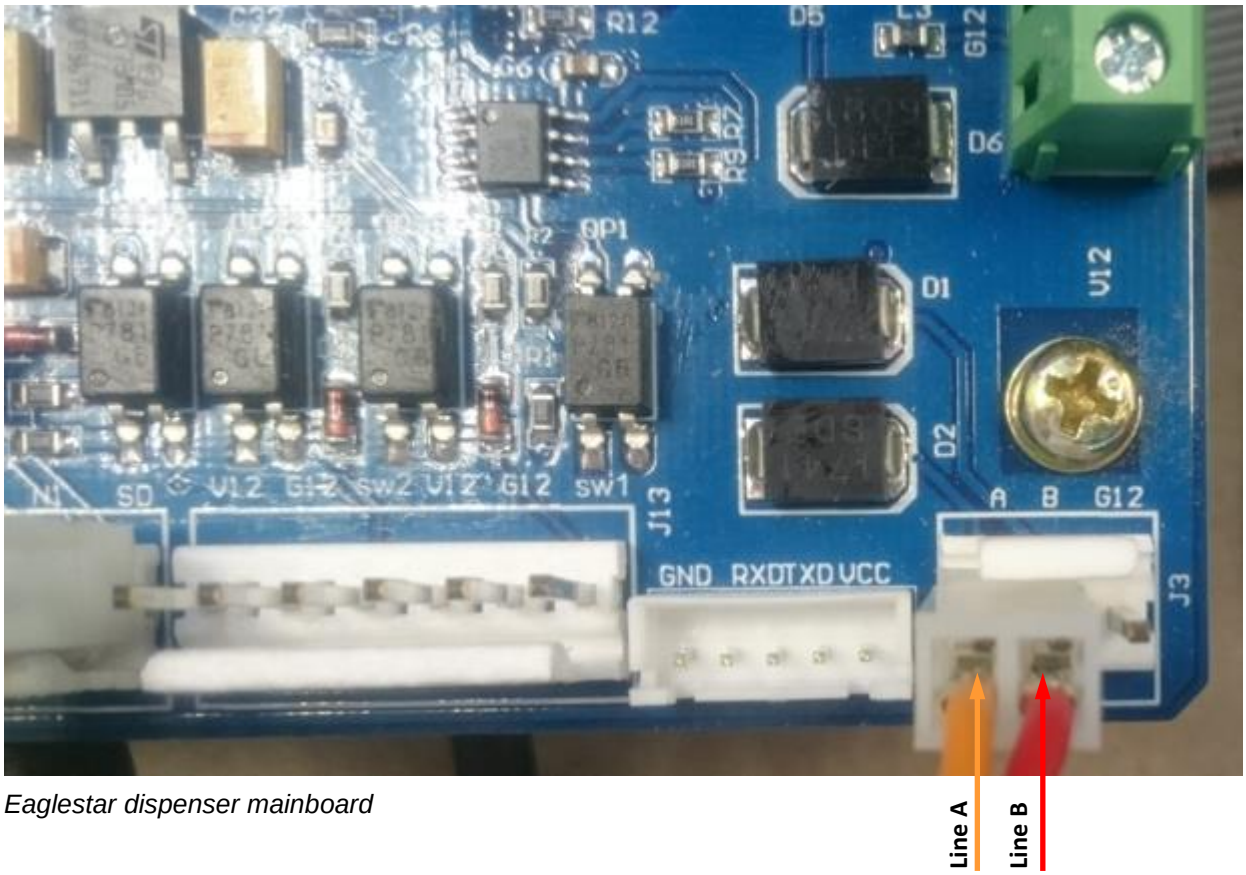
Datian Machines dispenser interface board

Eaglestar dispenser connection scheme

Connection to Eaglestar dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*52. SANKI NG*", baud rate "*4. 9600*".



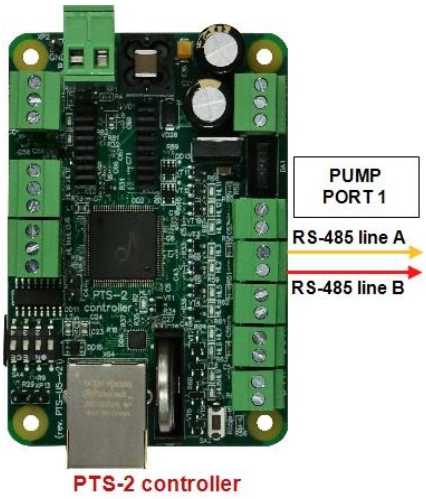


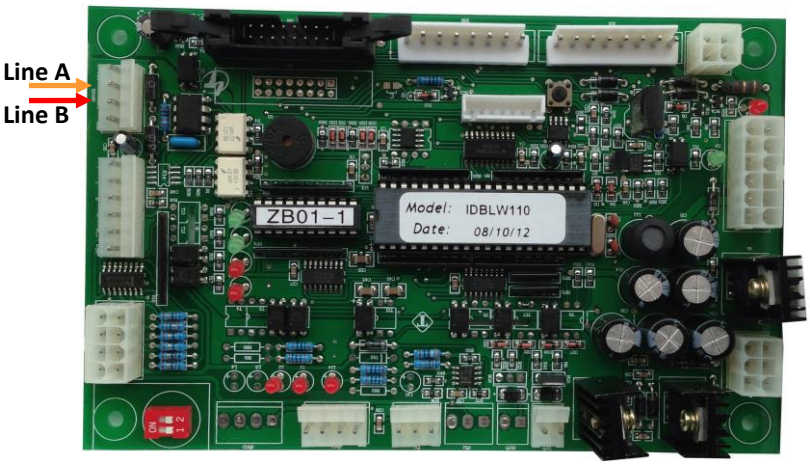
Eaglestar dispenser mainboard

Blue Sky dispenser connection scheme

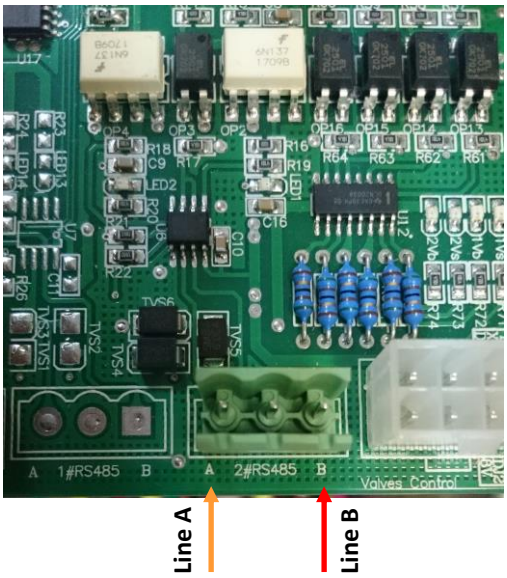
Connection to Blue Sky dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*26. Blue Sky*", baud rate "*2. 4800*".

