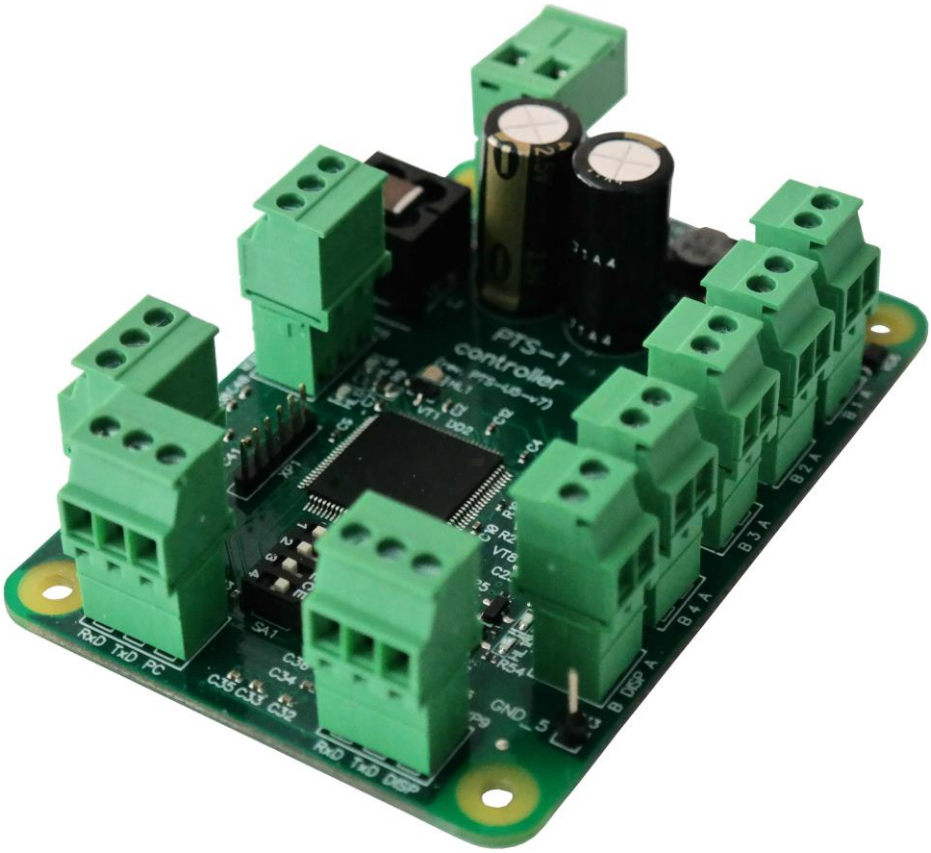
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PTS-1 controller

over fuel dispensers and ATG systems for petrol stations

TECHNICAL GUIDE

(PCB board modification: PTS-1, revision: PTS-U5-v7)

Review date: 10 October, 2021

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REVISION HISTORY

REV	DATE	BY	SECTIONS	DESCRIPTION
R01	2017.11.21	Evgeniy Vasyliev	All	First release of PTS-1 board revision
R02	2018.06.09	Evgeniy Vasyliev	All	Minor fixes
R03	2018.08.15	Evgeniy Vasyliev	All	Modification of PTS PCB board
R04	2018.11.17	Evgeniy Vasyliev	Supported communication protocols, examples of connection schemes	Updated list of supported communication protocols of fuel dispensers and ATG systems, added examples of connection to fuel dispensers and ATG systems
R05	2019.03.01	Evgeniy Vasyliev	Supported input communication protocols	Communication with PTS controller using pump and ATG consoles protocols
R06	2020.03.21	Evgeniy Vasyliev	General information update	Regular document review
R07	2020.07.18	Evgeniy Vasyliev	General information update	Regular document review

PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of PTS controller over fuel dispensers and ATG systems for petrol stations. It contains basic information regarding its

- technical characteristics
- supported communication protocols of fuel dispensers and ATG systems
- board interfaces and connectors
- configuration
- supplied application programming interfaces (API)
- description, configuration and connection of PTS controller software development kit (SDK)
- schemes of connection to fuel dispensers and ATG systems
- board schematics
- cabling

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

Given technical manual describes the latest hardware version of the PTS controller board (PTS controller PCB board modification PTS-1). Technical manuals of older versions of the PTS controller board (PTS-U5, PTS-U3, PTS-U2 and PTS-U) with their corresponding connection schemes can be downloaded from PTS controller web-page: *http://www.technotrade.ua/fuel-pump-controller.html*.

Due to a reason that PTS 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 controller web-page: *http://www.technotrade.ua/fuel-pump-controller.html*.

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

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

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

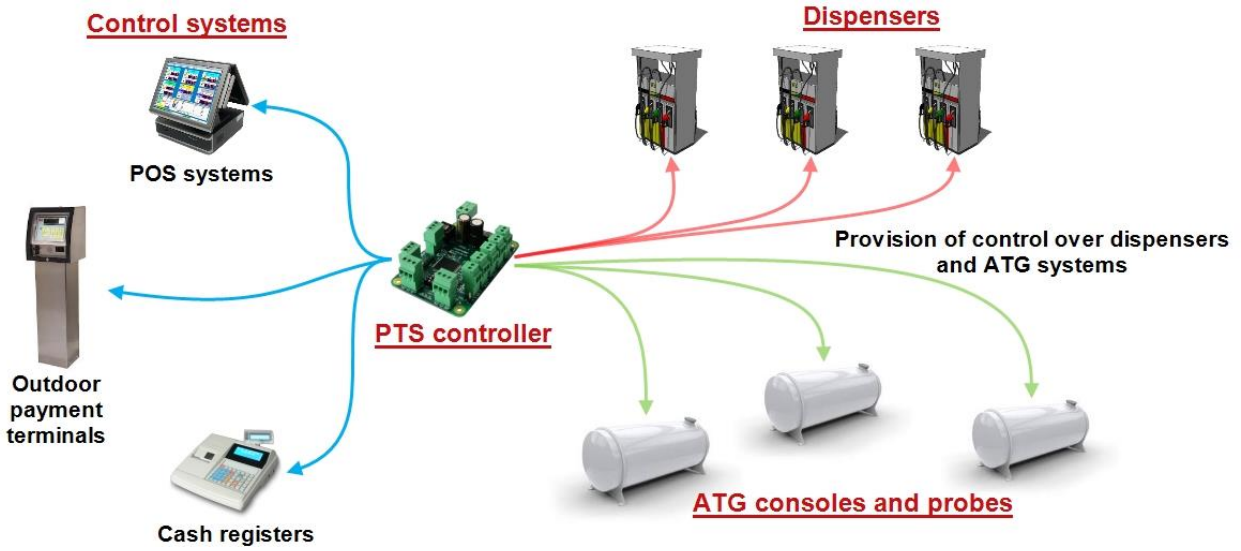
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TECHNICAL FEATURES

Appointment

PTS-1 controller over fuel dispensers and ATG (automatic tank gauge) systems for petrol stations serves as a protocols converter. It knows communication protocols of a great variety of fuel dispensers and ATG probes and allows control over any of them in exactly the same way using its own input communication protocol or popular pumps and ATG systems communication protocols. POS system (cash register, payment terminal) should not matter what is the brand of fuel dispenser or ATG system connected – it simply communicates to the PTS controller the same way regardless the brand of fuel dispensers and ATG systems used, PTS controller undertakes all work on communication with fuel dispensers and ATG systems using their native communication protocol and takes into account all their peculiarities.



This completely simplifies work for a POS system developer: by having implemented input common communication protocol of PTS controller the POS becomes able to provide control over any of fuel dispensers and ATG systems supported by PTS controller. PTS controller itself converts input communication protocol into proprietary communication protocols of fuel dispensers and ATG systems. Thus, the time required for development of POS system for petrol stations is significantly reduced.

PTS controller can be called a forecourt controller and can be used together with POS systems, cash registers, OPTs (outdoor payment terminals) and other control systems for petrol stations in order to provide control over fuel dispensers, LPG (liquified petroleum gas) dispensers, CNG (compressed natural gas) dispensers and various brands of ATG systems at petrol stations and storage depots.

PTS controller is supplied with a rich set of APIs (application programming interfaces) developed under most popular programming languages and environments in order to provide comfortable and quick implementation of the PTS controller into control systems for petrol stations (POS system, cash register, OPT terminal, etc).

General specification

##	PARAMETER	VALUE
1	**Power supply voltage**	12 V DC
2	**Current consumption**	400 mA max
3	**Temperature range**	-40°C ÷ +80°C
4	**Weight**	120 g
5	**Overall dimensions**	85 x 58 x 30 mm

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. *DIGITAL FLOW*
26. *DINT*
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*

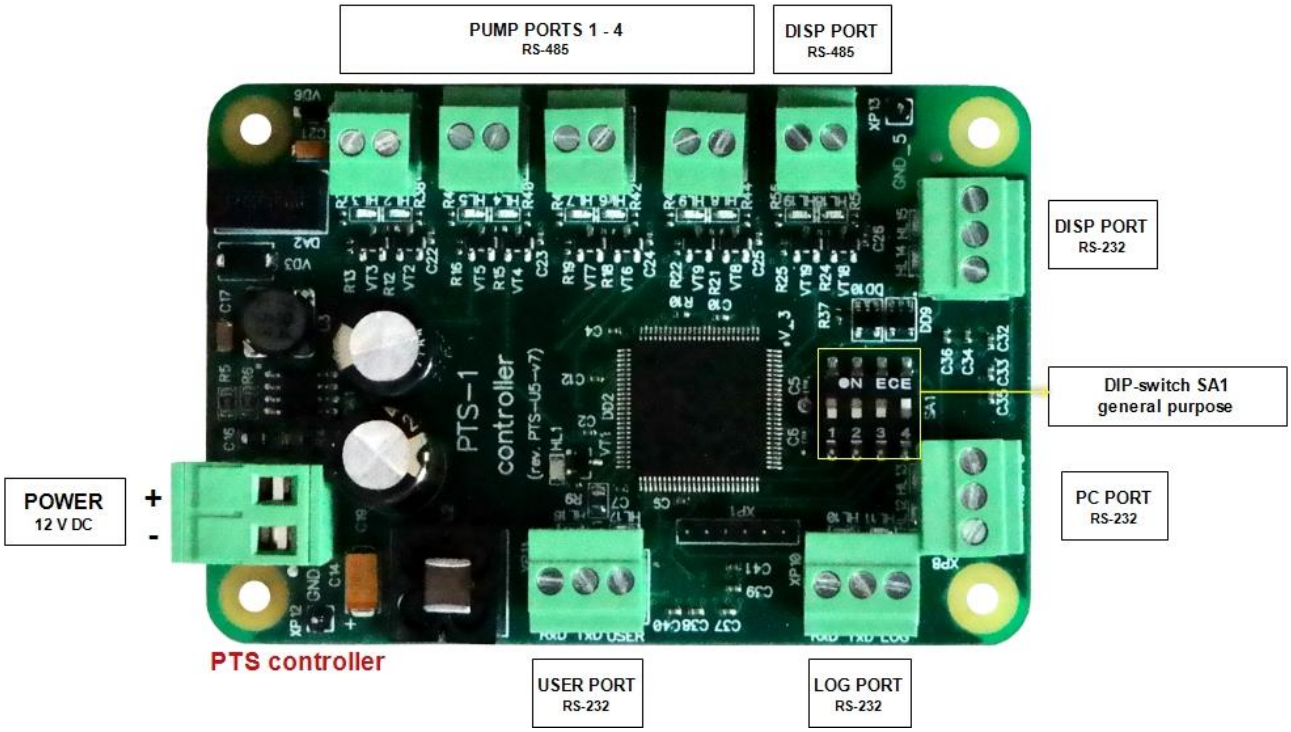
** Some dispensers may demand using interface converter boards to RS-485 interface (depends on electronics of used pumphead in dispenser).*

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*

** Communication parameters (baud rate, parity control, data and stop bits) are configured for probe ports in PTS controller independently from used communication protocol*

BOARD CONNECTORS AND INTERFACES



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

COMMUNICATION PORTS

PORT NAME		INTERFACE	APPOINTMENT
PC PORT		RS-232 (3 wires: TxD, RxD, Gnd)	Connection with control system (POS system, cash register, OPT terminal, etc). It is recommended to use shielded cable.
PUMP PORTS	Pump port 1	RS-485 (2 wires: line A, line B)	Connection with fuel dispensers using configurable proprietary communication protocol (up to 16 fuel dispensers). 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)	Connection with fuel dispensers using configurable proprietary communication protocol (up to 16 fuel dispensers). It is required to use shielded cable, which shield is connected to ground on the side of connected pump.
	Pump port 3	RS-485 (2 wires: line A, line B)	Connection with fuel dispensers using configurable proprietary communication protocol (up to 16 fuel dispensers). It is required to use shielded cable, which shield is connected to ground on the side of connected pump.
	Pump port 4	RS-485 (2 wires: line A, line B)	Connection with fuel dispensers using configurable proprietary communication protocol (up to 16 fuel dispensers). It is required to use shielded cable, which shield is connected to ground on the side of connected pump.
	DISP port (RS-485)	RS-485 (2 wires: line A, line B)	1. PTS controllers interconnection (up to 16 PTS controllers) for simultaneous control over the same fuel dispensers and ATG systems 2. Connection with ATG systems (probes) using configurable proprietary com. protocol (up to 16 ATG probes) It is required to use shielded cable, which shield is connected to ground on the side of connected ATG system (probe).
PROBE PORTS	DISP port (RS-232)	RS-232 (3 wires: TxD, RxD, Gnd)	Connection with ATG system (console) using configurable proprietary communication protocol (up to 16 ATG probes).
	LOG port	RS-232 (3 wires: TxD, RxD, Gnd)	1. Connection with ATG system (console) using configurable proprietary communication protocol (up to 16 ATG probes) 2. Writing of operation log of PTS controller interaction with fuel dispensers, ATG systems, PTS interconnection
	USER port	RS-232 (3 wires: TxD, RxD, Gnd)	Connection with ATG system (console) using configurable proprietary communication protocol (up to 16 ATG probes).

NOTE!

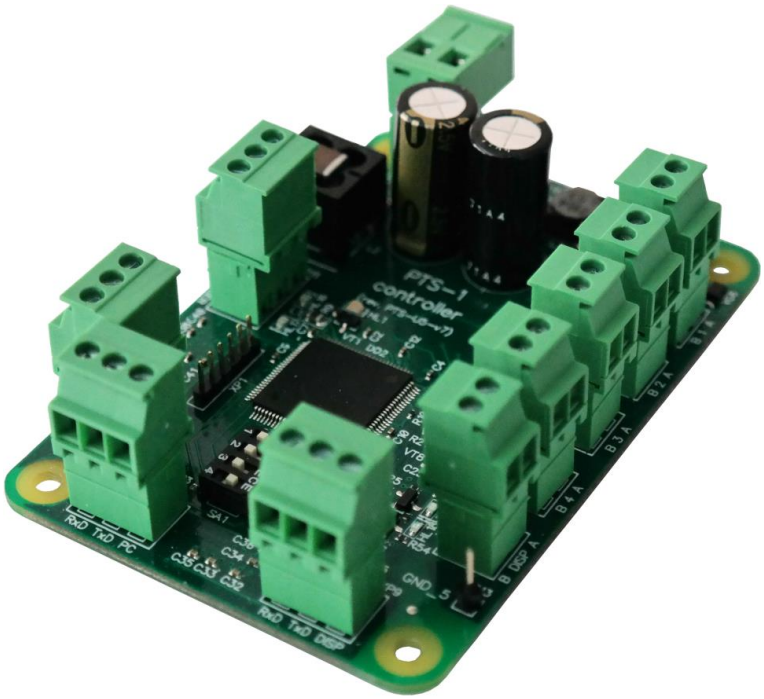
It is strictly prohibited to connect any of the cables' shields to ports of PTS controller.

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.

COMPLETE SET

Depending on the order code (see section “Order information”) PTS-1 controller can be supplied either in a view of electrical board (variant of controller supply *PTS1-PCB-z*), or installed in a mounting box with cables inputs and a power switching button (variant of controller supply *PTS1-BOX-z)*.



Variant of controller supply in a view of electrical board (PTS1-PCB-z)



Variant of controller supply installed in a plastic box with cables inputs and a power switching button (variant of controller supply PTS1-BOX-z)

CONNECTION TO POWER SUPPLY

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

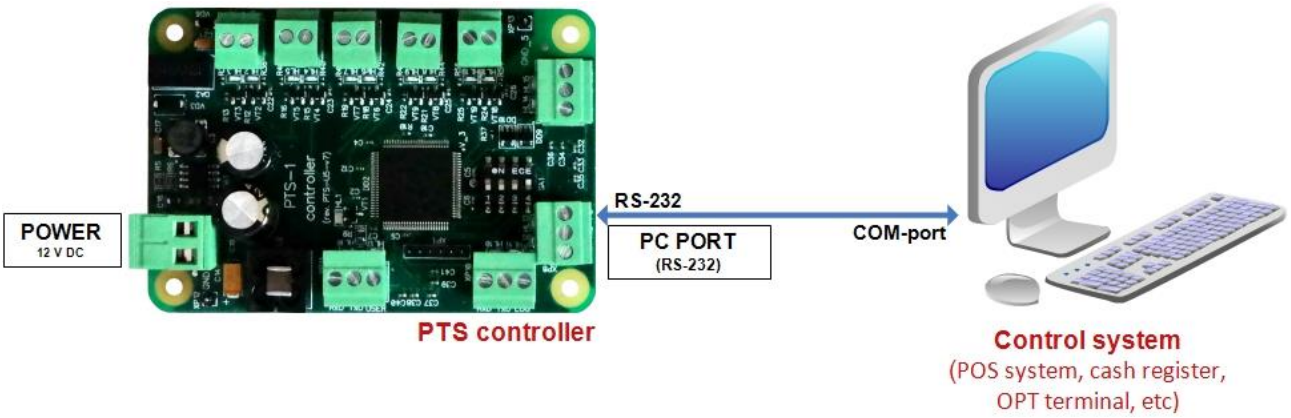


Ferrite ring coil should be located on the power supply cable nearby (up to 3 cm) the power supply connector of controller board (in case if controller is supplied in a view of electrical board, variant of supply *PTS1-PCB-z*) or nearby the power supply cable input of box (in case if controller is supplied in plastic box, variant of supply *PTS1-BOX-z*). After placing a ferrite ring on the power supply cable, it is required to check correctness of its installation, it is possible to check it by moving ferrite ring along the power supply cable by pushing power supply cable into it from one side and pulling the cable from another side of the ferrite ring.

CONNECTION TO CONTROL SYSTEM

Connection to the control system (POS system, cash register, OPT terminal, etc) is made through a 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 controller 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 controller over fuel dispensers and ATG systems*" for more information. Thus, PTS controller provides conversion of the common communication protocol UniPump into various proprietary communication protocols of fuel dispensers and ATG systems.

INSTALLATION REQUIREMENTS FOR PETROL STATION

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

1. Requirements to power supply

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

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

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

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

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

2. Requirements to grounding

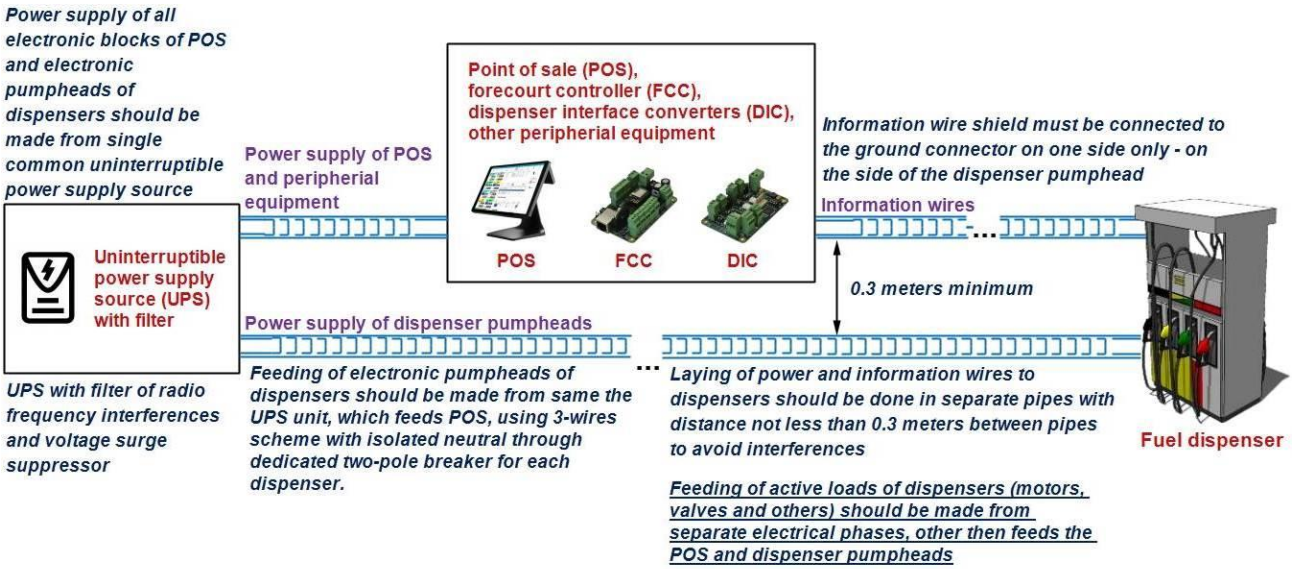
In the switchboard the ground wire of feeder socket should be connected to the grounding screw, which should be connected by means of welding with a protection grounding circuit of petrol station by steel wire with a diameter of not less than 5 mm.

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

3. Requirements to laying of cable communications

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

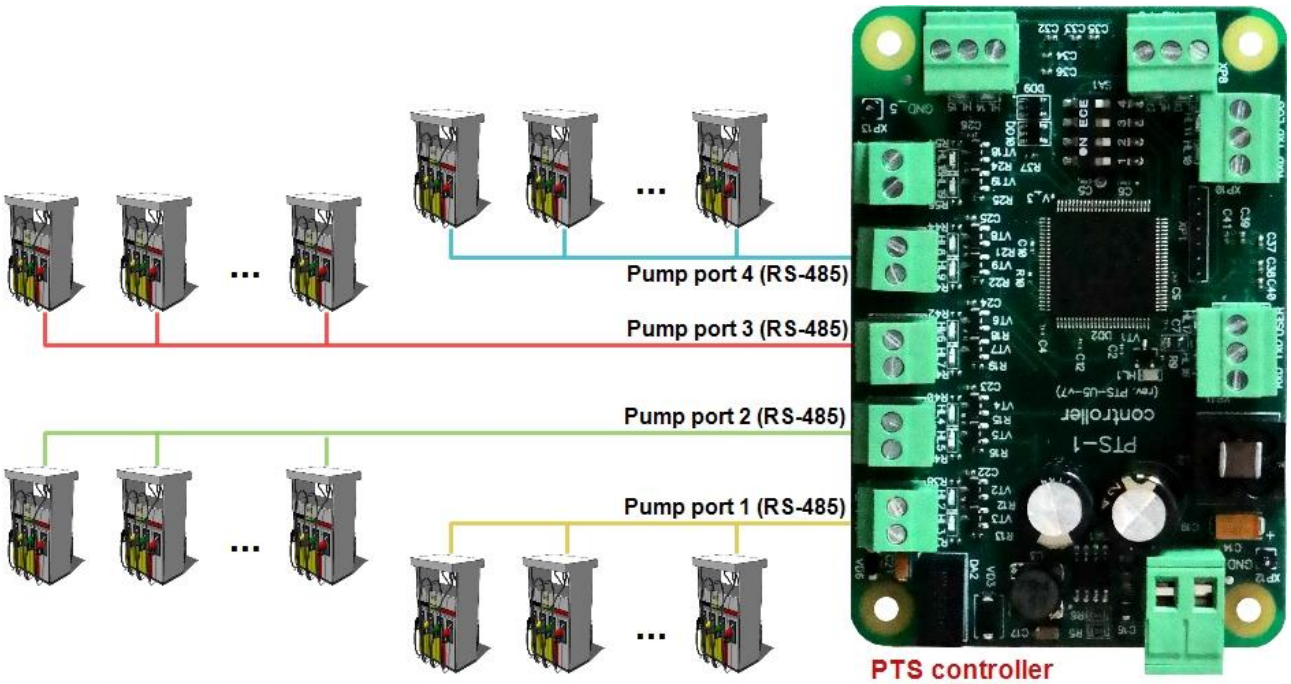
it is recommended to use shielded twisted-pair cables (recommended type – FTP CAT 5E). The cable shield must be connected to the ground connector on one side only – on the side of the dispenser.



CONNECTION TO FUEL DISPENSERS

PTS controller can simultaneously control up to 16 fueling places (16 sides of 1-sided dispensers or 8 sides of 2-sided fuel dispensers or mixture of 1-sided and 2-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 and can connect up to 16 fueling places) (see section "*Examples of connection to fuel dispensers*").

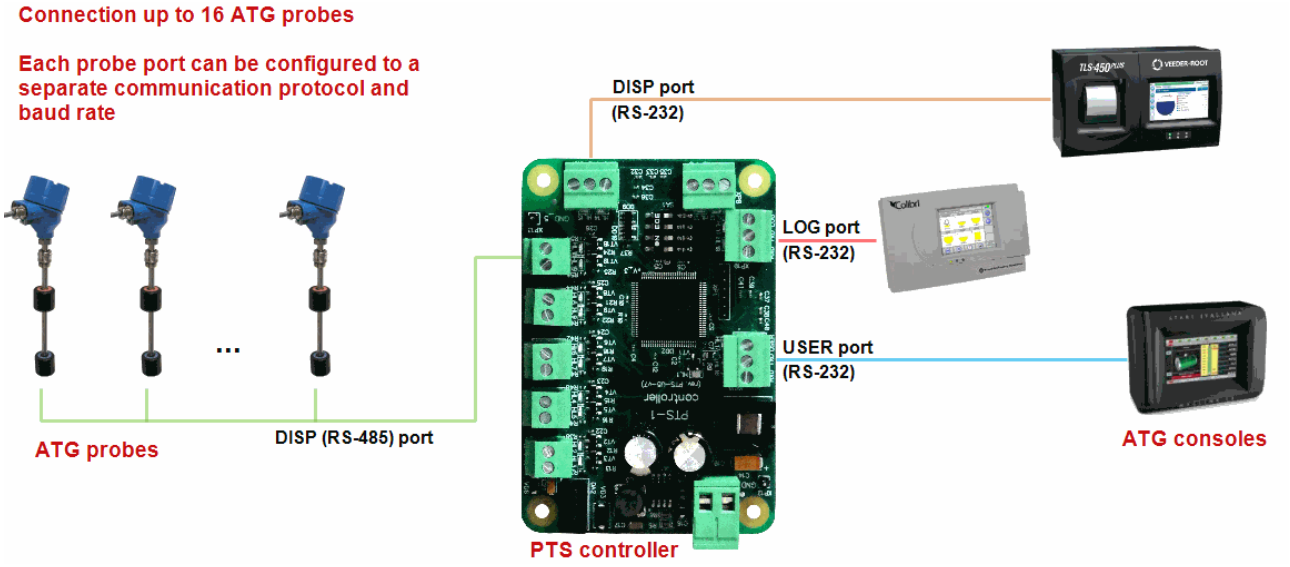
So, you can connect in total 16 pumps to the same pump port or you can distribute all the 16 pumps between the any of the pump ports.



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 PTS controller ports in approximately equal quantities in order to minimize delays between fuel dispensers querying in the same pump port.

CONNECTION TO ATG SYSTEMS AND PROBES

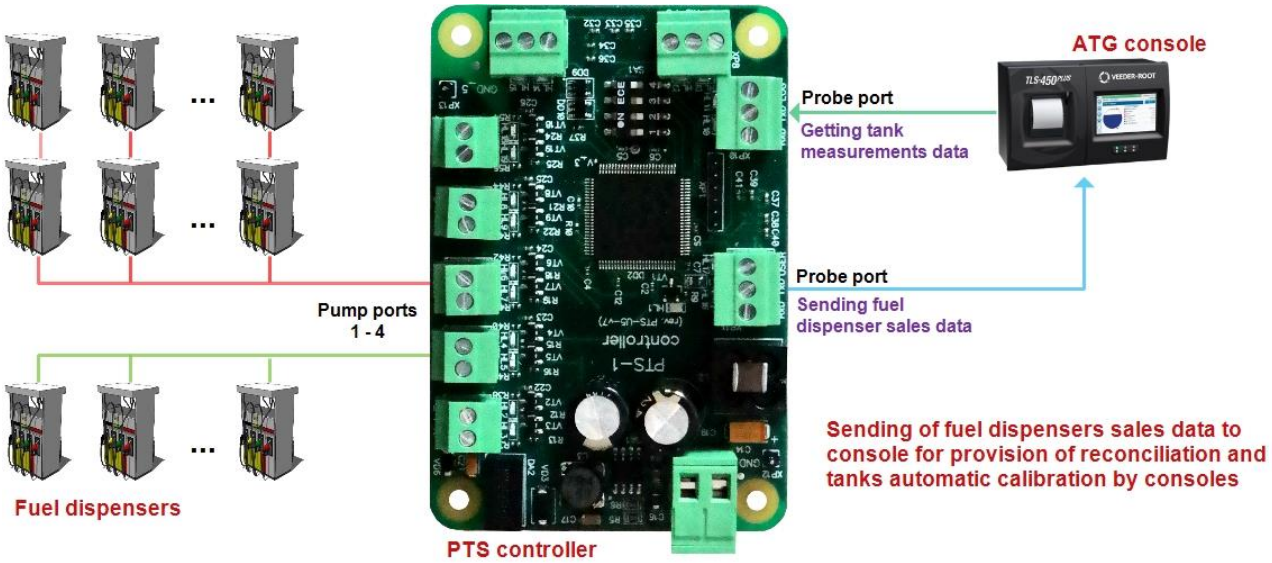
PTS controller can simultaneously control up to 16 ATG probes (gauges) (separate probes or probes connected to ATG systems / consoles) that use up to 3 various communication protocols (each of the probe ports can be adjusted to a separate communication protocol and baud rate and connect up to 16 ATG probes) (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 controller.

SENDING OF PUMPS SALES DATA TO CONSOLES

At communication to ATG consoles PTS 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:

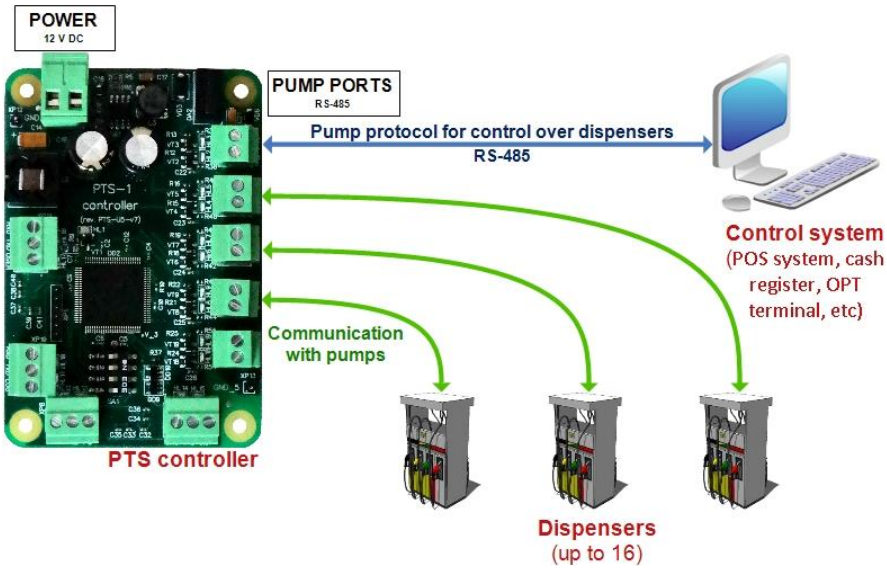


CONVERSION BETWEEN PUMPS PROTOCOLS

In case if POS system already knows some open communication protocol of dispensers then it can use PTS controller for its conversion to any other pump protocols without any additional integration.

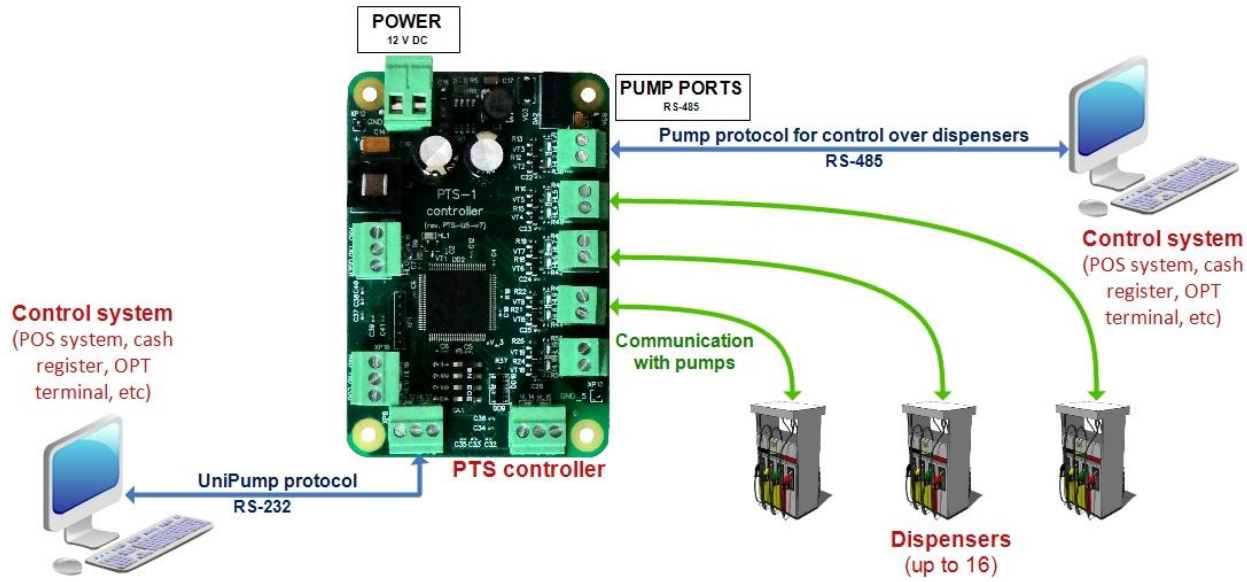
Communication of PTS controller with control system (POS system, cash register, OPT terminal, etc) for provision of control over dispensers can be done using popular open pump protocols. At this connection is made through one of the pump ports, which has RS-485 interface (2 wires: A, B). Any of the pump ports can be configured to work as input port for communication with control system.

Scheme of connections:



In this case the control system should know pump communication protocol. PTS controller in this case serves as a protocols converter: converts input pump protocol into any other supported pump protocols.

At this control over pumps can be done in parallel from control systems connected through pump port and PC port, PTS controller internally tracks which control system locks control over dispensers:

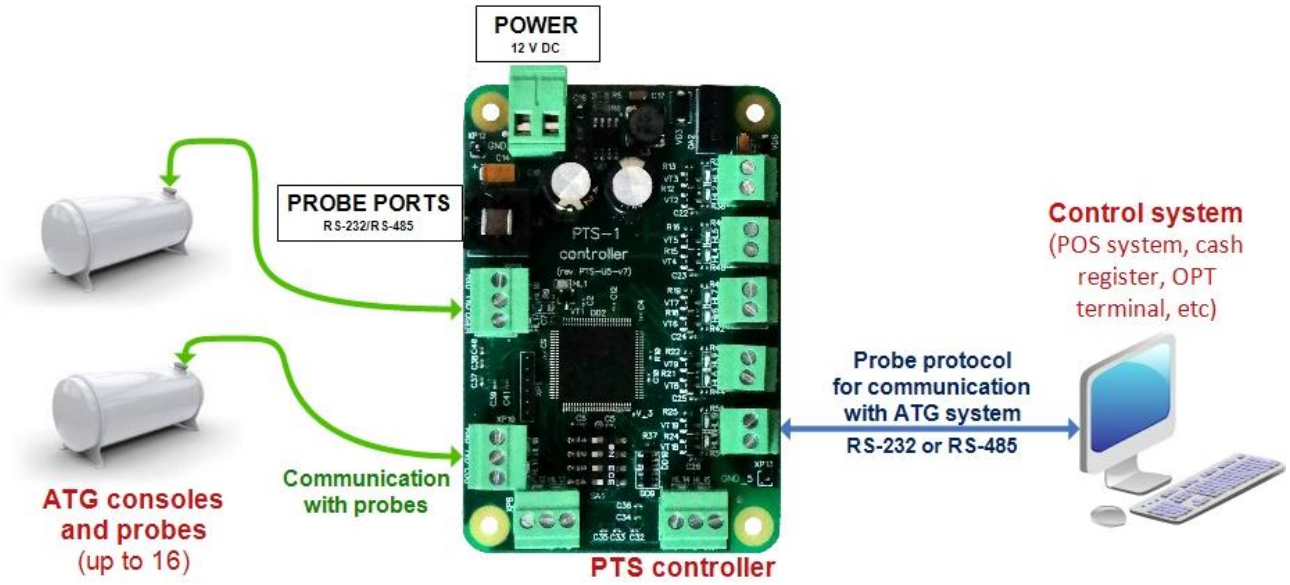


CONVERSION BETWEEN ATG CONSOLES PROTOCOLS

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

Communication of PTS controller with control system (POS system, cash register, OPT terminal, etc) for getting measurement data from probes can be done using popular open ATG console protocols. At this connection is made through one of the probe ports, which has RS-232 interface (3 wires: TxD, RxD, Gnd) or RS-485 interface (2 wires: A, B). Any of the probe ports can be configured to work as input port for communication with control system.

Scheme of connections:

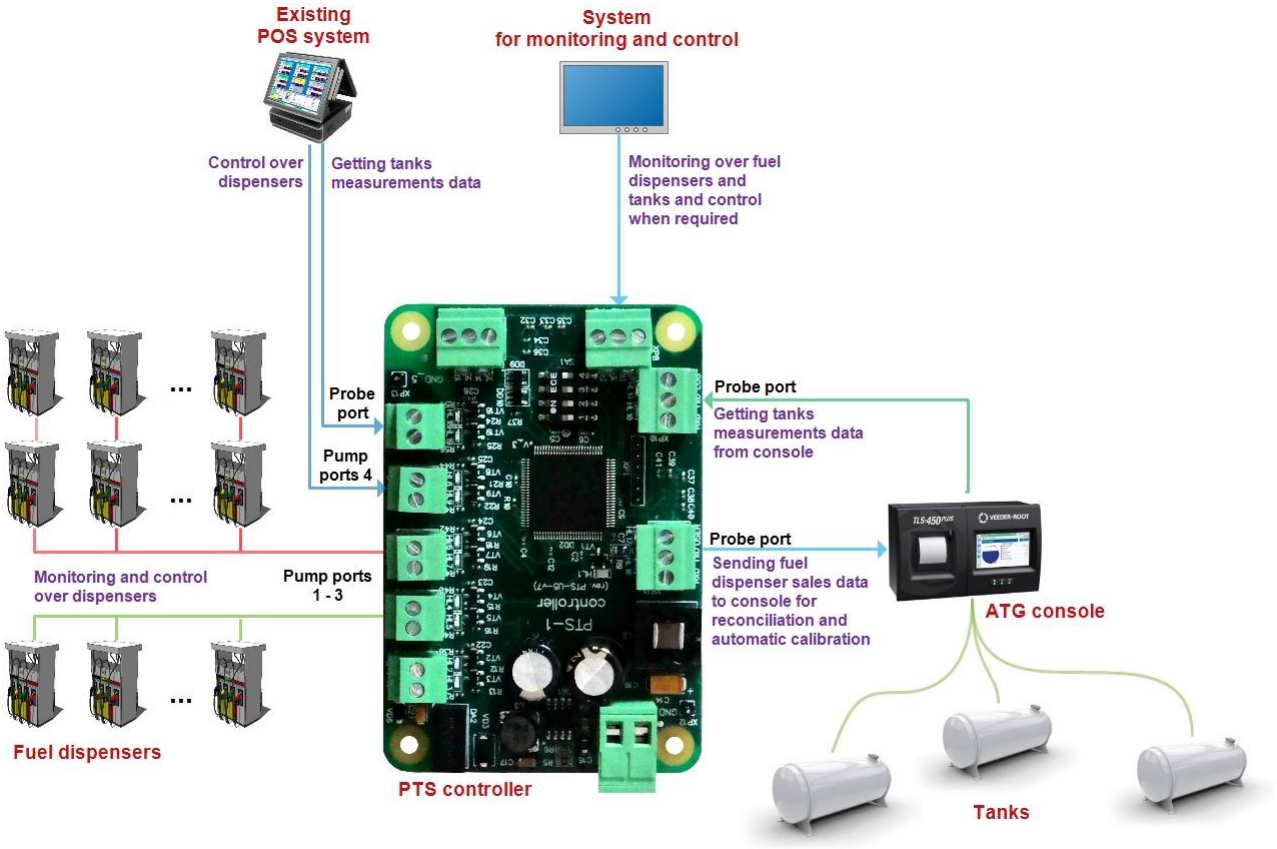


In this case the control system should know communication protocol of ATG console. PTS controller in this case serves as a protocol's converter: converts input ATG console protocol into any other supported ATG consoles and probe protocols.

MONITORING OVER FUEL DISPENSERS AND TANKS

In case if there is an existing POS system already installed on the station PTS controller allows to monitor operation of the fuel dispensers and tanks (and optionally to make sales when required). At this PTS controller is connected between existing POS system and fuel dispensers and ATG console (tank probes), PTS controller communicates with fuel dispensers and ATG console (probes) using their proprietary communication protocols and with POS system – using open communication protocols for pumps and ATG console. Monitoring system can connect to PC port of PTS controller and get all data of fuel dispensers sales and tanks real time, at this it can also provide control over the dispensers when required.

Scheme of connections:



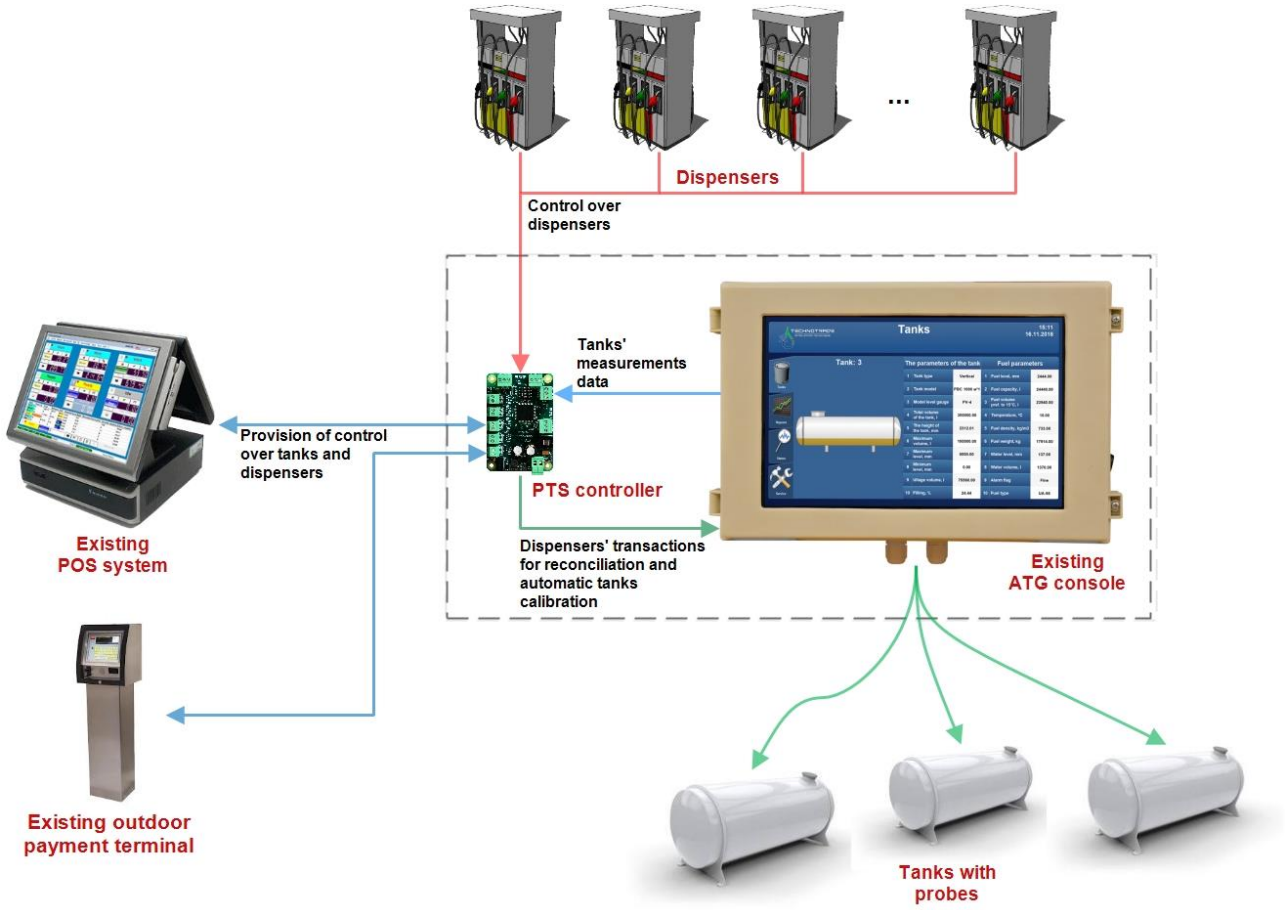
FUEL DISPENSERS SALES DATA FOR ATG CONSOLES FOR RECONCILIATION

PTS controller can be applied for listening of communication exchange between POS system and dispensers and sending of dispensers' transactions to the ATG console for provision of tanks' reconciliation and automatic calibration. Installation of the PTS controller between POS system and dispensers solves this problem without any additional integration from the side of POS system.

Additionally, it is possible to apply PTS controller inside the casing of the ATG console. At this a scheme of connection specified on the above image is saved, but at some extra development of the console GUI it is possible to make a completely new function of the console – provision of monitoring and control over dispensers from the console in parallel with POS system. As a result, the console becomes a common system of control, monitoring and account providing:

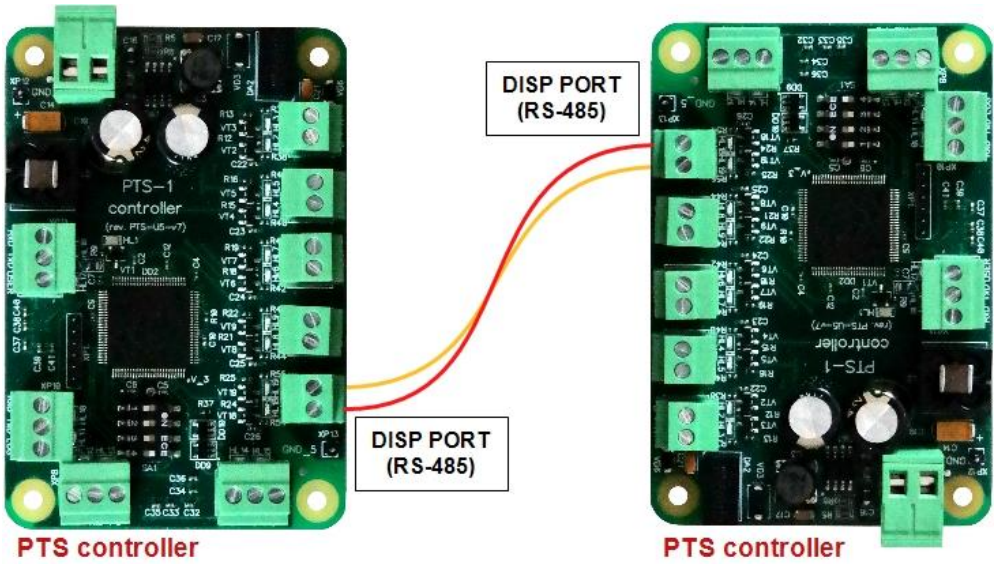
- connection of console to any POS system, OPT terminal for provision of control over dispensers
- possibility to connect various brands of probes, which communication protocols are not supported by the console
- transmission from PTS controller to console data on sales transaction of dispensers for formation of reconciliation reports and automatic tanks calibration
- additional possibility to monitor and control fuel dispenser operation from the console display in parallel to POS system already installed at petrol station (needs update of console software)

Scheme of connections:



PTS CONTROLLER MULTI POS SYSTEMS OPERATION

PTS controller allows a possibility to lead management over the same fuel dispensers from several POS systems and share ATG probes measurement values between several interconnected PTS controllers. Thus every interconnected PTS controller is able to provide control over any of the connected fuel dispensers and know ATG system measurement data of every other interconnected PTS controller.



NOTE! In order to enable PTS controller interconnection interface of DISP port should be configured to RS-485 in configuration parameters of PTS controller and DISP port should not be configured for any ATG system (see section "*PTS controller configuration*").

Configuration:

At necessity to organize several working places at petrol station (several POS systems) each of the POS systems should have its own PTS controller connected. PTS controllers should be interconnected with each other through a dispatcher PTS port (DISP port on RS-485 interface) and also connected with fuel dispensers. Thus control over each fuel dispenser at petrol station can be made from every POS system and each PTS controller will know measurement data of every ATG probe connected to any of the interconnected PTS controllers. At authorization of a fuel dispenser from one POS system the fuel dispenser becomes locked by PTS controller of this POS system and while it is locked all other POS systems can not control over given fuel dispenser, they can only monitor current state of the fuel dispenser. When operation of given POS system is finished with given fuel dispenser, PTS controller of this POS system unlocks the fuel dispenser and it becomes commonly available for all other PTS controllers, which makes it possible to be controlled (locked) by any of the PTS controllers connected to other POS systems.

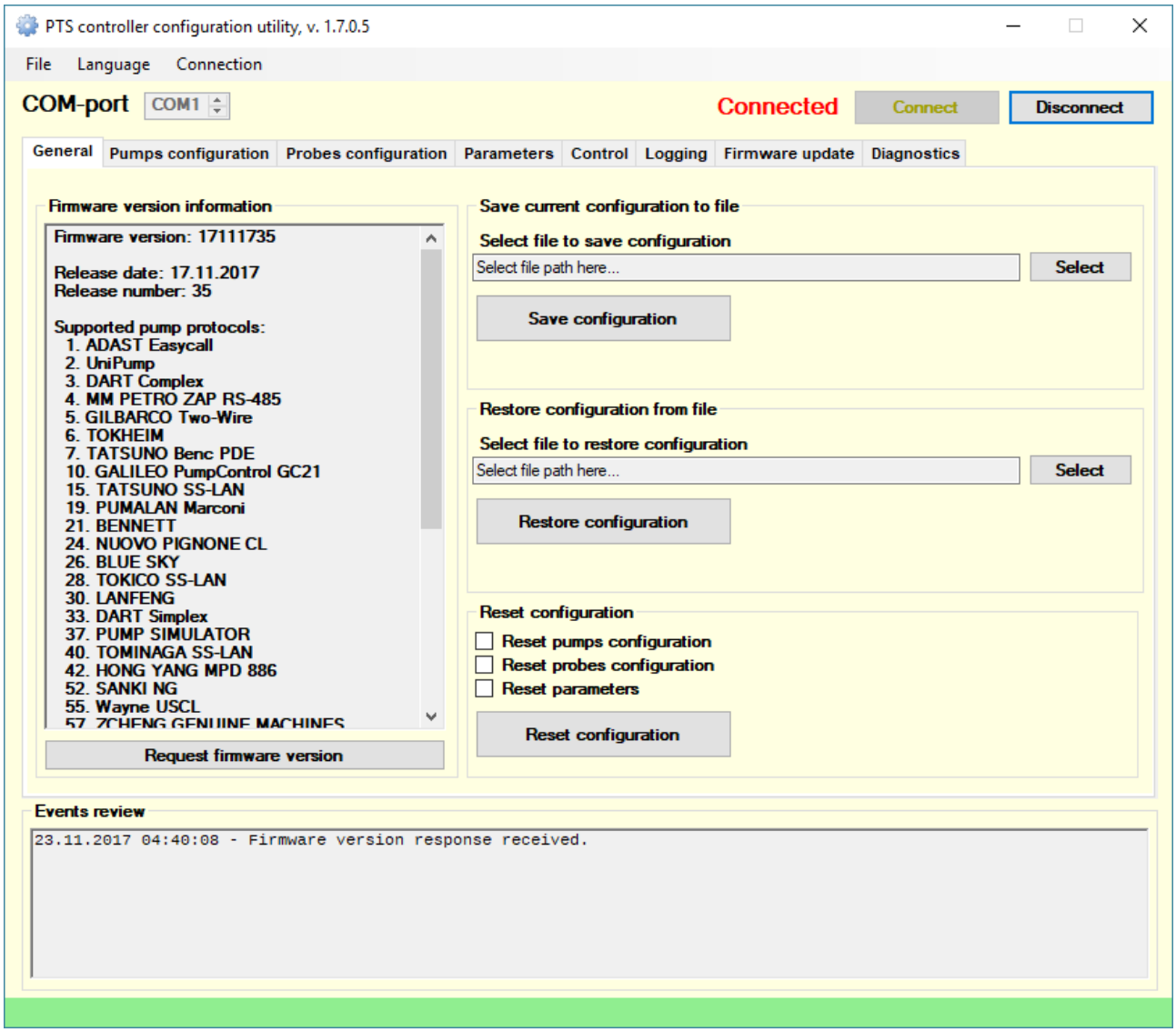
NOTE! In order to provide control over same fuel dispensers from several PTS controllers locking and unlocking of dispensers is required. For this reason in configuration of PTS controller in parameters for PTS controller "*Lock*" and "*Unlock*" commands should be set to be used (see section "*Configuration of parameters for PTS controller*").

NOTE! In order to provide correct exchange of ATG systems measurement data between interconnected PTS controllers logical addresses of connected ATG probes in configuration of interconnected PTS controllers should not intersect (have various values in different PTS controllers).

PTS CONTROLLER CONFIGURATION AND TESTING UTILITY

General information

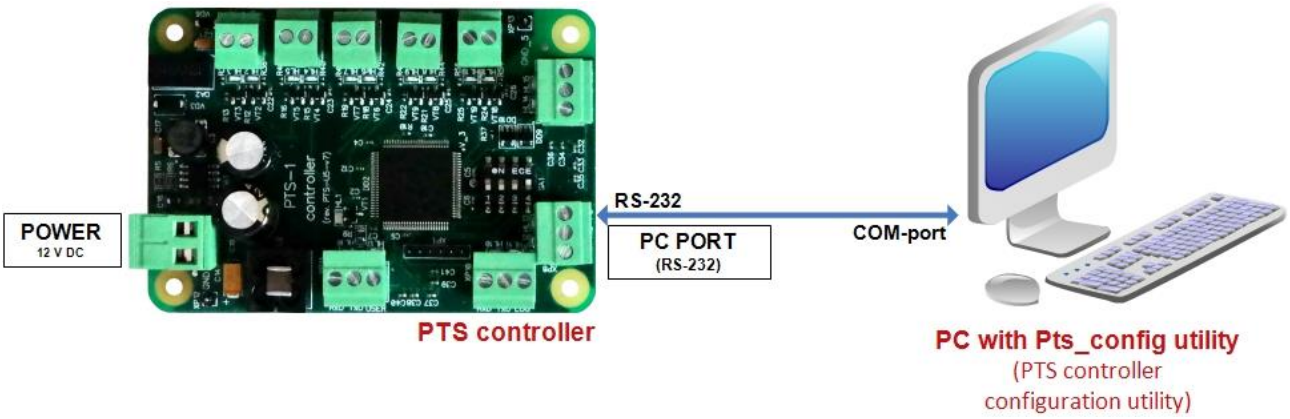
PTS controller configuration and testing utility *Pts_config.exe* serves for configuration and testing of the PTS controller. This utility is open source, which allows developers to use its source code in their development. Currently utility is developed under Visual Studio using C# and Visual Basic .NET languages under Windows OS. Development of the utility is also done in other programming languages under other operating systems. For direct communication with PTS controller the utility uses *UniPump communication protocol* (own proprietary protocol of Technotrade LLC) – see document "*UniPump communication protocol specification for PTS controller over fuel dispensers and ATG systems*" for more information.



PTS controller configuration and testing utility *Pts_config.exe* is a multipurpose utility for PTS controller. It provides the following possibilities:

- provision of control over the connected pumps and probes
- configuration of pumps (fuel dispensers) ports and probes (ATG systems) ports
- configuration of PTS controller parameters
- update of the PTS controller firmware
- logging of PTS controller communication exchange with connected equipment
- self-diagnostics of PTS controller communication ports and switches

Scheme of connections

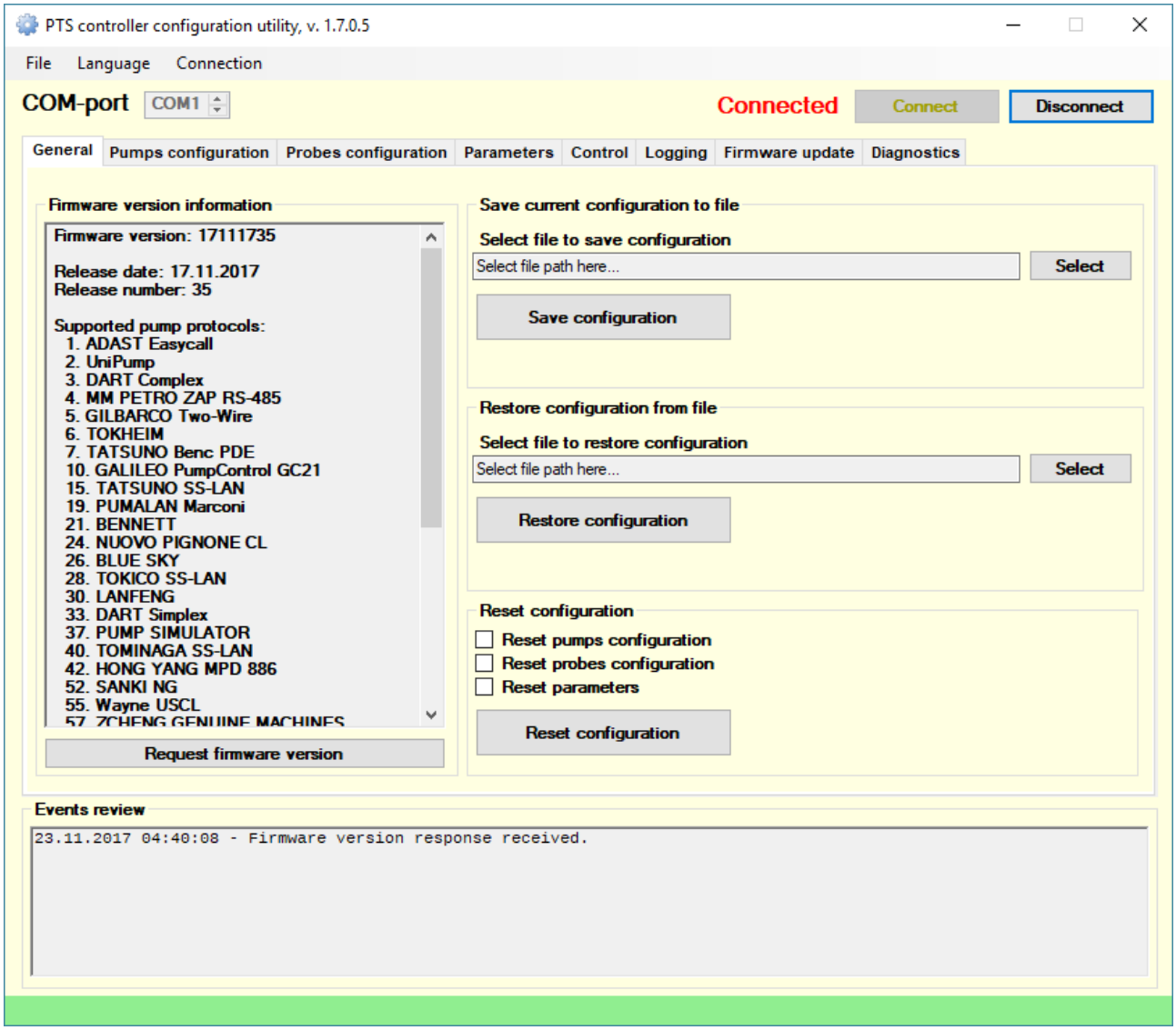


NOTE! On some PCs for correct operation COM-port FIFO settings should be adjusted to Tx: 1, Rx: 1. This may also apply to situations when a PC does not have a native COM-port and external COM-port converter are applied (like USB-to-COM, PCI-to-COM, Ethernet-to-COM, Bluetooth-to-COM etc).

Starting PTS configuration utility

Run *Pts_config.exe* utility. Make sure that in main menu in tab "*Connection*" type of PTS controller connection "*Direct connection to COM-port*" is selected (other types of connection serve for connection of PTS controller through fiscal modules). Set up a correct COM-port number and press "*Connect*" button.

Tab "General"



Tab "*General*" serves for 3 main purposes:

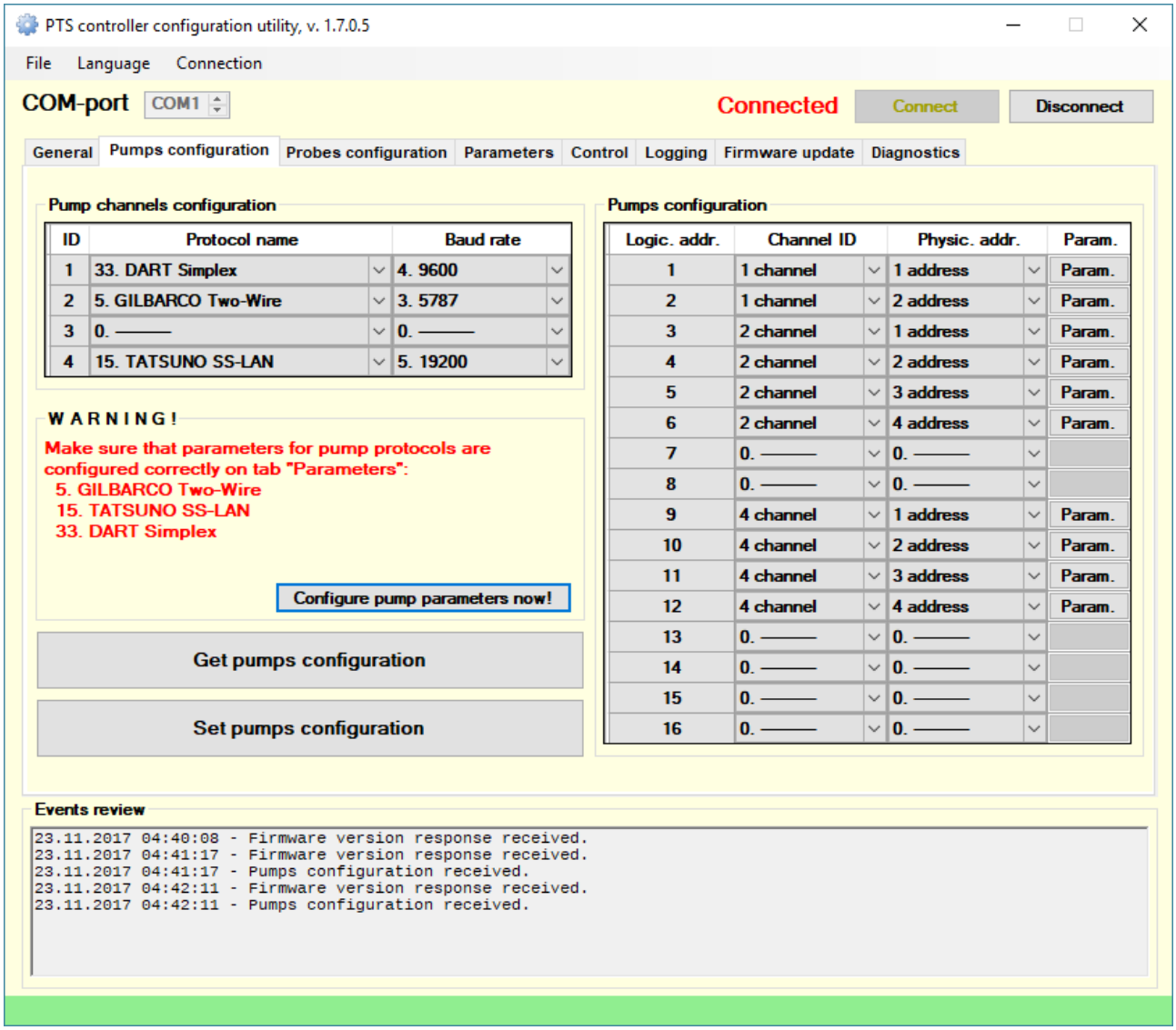
- reading of PTS controller firmware version information: firmware date and a list of supported communication protocols of pumps and ATG systems (probes)
- saving of all PTS controller configuration to a file on PC and restoring of all PTS controller configuration from a file on PC
- resetting of PTS controller configuration

NOTE! Pay attention that the PTS 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. Normally new firmware for PTS controller is issued together with PTS configuration utility update having latest features of PTS controller, so updated version of the PTS controller configuration utility *Pts_config.exe* should be also requested and downloaded. Information on how to update PTS controller firmware please find below in section "*Tab 'Firmware update'*".

In case if firmware version used in PTS controller is older than required for *Pts_config.exe* utility – then a warning message about it will appear in *Events review* field.

A list of all supported communication protocols and baud rates by PTS controller as well as description and settings of all parameters are described in file pts_config_en.xml (file may have other name depending on the used language).

Tab "Pumps configuration"



Tab "*Pumps configuration*" is used for reading and writing of configuration of pump ports in PTS controller.

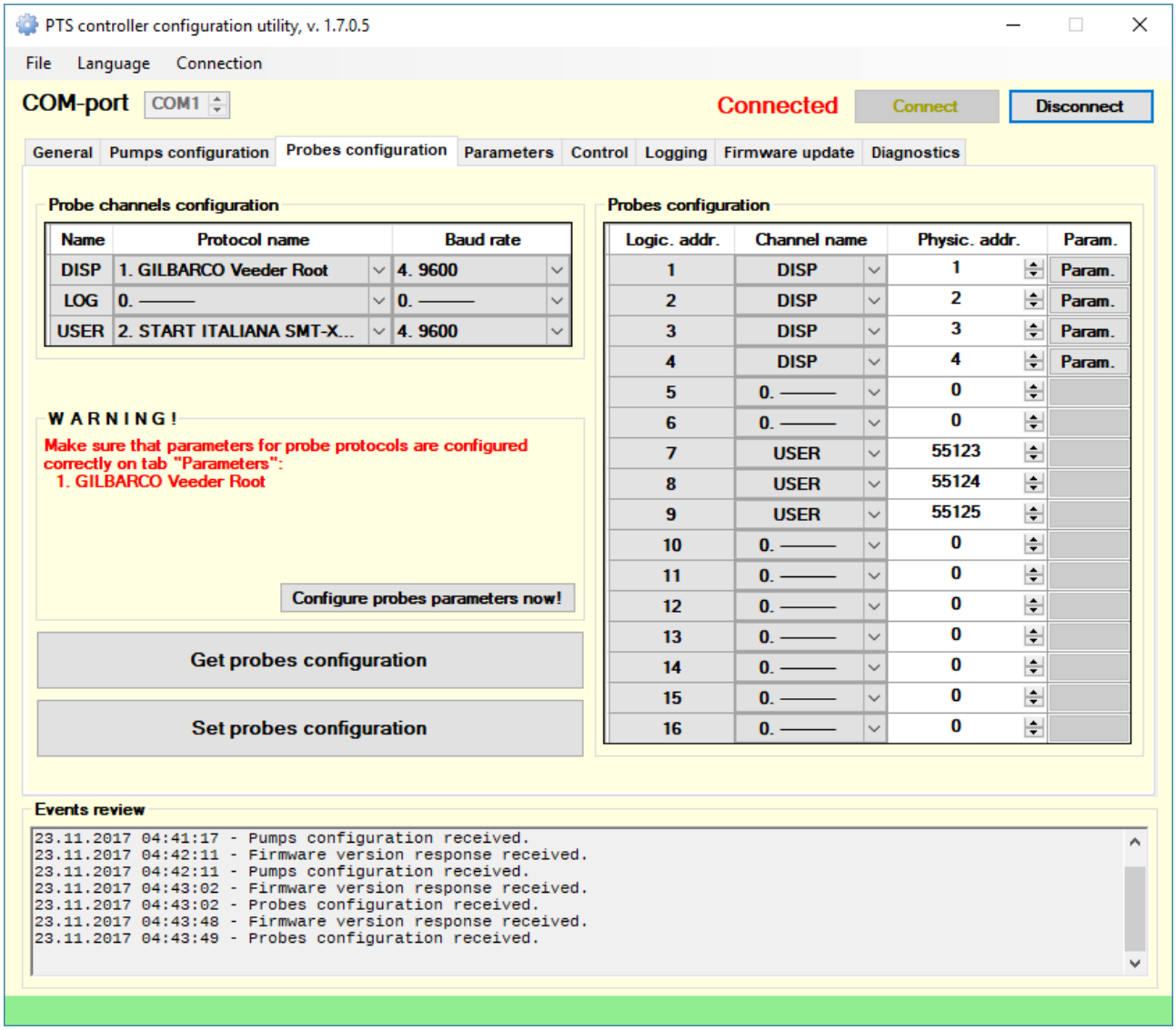
Configuration of pump ports includes setting of communication protocol and baud rate for each of the pump ports and also assigning of pumps to each of the pump ports. Each of the pumps can be assigned to any of the pump ports and requires specification of the pump physical address.

Logical address of the pump means the address on which the control system (POS system, cash register, OPT, etc) will see given fueling place. Physical address of the pump means address of the real fueling place, which is programmed or set in configuration of the fuel dispenser fueling place.

For some pump protocols it is also necessary to configure parameters, which is to be done on tab *"Parameters"* of the utility. Button *"Param."* is used to transfer to *"Parameters"* tab to configure parameters for the selected pump. Button *"Configure pump parameters now"* is used to transfer to *"Parameters"* tab to configure parameters for all pumps.

After configuration is finished it is necessary to click a button "*Set pumps configuration*", which will write current pump ports configuration to controller. Information about result of operation of writing of configuration to controller (whether it is made successfully or there was some problem) will be written in the events review field on the form.

Tab "Probes configuration"



Tab "*Probes configuration*" is used for reading and writing of configuration of probe ports in PTS controller.

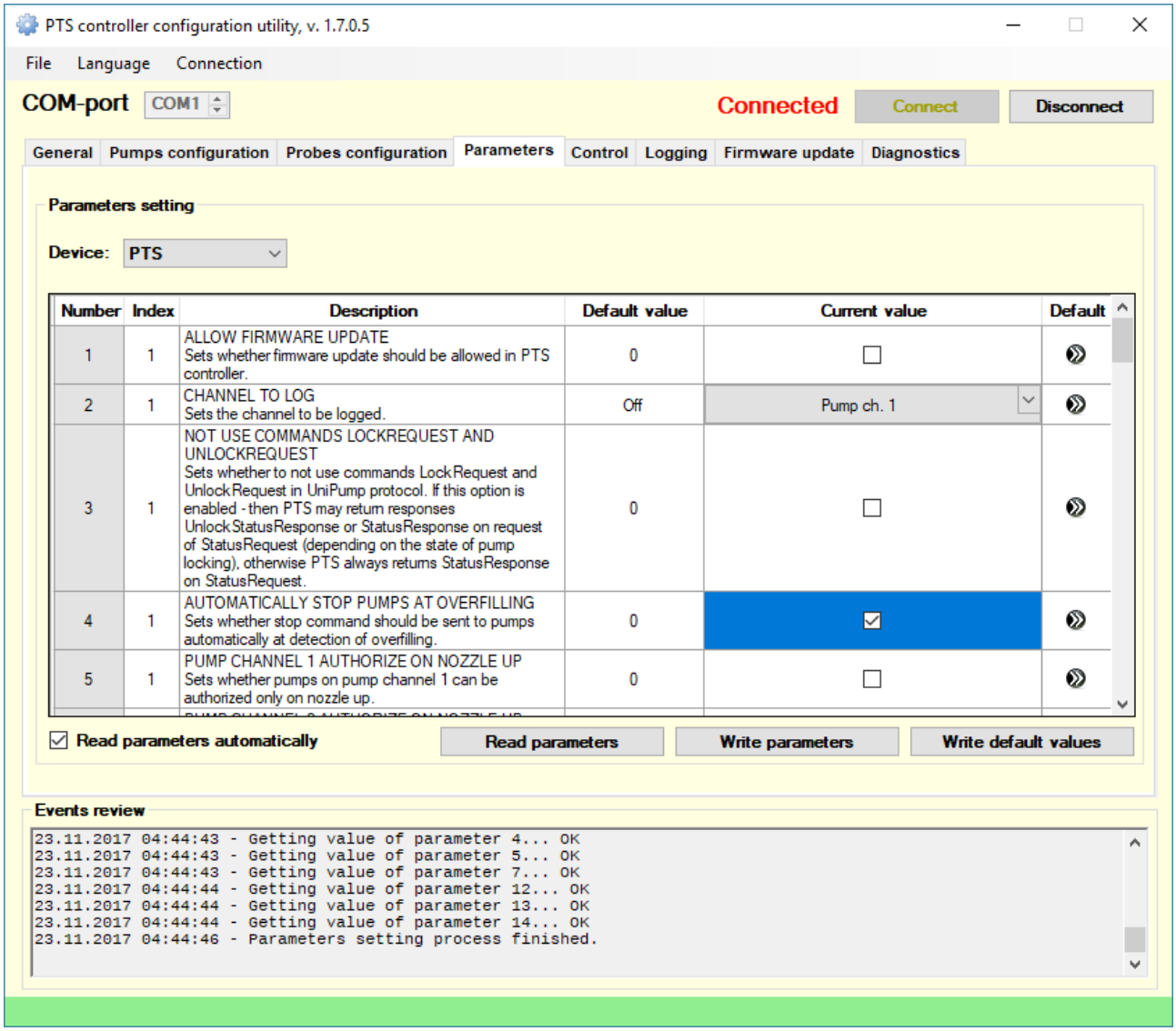
Configuration of probe ports includes setting of communication protocol and baud rate for each of the probe ports and also assigning of probes to each of the probe ports. Each of the probes can be assigned to any of the probe ports and requires specification of the probe physical address.

Logical address of the probe means the address on which the control system (POS system, cash register, OPT, etc) will see given probe. 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 probe.

For some probe protocols it is also necessary to configure parameters, which is to be done on tab *"Parameters"* of the utility. Button *"Param."* is used to transfer to *"Parameters"* tab to configure parameters for the selected probe. Button *"Configure pump parameters now"* is used to transfer to *"Parameters"* tab to configure parameters for all probes.

After configuration is finished it is necessary to click a button "Set probes configuration", which will write current probe ports configuration to controller. Information about result of operation of writing of configuration to controller (whether it is made successfully or there was some problem) will be written in the events review field on the form.

Tab "Parameters"



Tab *"Parameters"* serves for:

- configuration of parameters for PTS controller
- configuration of parameters for pumps protocols
- configuration of parameters for probes protocols

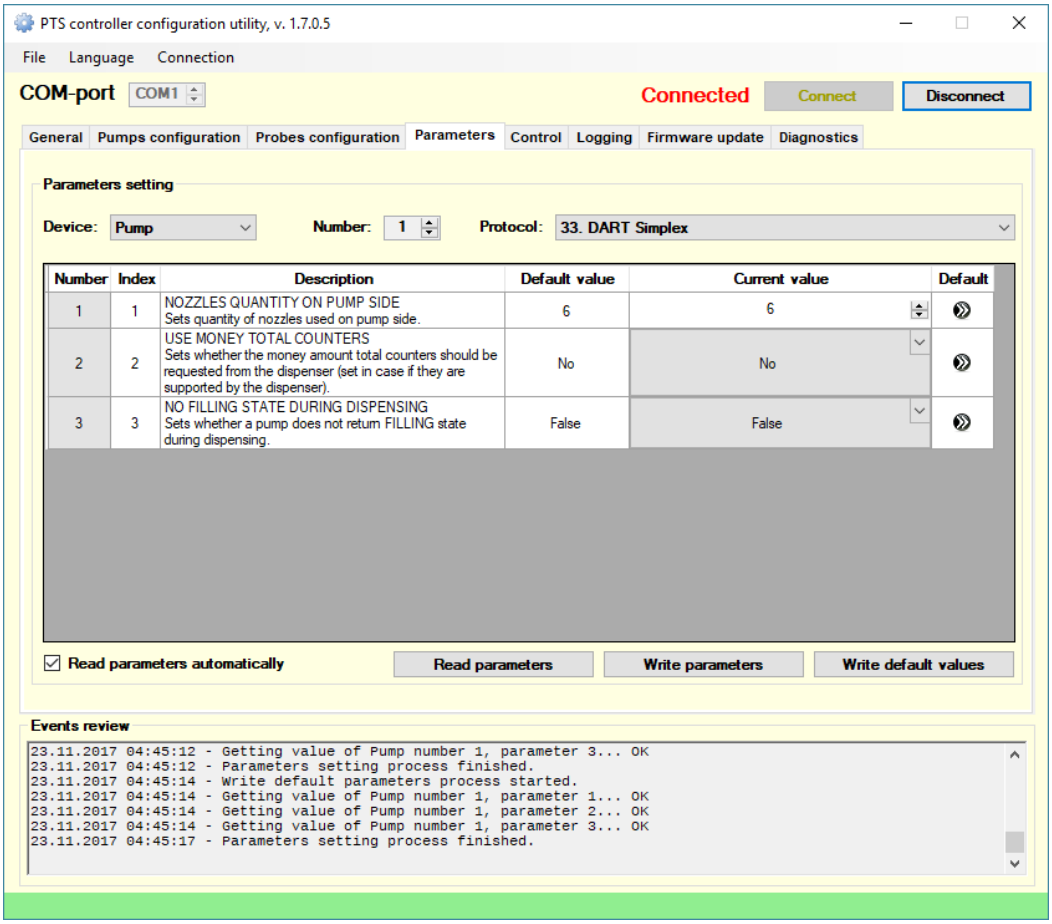
All parameters are listed in a table with detailed description. Default parameters values are specified in a separate column. To get a current value of the parameter it is necessary to read them from PTS controller.

Configuration of PTS controller parameters includes various adjustments for PTS controller operation.

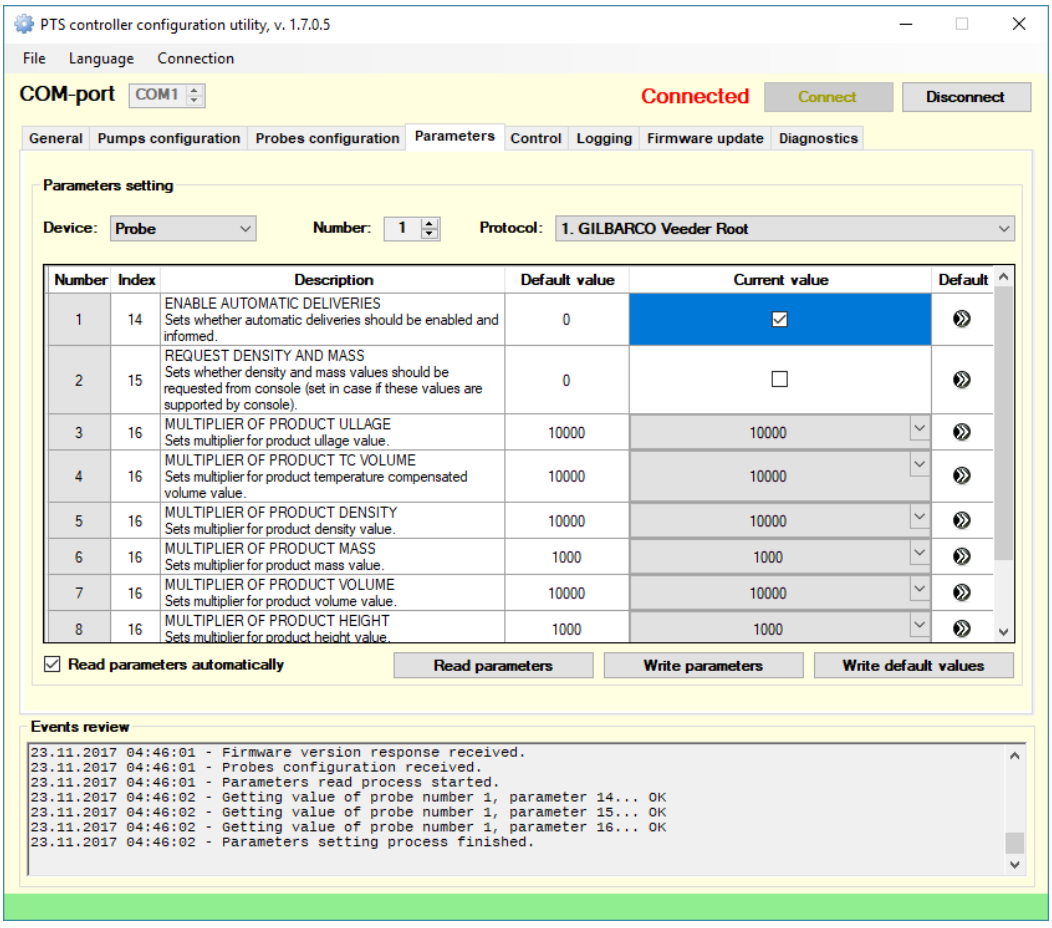
Some of the pumps and probes communication protocols also require setting of parameters. These parameters are set for the specified logical address of the pump (or probe) and do not refer to other pumps (or probes) in the PTS controller.