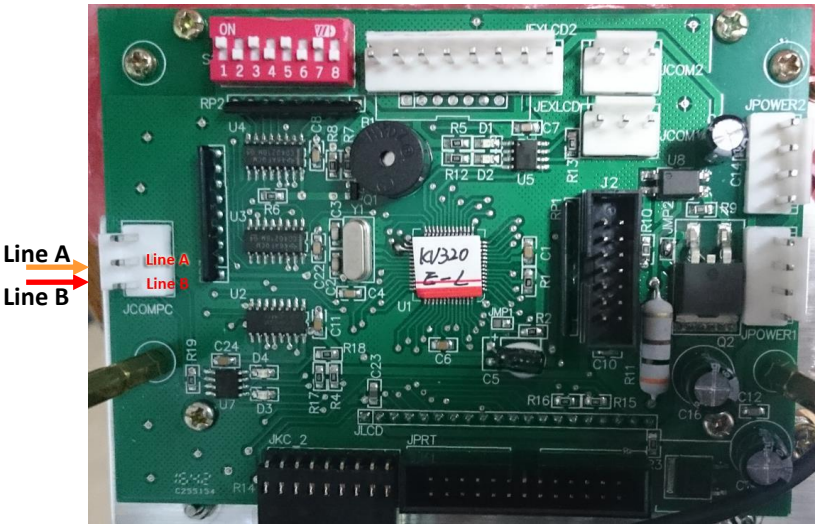




Blue Sky LT-B dispenser board



Blue Sky LT-L/LT-LG dispenser board

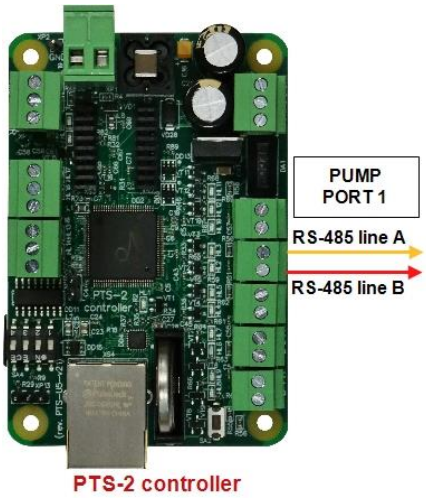


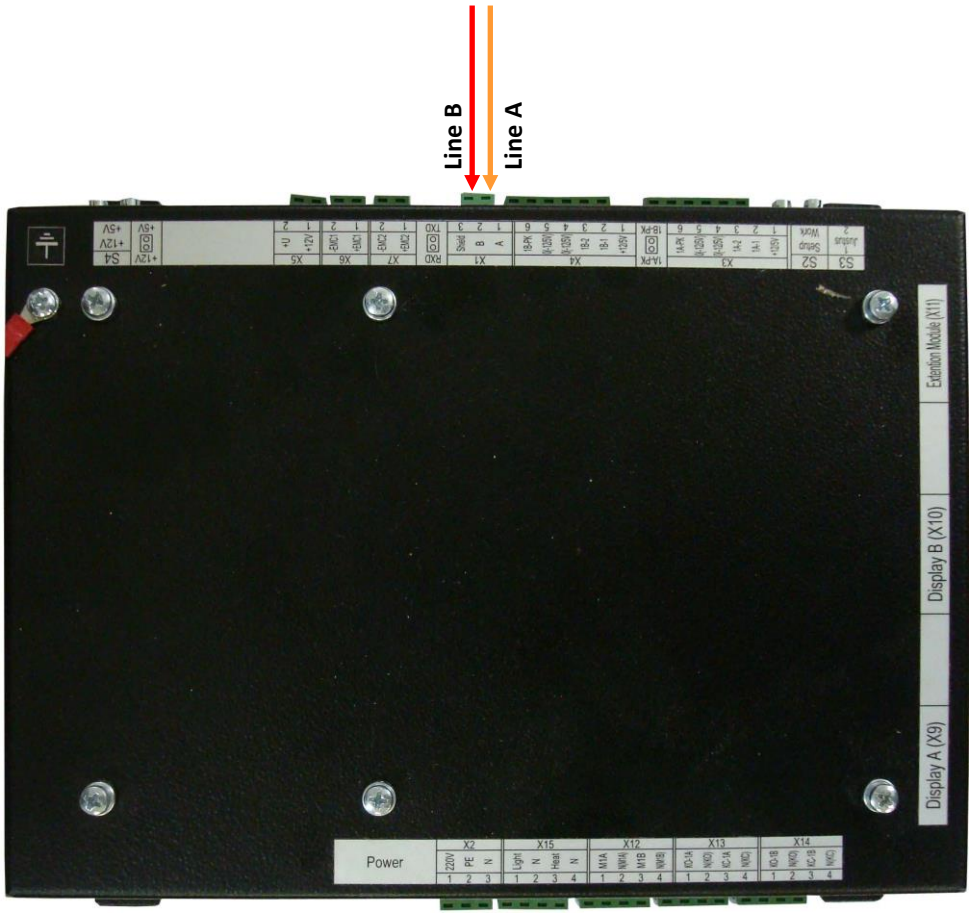
Blue Sky LT-C/LT-H dispenser board

Topaz dispenser connection scheme

Connection to TOPAZ dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*41. TOPAZ*", baud rate "*2. 4800*".



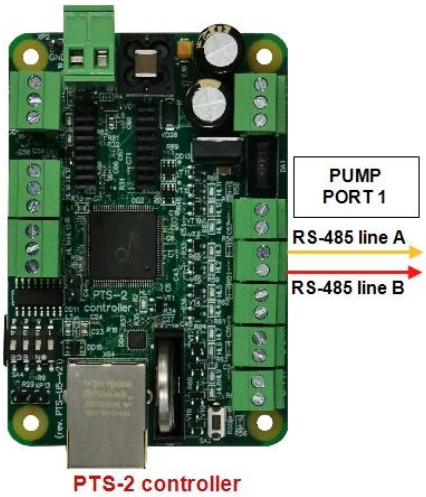


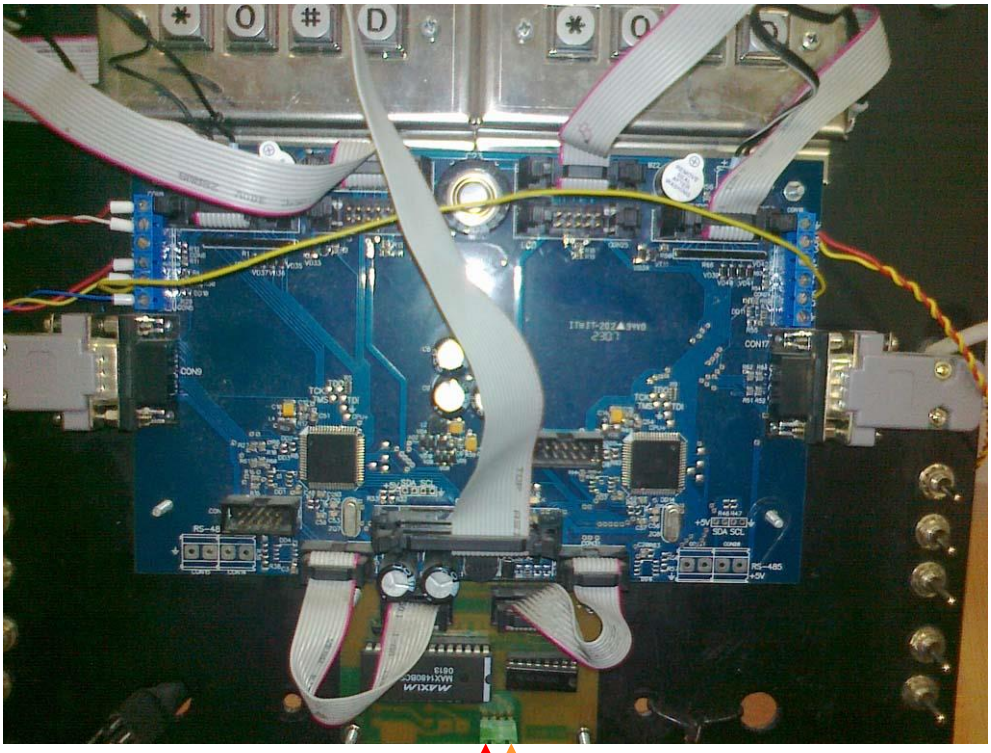
Topaz dispenser system board

Shelf dispenser connection scheme

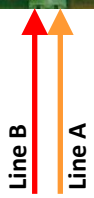
Connection to SHELF dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*16. SHELF*", baud rate "*4. 9600*".





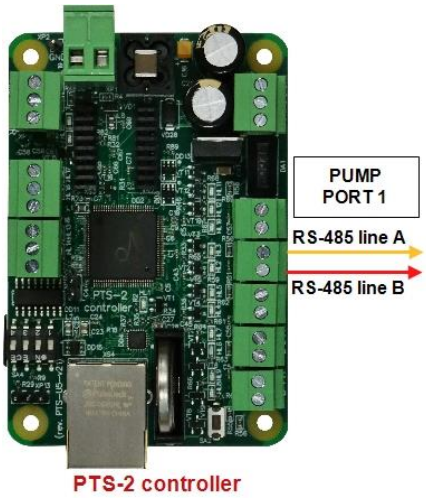
Shelf dispenser system board



UniCon dispenser connection scheme

Connection to UniCon dispenser is made directly without any interface converter.

Configuration of PTS-2 controller pump port: protocol "*16. UniPump*", baud rate "*4. 9600*".



UniCon dispenser system board

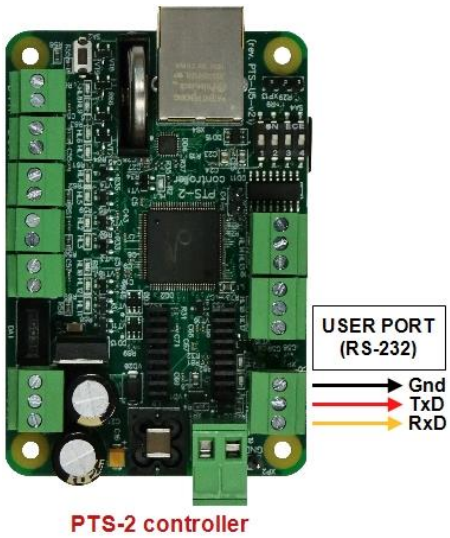
EXAMPLES OF ATG SYSTEMS CONNECTION SCHEMES

Below sections show examples of connection to various brands of probes and ATG systems. This information is provided as an example. For reception of detailed information on connection to various brands of probes and ATG systems, configuration of the probes and ATG systems and configuration of PTS-2 controller please refer to our support mailbox *support_1a@technotrade.ua.*

Gilbarco Veeder Root TLS consoles connection scheme

Connection to Gilbarco Veeder Root TLS system is made directly to one of probe ports of PTS-2 controller (RS-232 interface).

Configuration of PTS-2 controller probe port: protocol "*1. GILBARCO Veeder Root*", baud rate is selected to be equal to set in TLS ATG system.

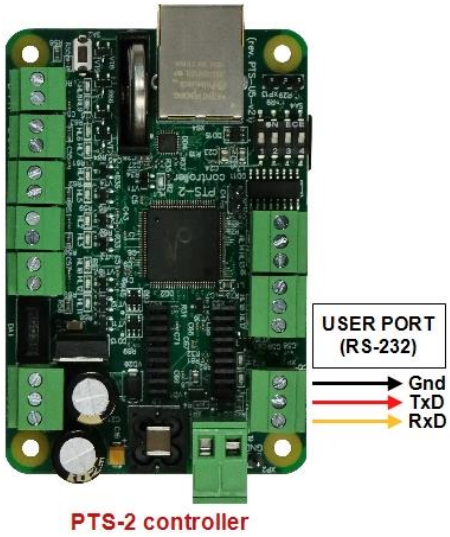


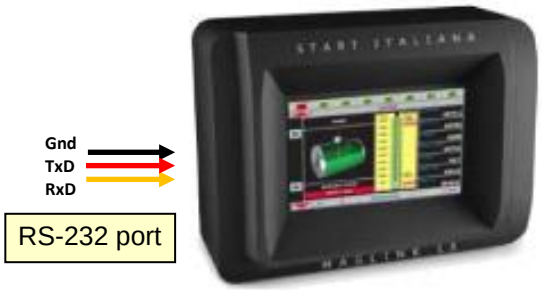
Gilbarco Veeder Root TLS ATG console

Start Italiana console connection scheme

Connection to Start Italiana console is made directly to one of probe ports of PTS-2 controller (RS-232 interface).