Description and settings of all parameters as well as a list of all supported communication protocols and baud rates by PTS controller are described in file pts_config_en.xml (file may have other name depending on the used language).

Examples of the device protocol parameters:

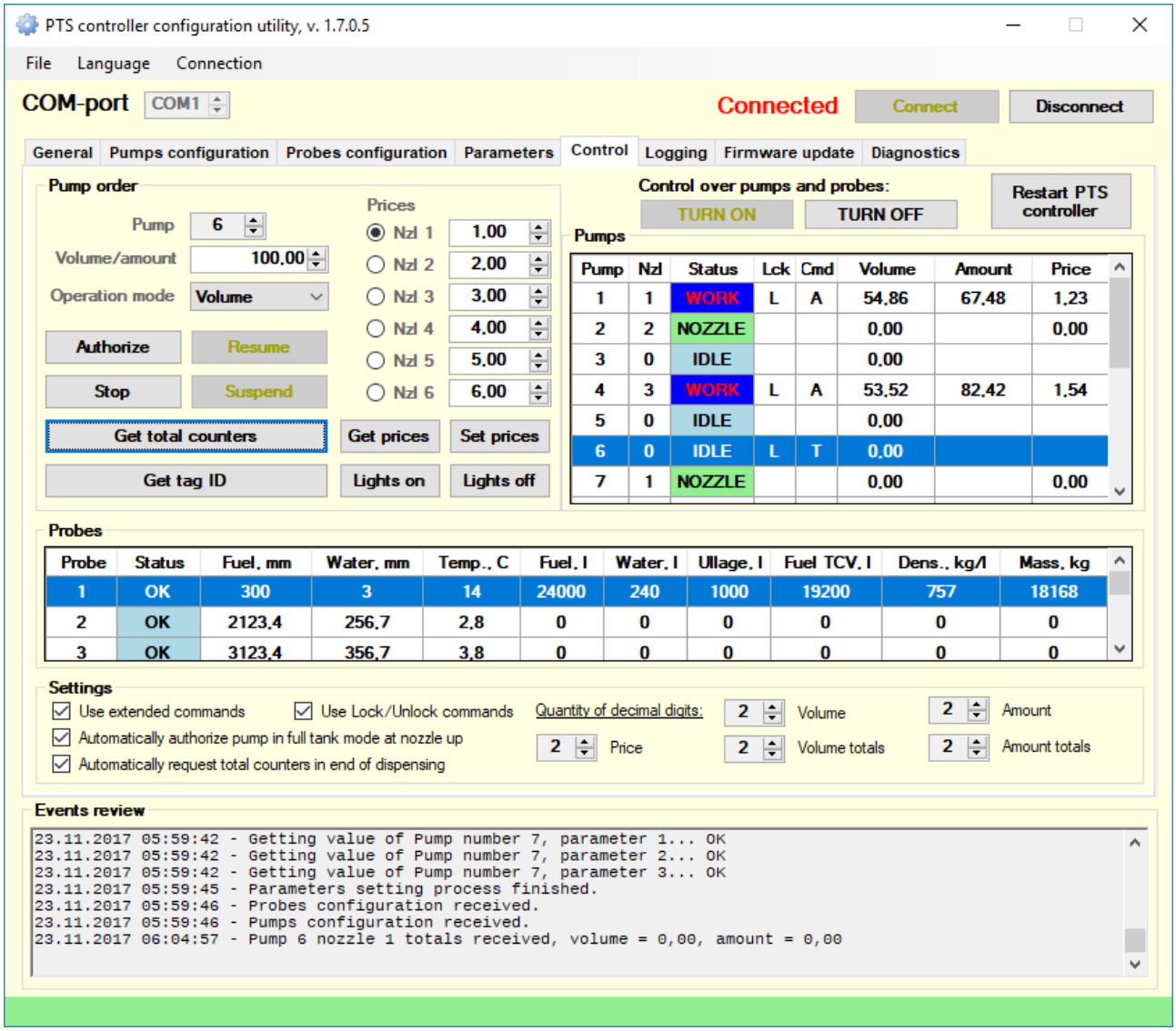


Parameters for pump - Dart communication protocol parameters for pump 1



Parameters for probe – Gilbarco Veeder Root communication protocol parameters for probe 1

Tab "Control"



Tab "*Control*" serves for provision of control over connected pumps and probes.

Section "*Pumps*" is used for displaying state of all 16 pumps of PTS controller, current taken up nozzle, state whether the pump is locked by PTS controller, currently executed command and also volume, money amount and price of dispensed fuel. Selection of the pump is made by selecting a pumps row in a table.

Section "*Pump order*" is made for provision of control over the pumps:

- selection of pump
- field for setting a dose to be dispensed by selected pump
- selection of operation mode: volume preset, money amount preset, full tank
- commands to be given to selected pump: authorize, stop, suspend, resume, get total counters, get and set price, get tag ID, turn lights on or off.
- fields for getting/setting prices of each nozzle of the selected pump

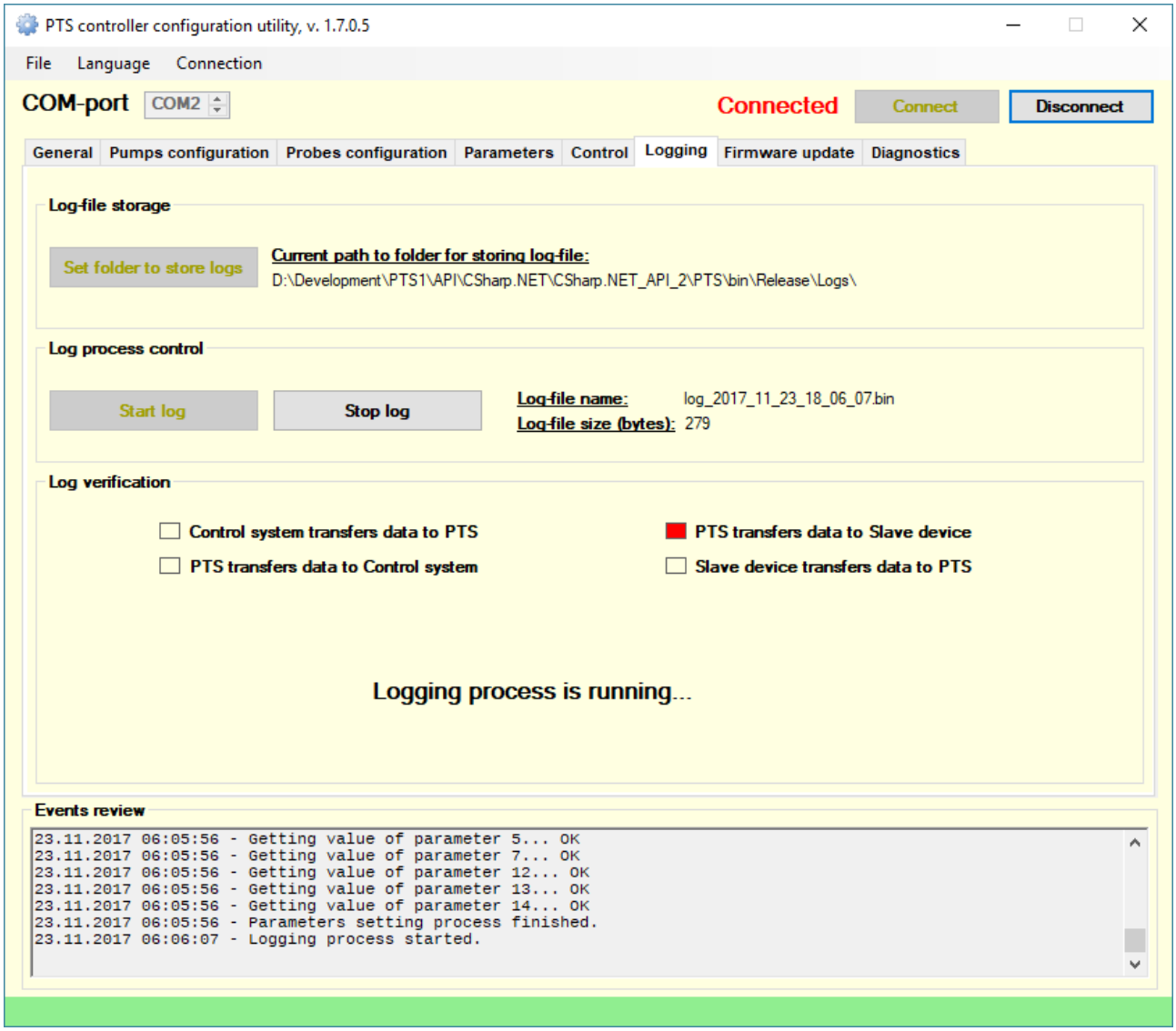
Section "*Probes*" is used for displaying measurement data of each of 16 probes of PTS controller.

Section "*Settings*" includes the following settings:

- "*Use extended commands*" sets if communication with PTS controller should be doe using general commands of extended (extended commands are to be used instead of general commands when there is necessity to get/set values to PTS controller, which size is biger than provided by general UniPump protocol format)
- "*Use Lock/Unlock commands*" – if this option is selected then PTS controller will try to lock the pump before giving command to it and unlock it after the command is performed, it this option is not set then PTS controller will not send LockRequest and UnlockRequest commands. This option should be equal to PTS parameter "Use command LockRequest and UnlockRequest".
- "*Automatically authorize pump in full tank mode at nozzle up*" – if this option is set then PTS controller will automatically authorize the pump with volume on 999999 liters automatically at once when the nozzle is up. This is made to set dispensing in completely automatic mode without any actions to be performed on computer to start dispensing.
- "*Automatically request total counters in end of dispensing*" – I this optionis set then PTS controlle will automatically request total counters from the pump at the end of dispensing (after a transaction is closed).
- "*Quantity of decimal digits*": these options set number of decimal places used in pump in fields of volume, money amount, price, volume and money amount total counters. The quantity of decimal digits in these fields should correspond to their quantity in the pump in order to make numbers displays in pump same as in this PTS configuration utility.

Events review fields displays results of all performed operations.

Tab "Logging"



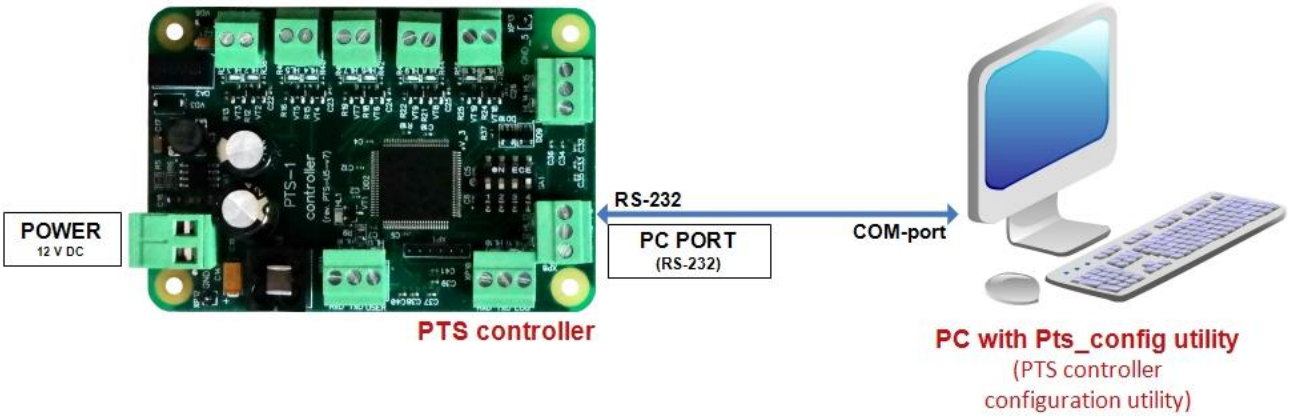
Tab "*Logging*" serves for logging of communication exchange between the PTS controller and connected pumps or probes.

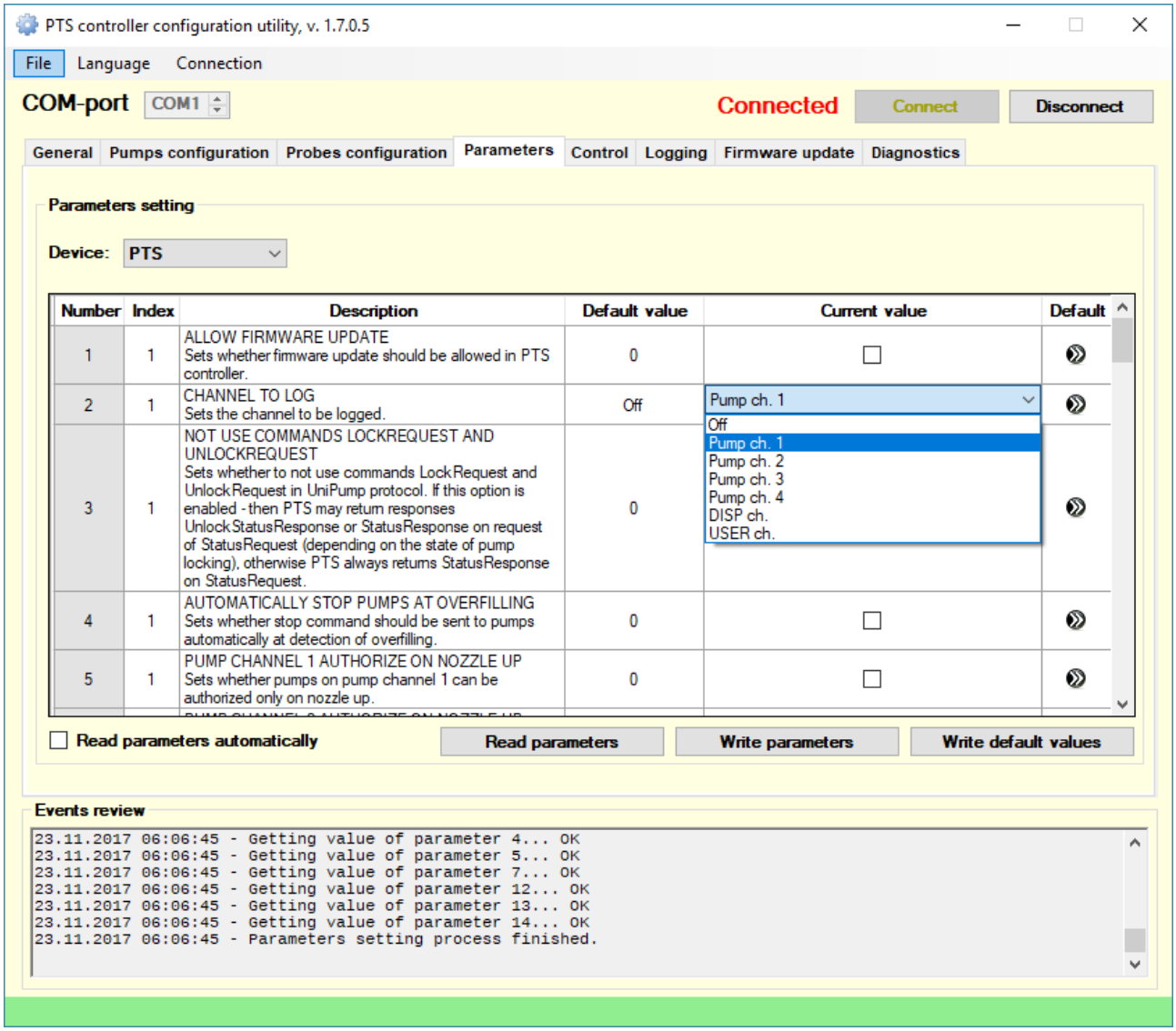
With a reason to quickly locate and remove possible bugs in PTS controller communication with connected equipment (fuel dispensers and ATG systems) PTS controller has a possibility of logging of its exchange with connected equipment. Use *Pts_config.exe* utility to save in a control system exchange logs of PTS controller with connected equipment.

Configuration of PTS controller to get a log

In order to get the log it is necessary first to set a port to be logged. For this connect PTS controller to PC and run Pts_config utility.

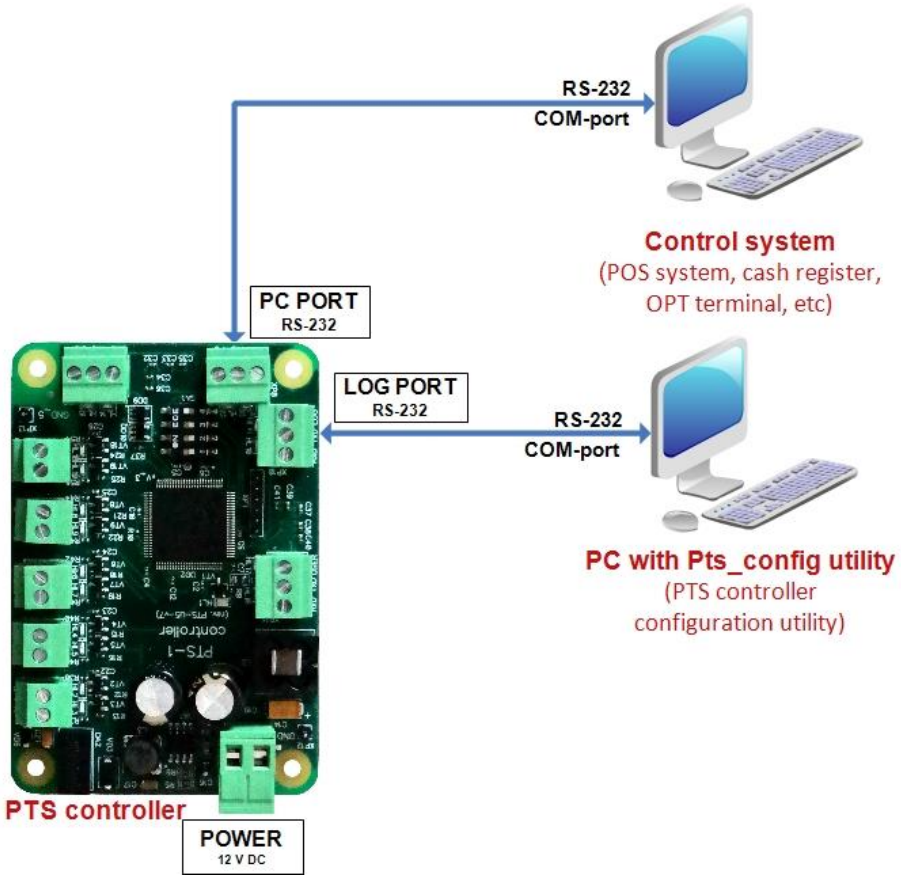
In Pts_config utility go to tab "Parameters" and there set a parameter for PTS controller named "Port to log" for the PTS controller port, from which a log should be taken (see below screenshot). Save this configuration.


POWER
12 V DC
RS-232
PC PORT
(RS-232)
COM-port
PTS controller
PC with Pts_config utility
(PTS controller
configuration utility)


PTS controller configuration utility, v. 1.7.0.5
File
Language
Connection
COM-port
COM1
Connected
Connect
Disconnect
General
Pumps configuration
Probes configuration
Parameters
Control
Logging
Firmware update
Diagnostics
Parameters setting
Device:
PTS
Number
Index
Description
Default value
Current value
Default
1
1
ALLOW FIRMWARE UPDATE
Sets whether firmware update should be allowed in PTS controller.
0
2
1
CHANNEL TO LOG
Sets the channel to be logged.
Off
Pump ch. 1
Off
Pump ch. 1
Pump ch. 2
Pump ch. 3
Pump ch. 4
DISP ch.
USER ch.
3
1
NOT USE COMMANDS LOCKREQUEST AND UNLOCKREQUEST
Sets whether to not use commands LockRequest and UnlockRequest in UniPump protocol. If this option is enabled - then PTS may return responses UnlockStatusResponse or StatusResponse on request of StatusRequest (depending on the state of pump locking), otherwise PTS always returns StatusResponse on StatusRequest.
0
4
1
AUTOMATICALLY STOP PUMPS AT OVERFILLING
Sets whether stop command should be sent to pumps automatically at detection of overfilling.
0
5
1
PUMP CHANNEL 1 AUTHORIZE ON NOZZLE UP
Sets whether pumps on pump channel 1 can be authorized only on nozzle up.
0
Read parameters automatically
Read parameters
Write parameters
Write default values
Events review
23.11.2017 06:06:45 - Getting value of parameter 4... OK
23.11.2017 06:06:45 - Getting value of parameter 5... OK
23.11.2017 06:06:45 - Getting value of parameter 7... OK
23.11.2017 06:06:45 - Getting value of parameter 12... OK
23.11.2017 06:06:45 - Getting value of parameter 13... OK
23.11.2017 06:06:45 - Getting value of parameter 14... OK
23.11.2017 06:06:45 - Parameters setting process finished.

Procedure to get a log

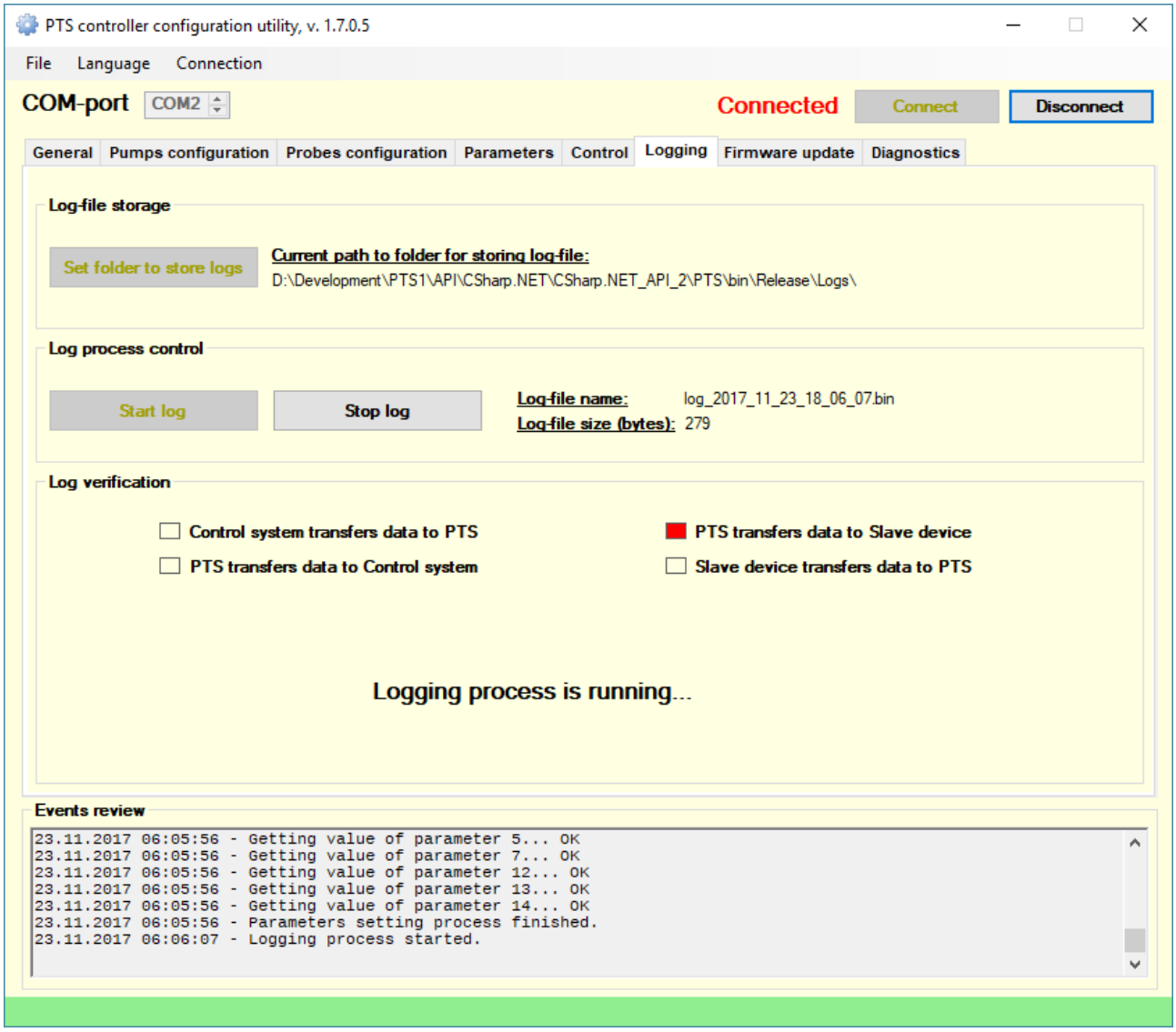
For taking a log it is necessary to connect the PC to PTS controller port LOG as shown on the scheme below. At this PTS controller should be working with connected equipment and control system. Log is taken online – all current actions on the selected port are written to the log-file (no log is stored inside PTS).



On the tab "*Logging*" it is necessary to select a folder, where the log-file is to be stored and press "*Start log*" button. Log process will be displayed in the "*Log verification*" section and size of the log-file capture will be displayed on the form.

"*Log verification*" section displays log process by indicating the direction of currently taken log:

1. Control system transfers data to PTS
2. PTS transfers data to Control system
3. PTS transfers data to Slave device
4. Slave device transfers data to PTS



In case if there is no data transferred – the "*Log verification*" section displays a message "*Log is not taken, please recheck log parameters in PTS controller and connections!*". If you see this message – you need to recheck all the configuration and connections to get a log.

Each of the boxes in "*Log verification*" section display a direction of messages sent in PTS controller communication.

NOTE! At taking a log make sure that the red boxes on the right side blink indicating exchange between the PTS and Slave device. If they do not blink – it means that the log of exchange on selected port is not written, at this you should recheck your logging port parameter in PTS controller parameter or check communication between the PTS controller and connected device on the specified port.

Log is accumulated to a file, size of file should be growing during the logging process, if it does not grow – then the log is not taken, you will probably see a message "*Log is not taken, please recheck log parameters in PTS controller and connections!*" in "*Log verification*" section as described above.

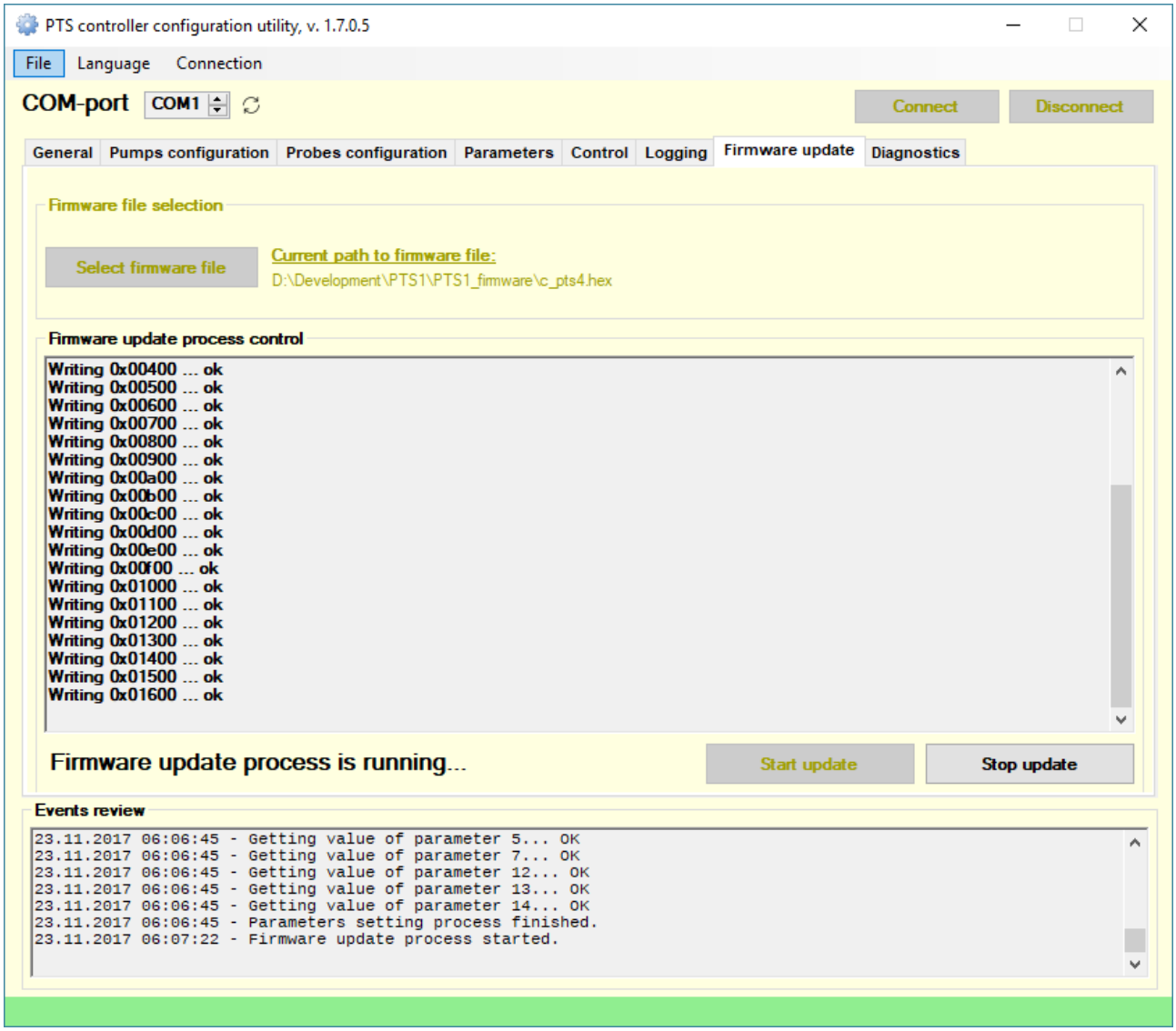
Log-file has a name with indication of the time of log taken, for example: log_2014_07_04_12_14_58.bin, which means that the log was taken on 4th of July, 2014 at 12:14:58.

In case if log process is switched on – a new log-file with a new name is created each 30 minutes (old log-file is saved). This allows to avoid log-file overfilling when its size comes to critical to the operating system.

Thus, you can switch on logging and wait until any problem happens. When it happens and you approximately know time of this problem – you can take appropriate (by name) log-file and send to Technotrade LLC for analysis.

Log in accumulated in the encrypted form. After a log of exchange is taken it is required to pass a received *bin* file to Technotrade LLC company for examining and elimination of possible problems, for reasons of which it was taken.

Tab "Firmware update"

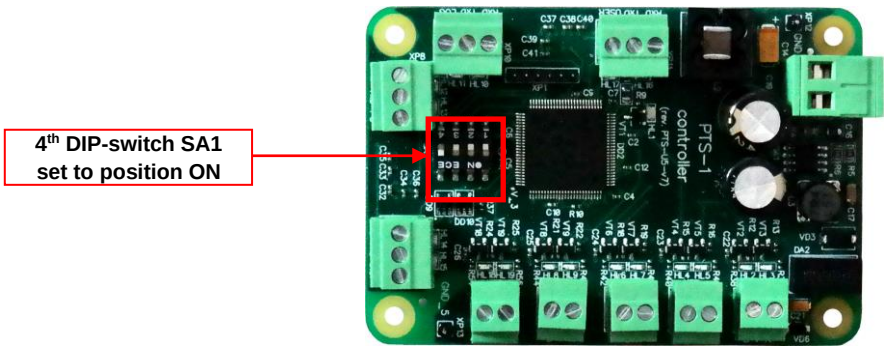


Tab "*Firmware update*" servers for updating of firmware of PTS controller and other interface converters.

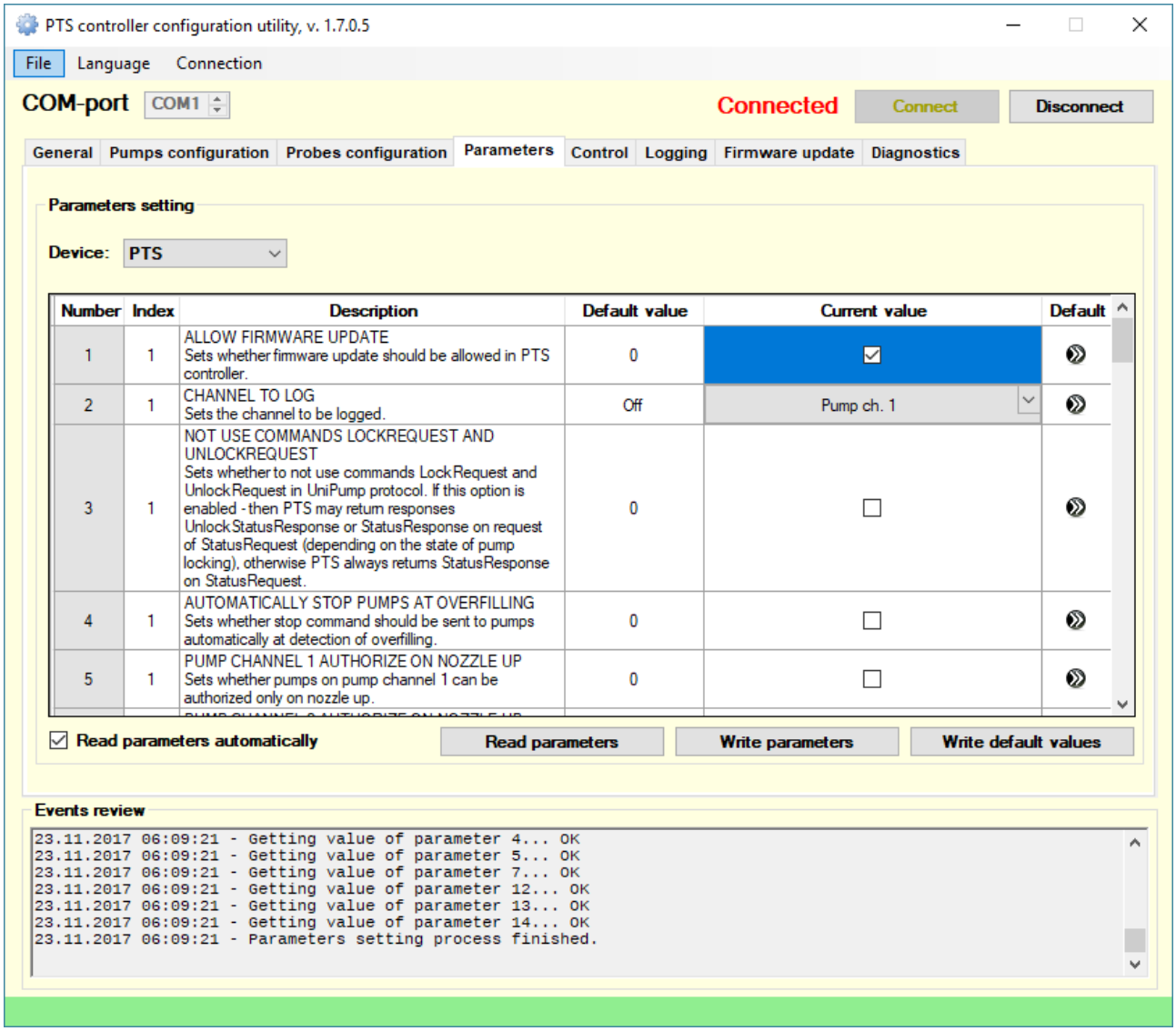
PTS controller firmware is constantly being improved and new versions of firmware with new added communication protocols and fixed bugs of the previous firmware versions are proposed to be applied. New versions of PTS controller's firmware are always available for downloading for customers.

For update of firmware update it is necessary to make one of 2 possible actions:

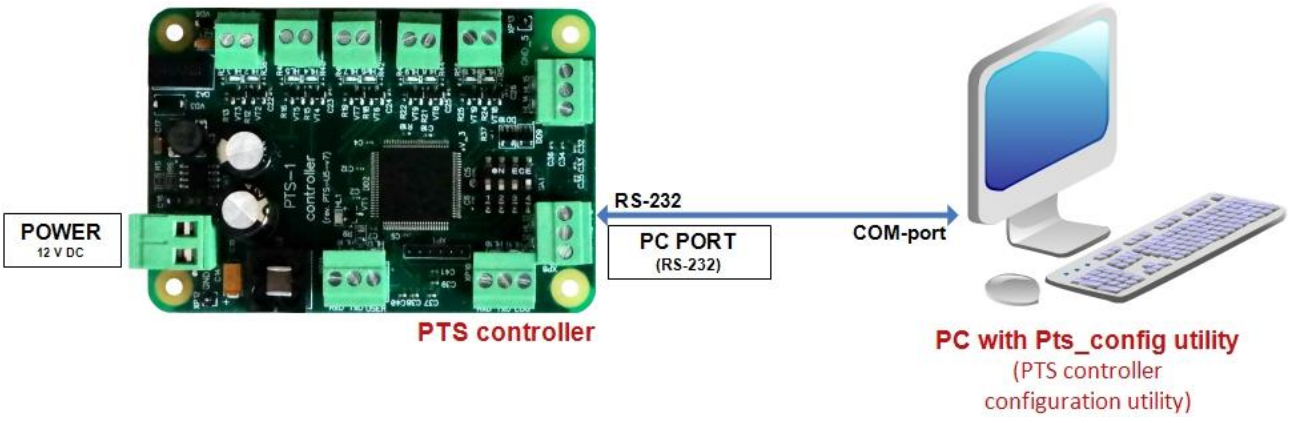
1. Set 4th DIP-switch SA1 in position ON:



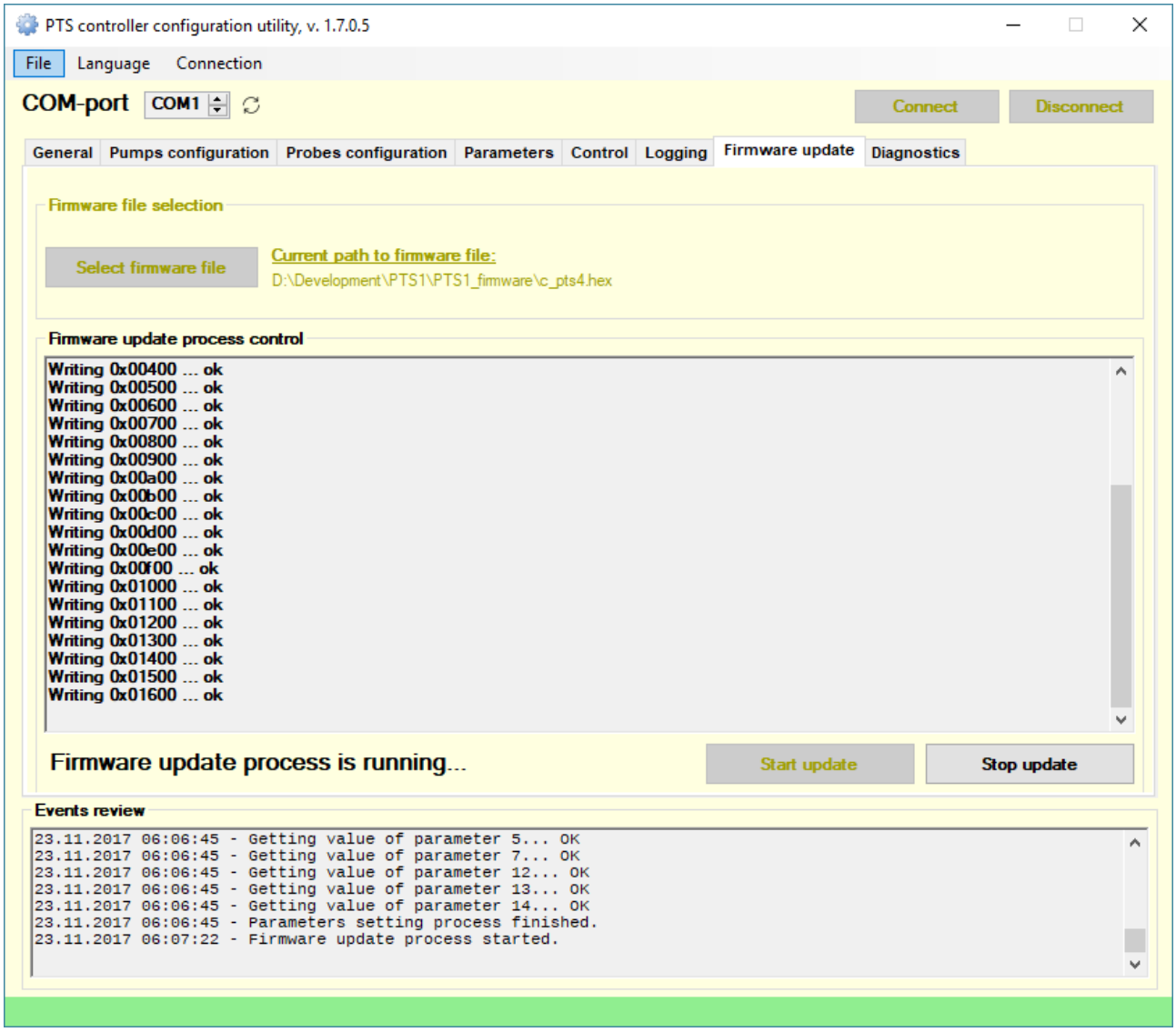
2. Set a PTS controller parameter “ALLOW FIRMWARE UPDATE” to enable firmware update of PTS controller:



Connection of the PTS controller is done directly to COM-port of PC.



On tab “Firmware update” it is necessary select the COM-port number of the PC, check that connection is not opened (COM-port is closed) and select the firmware file before starting the firmware update process.



Firmware update process will start upon clicking on button “Start update”. In case if the firmware is not being updated – power off the PTS controller, click to start firmware update and power on the PTS controller. At this the firmware update process should start.

NOTE! In order to prevent PTS controller firmware from accidental update it is strictly recommended to keep 4th DIP-switch SA1 in OFF position and disable PTS controller parameter “ALLOW FIRMWARE UPDATE” in any moment of time except for firmware update needs.

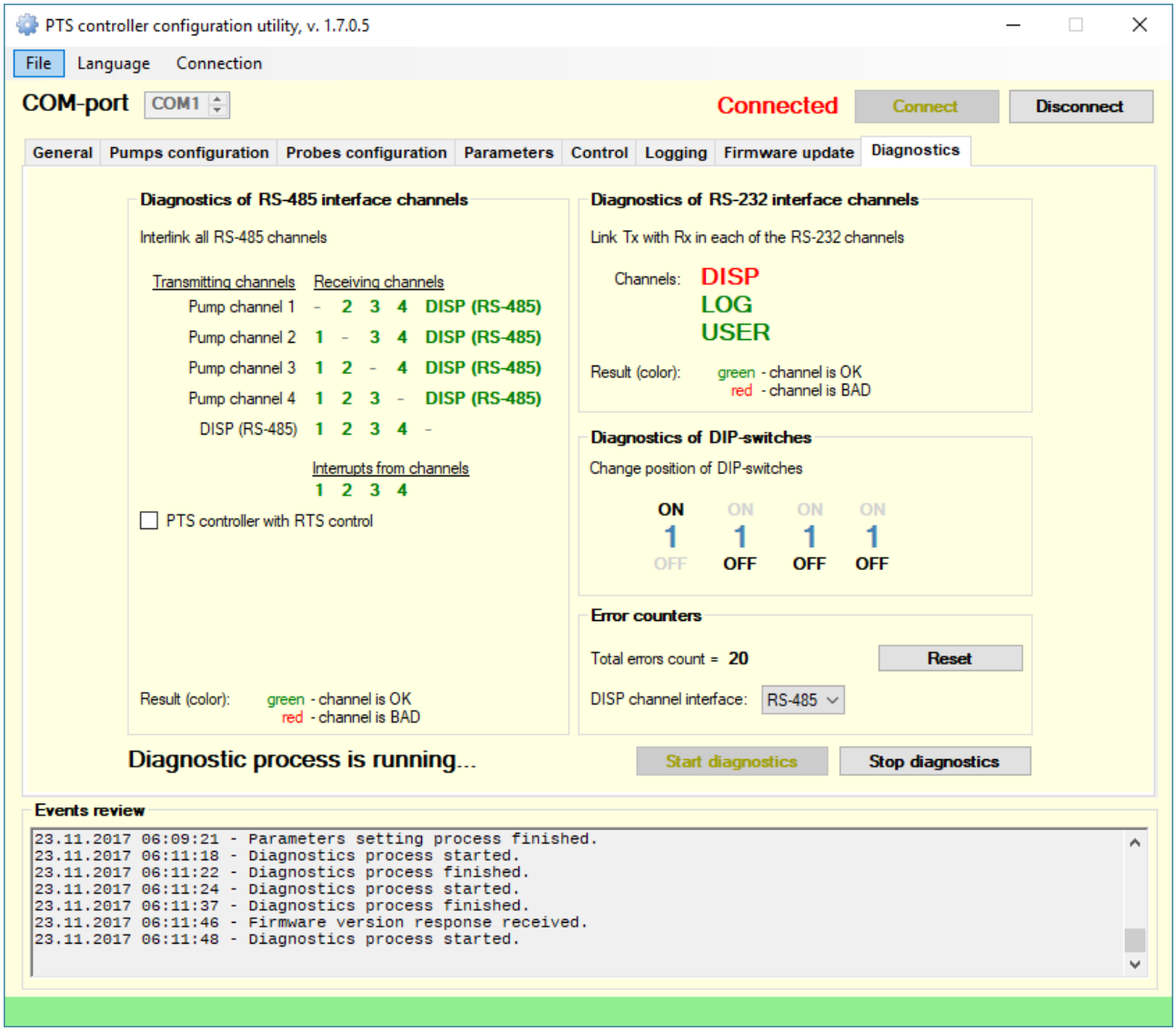
NOTE! Pay attention that your PTS controller is using latest version of the firmware. Latest version of firmware can be received upon request from Technotrade LLC company or downloaded from Technotrade LLC company website. Normally new firmware for PTS controller is issued together with PTS configuration utility update having latest features of PTS controller, so updated version of the PTS controller configuration utility Pts_config.exe should be also requested and downloaded. Information on the present firmware version of PTS controller can be checked on tab “General” (mentioned above).

Due to a reason that some firmware versions may erase all configuration of the PTS controller it recommended to save all configuration of PTS controller to file before making an update (see on tab “*General*” section *“Save current configuration to file*”) and in case if after the update the PTS controller configuration turns out to be erased – restore all the configuration from the previously saved file (see on tab “*General*” section “*Restore configuration from file*”).

NOTE! In case if an error happened during the firmware update process and PTS-1 controller became unresponsive please make the following procedure:

1. Power off the PTS controller and wait until all the LEDs on the PTS controller board stop blinking or shining.
2. In PTS controller board set DIP-4 switch to ON position.
3. Connect PTS controller to PC with PTS configuration utility.
4. In PTS configuration utility select the firmware update file, COM-port number and click on “Start update” button.
5. Power on the PTS-1 controller – at this firmware update process should start automatically.
6. After the firmware update process is completed set DIP-4 switch back to OFF position.

Tab "Diagnostics "

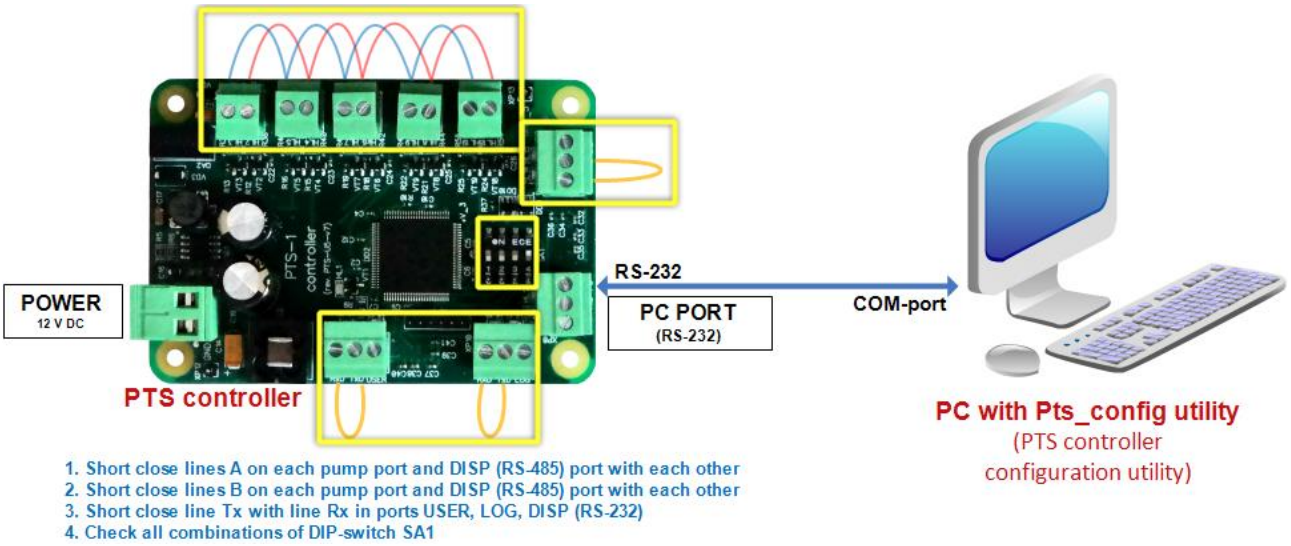


Tab "*Diagnostics*" servers for self-diagnostics of PTS controller ports and DIP-switches.

Scheme of connections of the PTS 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 LOG, USER and DISP (RS-232) ports pin TxD should be shortened with pin RxD as shown on the picture.



Diagnostics of port with RS-485 interfaces

In section “Diagnostics of RS-485 interface channels” results of diagnostics will be shown by color of labels. Green color means that correspondent channel is working correctly (OK), red color – correspondent channel is working incorrectly (BAD). In case if the error counter increases its value – then the errors are taking place.

For PTS controller of version PTS-U5 area RTS channel 1 – 4 should not be taken into account cause is used with previous versions of PTS controller (PTS-U, PTS-U2, PTS-U3).

Diagnostics of port with RS-232 interfaces

In section “Diagnostics of RS-232 interface channels” results of diagnostics will be shown by color of labels. Green color means that correspondent channel is working correctly (OK), red color – correspondent channel is working incorrectly (BAD). In case if the error counter increases its value – then the errors are taking place.

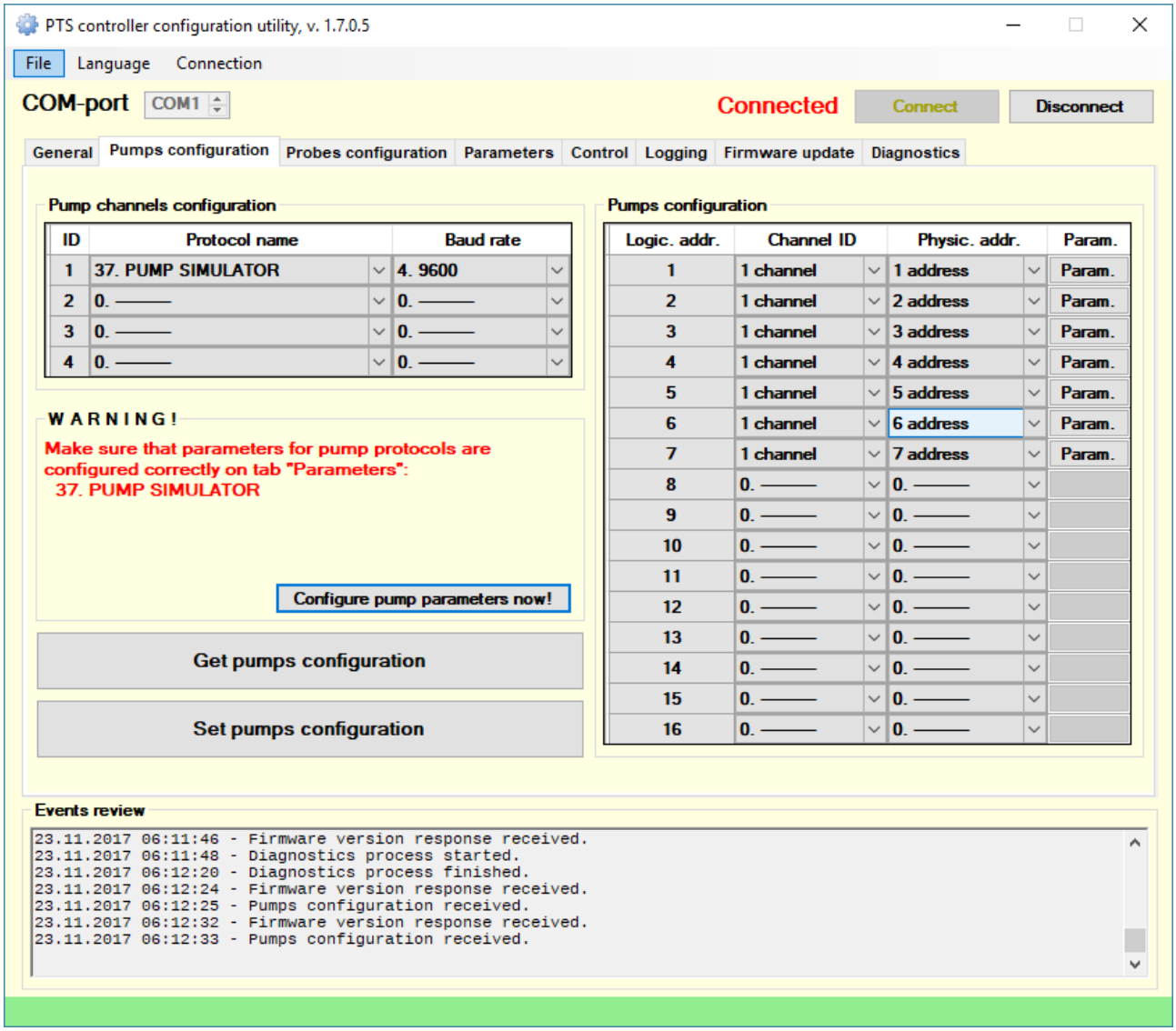
Diagnostics of DIP-switch SA1

In section “*Diagnostics of DIP-switches*” current position of switches in SA1 DIP-switch on PTS board is displayed. If displayed position of switches correspond to real position of switches in DIP-switch SA1 on PTS board after checking them in various positions – then DIP-switch SA1 is working correctly.

BUILT-IN PUMPS SIMULATOR

PTS controller firmware between its pump protocols has a protocol "*37. PUMP SIMULATOR*", which allows to simulate presence of connected pumps. Baud rate at this can be set to any possible.

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

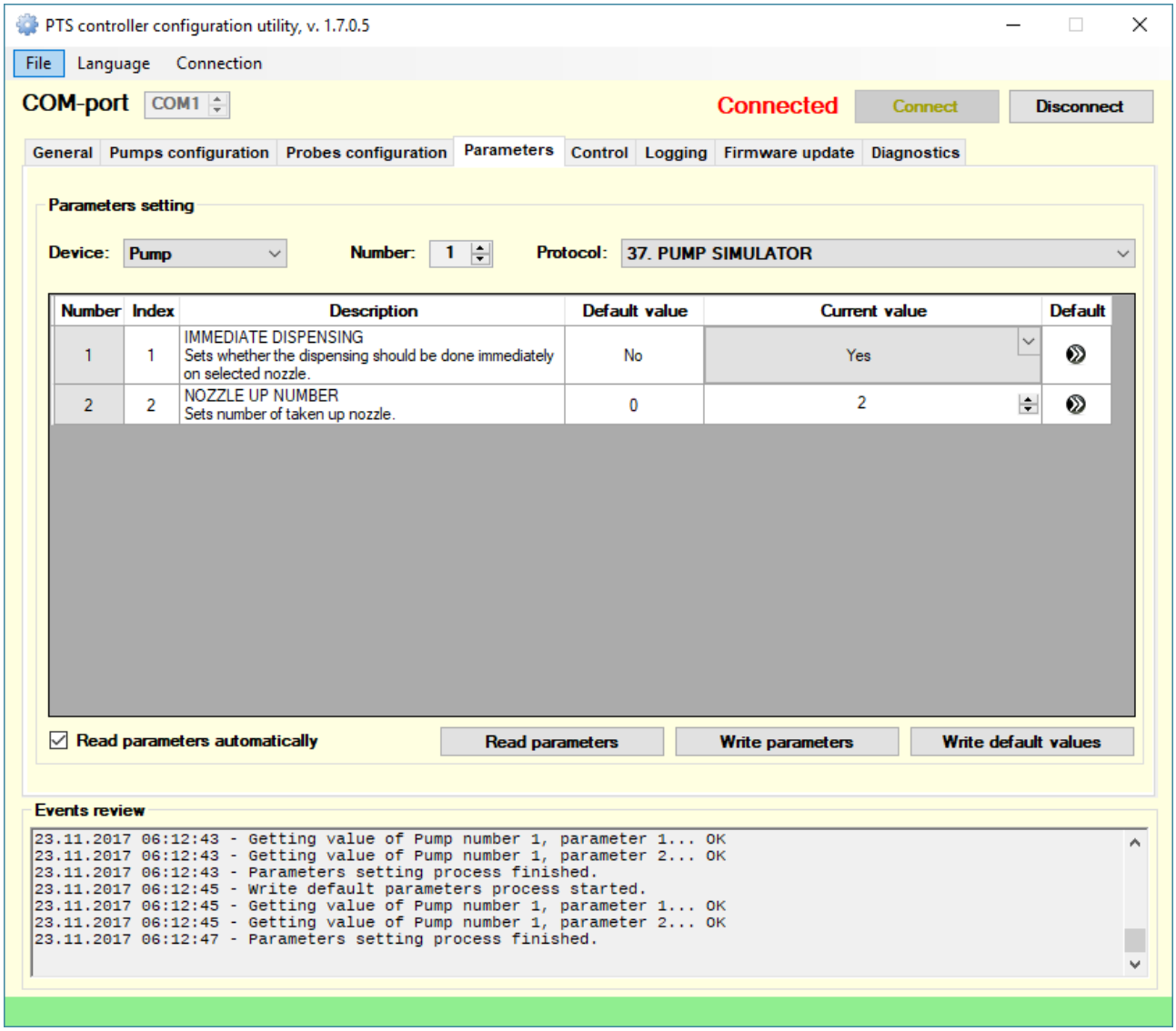


Purpose of the pump simulator protocols is to help developers in debugging of the control system software over PTS controller at absence of real dispenser pumphead for connection or software simulators of fuel dispenser.

When protocol "*37. PUMP SIMULATOR*" is selected – then it is possible to debug dispensing of the pumps without any pumphead or simulator connected to PTS controller. 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.

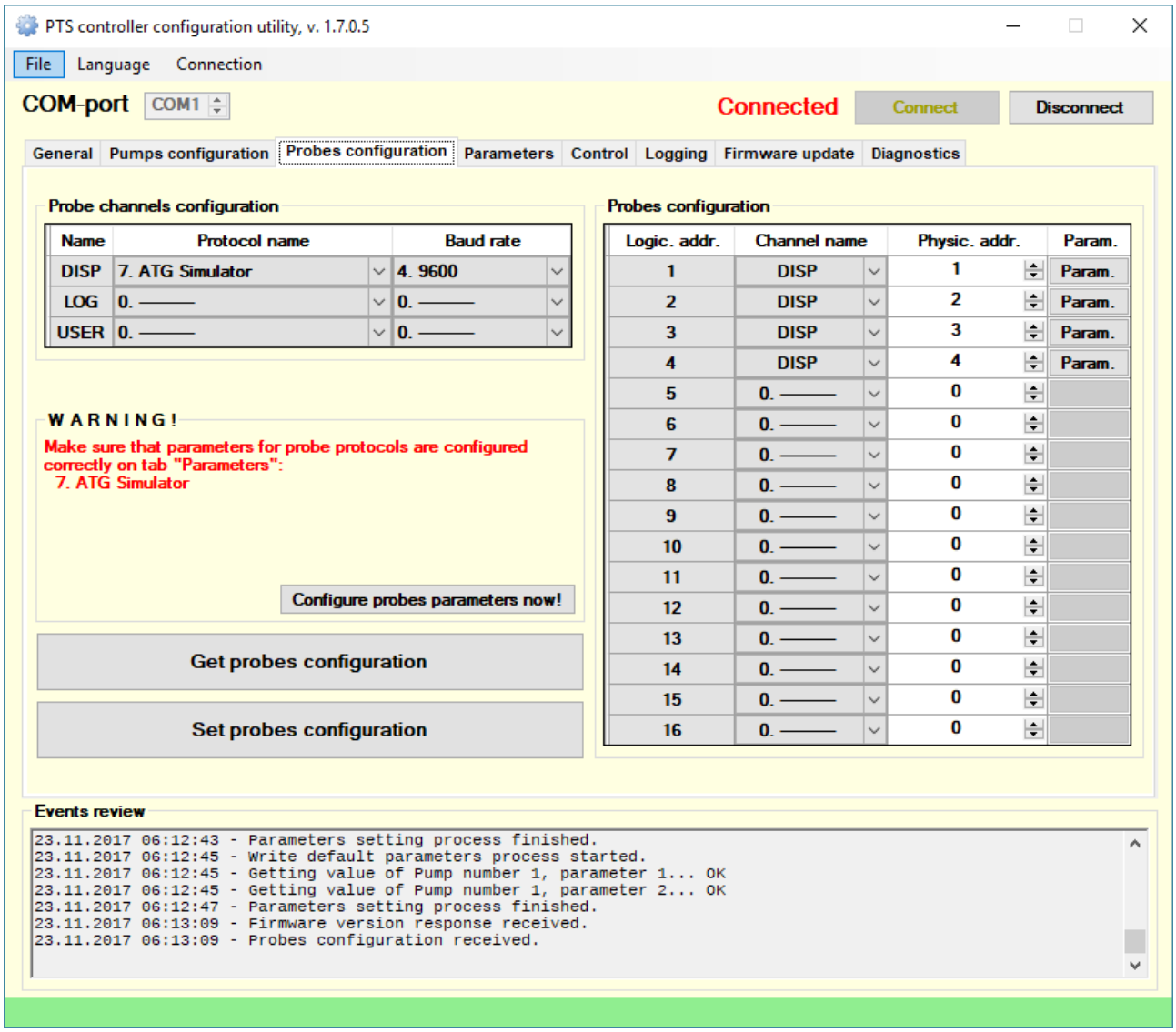
Pump simulators allow to:

- 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 controller)
- set pause during dispensing and release (continue) dispensing after pause



BUILT-IN ATG PROBES SIMULATOR

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



At this depending on the selected address of the ATG probe output measurement values will be the following.

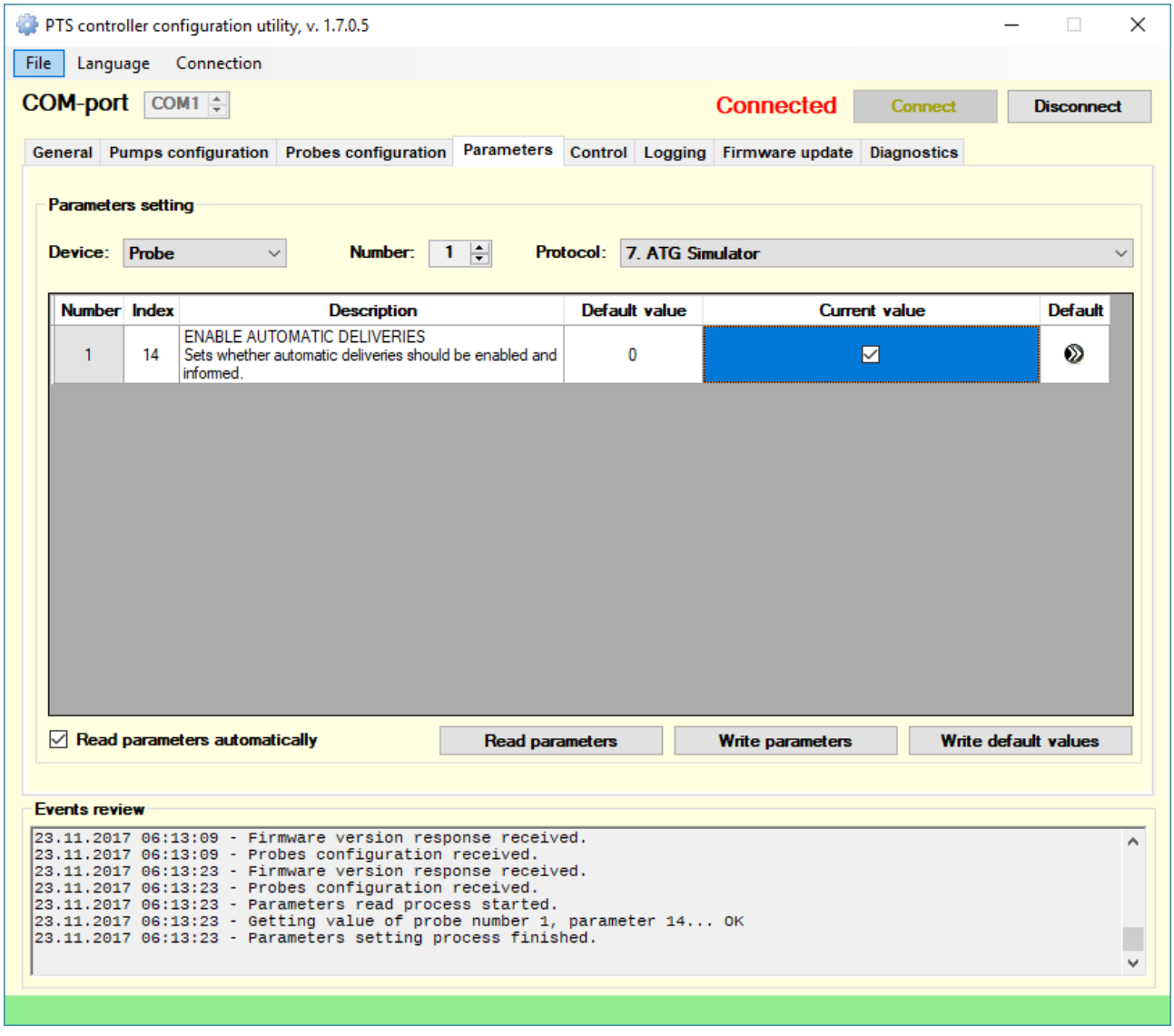
For ATG probes with logical address 1 – dynamically changing all measurement parameters looping in the following sequence (measurement numbers coming from 1 to 9 and back from 9 to 1):

		Measurement number							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Measurement parameter	**Product level, mm**	100	120	150	160	200	222.5	250	300
	Water level, mm	1	1.2	1.5	1.6	2	2.2	2.5	3
	Product volume, l	8000	9600	12000	12800	16000	17800	20000	24000
	Water volume, l	80	96	120	128	160	176	200	240
	Temperature, deg. C	+11.0	+11.1	+11.3	+11.6	+12.0	+12.5	+13.1	+14.0
	Product temperature compensated volume, l	6400	7680	9600	10240	12800	14240	16000	19200
	Product ullage, l	17000	15400	13000	12200	9000	7200	5000	1000
	Product density, kg/m³	759	758.8	758.5	758.4	758	757.8	757.5	757
	Product mass, kg	6072	6829.2	9102	9100.8	12128	12882.6	15150	18168

For ATG probes with logical addresses 2-16 there are statically fixed measurement values:

- product level – logical address + 123.4 mm (example - for address 6: 6123.4 mm)
- water level – logical address + 56.7 mm (example - for address 9: 956.7 mm)
- temperature – logical address + 0.8 deg. C (example - for address 12: 12.8 deg. C)

There are parameters for "*7. ATG SIMULATOR*" probes protocol allowing to simulate reception of automatic in-tank deliveries reports from ATG systems.



PTS CONTROLLER API (APPLICATION PROGRAMMING INTERFACES)

PTS controller for developers is supplied together with rich set of API (application programming interfaces) for mostly used programming languages and operation platforms:

- **C and C++:** API for communication with a PTS controller through a COM-port, documentation and examples of application in source codes under Windows OS and Linux operation systems
- **C#:**
  - open source library, which includes classes, methods and properties for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller
  - open-source utility for testing and indication of all operations provided by the PTS controller, allows to perform all operations with the PTS controller
  - open source fully-functional application for provision of control over up to 8 pumps and 4 ATG systems by the PTS controller, allows to perform all operations with the PTS controller
  - open source PTS controller configuration and testing utility
- **Delphi:** API for communication with a PTS controller through a COM-port, documentation and examples of application in source codes
- **Java:**
  - open source library, which includes classes, methods and properties for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller
  - open-source utility for testing and indication of all operations provided by the PTS controller, allows to perform all operations with the PTS controller
- **Python:** API for communication with a PTS controller through a COM-port, documentation and examples of application in source codes
- **Visual Basic .NET:**
  - open source library, which includes classes, methods and properties for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller
  - open-source utility for testing and indication of all operations provided by the PTS controller, allows to perform all operations with the PTS controller
  - open source fully-functional application for provision of control over up to 8 pumps and 4 ATG systems by the PTS controller, allows to perform all operations with the PTS controller
  - open source PTS controller configuration and testing utility
- **COM-object for PTS controller:**
  - open-source COM-object (written in Microsoft Visual C++ 6.0 IDE in C++ programming language) with methods and properties for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller
  - open-source application in Microsoft Visual Basic 6.0 for testing and indication of all operations provided by the PTS controller, allows to perform all operations with the PTS controller
- **Description of communication protocol of PTS controller:** describes communication parameters, messages structure, commands and responses of communication between POS management system and PTS controller, typical flowchart and diagram of interoperation

C and C++ API

API represents a set of for communication with a PTS controller through a COM-port, documentation and examples of application in source codes under Windows OS and Linux operation systems

API can be compiled as a static or dynamic library. The library can be compiled by different compilers for different operating systems: POSIX compatible (tested with GNU Linux only) and Microsoft Windows.

Source code of library are located in ./src directory.
Headers of library located in ./include directory.
Directoty ./examples contains several examples of using library functions.
Directoty ./doc contains html documentation generated by ccdoc programm.

Conditionally, API functions can be divided into groups:

- Manage API: Open/close, receiving error, set/get API options
  - pts_open
  - pts_open_dev
  - pts_close
  - pts_last_error
  - pts_option_get
  - pts_option_set
- Handle of a controller configuration
  - pts_pump_config_get
  - pts_atg_config_get
  - pts_pump_config_set
  - pts_atg_config_set
  - pts_version_get
- Functions of a read and write parameters of the controller or filling places
  - pts_param_get
  - pts_param_set
- Functions of management by filling places
  - pts_authorize
  - pts_pts_authorize_by_amount
  - pts_halt
  - pts_lock
  - pts_unlock
  - pts_preset_prices
  - pts_prices_request
  - pts_status_request
  - pts_total_request
  - pts_trans_close
- Functions of reading measurements of Automatic Tank Gauge (ATG)
  - pts_atg_measure_request

Library functions (except for : pts_open, pts_open_dev, pts_close) have common features:

- return value: functions return 0 (FM_OK) if no error and error code if error (see include/pts_errors.h for
- determine the type of error)

- first of parameter - pts_api_descriptor - integer obtained by the open function: pts_open or pts_open_dev
- last parameter - pointer to PTS response structure - see include/pts_data.h for determine the data type.

All commands in protocol involve getting a response.

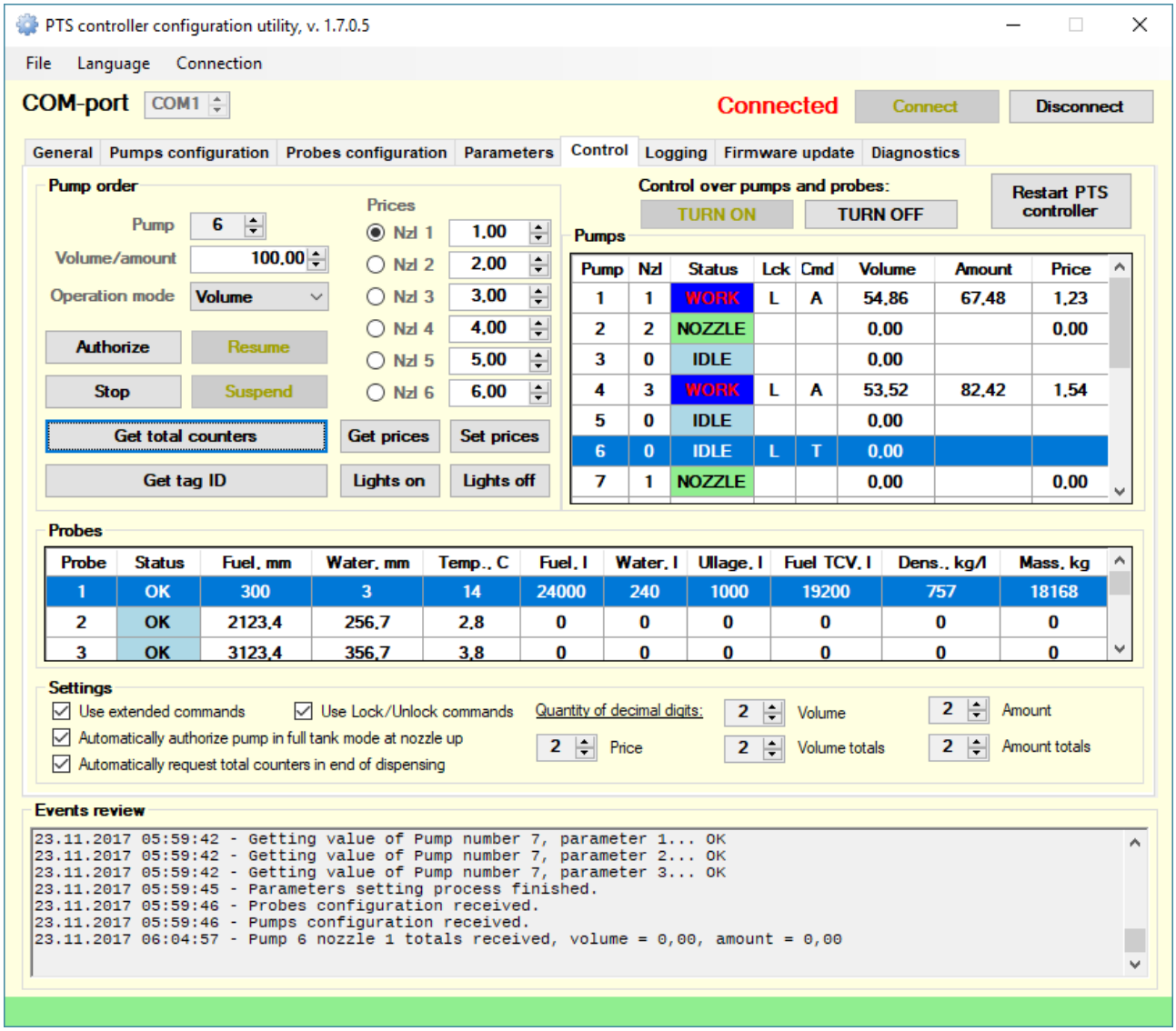
PS: If you want use *.bat files for call make, please edit it for set true path to your favorite language installation.

C# PTS controller configuration and testing utility

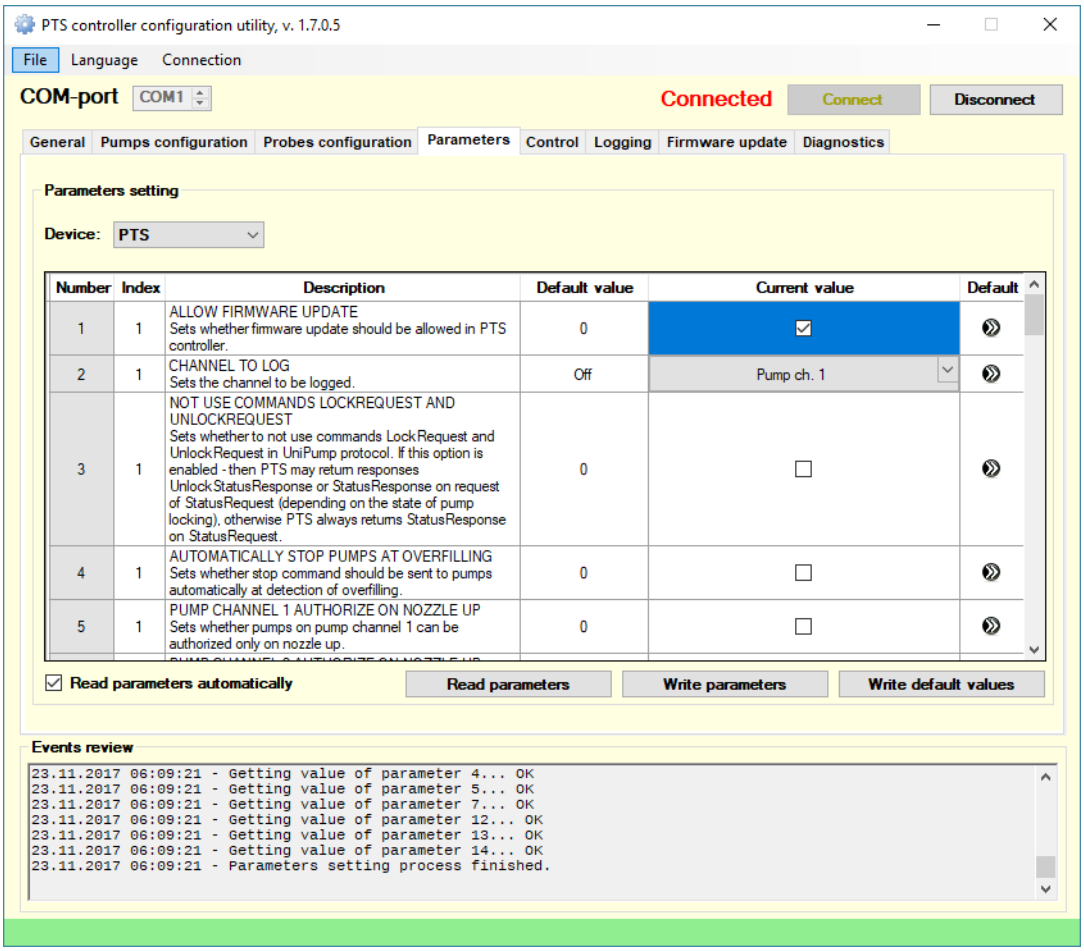
PTS controller configuration and testing utility is written in C# programming language in Visual Studio 2010 Express and requires .NET Framework 2.0.

Given application includes 2 projects:

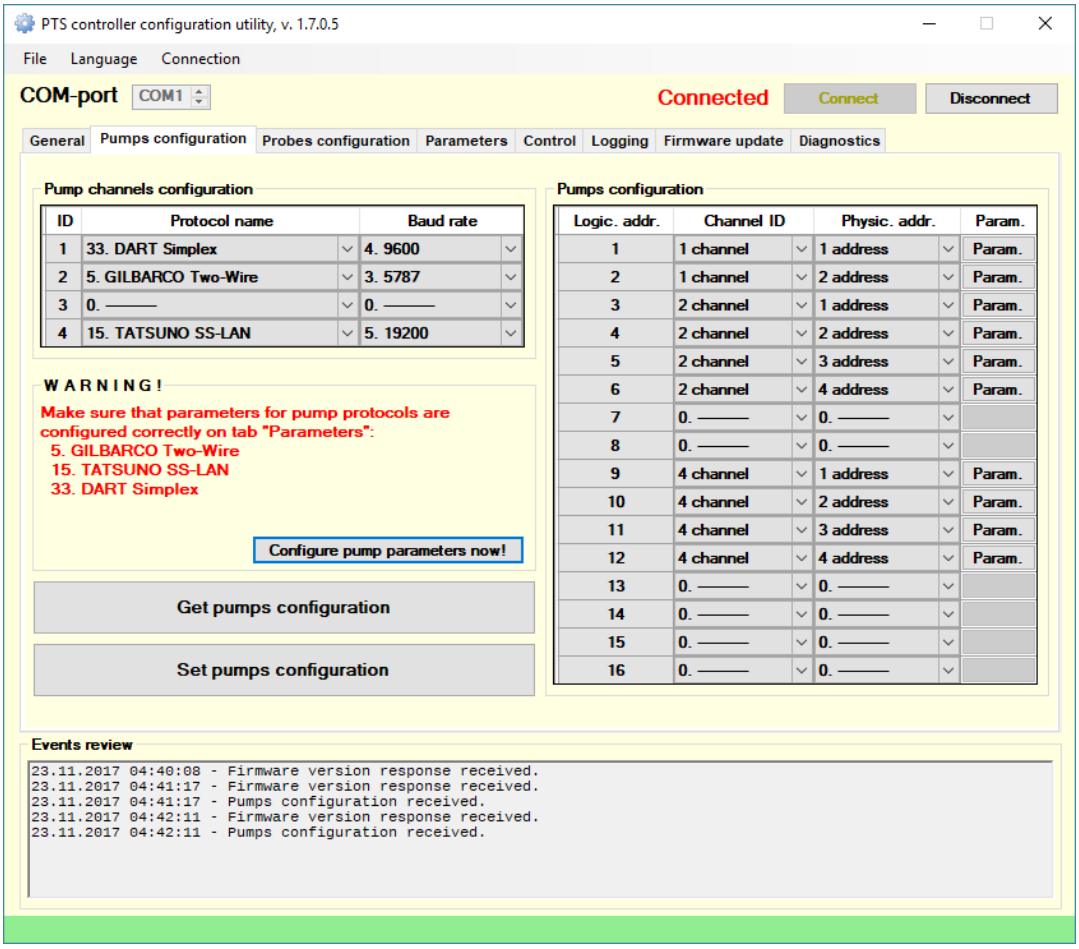
- PtsLib - project of PtsLib.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- Open source utility for configuration of PTS controller, provision of control over pumps and probes, logging of operation, firmware update, self-diagnostics, others (uses classes and methods of PtsLib.dll library).