Configuration of PTS-2 controller probe port: protocol "*1. GILBARCO Veeder Root*", baud rate is selected to be equal to set in Start Italiana console.



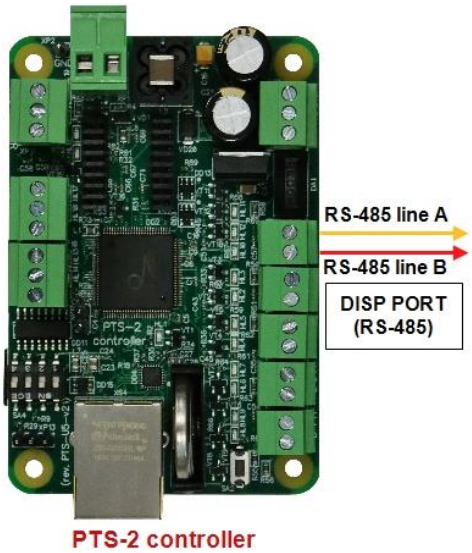


Start Italiana ATG console

Start Italiana wired probes connection scheme

Connection to Start Italiana wired probes is made directly to DISP (RS-485) port of PTS-2 controller (RS-485 interface).

Configuration of PTS-2 controller probe port: protocol "*2. START ITALIANA SMT-XMT*", baud rate "*4. 9600*".

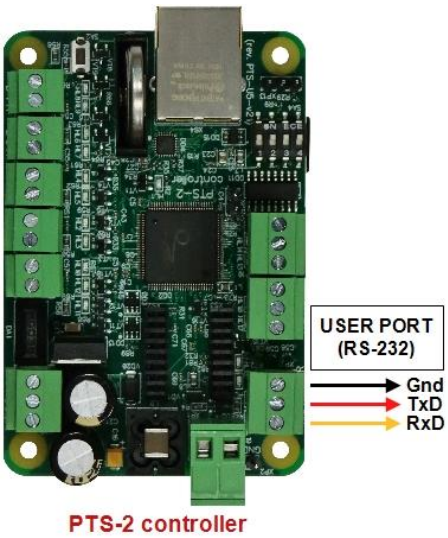


Start Italiana probe (RS-485)

Start Italiana wireless probes connection scheme

Connection to Start Italiana wireless probes is made through wireless receiver to one of probe ports of PTS-2 controller (RS-232 interface or RS-485 interface).

Configuration of PTS-2 controller probe port: protocol "*2. START ITALIANA SMT-XMT*", baud rate "*4. 9600*".

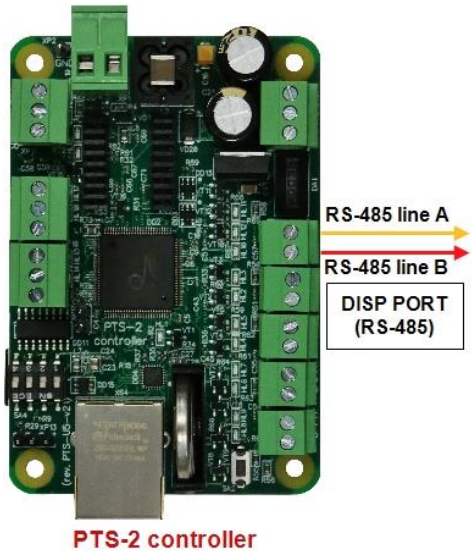


Start Italiana wireless repeater

Alisonic wired probes connection scheme

Connection to Alisonic wired probes is made directly to DISP (RS-485) port of PTS-2 controller (RS-485 interface).

Configuration of PTS-2 controller probe port: protocol "*22. Alisonic Delphi*", baud rate "*4. 9600*".

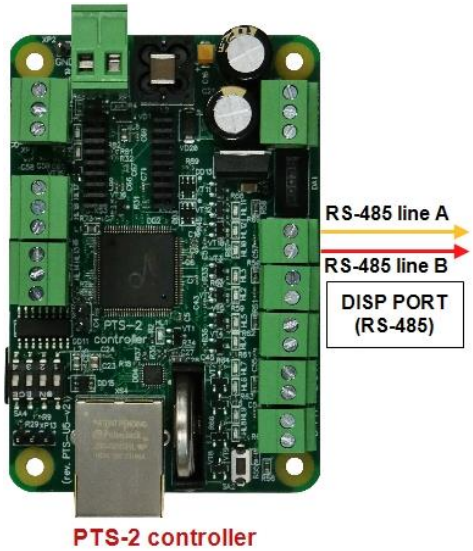


Alisonic probe (RS-485)

Alisonic wireless probes connection scheme

Connection to Alisonic wireless probes is made through Alisonic wireless receiver to DISP (RS-485) port of PTS-2 controller (RS-485 interface).

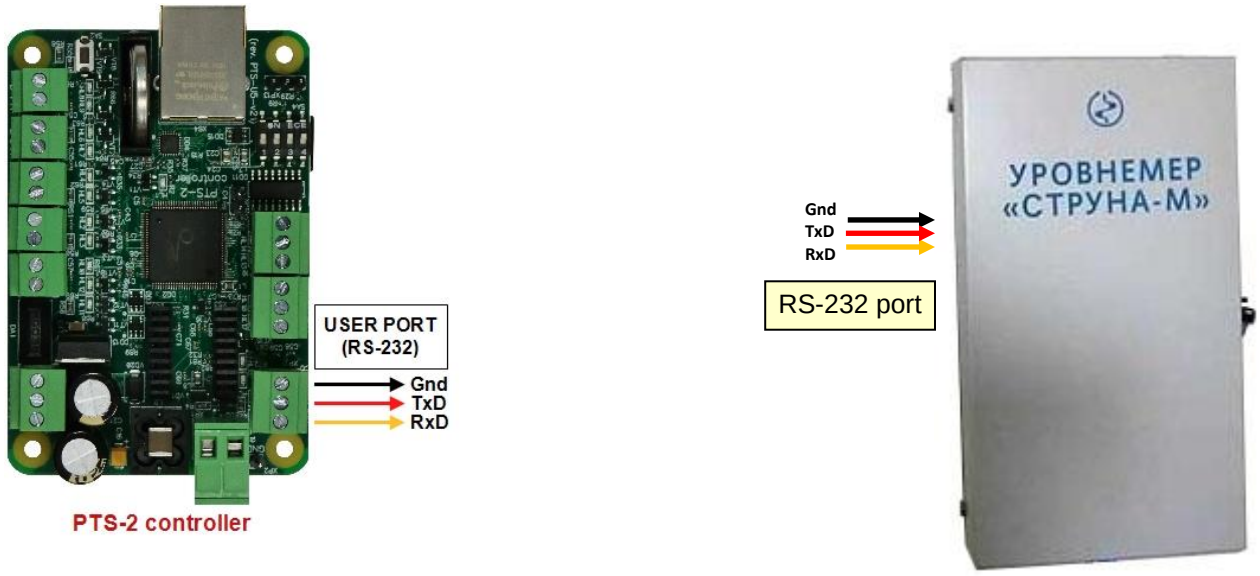
Configuration of PTS-2 controller probe port: protocol "*22. Alisonic Delphi*", baud rate "*4. 9600*".



Alisonic wireless receiver

Struna ATG system connection scheme

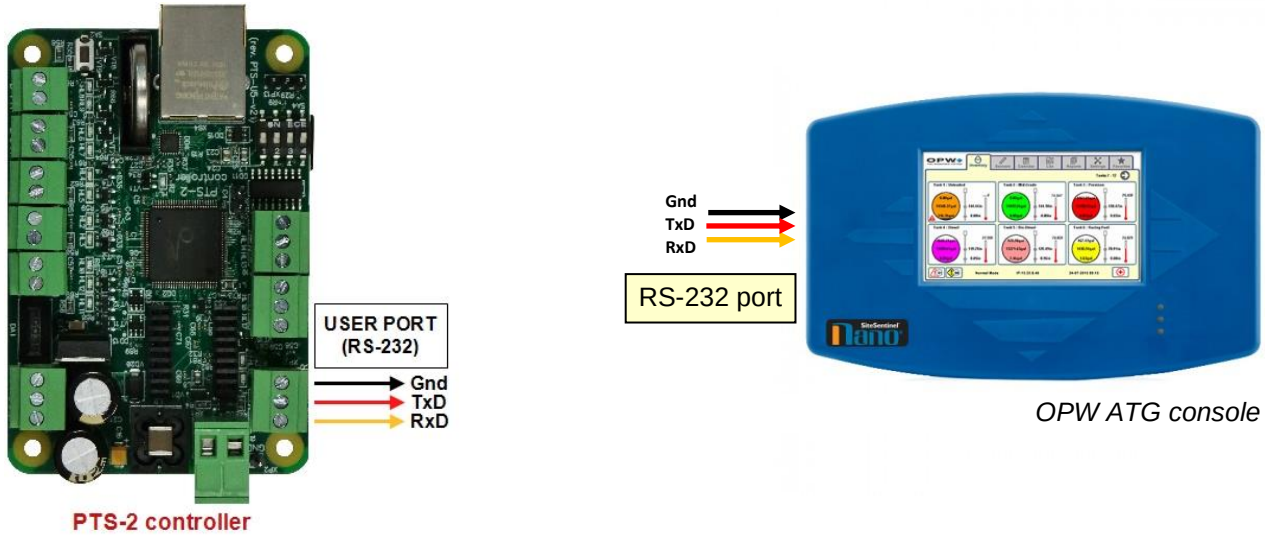
Connection to Struna system is made directly to one of probe ports of PTS-2 controller (RS-232 interface). Configuration of PTS-2 controller probe port: protocol "*4. STRUNA Kedr spec. 1.4*", baud rate is selected to be equal to set in Struna ATG system.



Struna ATG calculation unit

OPW Site Sentinel ATG system connection scheme

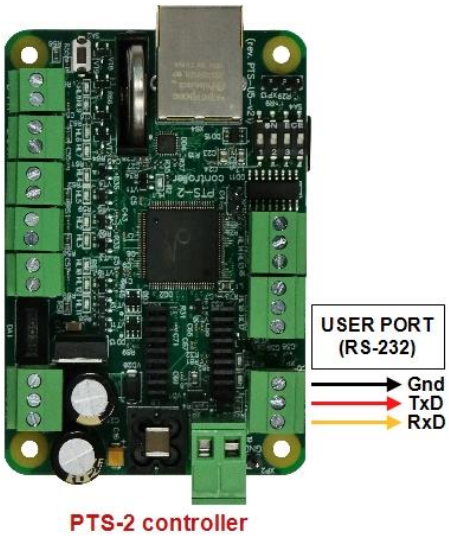
Connection to OPW system is made directly to one of probe ports of PTS-2 controller (RS-232 interface). Configuration of PTS-2 controller probe port: protocol "*3. Petrovend4*", baud rate is selected to be equal to set in OPW ATG system.



OPW ATG console

Colibri ATG system connection scheme

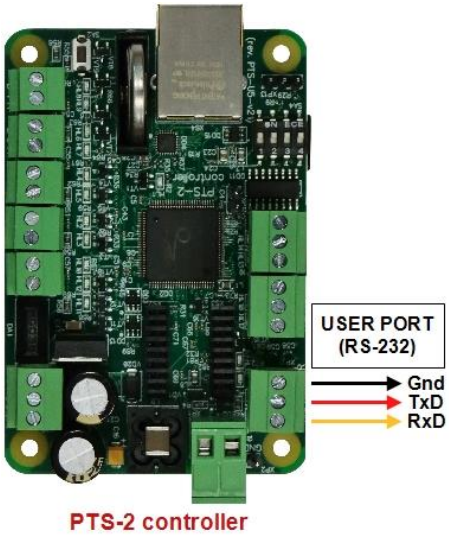
Connection to Colibri system is made directly to one of probe ports of PTS-2 controller (RS-232 interface). Configuration of PTS-2 controller probe port: protocol "*1. Gilbarco Veeder Root*", baud rate is selected to be equal to set in Colibri ATG system.