PTS controller configuration and testing utility: tab "Control"



PTS controller configuration and testing utility: tab "Parameters"



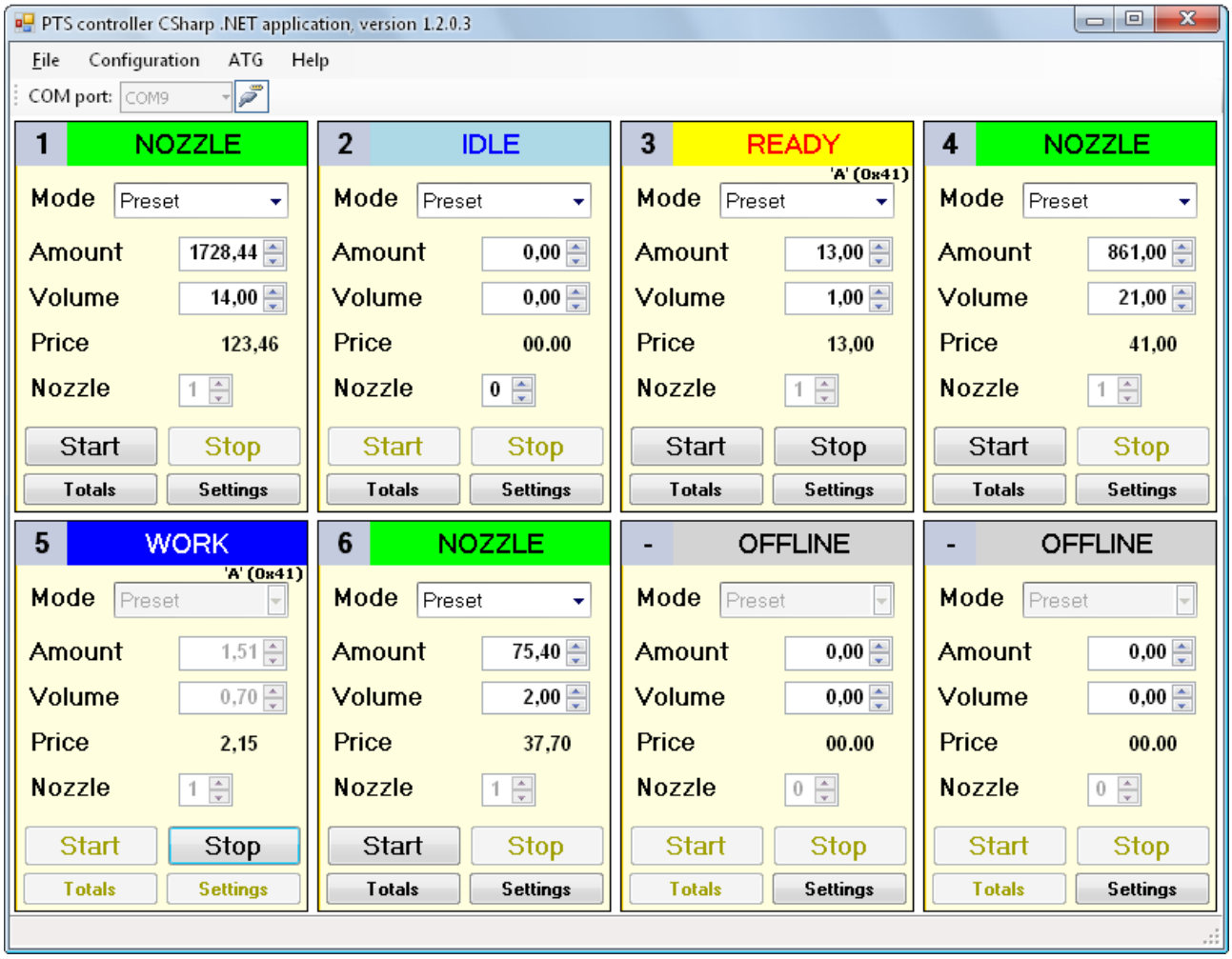
PTS controller configuration and testing utility: tab "Pumps configuration"

C# application

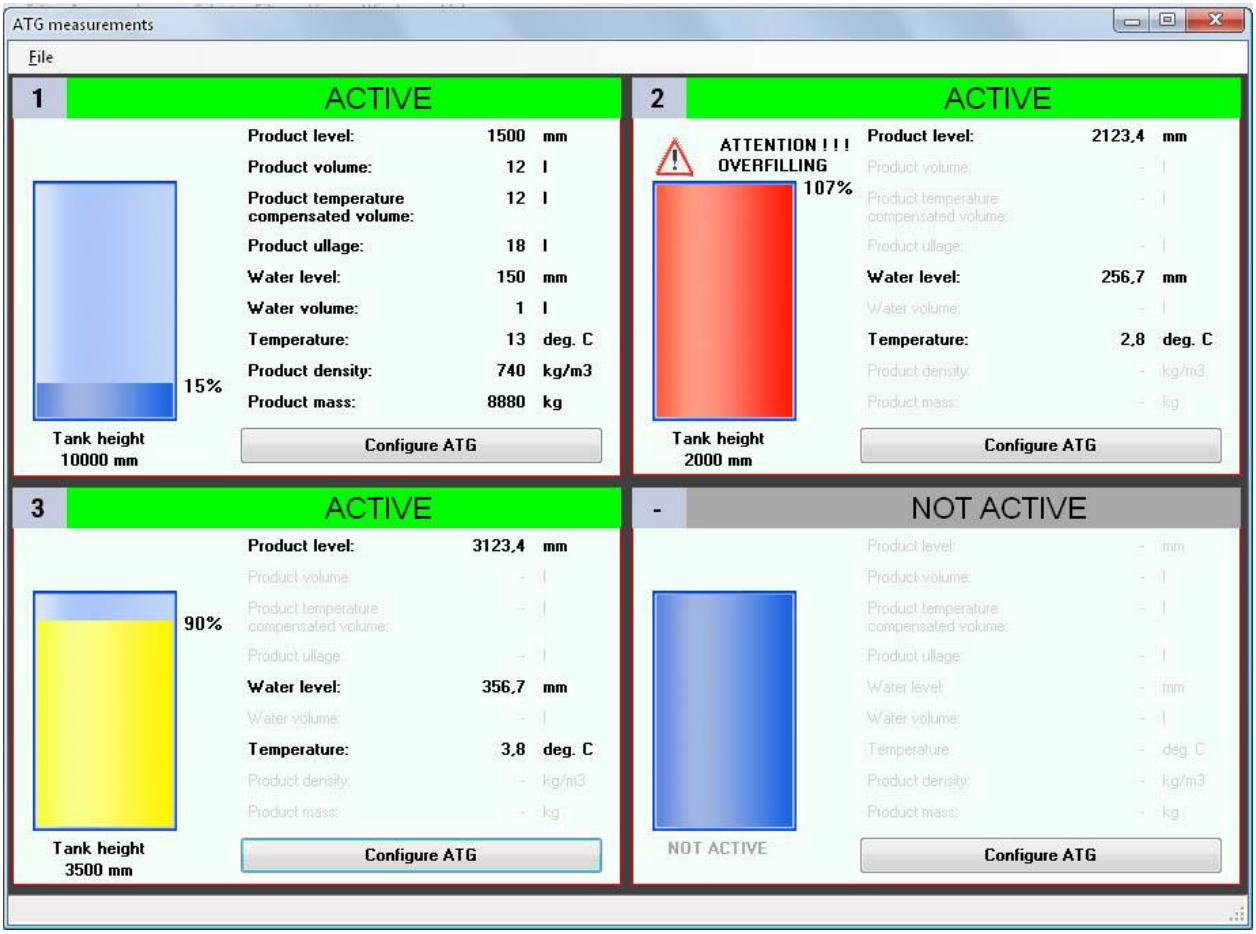
The application for PTS controller is written in C# programming language in Visual Studio 2010 Express and requires .NET Framework 2.0.

Given application includes 2 projects:

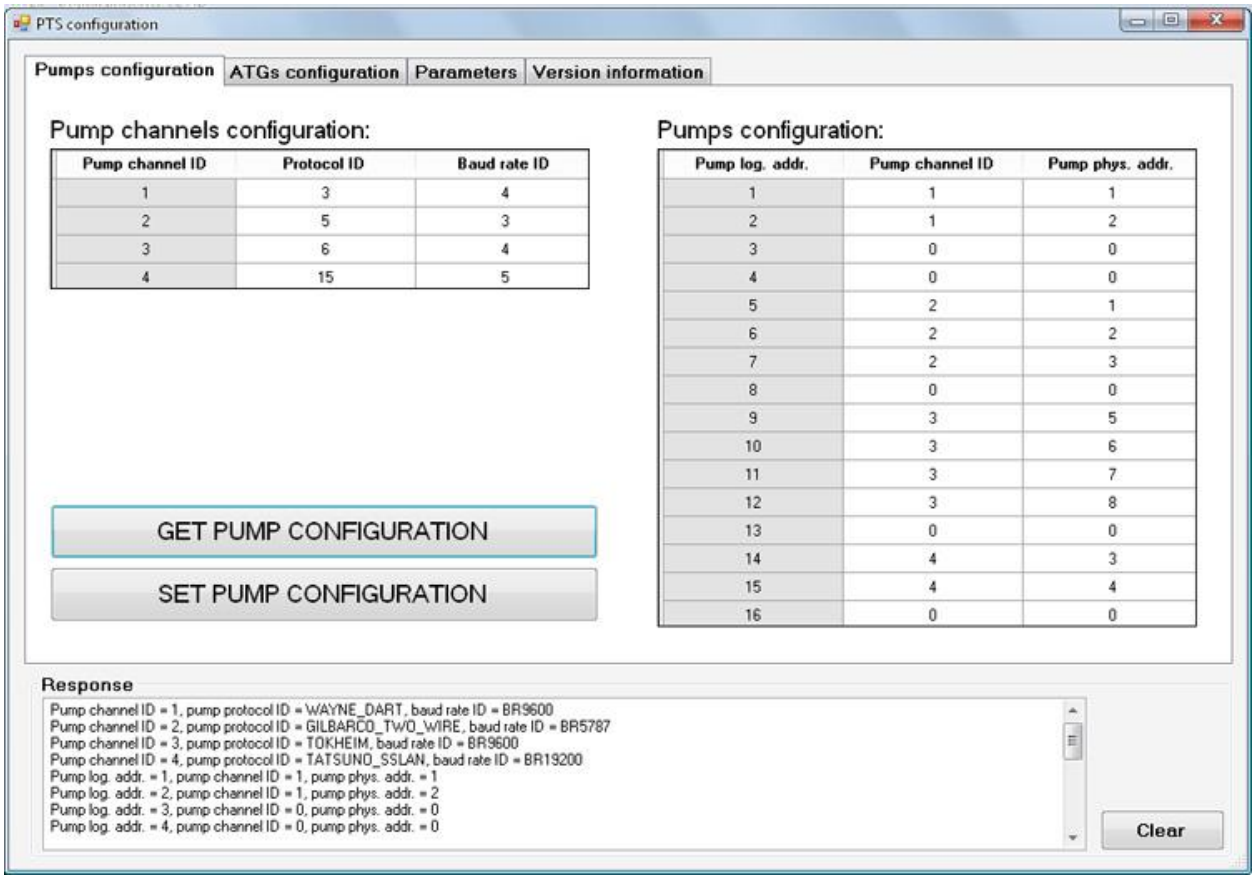
- PtsLib - project of PtsLib.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- Fully-functional open source application for provision of control over up to 8 pumps and 4 ATG systems by the PTS controller, allows to perform all operations with the PTS controller (uses classes and methods of PtsLib.dll library).



General view of the application: allows to provide control over up to 8 pumps



Form of ATG systems monitoring: allows to monitor up to 4 ATG systems



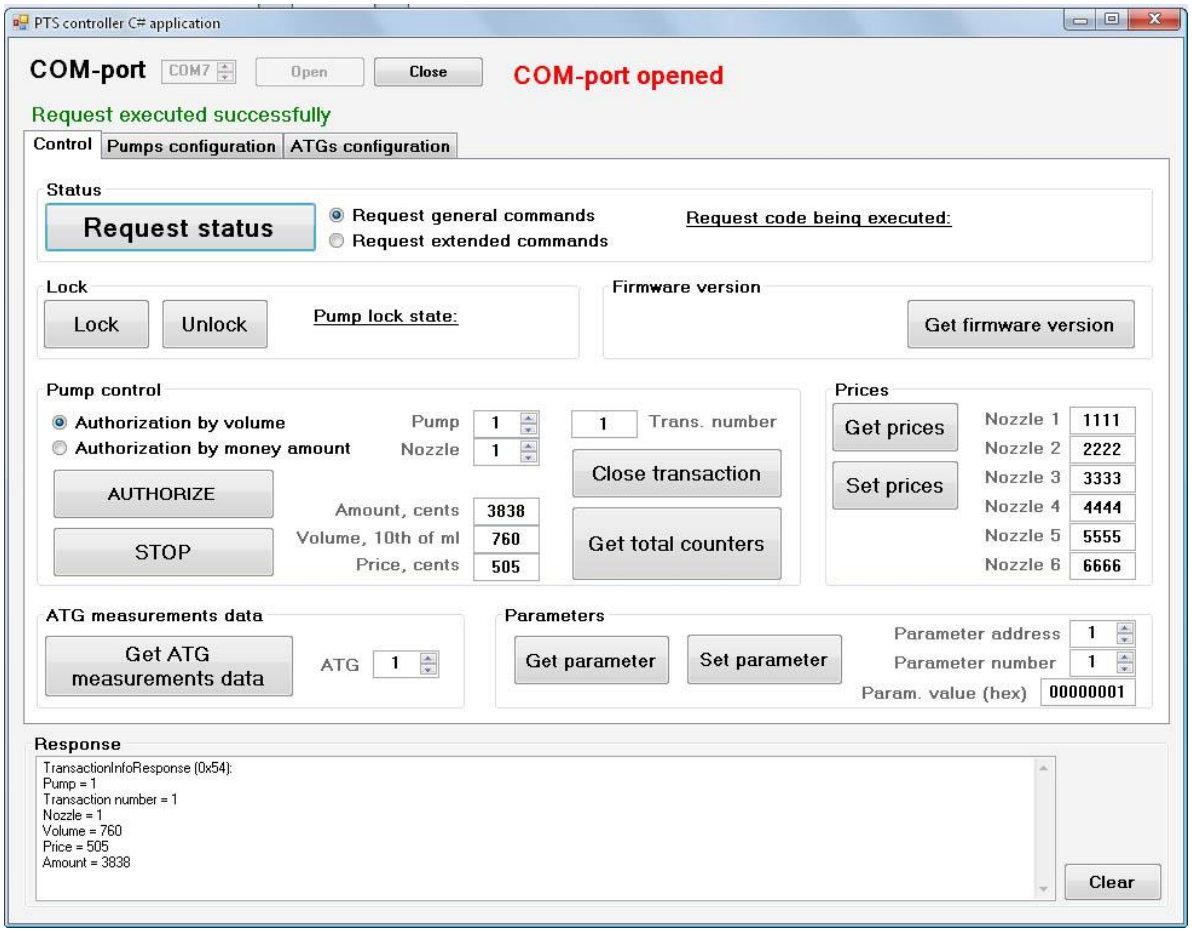
Form of PTS controller configuration: allows to set configuration for pumps and ATG systems ports and also set parameters

C# API

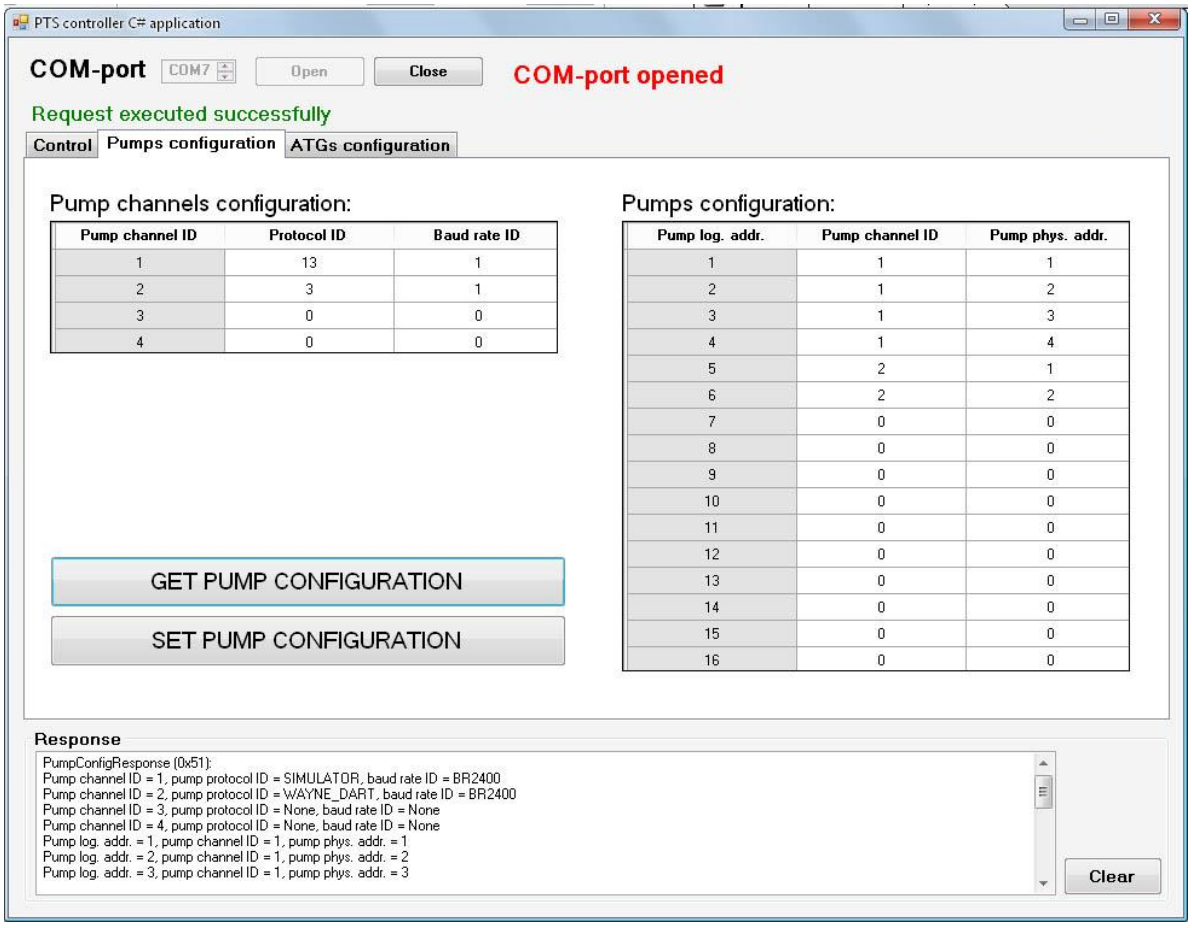
The API for PTS controller is written in C# programming language in Visual Studio 2010 Express and requires .NET Framework 2.0.

Given API includes 2 projects:

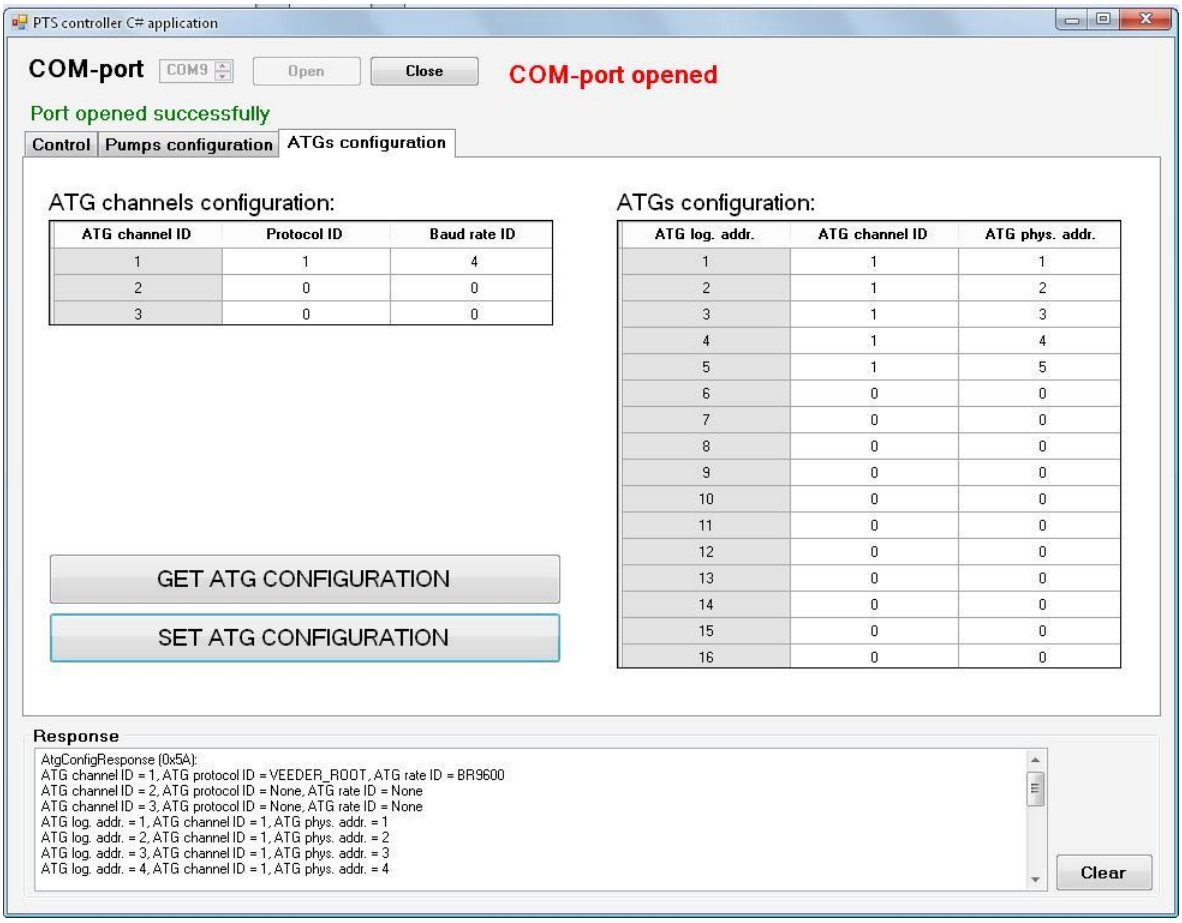
- PtsLib - project of PtsLib_CSharp.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- Open-source utility for testing and indication of all operations provided by the PTS controller, allows to perform all operations with the PTS controller (uses classes and methods of PtsLib_CSharp.dll library).



Form for testing and indication of all operations provided by the PTS controller



Form for configuration of pumps ports of PTS controller

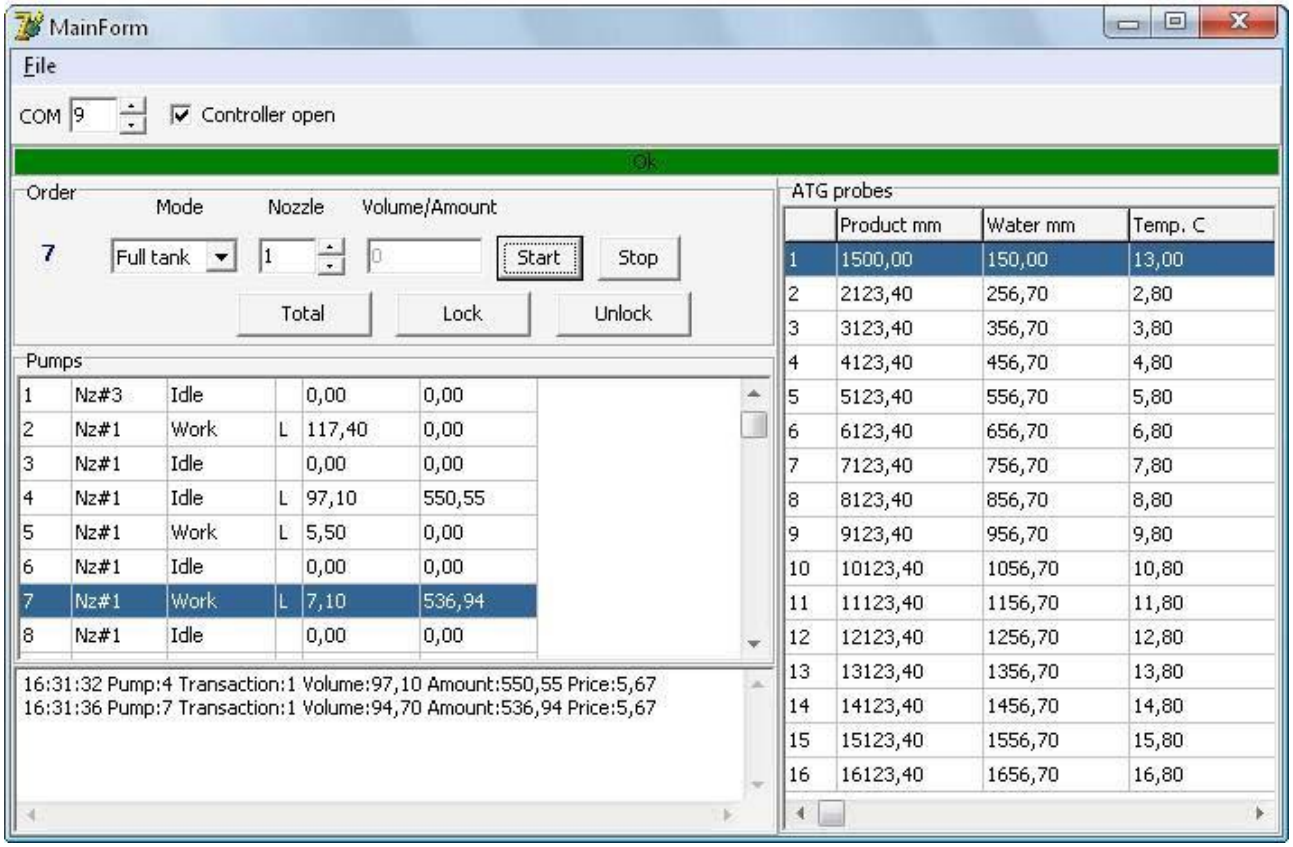


Form for configuration of ATG systems ports of PTS controller

Delphi API

Delphi API implements shared library libpts.dll calls.
Library libpts.dll was build with Borland compiler C PTS API (source C files you can find in libpts.zip).

Source code of library are located in ./src directory. Directoty ./examples contains several examples of using library functions.



Graphical form for testing API for PTS controller written in Delphi

Conditionally, API functions can be divided into groups:

- Manage API: Open/close, receiving error, set/get API options
  - pts_open
  - pts_open_dev
  - pts_close
  - pts_last_error
  - pts_option_get
  - pts_option_set
- Handle of a controller configuration
  - pts_pump_config_get
  - pts_atg_config_get
  - pts_pump_config_set
  - pts_atg_config_set
  - pts_version_get
- Functions of a read and write parameters of the controller or filling places
  - pts_param_get
  - pts_param_set
- Functions of management by filling places

    - pts_authorize
    - pts_pts_authorize_by_amount
    - pts_halt
    - pts_lock
    - pts_unlock
    - pts_preset_prices
    - pts_prices_request
    - pts_status_request
    - pts_total_request
    - pts_trans_close
- Functions of reading measurements of Automatic Tank Gauge (ATG)
    - pts_atg_measure_request

Library functions (except for : pts_open, pts_open_dev, pts_close) have common features:

- return value: functions return 0 (FM_OK) if no error and error code if error (see include/pts_errors.h for
- determine the type of error)
- first of parameter - pts_api_descriptor - integer obtained by the open function: pts_open or pts_open_dev
- last parameter - pointer to PTS response structure - see include/pts_data.h for determine the data type.

All commands in protocol involve getting a response.

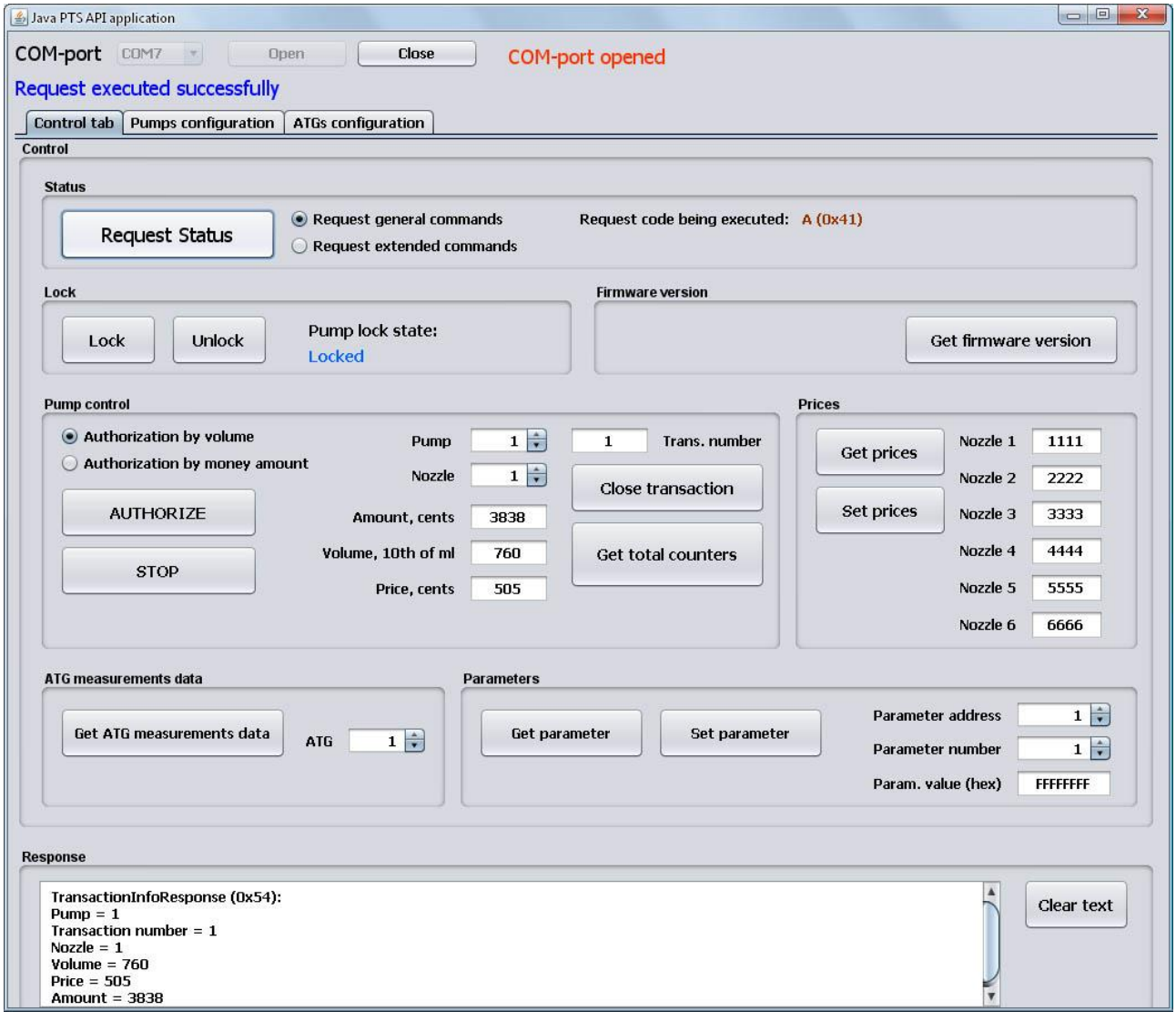
Java API

Java API for PTS controller is written in Java programming language in NetBeans IDE 7.2.1.

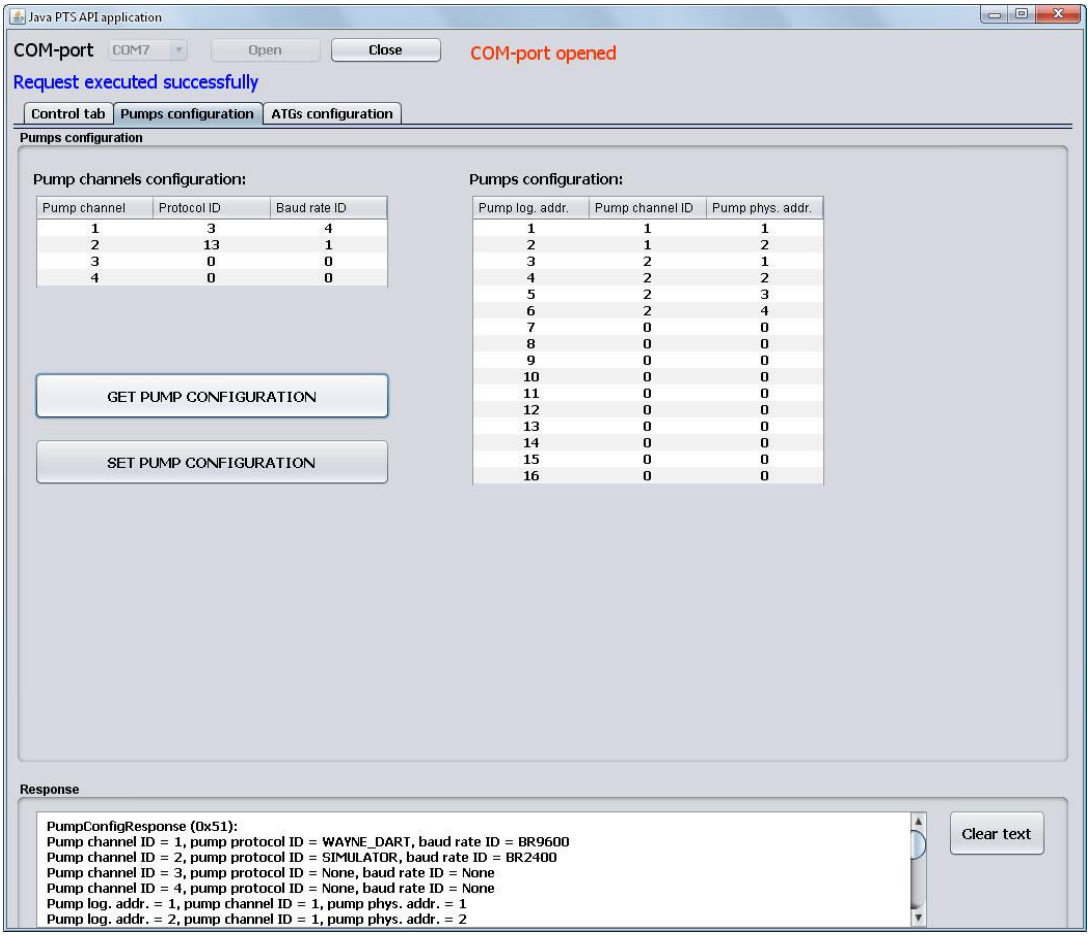
Given API includes:

- JavaPtsLib: library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- JavaPtsApp: open-source utility for testing and indication of all operations provided by the PTS controller, allows to perform all operation with the PTS controller (uses classes and methods of JavaPtsLib).

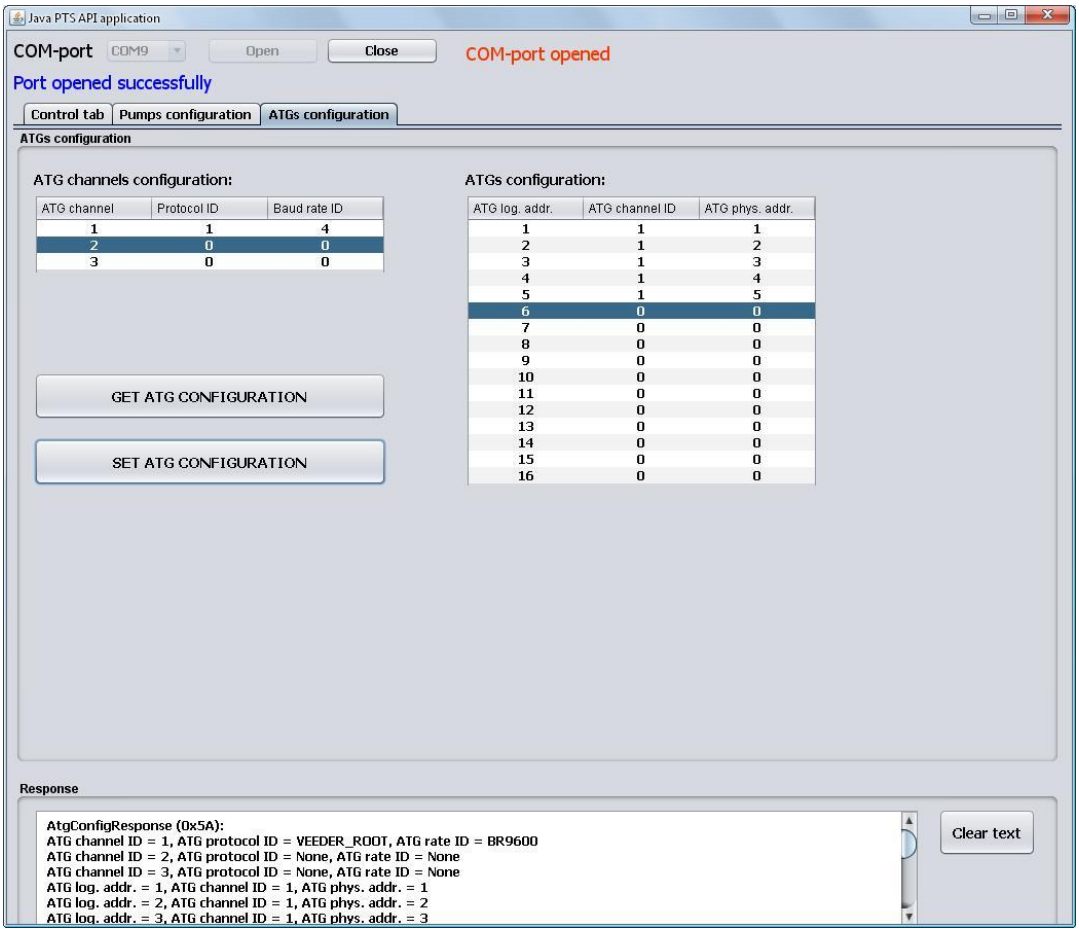
Communication over the COM-port (RS-232 interface) is done using RXTX Java library (visit www.rxtx.qbang.org for downloads and information): RXTX is a Java library, using a native implementation (via JNI), providing serial and parallel communication for the Java Development Toolkit (JDK). It is based on the specification for Sun's Java Communications API, though while many of the class descriptions are the same the package used it not, since gnu.io is used instead. For more information please visit the rxtx wiki at *http://rxtx.qbang.org/wiki* (latest releases of the library can be downloaded there).



Form for testing and indication of all operations provided by the PTS controller



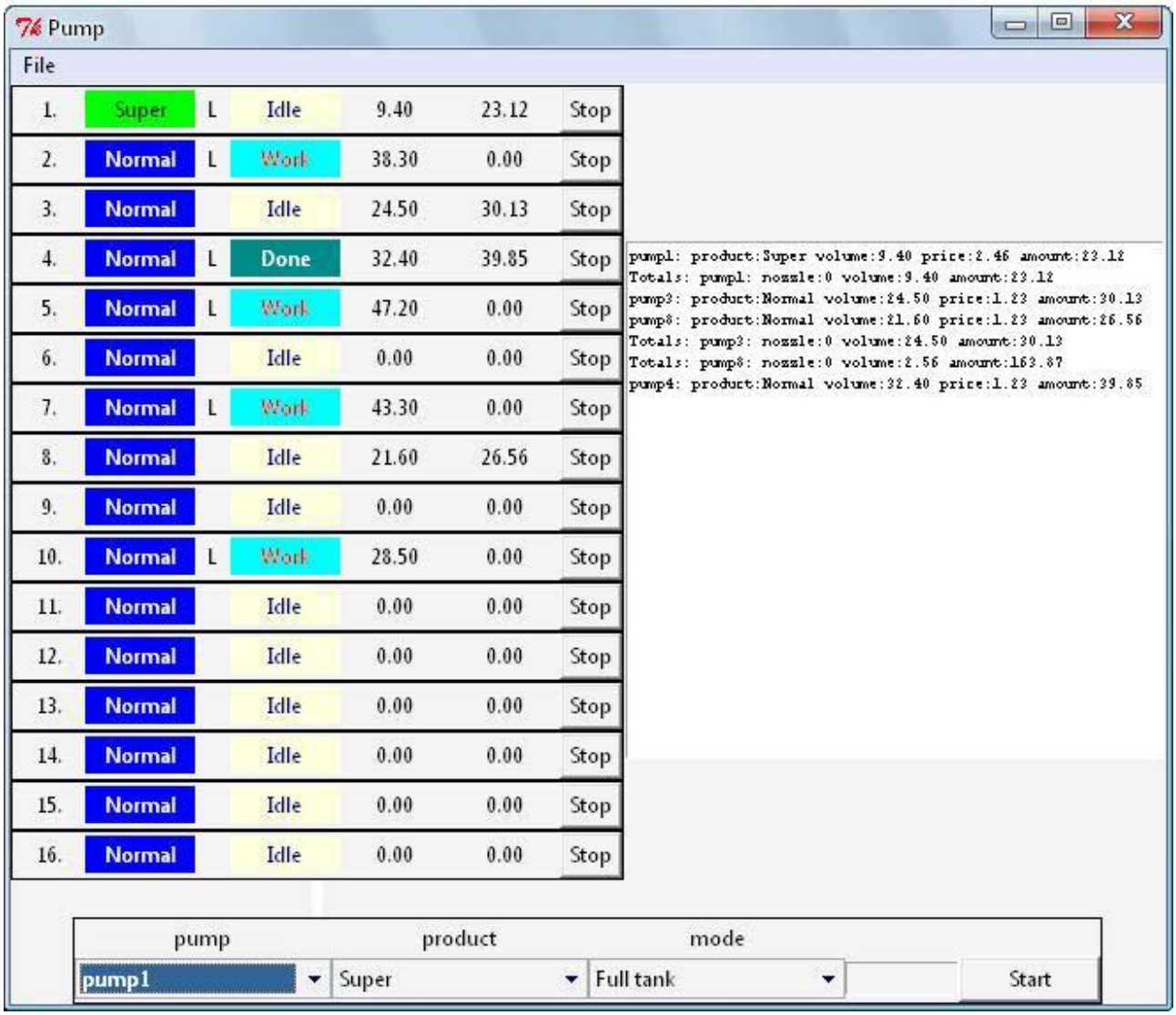
Form for configuration of pumps ports of PTS controller



Form for configuration of ATG systems ports of PTS controller

Python API

Before installation of this package it is necessary to install PySerial (*http://pyserial.sourceforge.net/*).
To install PTS module, run python setip.py install, Where python = your desired python version executable.