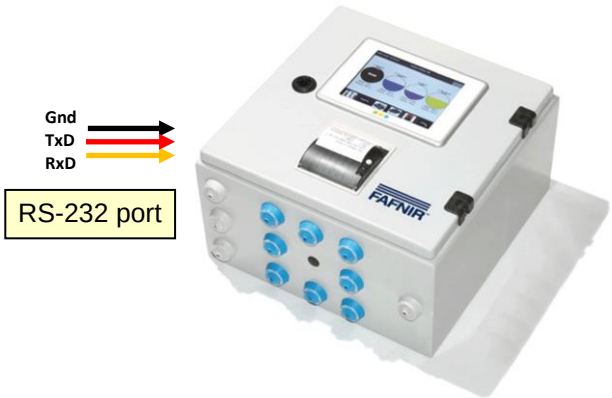


Colibri ATG console

Fafnir ATG system connection scheme

Connection to FAFNIR system is made directly to one of probe ports of PTS-2 controller (RS-232 interface). Configuration of PTS-2 controller probe port: protocol "*5. Fafnir Visy-Quick*", baud rate is selected to be equal to set in FAFNIR ATG system.



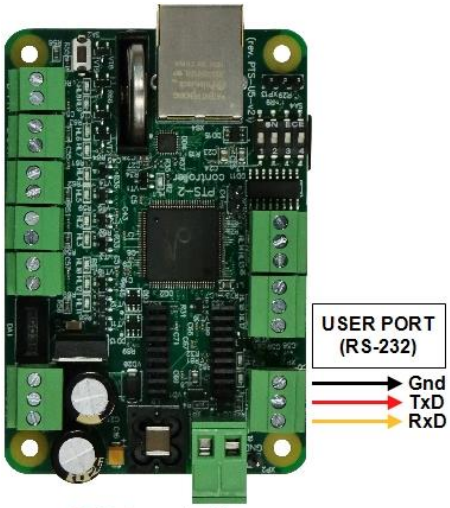


FAFNIR-Command ATG console

Hectronic ATG probes connection scheme

Connection to Hectronic probes is made directly to one of probe ports of PTS-2 controller (RS-232 interface) to Hectronic OptiLevel Supply box.

Configuration of PTS-2 controller probe port: protocol "*8. Hectronic HLS*", baud rate "*4. 9600*".



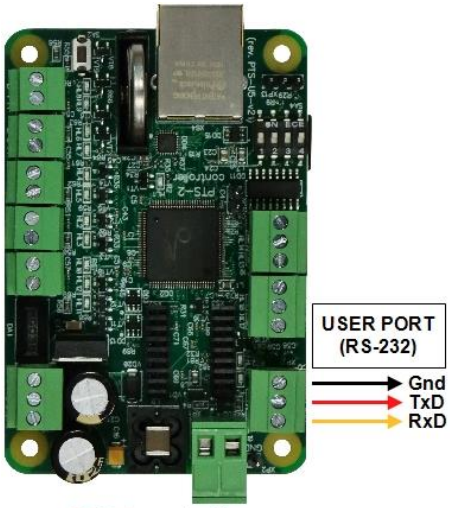
PTS-2 controller

Hectronic OptiLevel Supply box

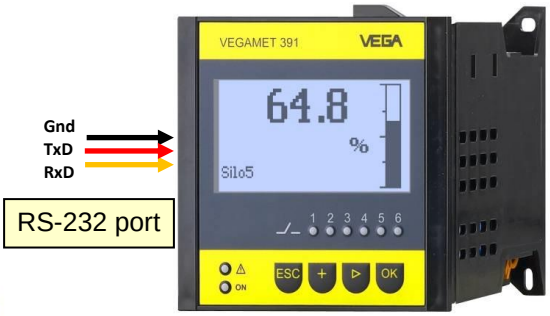
Vega radar level meters

Connection to VEGA meters is made through a VEGAMET probes is made directly to one of probe ports of PTS-2 controller (RS-232 interface) to Hectronic OptiLevel Supply box.

Configuration of PTS-2 controller probe port: protocol "10*. Vega*", baud rate "*4. 9600*".