Graphical form for testing API for PTS controller written in Python

The protocol of exchange is realized in the pts.protocol module.
The exchange through a serial port is realized with use PySerial module (*http://pyserial.sourceforge.net/*) (therefore, before installation of this package it is necessary to install PySerial).

The package was tested with python of versions 2.7 and 3.0

The pts.constants module contains values of various constants
The pts.config module - structures of data, for a controler configuration
The pts.response module - structures of the data returned by the controler
The pts.protocol module - protocol commands

Conditionally, API functions can be divided into groups:

- Manage API: Open/close, receiving error, set/get API options
  - pts_open
  - pts_open_dev

- pts_close
- pts_last_error
- pts_option_get
- pts_option_set

- Handle of a controller configuration
  - pts_pump_config_get
  - pts_atg_config_get
  - pts_pump_config_set
  - pts_atg_config_set
  - pts_version_get
- Functions of a read and write parameters of the controller or filling places
  - pts_param_get
  - pts_param_set
- Functions of management by filling places
  - pts_authorize
  - pts_pts_authorize_by_amount
  - pts_halt
  - pts_lock
  - pts_unlock
  - pts_preset_prices
  - pts_prices_request
  - pts_status_request
  - pts_total_request
  - pts_trans_close
- Functions of reading measurements of Automatic Tank Gauge (ATG)
  - pts_atg_measure_request

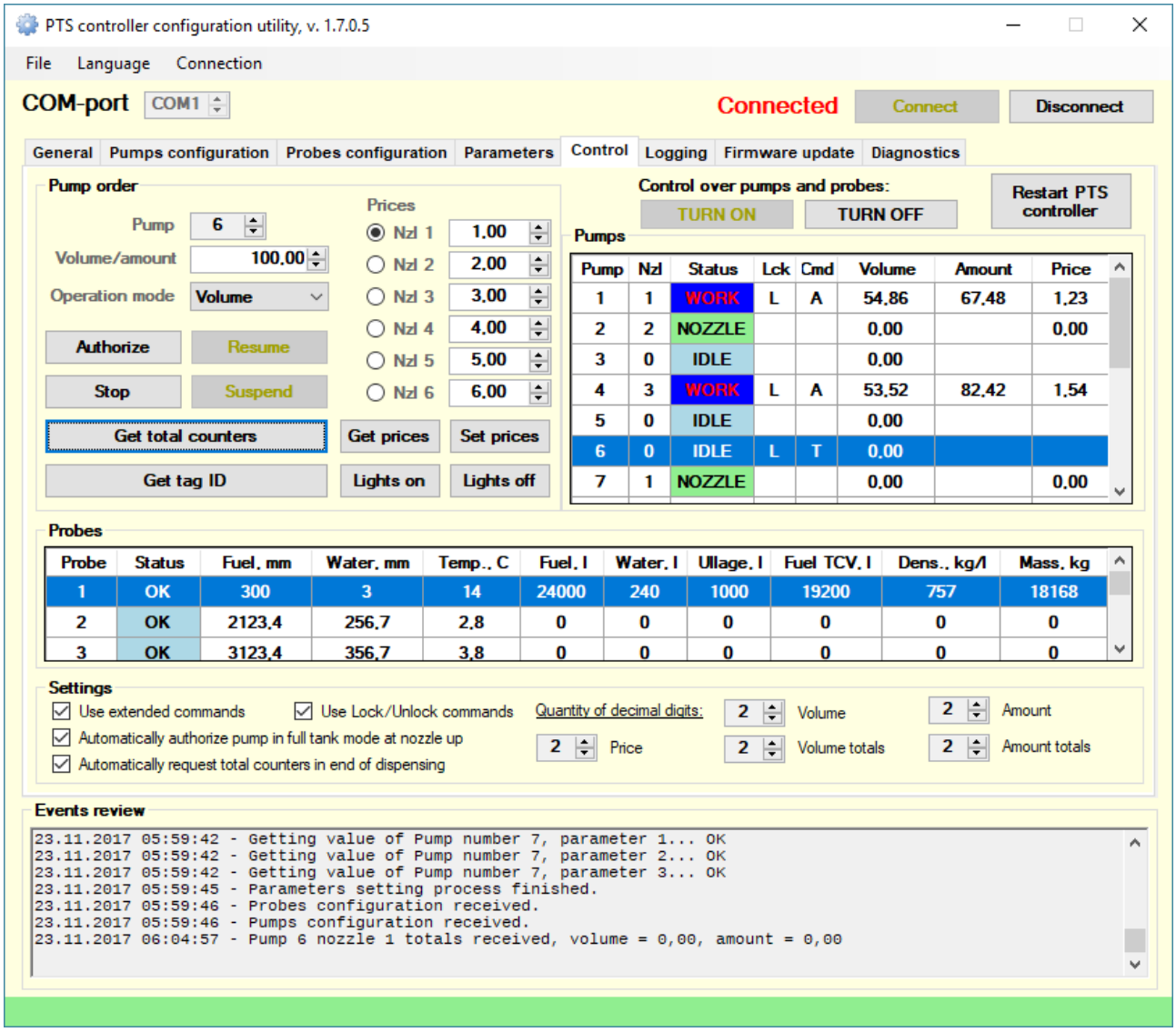
Work with the protocol can be set for work without exceptions (when error occured), and with generation of exceptions (PtsException). Parameter of initialization of use_exceptions is responsible for it.

Visual Basic .NET PTS controller configuration and testing utility

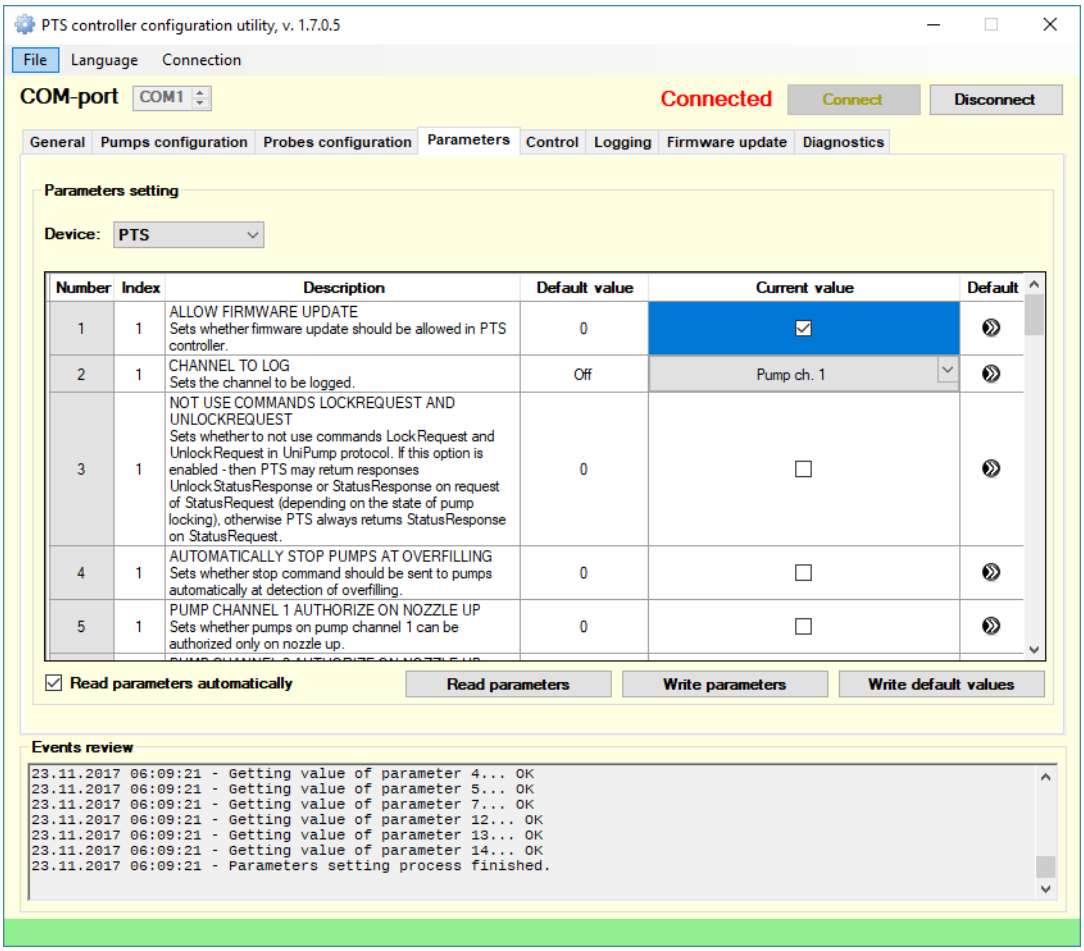
PTS controller configuration and testing utility is written in VB.NET programming language in Visual Studio 2010 Express and requires .NET Framework 2.0.

Given application includes 2 projects:

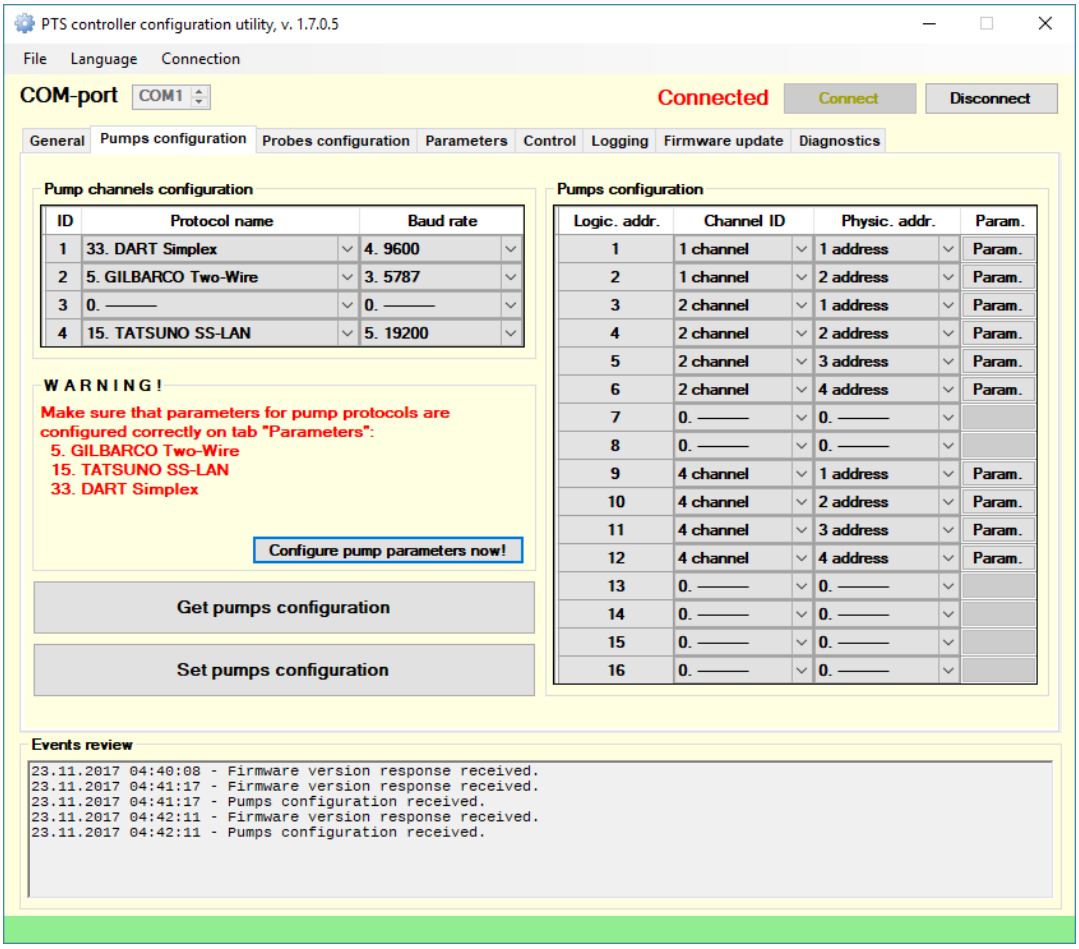
- PtsLib - project of PtsLib.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- Open source utility for configuration of PTS controller, provision of control over pumps and probes, logging of operation, firmware update, self-diagnostics, others (uses classes and methods of PtsLib.dll library).



PTS controller configuration and testing utility: tab "Control"



PTS controller configuration and testing utility: tab "Parameters"



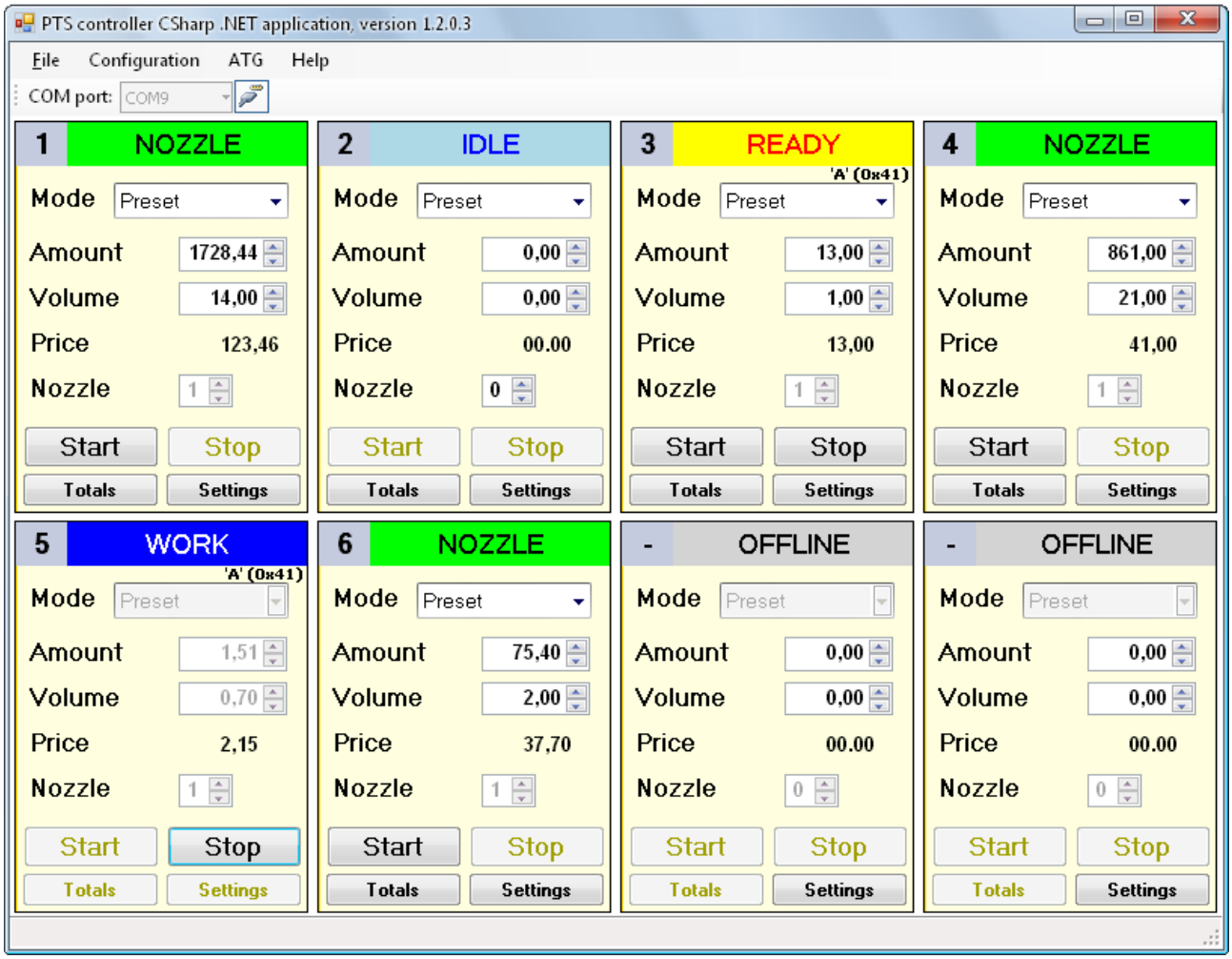
PTS controller configuration and testing utility: tab "Pumps configuration"

Visual Basic .NET application

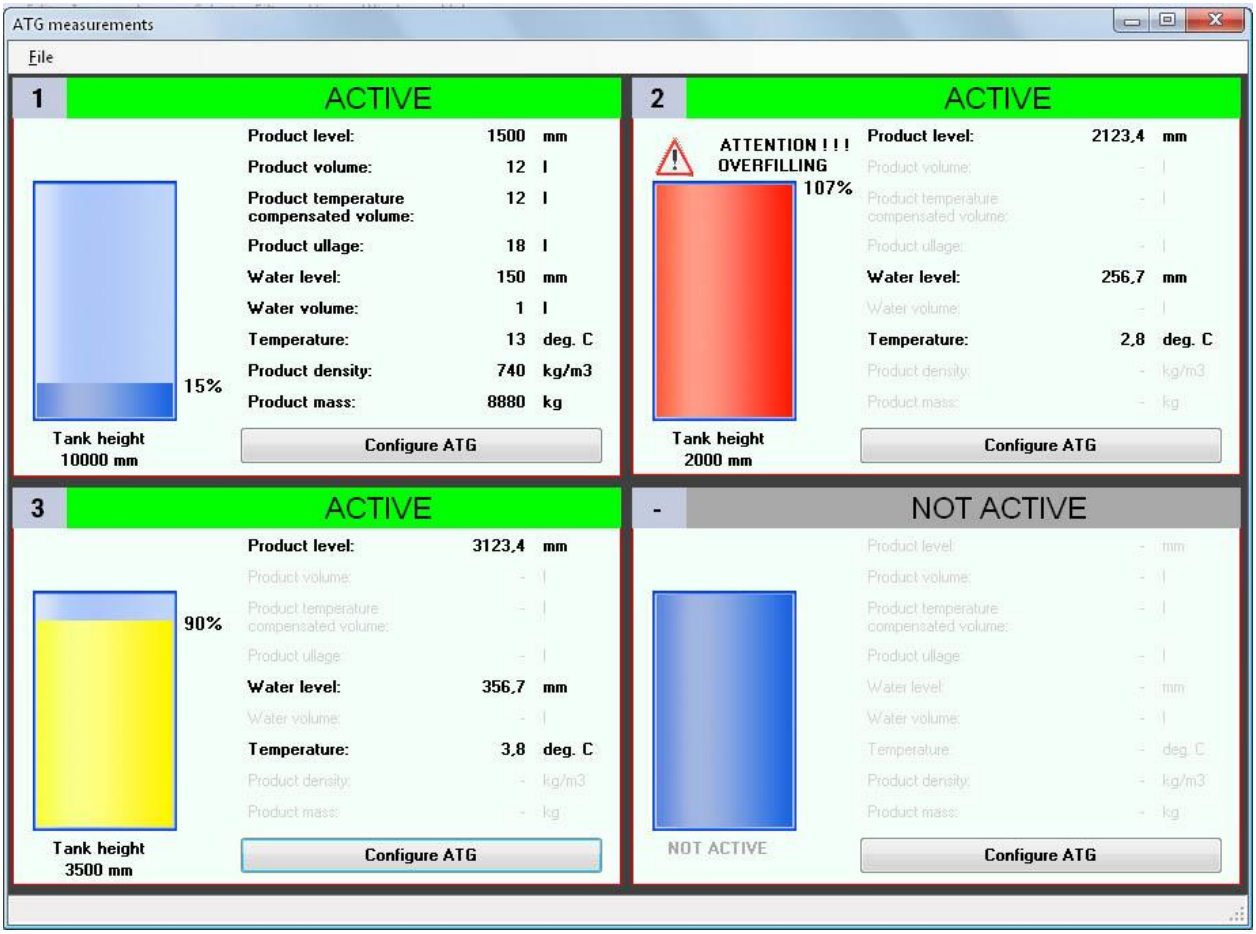
The Visual Basic .NET application for PTS controller is written in VB.NET programming language in Visual Studio 2010 Express and requirs .NET Framework 2.0.

Given application includes 2 projects:

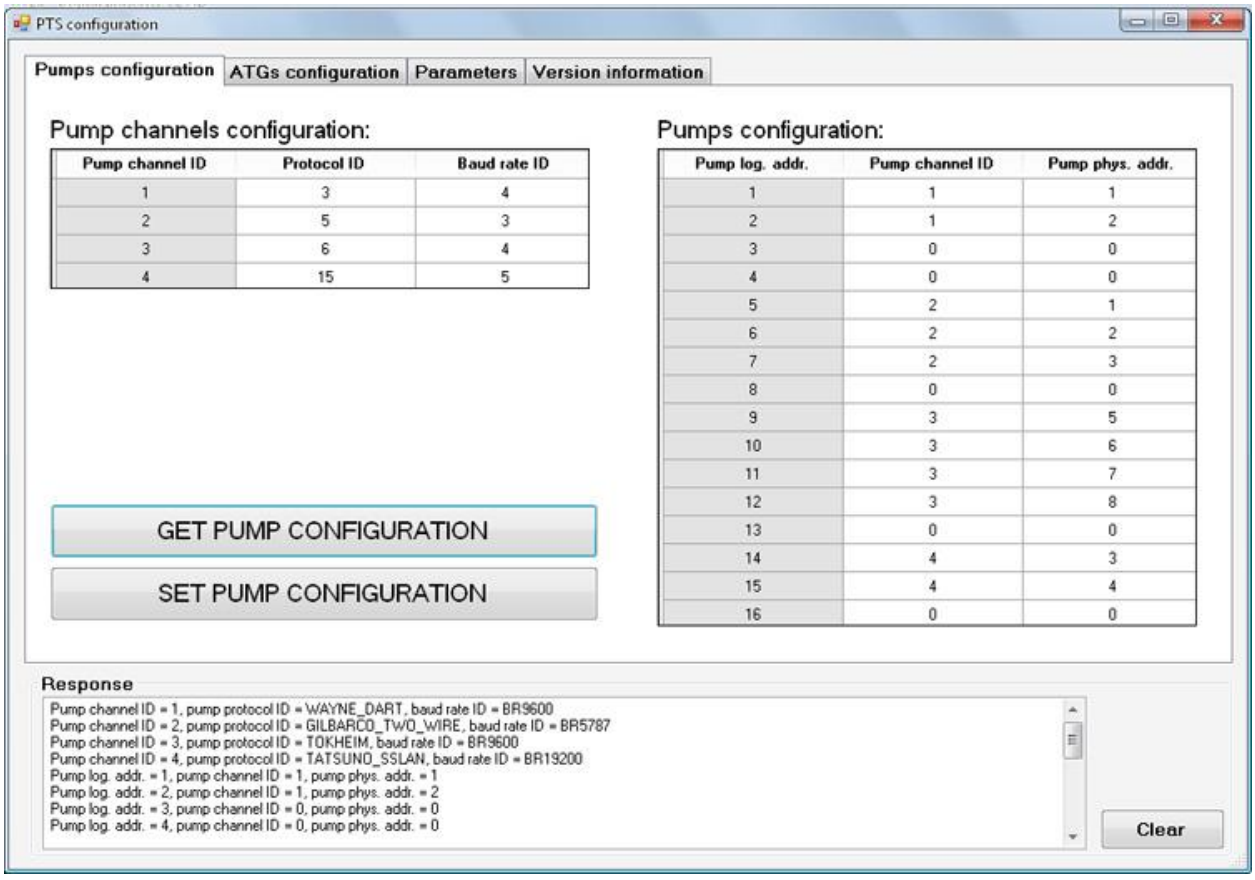
- PtsLib: project of PtsLib.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- PTS: fully-functional open source application for provision of control over up to 8 pumps and 4 ATG systems by the PTS controller, allows to perform all operations with the PTS controller (uses classes and methods of PtsLib.dll library).



General view of the application: allows to provide control over up to 8 pumps



Form of ATG systems monitoring: allows to monitor up to 4 ATG systems



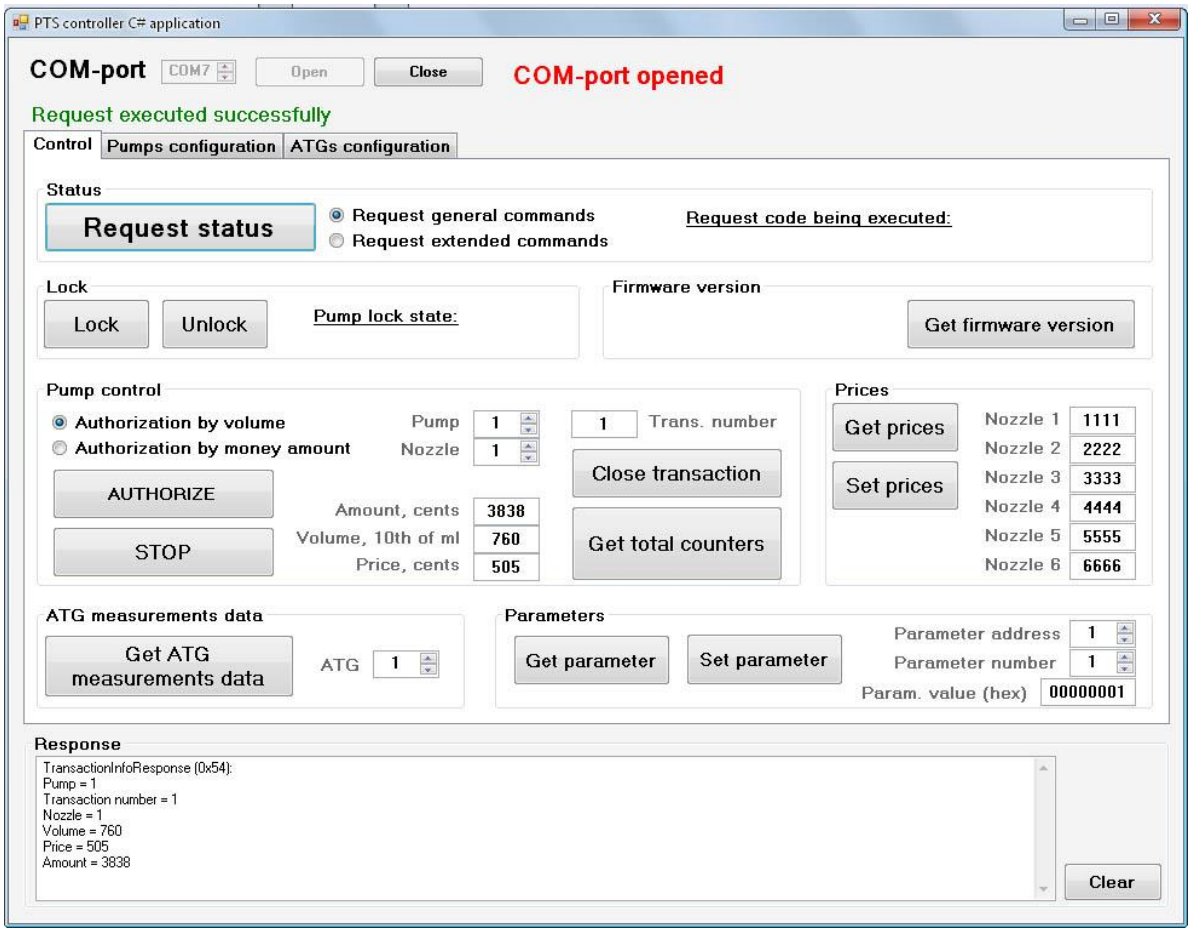
Form of PTS controller configuration: allows to set configuration for pumps and ATG systems ports and also set parameters

Visual Basic .NET API

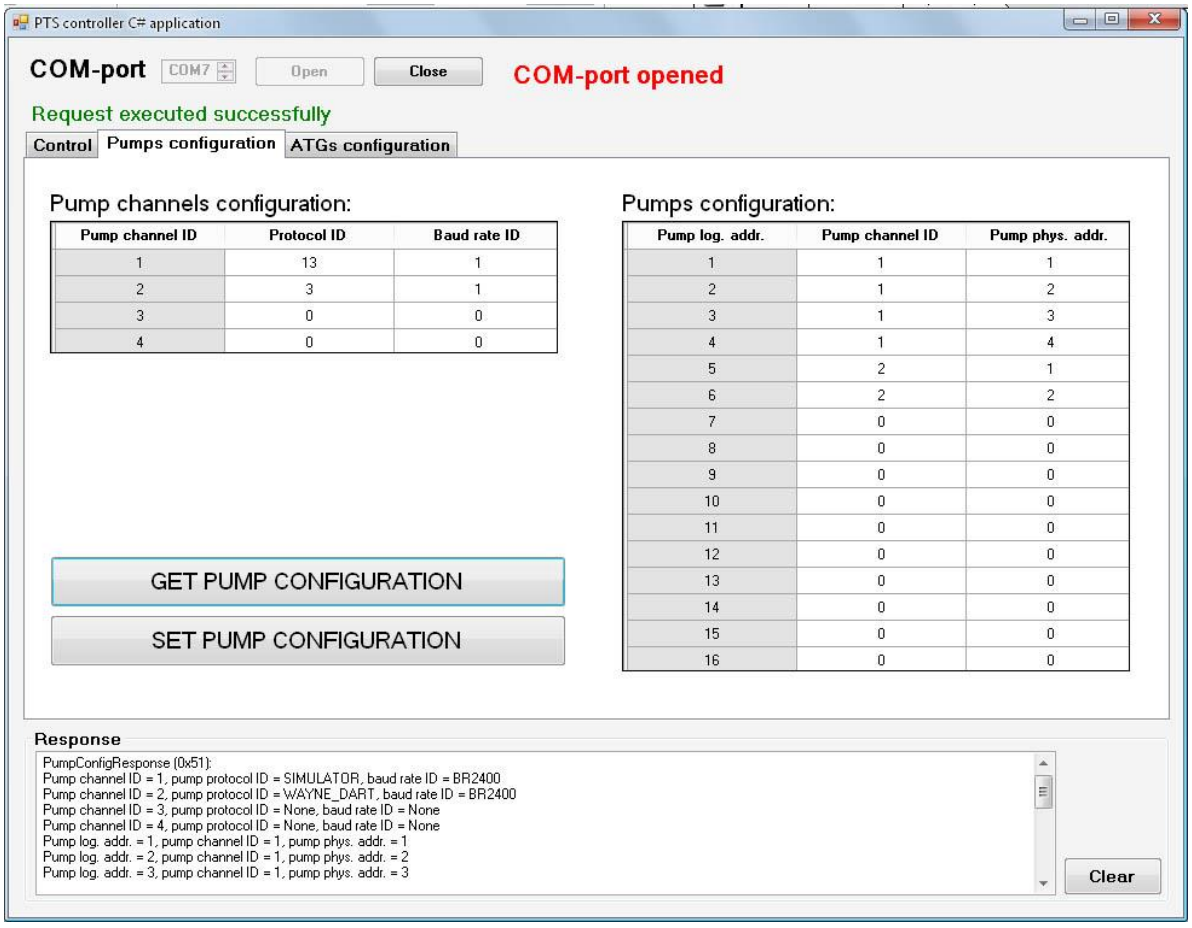
Visual Basic .NET API for PTS controller is written in VB.NET programming language in Visual Studio 2010 Express and requirs .NET Framework 2.0.

Given API includes 2 projects:

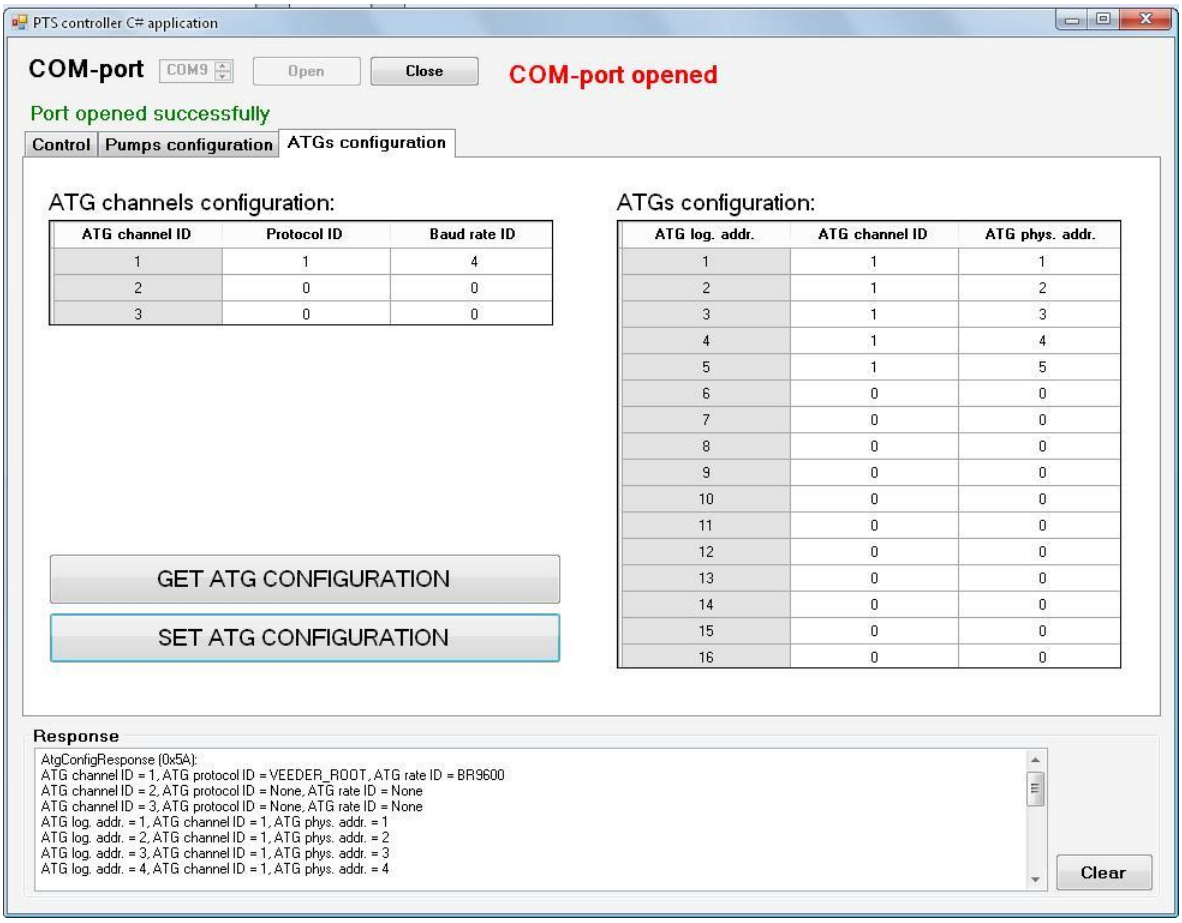
- PtsLib - project of PtsLib_VBNET.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- PTS - open-source utility for testing and indication of all operations provided by the PTS controller, allows to perform all operations with the PTS controller (uses classes and methods of PtsLib_VBNET.dll library).



Form for testing and indication of all operations provided by the PTS controller



Form for configuration of pumps ports of PTS controller



Form for configuration of ATG systems ports of PTS controller

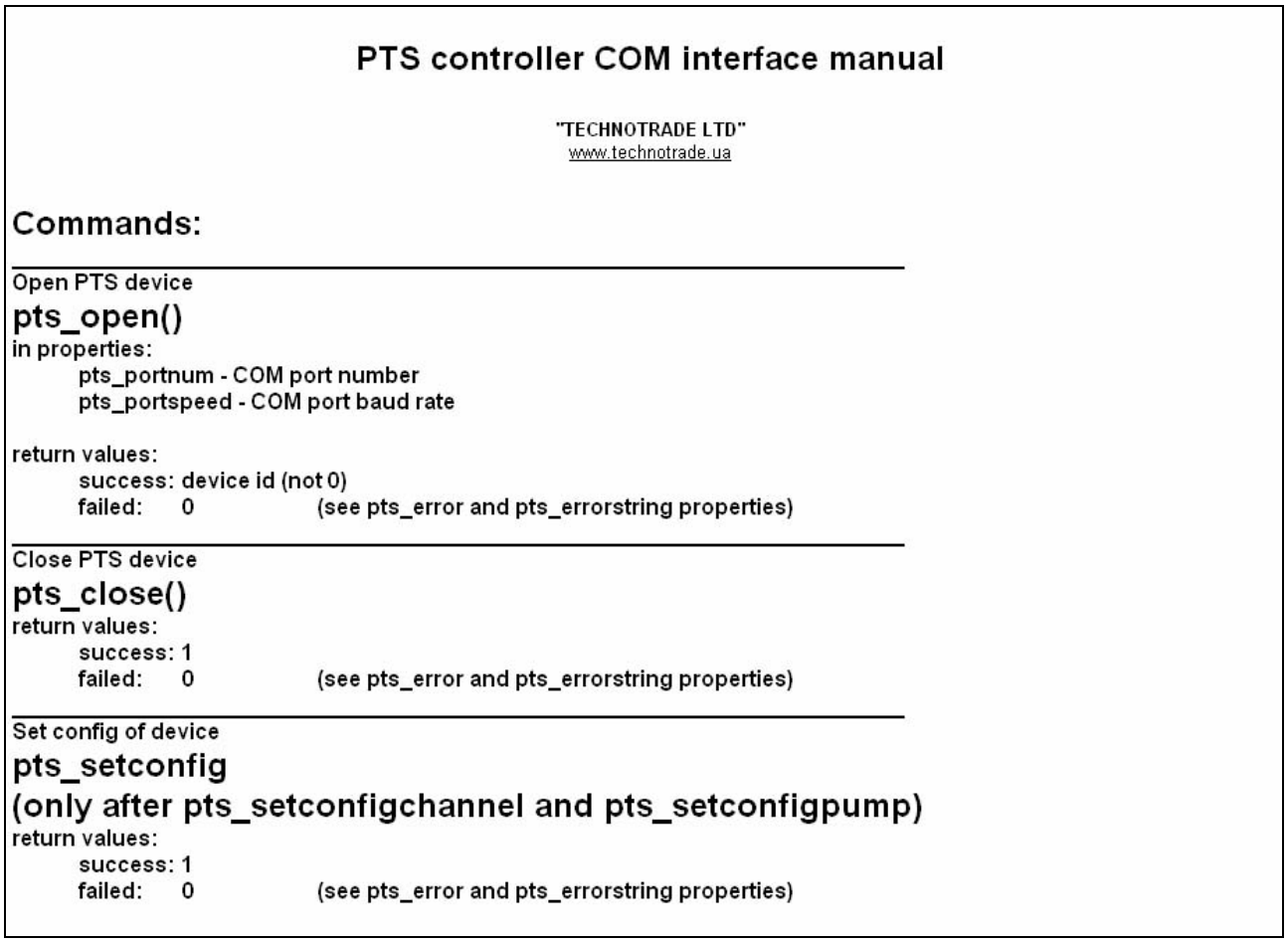
PTS controller COM-object for MS Windows OS

COM-object for PTS controller is written in Microsoft Visual C++ 6.0 IDE in C++ programming language. Project is located in PTSDriver folder. It builds PTSDriver.dll on output.

For communication with a PTS controller it uses API (application programming interface), written in C language (located in C_API folder).