PTS-2 controller

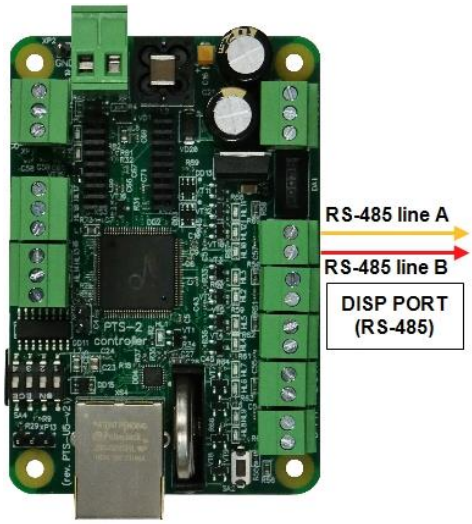


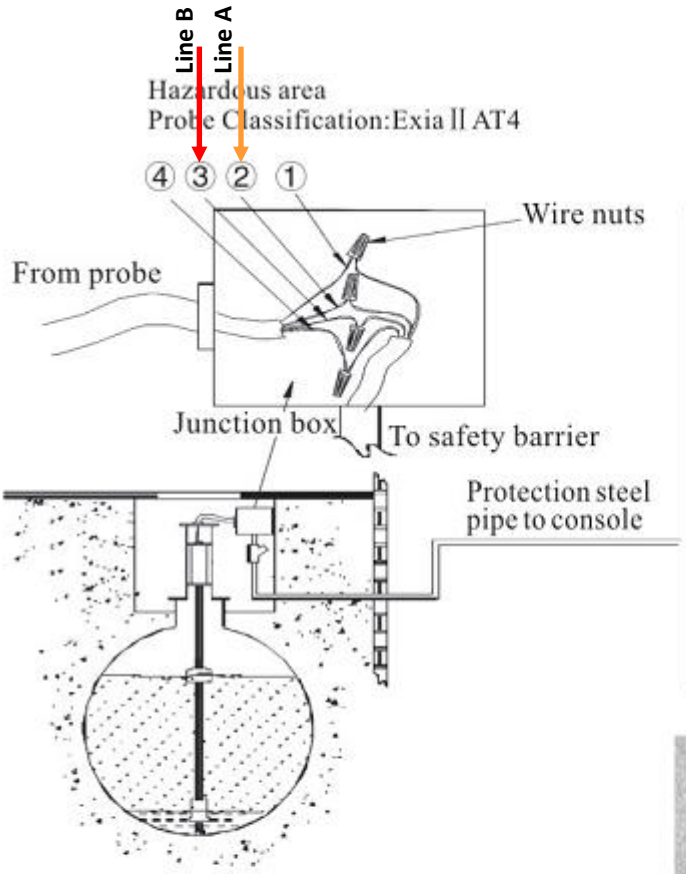
VEGAMET signal conditioning instrument

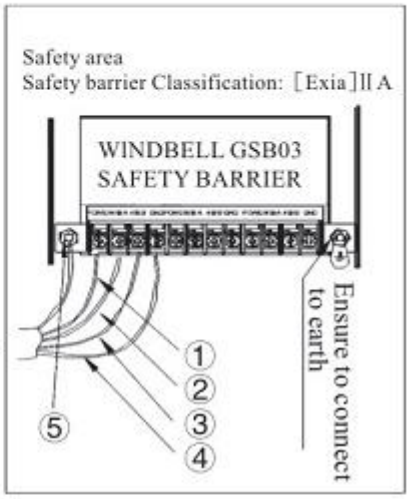
VEGAPULS radar meter

Windbell magnetostrictive probes connection scheme

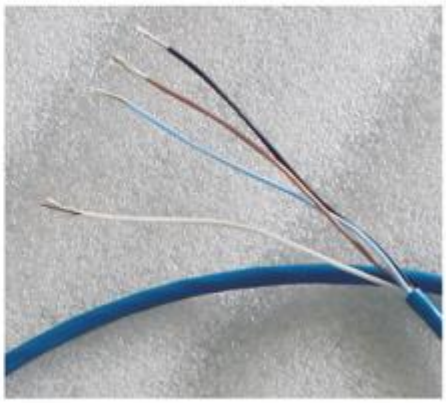
Connection to Windbell probes is made directly to DISP (RS-485) port of PTS-2 controller (RS-485 interface). Configuration of PTS-2 controller probe port: protocol "*11. Windbell*", baud rate "*4. 9600*".







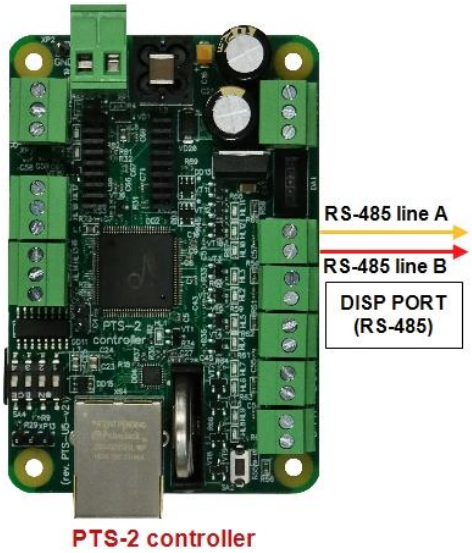
No.	Power wires	Port of safety barrier
①	Blue wire	Power (Power +)
②	Brown wire	485A
③	White wire	485B
④	Black wire	GND (Power-)
⑤	Shielded wire	



North Falcon wired probes connection scheme

Connection to North Falcon wired probes is made directly to DISP (RS-485) port of PTS-2 controller (RS-485 interface).

Configuration of PTS-2 controller probe port: protocol "*22. Alisonic Delphi*", baud rate "*4. 9600*".

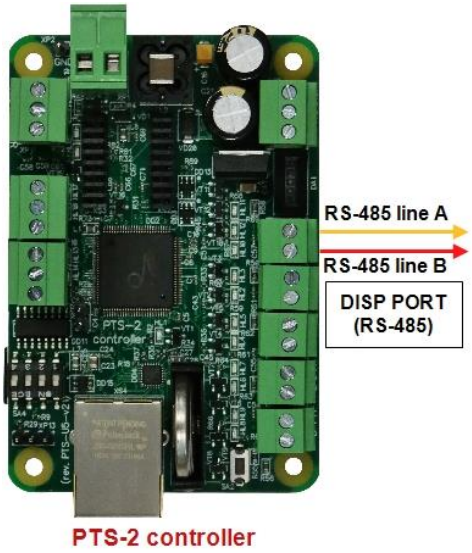


North Falcon probe (RS-485)

North Falcon wireless probes connection scheme

Connection to North Falcon wireless probes is made through North Falcon wireless receiver to DISP (RS-485) port of PTS-2 controller (RS-485 interface).

Configuration of PTS-2 controller probe port: protocol "*22. Alisonic Delphi*", baud rate "*4. 9600*".



North Falcon wireless receiver

CONFIGURATION FILE PTS_CONFIG_EN.JS

PTS-2 controller has a built-In configuration file named pts_config_en.js, which can be requested by addressing to this file (for example https://192.168.1.117/pts_config_en.js in case if usage of HTTPS is selected on DIP-1 switch and IP-address is set to 192.168.1.117). The configuration file contains:

- list of pump communication protocols supported
- list of probe communication protocols supported
- list of baud rates supported
- list of parameters supported

Section "*protocols*" contains a list of all supported pumps and probes communication protocols, where each "*protocol*" element contains properties:

- element "*name"* states communication protocol name
- element "*index*" states communication protocol index used for configuration
- element "*type*" states communication protocol type, possible variants are:
    - 0 – pump protocol type
    - 1 – probe protocol

Section "*bauds*" contains a list of all supported baud rates, where each "*baud*" element contains properties:

- element "*baud"* states baud rate value
- element "*index*" states baud rate index used for configuration

Section "*params*" contains a list of all supported parameters. PTS-2 controller uses parameters internally as configurable fields for storing different configuration settings, parameters are united in sets of 4-byte sections, so the maximal value of a parameter section in hexadecimal format can be 0xFFFFFFFF. Thus, each such section can be divided in one or several parameters, for example some of parameters can take only 1 bit, others can be longer up to the size of a whole 4 bytes section. Each "*param*" element describes a separate parameter and contains the following properties:

- element "*short_name"* states parameter short name to be displayed in case of small display
- element "*name"* states parameter name
- element "*description"* states parameter description
- element "*type"* states parameter type, possible variants are:
    - 0 – parameter for PTS-1 controller
    - 1 – parameter for PTS-2 controller
    - 2 – parameter for pump specific protocol
    - 3 – parameter for probe specific protocol
    - 4 – parameter common for all pump protocols
    - 5 – parameter common for all probe protocols
- element "*index*" states parameter index used for configuration
- element "*input*" states parameter range of values and meaning and contains the following possible elements:
    - element "*type*" states parameter input type, possible values are:
        - 0 – Boolean value taking 1 bit with possible values: 0 for unset, 1 for set

Example:

{"name":"Send price command at authorization","description":"Sets whether additional price setting command should be sent at pump authorization.","protocol":"15","type":"2","index":"1","input":{"type":"0","mask":"1","shift":"16","default":"0"}}

This parameter relates to pump protocol 15 (Tatsuno SS-LAN), its index is 1, GUI of software can display this parameter as a checkbox.
Default value is 0 (meaning unchecked state).
Shift of this parameter is 16, so that if the option is checked – then the parameter value is shifted 16 bits from start of the parameter section making the value to be 10000000000000000 in binary format.

- 1 – enumeration with list of values to be stated, in case of this input type the following elements for element "*input*" are possible:
  - element "*enum*" with description of the parameter with property "*value*" stating the parameter value

Example:

{"name":"Enter preset order at pump","description":"Sets whether preset of order is done from pump preset keyboard.","protocol":"16","type":"2","index":"1","input":{"type":"1","enum":[{"attr":"No","value":"0"},{"attr":"Yes","value":"1"},{"attr":"In automatic mode","value":"2"}],"default":"0"}}

This parameter relates to pump protocol 16 (Shelf), its index is 1, GUI of software can display this parameter as a dropdown list with possible options:
- *No (value 0)*
- *Yes (value 1)*
- *In automatic mode (value 2)*

Default value is 0 (meaning first option 'No').

- 2 – integer value with range of values to be stated, in case of this input type the following elements for element "*input*" are possible:
  - element "*min*" with minimal value of the parameter value
  - element "*max*" with minimal value of the parameter value

Example:

{"name":"Decimal digits quantity","description":"Sets quantity of digits after decimal separator used in pump.","protocol":"16","type":"2","index":"2","input":{"type":"2","min":"1","max":"4","default":"2"}}

This parameter relates to pump protocol 16 (Shelf), its index is 2, GUI of software can display this parameter as updown list with values in range from 1 to 4 and default value 2.

- 3 – float value with range of values to be stated, in case of this input type the following elements for element "*input*" are possible:

- element "*min*" with minimal value of the parameter value
- element "*max*" with minimal value of the parameter value
- element "*mul*" states the value on which the entered value should be multiplied
- element "*format*" states the format of the float number to represent – number of integer and decimal digits

Example:


```
{"name":"Maximal volume for authorization,
liters","description":"Sets value of maximal volume for pump
authorization,
liters","protocol":"16","type":"2","index":"3","input":{"type":"
3","min":"1","max":"9999","mul":"100","format":"03.02f","default
":"700.00"}}
```

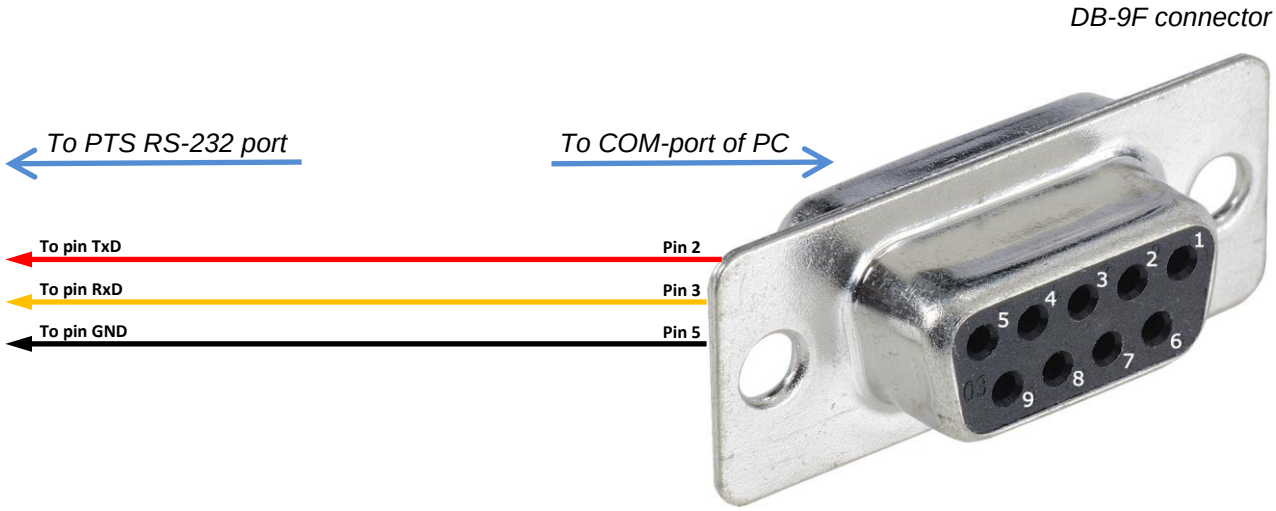

This parameter relates to pump protocol 16 (Shelf), its index is 3, GUI of software should display this parameter as float value in format "03.02f" meaning 3 integer digits and 2 decimal digits, default value is 700.00. After entering the value, the system should multiply it on 100 making the decimal digit from it. For example, if the entered value is 123.45 – then the value to be saved should be 12345 = 0x3039.

- element "*mask*" states how many bits the parameter takes in memory, the values are given in a format of maximal bits value the parameter can take. For example, if the parameter can have a value from 1 to 5 – then its values can take 3 bits maximum, so the maximal bits value is 111 in binary and the mask should equals to 7.
- element "*shift*" states what is the parameter offset in bits from the 4-bits parameter section value.
- element "*default*" states what is the parameter default value.

Parameters are saved in memory in hexadecimal format. In case if there are several parameters taking the same parameter section – then all of them should be accounted when writing new parameter value to parameter section.

RS-232 PORT CABLE CONNECTOR

Pinout of cable used for connection RS-232 ports of PTS-2 controller to PC:



ORDER INFORMATION

Variant of PTS-2 controller supply is marked with *PTS2-y-z*, where

- U – version of PTS-2 controller electric board;
- y – type of supply:
  - "*PCB*" in case if PTS-2 controller is supplied in a view of electric board;
  - "BOX" in case if PTS-2 controller is supplied installed in mounting box with hermetic inputs for connection of wires and a button for power supply switching;
  - "SDK" in case of PTS-2 controller SDK is supplied installed in mounting 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 PTS-2 controller in a view of electric board: PTS2-PCB-001
- order of PTS-2 controller installed in a mounting box: PTS2-BOX-001
- order of PTS-2 controller SDK: PTS2-SDK-001