In order to provide control over PTS controller and simplify work of developers, who are working in Windows OS in implementation of UniPump communication protocol of PTS controller, a COM-object with methods and properties for operation with PTS controller is provided.

COM-object is compiled on Visual C++ 6.0 and is supplied together with a test application, written on Visual Basic 6.0.
Documentation of COM-object describes all methods and properties of the COM-object and its application.



PTS controller COM interface manual

"TECHNOTRADE LTD"
www.technotrade.ua

Commands:

Open PTS device
pts_open()
in properties:
pts_portnum - COM port number
pts_portspeed - COM port baud rate

return values:
success: device id (not 0)
failed: 0 (see pts_error and pts_errorstring properties)

Close PTS device
pts_close()
return values:
success: 1
failed: 0 (see pts_error and pts_errorstring properties)

Set config of device
pts_setconfig
(only after pts_setconfigchannel and pts_setconfigpump)
return values:
success: 1
failed: 0 (see pts_error and pts_errorstring properties)

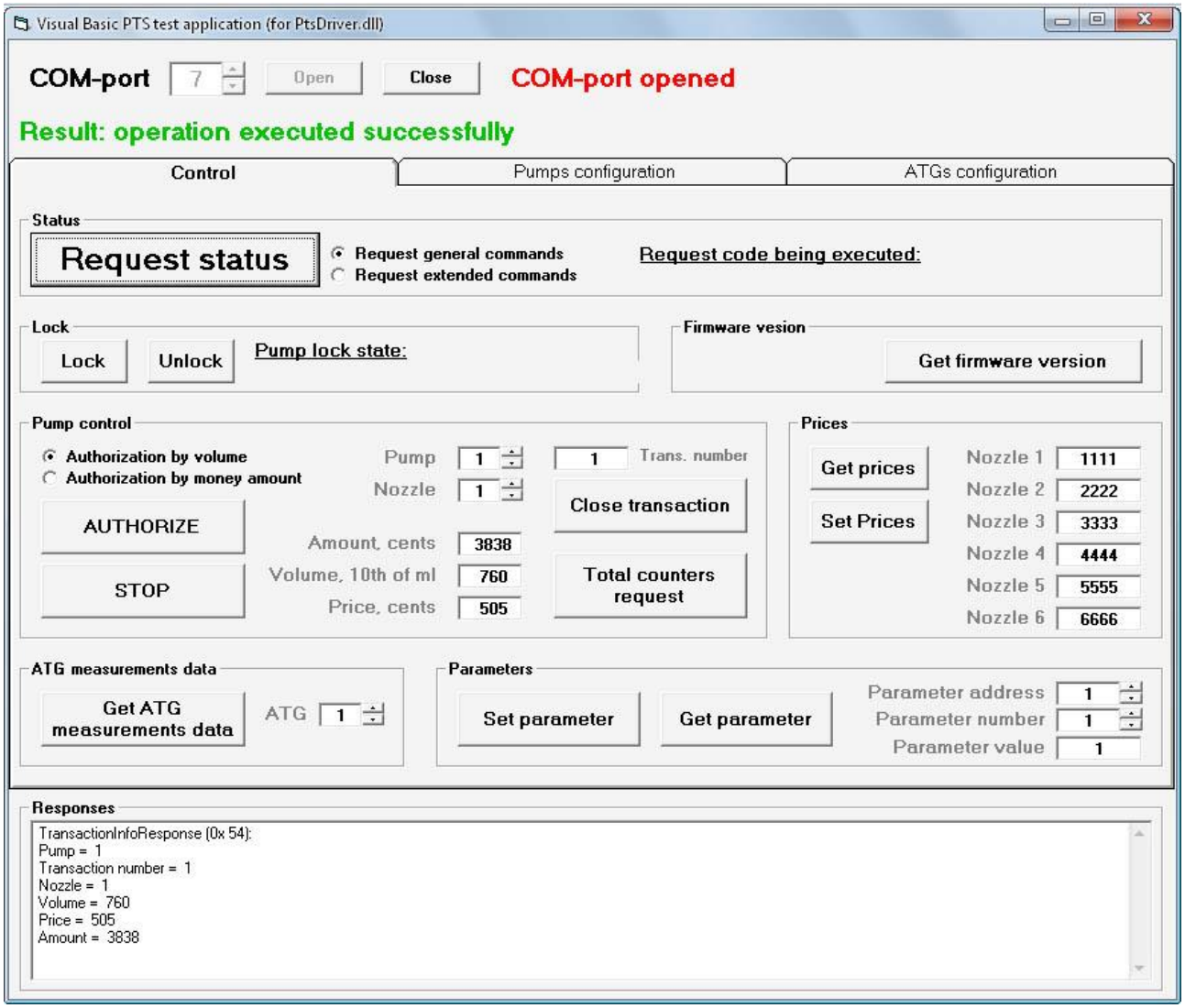
To register PTSDriver.dll library in Windows OS perform command

```
REGSVR32 PTSDriver.dll
```

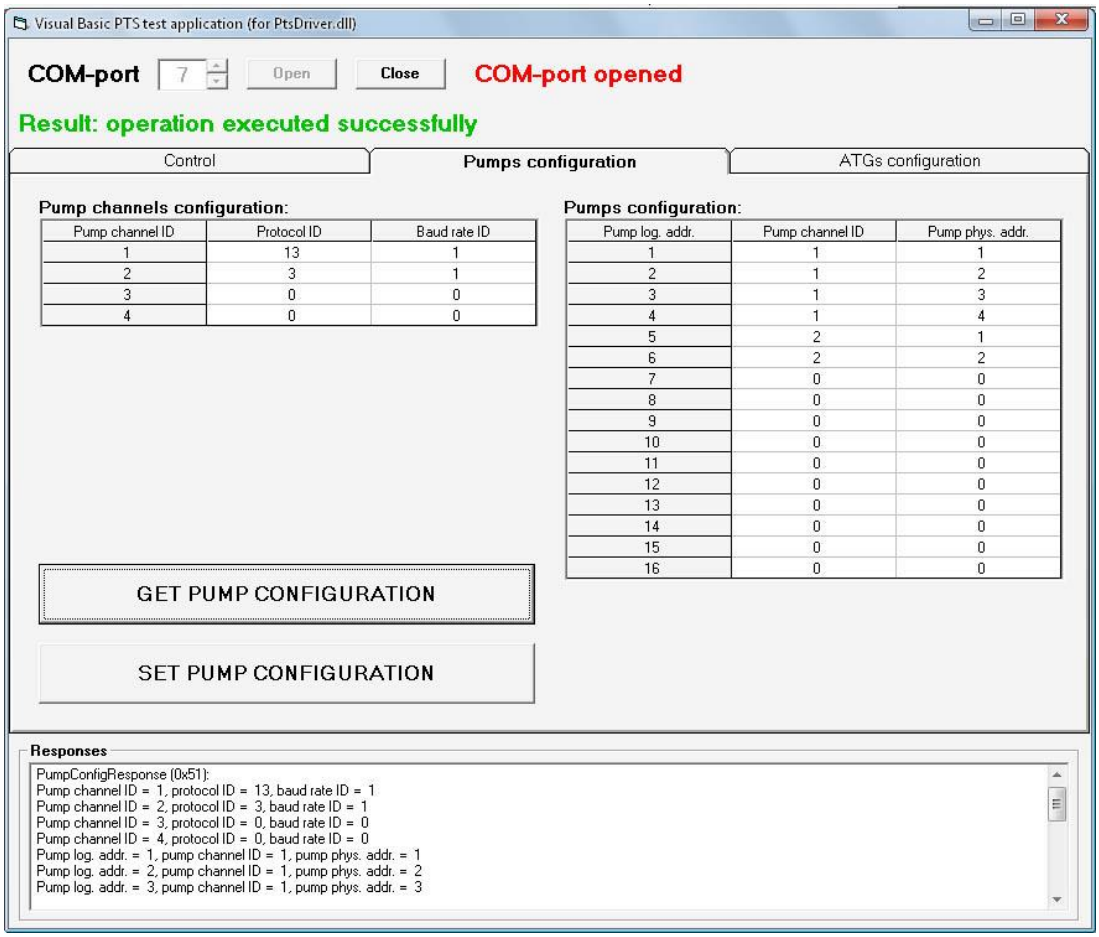
from folder
PTS_SDK\API TOOLS\COM_object_API_plus_VB6.0_appilcation.rar\PTSDriver\ReleaseMinDependency\

Visual Basic 6.0 application

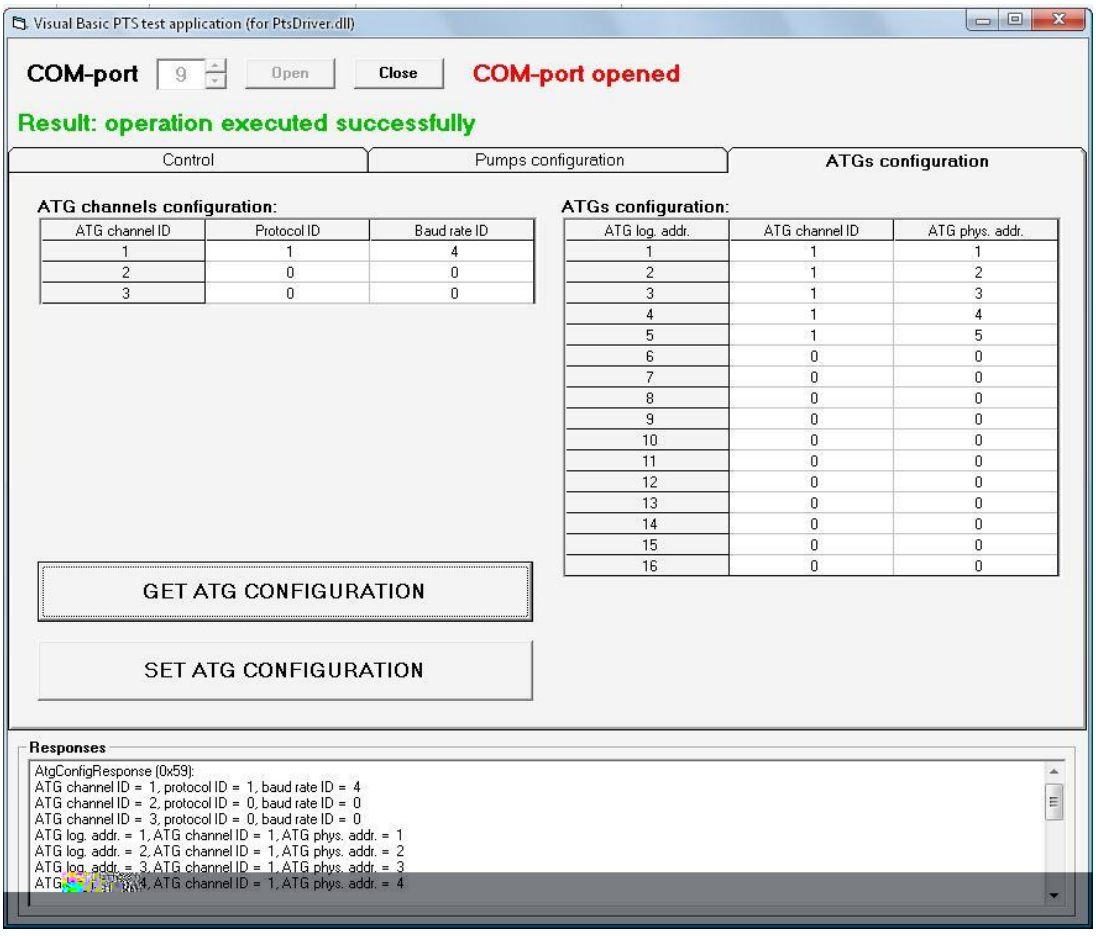
For testing of the COM-object an open-source application in Microsoft Visual Basic 6.0 is written (located in VB_6.0_app folder). It provides GUI form for testing and indication of all operations provided by the PTS controller, allows to perform all operation with the PTS controller (uses classes and methods of PTSDriver).



Form for testing and indication of all operations provided by the PTS controller



Form for configuration of pumps ports of PTS controller

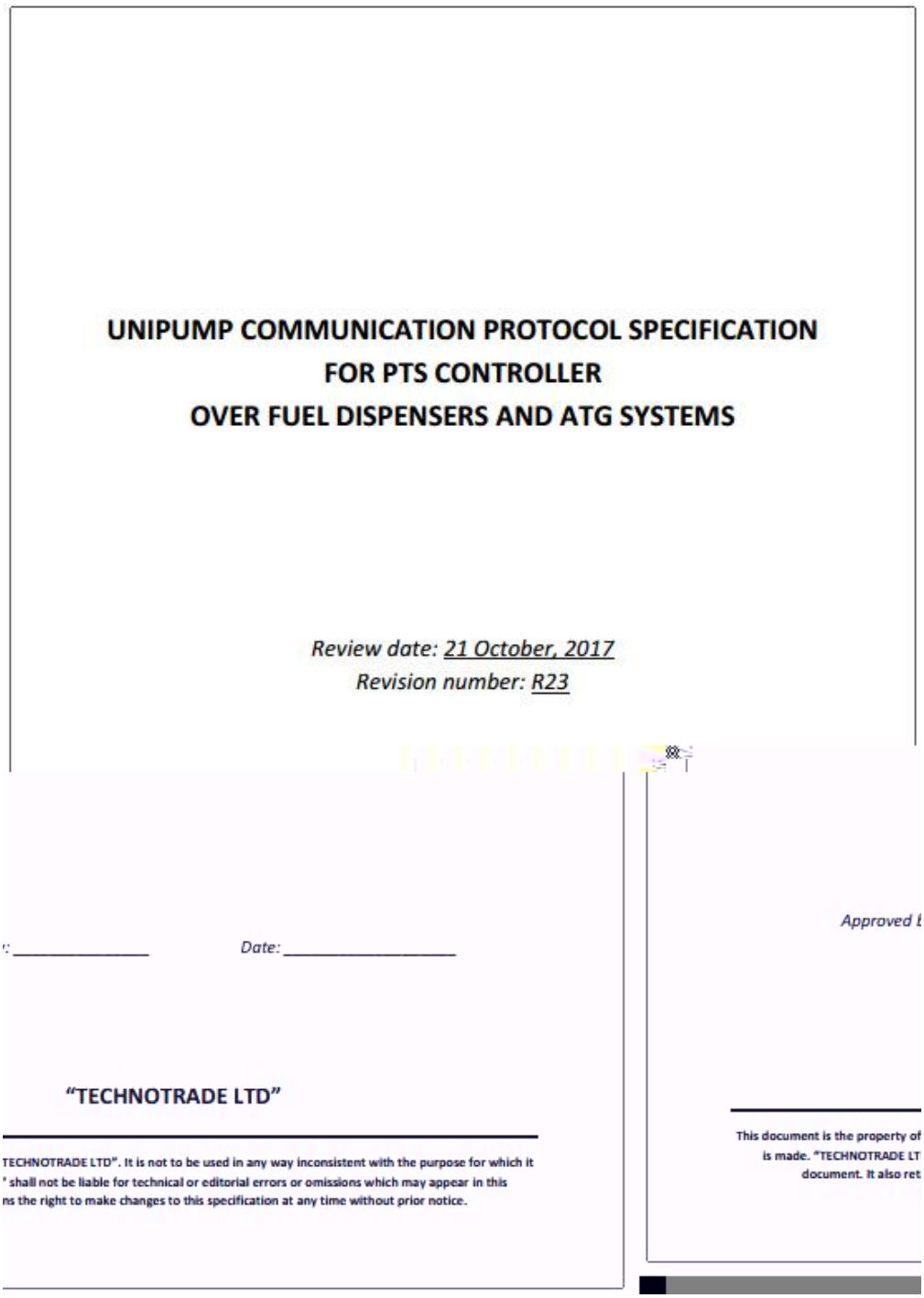


Form for configuration of ATG systems ports of PTS controller

PTS controller UniPump communication protocol

PTS controller is intended to be used in connection with control systems for petrol stations (POS systems, cash registers, OPT terminals, etc) to provide simultaneous control over various types of electronic fuel delivery dispensers and ATG systems of various manufactures using the single common communication protocol UniPump. PTS controller provides conversion of the common communication protocol UniPump into various proprietary communication protocols of manufacturers.

UniPump communication protocol covers a list of commands and responses for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.



UNIPUMP COMMUNICATION PROTOCOL SPECIFICATION
FOR PTS CONTROLLER
OVER FUEL DISPENSERS AND ATG SYSTEMS

Review date: 21 October, 2017
Revision number: R23

Date: _____

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PTS CONTROLLER SOFTWARE DEVELOPMENT KIT (SDK)

PTS controller SDK appointment



PTS 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 controller SDK includes a PTS 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 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 controller SDK allows developers to:

1. Study operation with the PTS controller.
2. Implement the PTS controller into own developed POS system or 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 using supplied with PTS SDK fuel dispensers software simulators, which simulate operation of various popular fuel dispensers. Through an interface converter RS-485 / RS-232, supplied together with PTS SDK, connect a PTS controller output RS-485 to a PC COM-port with fuel dispensers software simulators.

PTS controller SDK structure

HARDWARE:

1. PTS 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 (RS-232 to PC): 3 pcs

SOFTWARE:

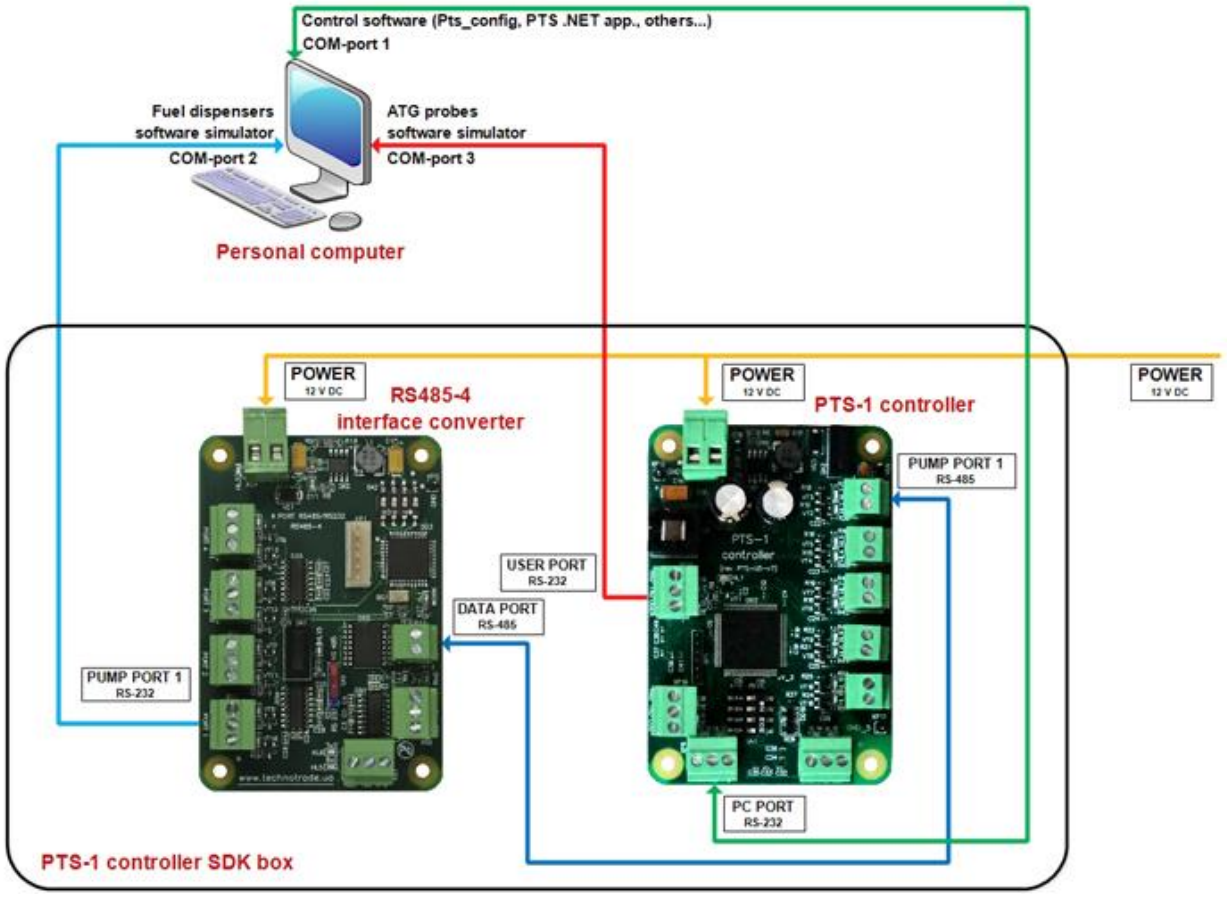
1. Software simulator of fuel dispensers
2. Software simulator of ATG systems (probes
3. API for developers in various programming languages
4. Useful utilities and applications for debugging of communication with PTS controller

PTS controller SDK technical features

Specification

##	PARAMETER	VALUE
1	**Voltage**	12 V DC
2	**Current consumption**	550 mA max
3	**Temperature range**	-40°C ÷ +80°C
4	**Weight**	600 g
5	**Overall dimensions**	160 x 160 x 85 mm

PTS controller SDK connections scheme



PTS-1 controller SDK box includes 2 boards mounted inside of a plastic case:

- PTS-1 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 software, which uses UniPump communication protocol, connects to the PTS controller PC port.

RS-232/RS-485 interface converter board is used in order to convert signals coming from PTS-1 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 2.

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 3.

Thus, it is possible to debug a correct operation of software, being developed, with the PTS-1 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.

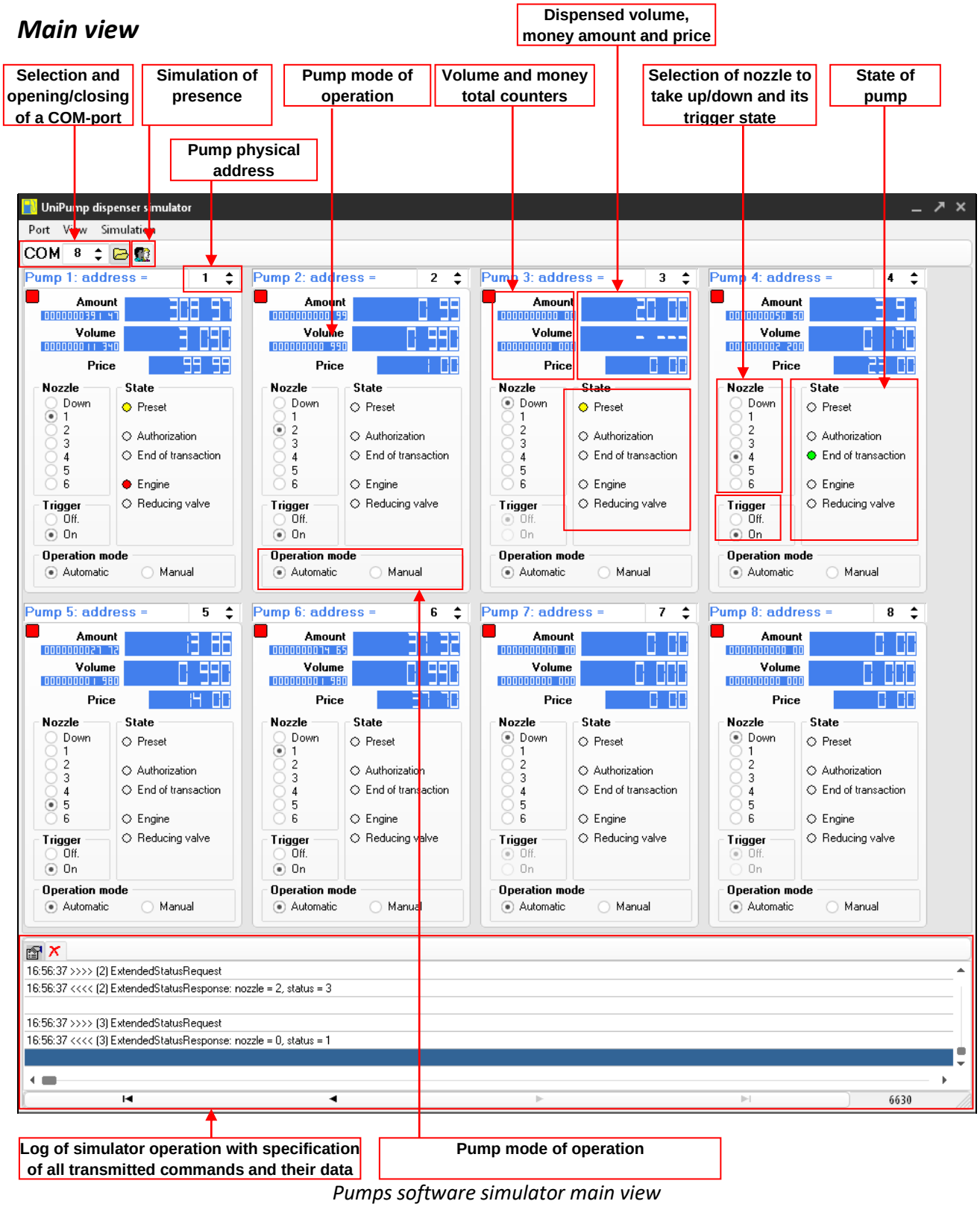
More technical information regarding RS485-4 dispenser interface converter (RS-485 to RS-232) can be found in technical guide on: *http://www.technotrade.ua/rs485-to-rs232-converter.html*.

UniPump pumps software simulator

Purpose

PTS controller SDK includes a pumps software simulator with a purpose to enable debugging of PTS 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 controller without a necessity to connect to real fuel dispensers.

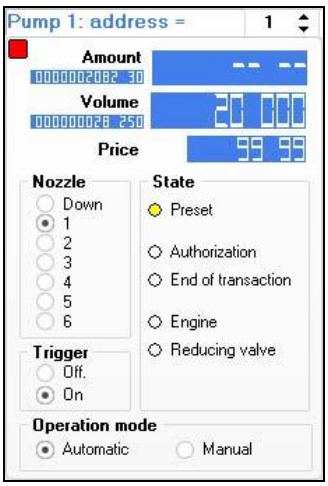
Main view



Pumps software simulator main view

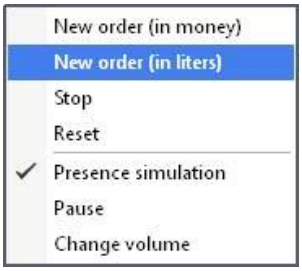
In pumps simulator it is possible to add up to 99 pumps giving each a unique physical address. Each of the pumps leads separately its total counters (volume and money amount) and prices for each of its 6 nozzles. Total counter values as well as prices are stored in Windows system register. Each of the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

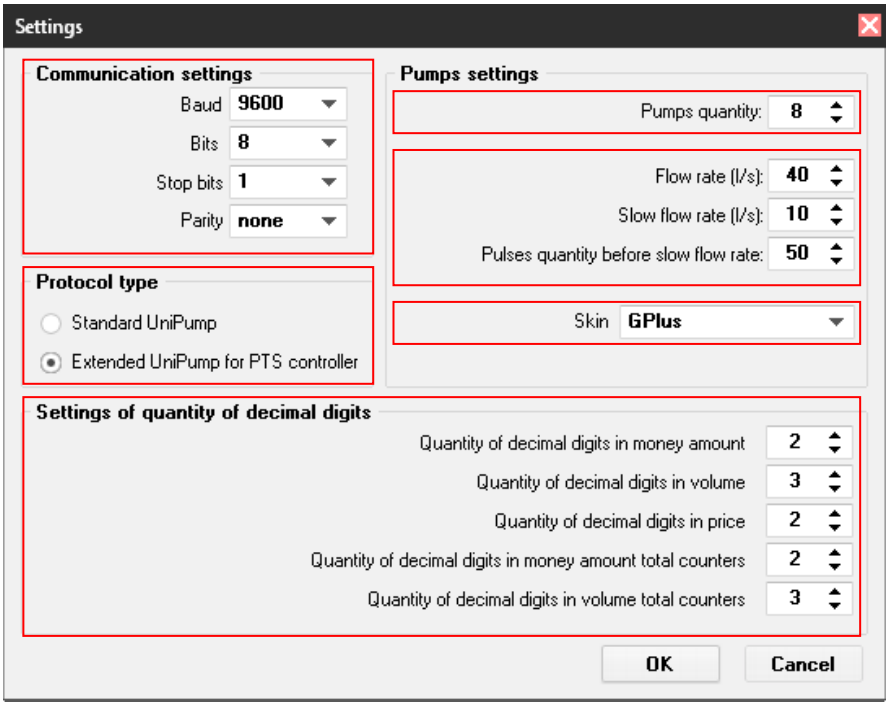
Configuration

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 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.

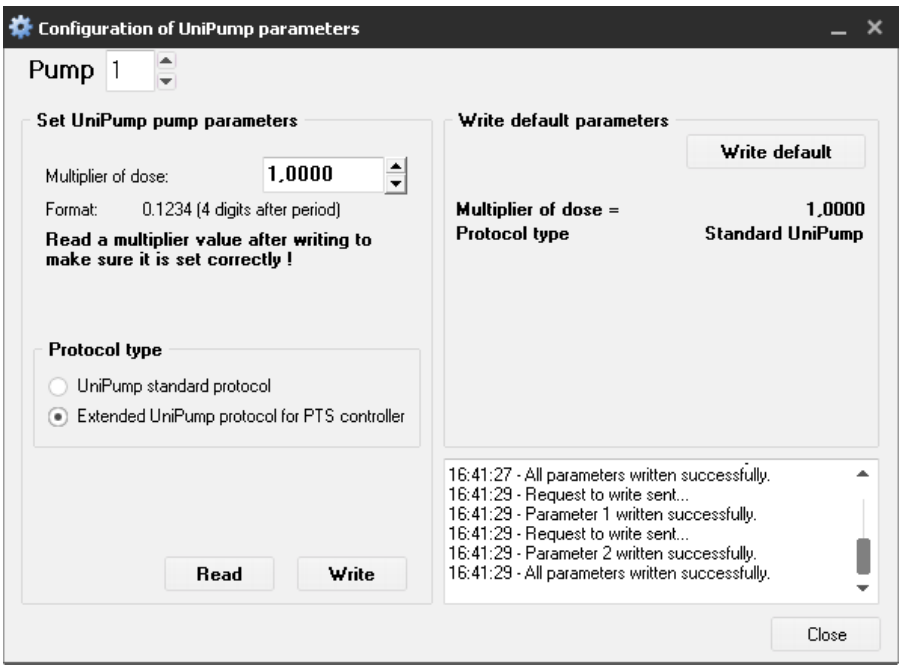
Log window of the pumps simulator enables to see all the requests and responses in communication and their respective data.



Settings of pumps simulator

For communication of PTS controller with the UniPump pumps software simulator it is necessary to select in PTS 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. Also it is necessary to set parameters to UniPump protocol for each of the pumps in PTS controller configuration (see image below):

1. Parameter "*Multiplier of dose*" set equal to 1.
2. Parameter "*Protocol type*" set equal to "*UniPump standard protocol*" in case if protocol type is set to "*Standard UniPump*" in pumps simulator or "*Extended protocol for PTS controller*" in case if protocol type is set to "*Extended UniPump for PTS controller*" in pumps simulator.



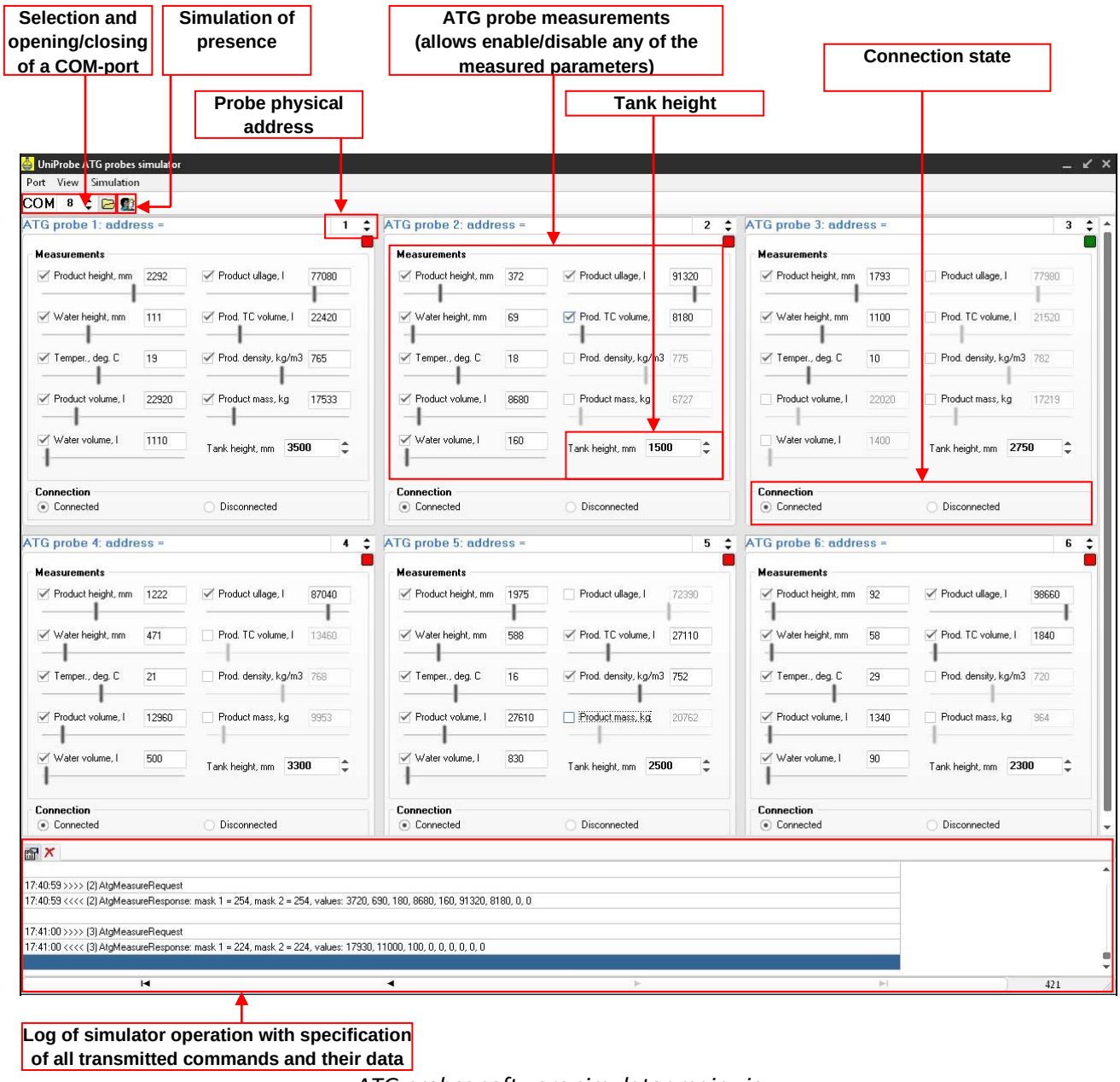
Parameters for UniPump protocol in PTS controller

UniProbe ATG probes software simulator

Purpose

PTS controller SDK includes a ATG probes software simulator with a purpose to enable debugging of PTS 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 controller without a necessity to connect to real ATG systems or probes.

Main view



ATG probes software simulator main view

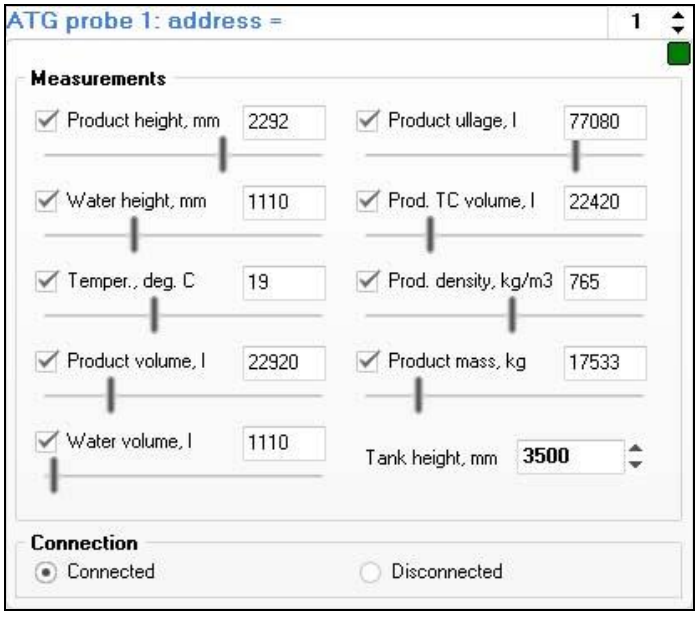
In ATG probes simulator it is possible to set measurements of the following parameters:

- 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 controller) or disconnected (does not response to PTS controller) state.

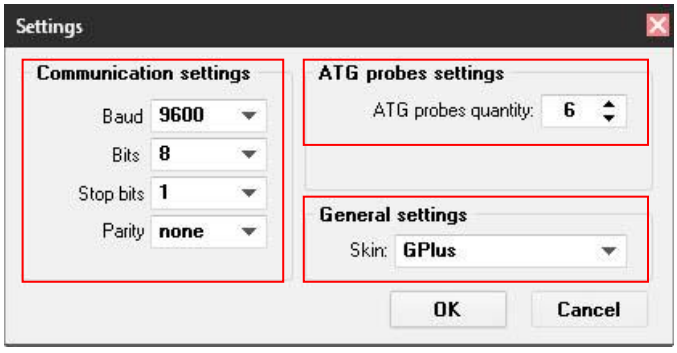


Probe control in ATG probes software simulator

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 controller with UniProbe ATG probes software simulator it is necessary to select in PTS 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.

Open source PTS controller .NET application (C# and VB.NET)

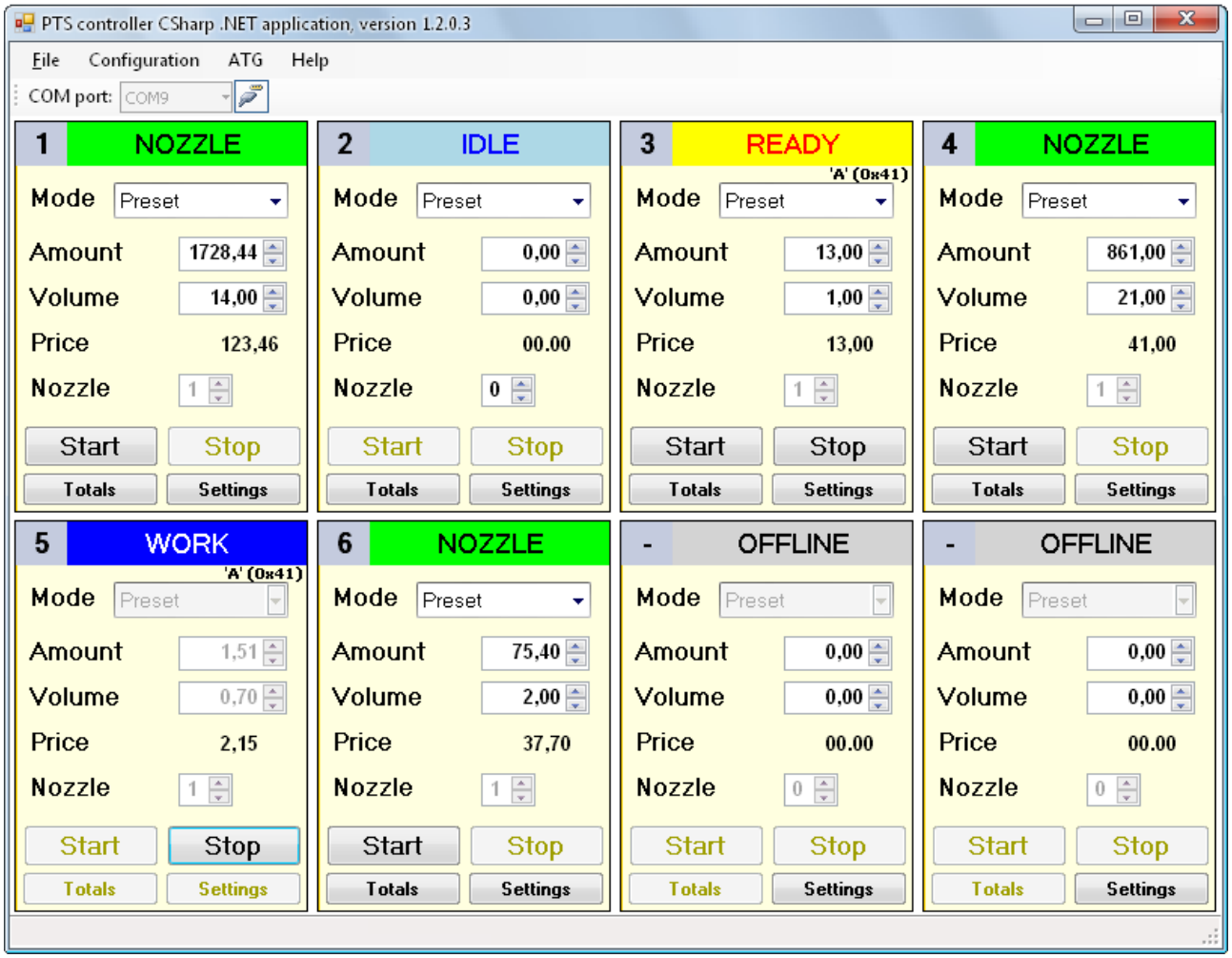
Purpose

In order to provide control over PTS controller and simplify work of developers, writing on Microsoft .NET Framework in implementation of UniPump communication protocol of PTS controller and give an open source example of application for control over fuel dispensers and ATG systems at petrol station a .NET library (with open source in C# and VB.NET languages and documentation on methods and properties) and PTS controller .NET application (with open source in C# and VB.NET languages) are provides.

Given application includes 2 projects:

- PtsLib - project of PtsLib.dll library for operation with a PTS controller. Includes classes, methods and properties for communication with PTS controller using requests and responses described in UniPump communication protocol for communication with PTS controller for provision of control over dispensers and ATG systems and configuration of PTS controller.
- Fully-functional open source application for provision of control over up to 8 pumps and 4 ATG systems by the PTS controller, allows to perform all operations with the PTS controller (uses classes and methods of PtsLib.dll library).

PTS controller .NET application is provided on both C# and VB.NET languages and requires .NET Framework 2.0 for operation.



Start

To launch PTS controller .NET application run PtsApplication.exe, select from a dropdown list a COM port name, to which PTS controller is connected, and press a button to open a selected COM port.

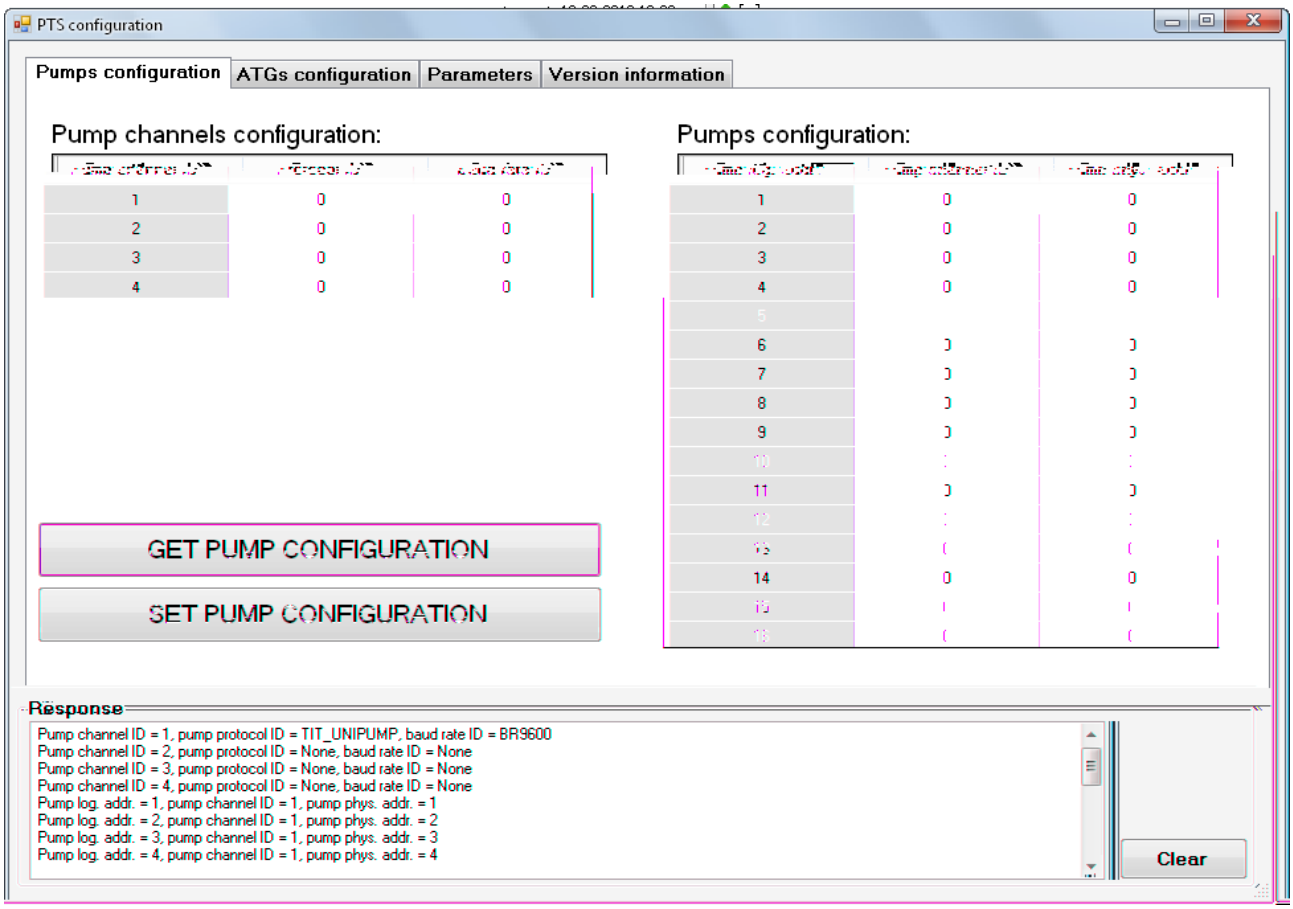
Note: connection with PTS controller is made through a 3-wire realization of RS-232 interface, an asynchronous half-duplex port, baud rate 57600 baud without a parity check. This configuration is hardly coded inside a program.

Configuration of PTS controller

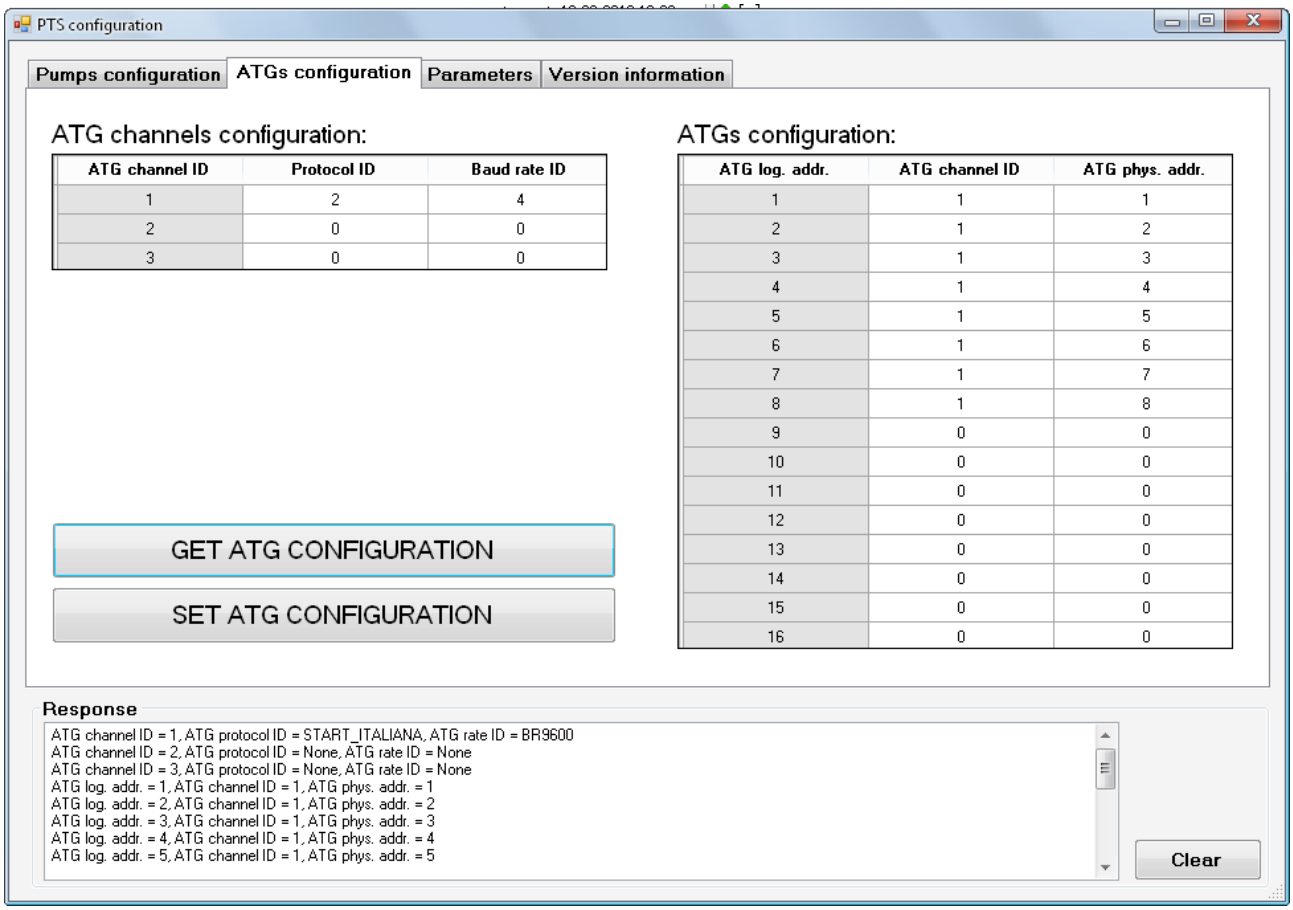
To open configuration form go on the main form to menu item "*Configuration*" → "*Fuel point configuration settings*".

Configuration allows to set pump ports, probe ports, parameters in PTS controller. It is quite convenient to use and open source code helps to understand better how the PTS controller works.

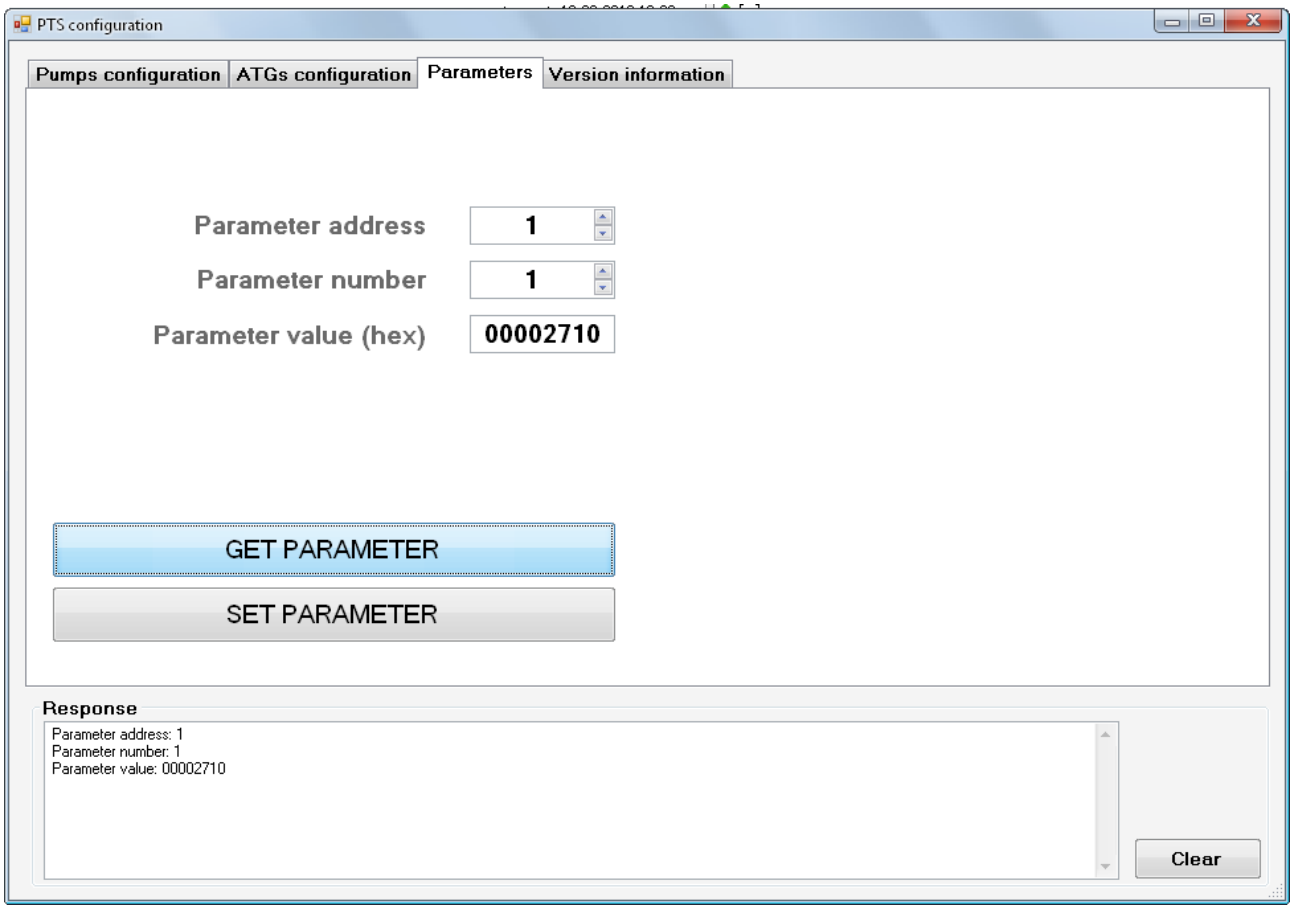
Pumps configuration tab allows to configure pumps ports of PTS controller (like *Pts_config.exe* utility):



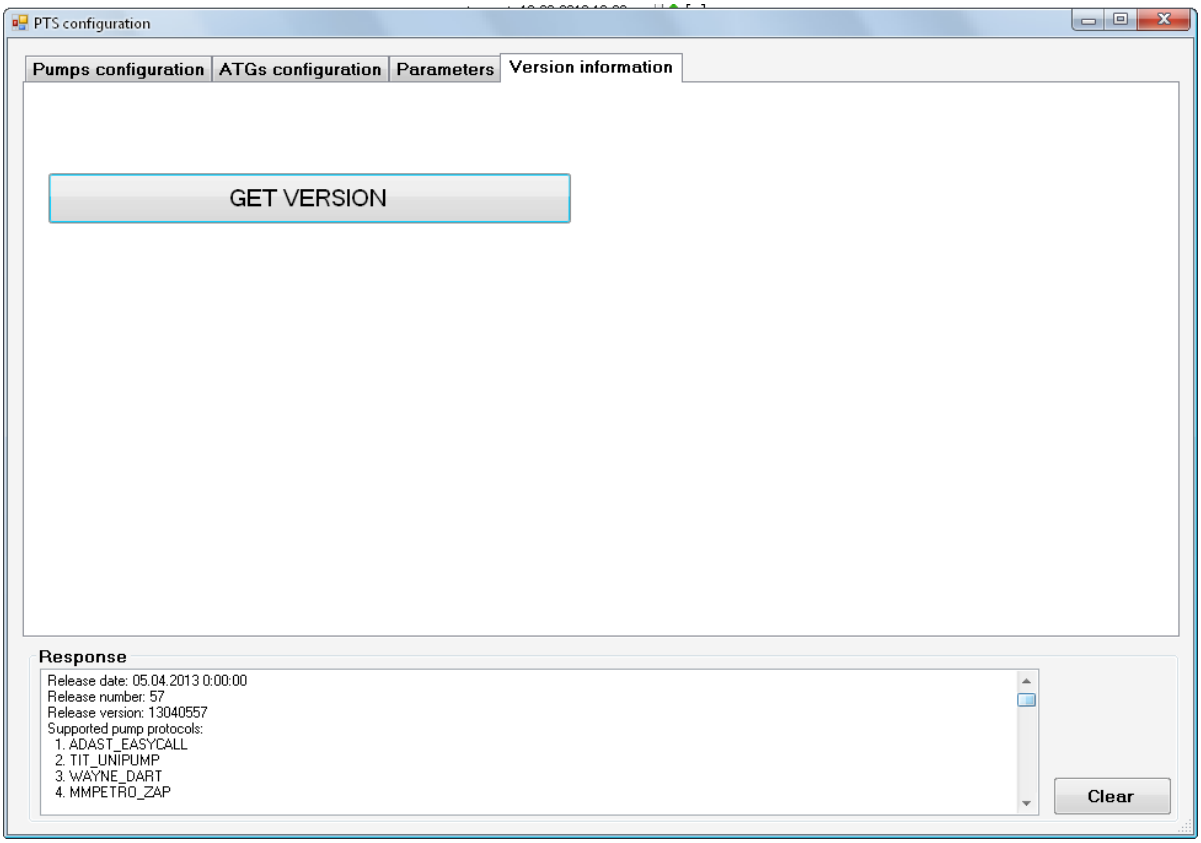
ATGs configuration tab allows to configure probe ports of PTS controller (like *Pts_config.exe* utility):



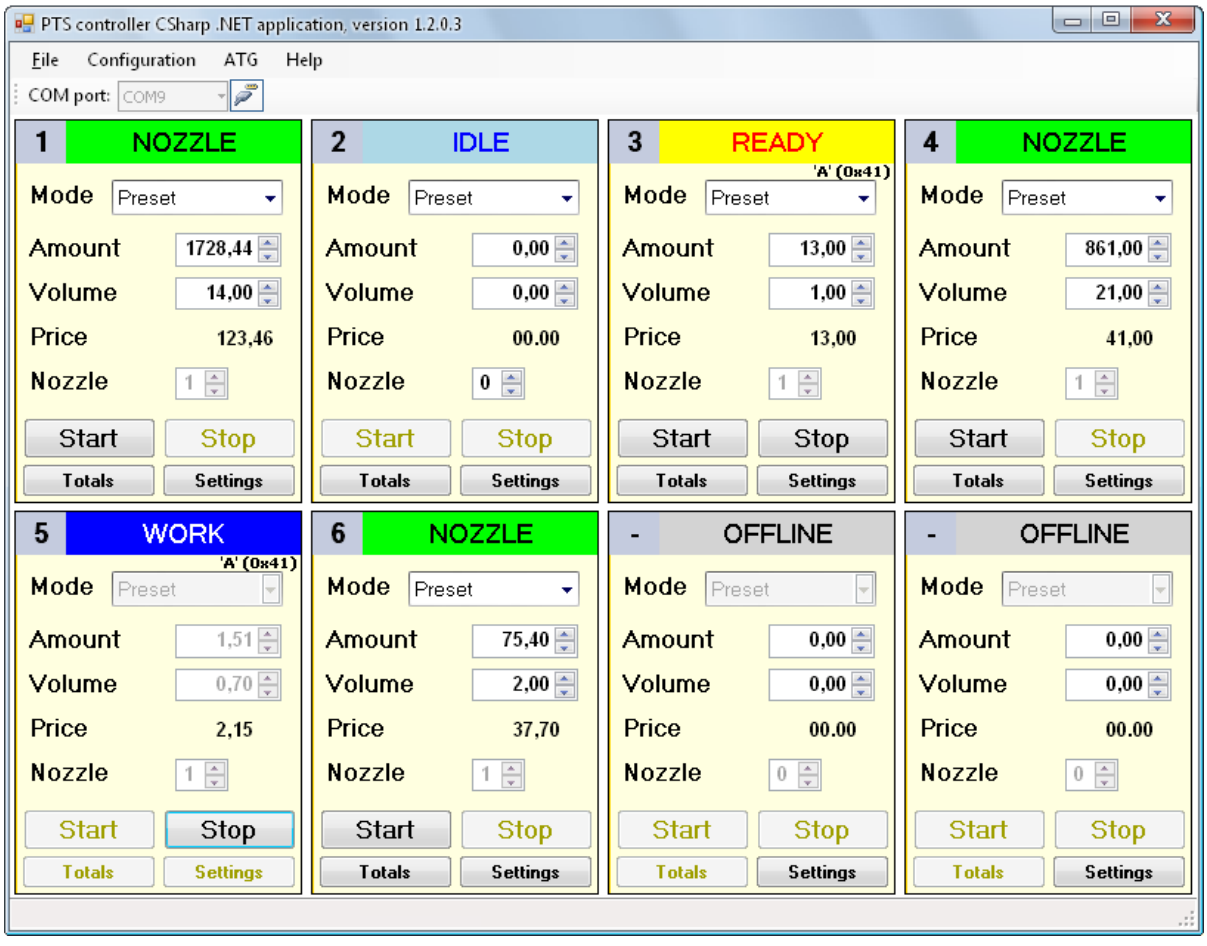
Parameters tab allows to read/write parameters in PTS controller (like *Pts_config.exe* utility):



Tab "*Version information*" allows to receive information about date and version of PTS controller firmware release and also a list of supported communication protocols of pumps and ATG systems (like *Pts_config.exe* utility):



Main view



In main view 8 fuel point icons are shown on the screen, which are to be linked to physical fuel points and show its state.

Each of the displayed fuel point icons contains information about:

- **Fuel point ID** - a logical number of a fuel point in PTS controller (number displayed in top left corner, displaying with a symbol "-" means a fuel point not set)
- **Status** – status of a fuel point (displayed in a top line)
- **Mode** – selection between Preset mode (required to specify money amount or volume of fuel to be dispensed) and Manual mode (does not require to specify money amount or volume of fuel to be dispensed)
- **Amount** – money amount for which a fuel dispensing should be made (in a range 0,00 – 9999,99)
- **Volume** – fuel volume for which a fuel dispensing should be made (in a range 0,00 – 9999,99)
- **Price** – price per 1 liter/gallon of fuel
- **Nozzle** – number of an active nozzle that is taken up (displaying with a symbol "-" means no nozzle is taken up)

Possible statuses of fuel points:

- **OFFLINE** – fuel point is not active, is not set or is controlled in a manual mode
- **IDLE** – fuel point is in idle state (all nozzles are hang down)
- **NOZZLE** – nozzle is taken up, waiting for allowance on fuel dispensing
- **READY** – fuel dispensing is allowed, test of indicator is running
- **WORK** – fuel dispensing is in process
- **TransactionCompleted** – transaction is finished normally, waiting for a nozzle to be hang down
- **TransactionStopped b**
- **ERROR** – Status of an error

Each of the fuel point icons contains the following buttons:

1. **Start** – start of fu

Given window contains a dropdown list with all 4 pump ports of the PTS controller, selecting each of which leads to displaying of all fuel points' IDs and corresponding fuel points' addresses configured to given pump port for a PTS controller in a field below. Selecting one of the fuel point IDs and pressing OK button leads to linking given fuel point icon to selected fuel point ID and displaying its status. Selecting of a PTS pump port with value 0 will lead to switching off a fuel point icon.

Given window for each of the fuel points also contains a list of 6 nozzles for setting of prices per 1 liter/gallon of fuel, dispensed through these nozzles, in a range 0,00 – 999,99. If a fuel point has less than 6 nozzles – prices will be set only for first number of nozzles, which a fuel point has.

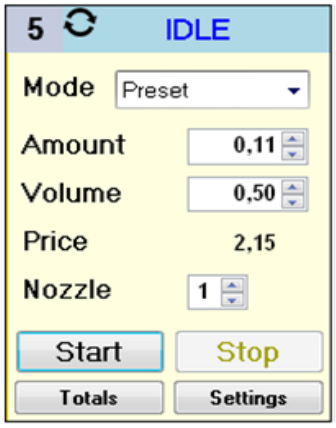
Clicking "*Set prices*" button leads to updating prices on selected fuel point. Clicking "*Get prices*" leads to receiving of prices from selected fuel point.

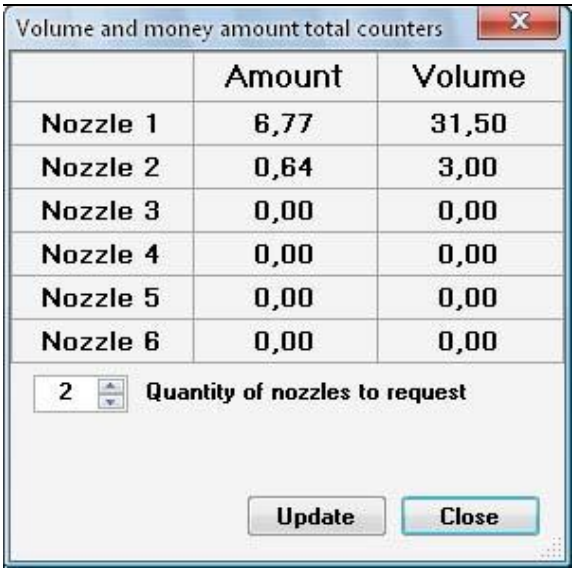
Clicking OK button leads to updating a fuel point icon and updating (creating) a file "*Config.xml*" in root folder with configuration of fuel point icons. At launching of a PTS controller .NET application next time configuration of fuel point icons will be read from this file "Config.xml" in root folder.

Reading of fuel point total counters

In the end of every dispensing application itself reads total counters from the pump on the nozzle, whih was dispensing. At this a sign of totals reading appears in the left top corner of the pump icon (and under the header of the "*T*" command is displayed, which means that currently PTS controller processes TotalInfoRequest command).

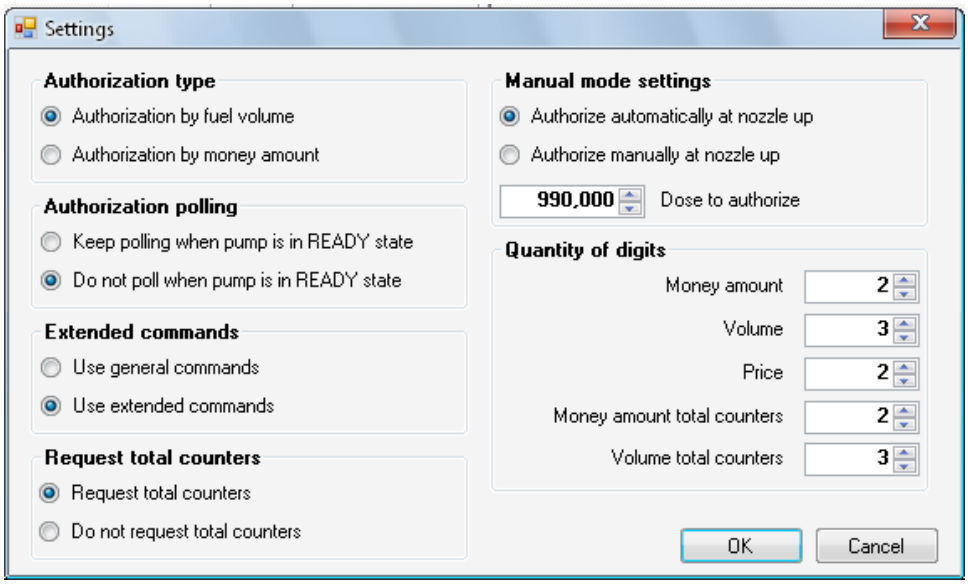
Total counters can be updated at any moment from any of the pumps. Selecting of a button "*Totals*" on a fuel point icon and clicking a button Update in it leads to reading of total counters:





Settings

Selection from top menu "*Configuration*" an item "*Settings*" leads to opening a new window, which allows adjustment of



Settings include the following:

1. Authorization type of fuel dispensers:
   - **Authorization by fuel volume** – dispensers are to be authorized with volume
   - **Authorization by money amount** – dispensers are to be authorized with money amount
2. Authorization polling:
   - **Keep polling when pump is in READY state** – after the Start button is clicked to authorize a dispenser, but nozzle is not taken up on the dispenser, the fuel point displays READY state; this option enables to keep constantly sending authorization command in READY state (until nozzle is taken up of fuel point and it is authorized)
   - **Do not poll when pump is in READY state** – after the Start button is clicked to authorize a dispenser, but nozzle is not taken up on the dispenser, the fuel point displays READY state; this option enables to send authorization command only once at clicking on a "*Start*" button of fuel point icon
3. Extended commands:
   - **Use general commands** – PTS controller can work with general commands (for prices containing up to 4 digits) and also with extended commands (for more quantity of digits in price values); this option sets to use general commands in communication with PTS controller (prices containing with up to 4 digits)
   - **Use extended commands** – PTS controller can work with general commands (for prices containing up to 4 digits) and also with extended commands (for prices containing with up to 9 digits); this option sets to use extended commands in communication with PTS controller (prices containing with up to 9 digits)
4. Request total counters:
   - **Request total counters** – this option sets that application should automatically request total counters after each dispensing on dispenser is performed
   - **Do not request total counters** – this option sets that application should not automatically request total counters after each dispensing on dispenser is performed

5. Manual mode settings:
   - **Authorize automatically at nozzle up** – this option sets that once a nozzle is taken up on the dispenser – application should at once authorize it with a value set in field "*Dose to authorize*"; this options enables the application to set in a way, when order is preset from dispenser keyboard and application simply monitors the dispensers operation; in order this feature to work a fuel point should be switched to Manual mode of operation (see above), in Preset mode this feature does not work (preset is supposed to be given from application)
   - **Authorize manually at nozzle up** – this option sets that dispensers are to be controlled fully from the application by clicking on Start and Stop buttons both in preset and Manual modes of operation

6. Quantity of digits:

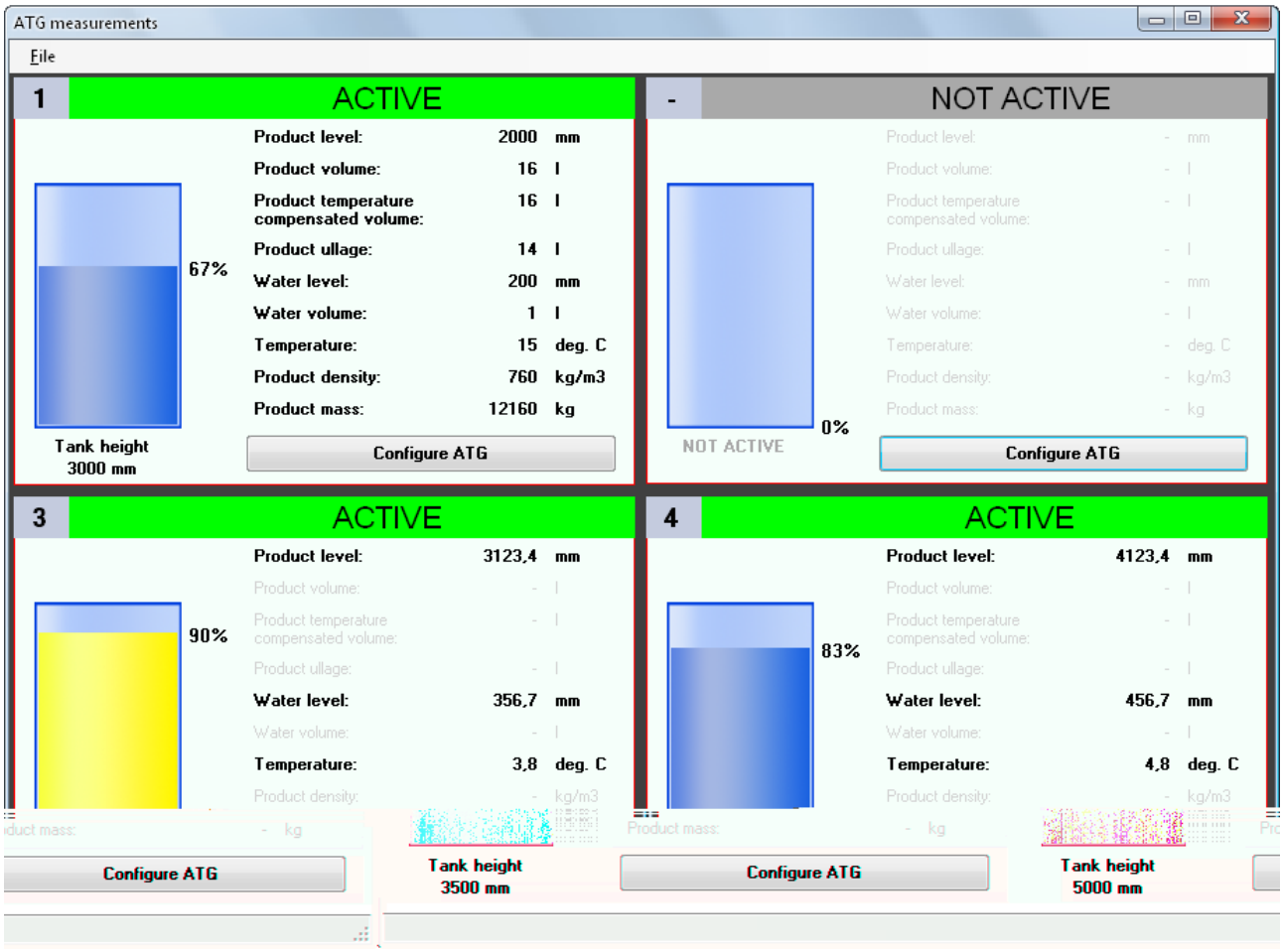
   Setting of quantity of digits in money, volume, price and total counters (volume and money amount) - this option is required in cases when dispensers may have non-standard quantity of digits (for example 3 digits in volume and 0 digits in money amount)

Displaying ATG systems probes states

In ATG view 4 ATG icons are shown on the screen, which are to be linked to physical ATG systems (probes) and show its state.

Each of the displayed ATG icons contains information about measured by ATG system (probe) parameters of petroleum product inside tanks. Depending on the type (communication protocol) of ATG system (probe) the following data may be displayed:

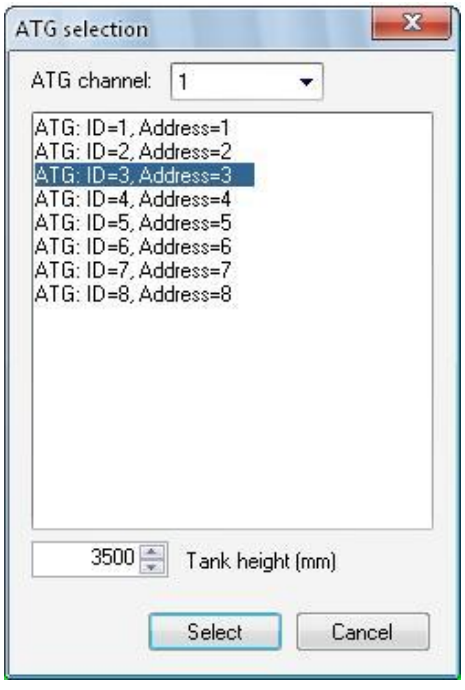
- **Product level** (accuracy 0.1 mm)
- **Product volume** (accuracy 1 liter)
- **Product temperature compensated volume** (accuracy 1 liter)
- **Product ullage (volume)** (accuracy 1 liter)
- **Water level** (accuracy 0.1 mm)
- **Water volume** (accuracy 1 liter)
- **Temperature** (accuracy 0.1 degree Celcium)
- **Product density** (accuracy 0.1 kg/m^3)
- **Product mass** (accuracy 0.1 kg)



If ATG system does not support any the parameters – a correspondent value label on ATG icon stays disabled. Picture of a tank on the ATG icon shows visually level of product in tank compared to tank height (which should be equal to ATG probe height). If ATG icon is linked with an ATG system – its state is "*ACTIVE*", else – "*NOT ACTIVE*".

Settings of ATG probe icons

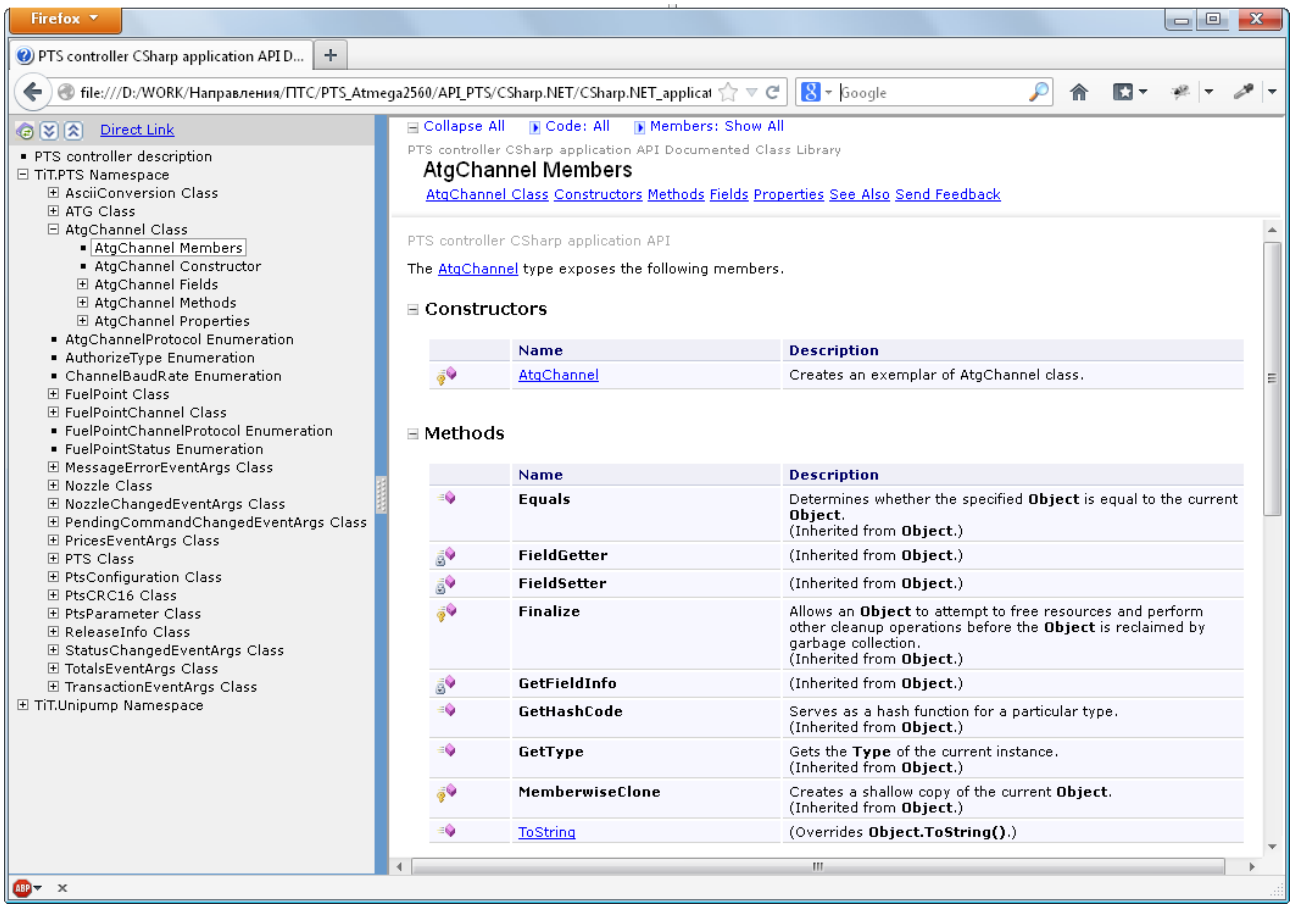
Given window contains a dropdown list with all 3 probe ports of the PTS controller, selecting each of which leads to displaying of all ATG probes' IDs and corresponding ATG probes' addresses configured to given probe port for a PTS controller in a field below. Selecting one of the ATG probe IDs and pressing OK button leads to linking given ATG probe icon to selected ATG probe ID and displaying its state. Selecting of a PTS probe port with value 0 will lead to switching off a ATG probe icon.



Given window for each of the ATG probes also contains a field for entering height of a tank with installed probe (which is considered to be a maximum level of product allowed for given tank).

TiT.PTS classes help file

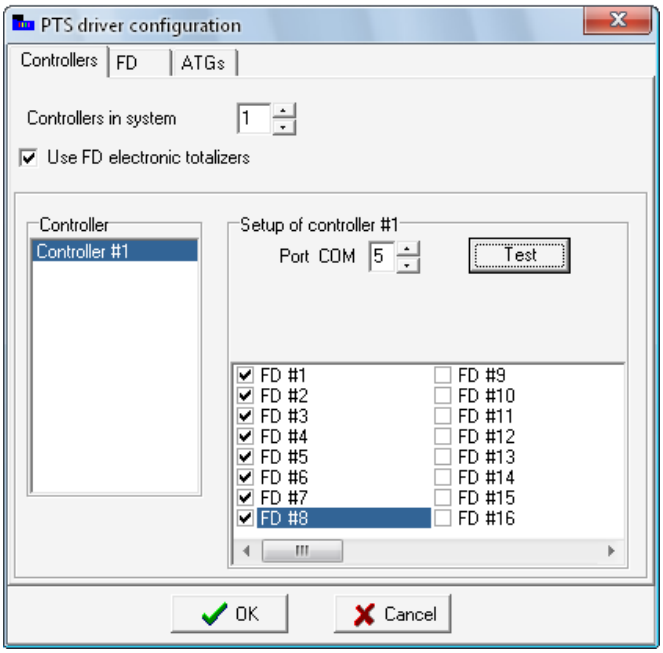
PTS controller .NET application is based on a number of classes which documentation describing methods and properties is supplied together with it. Documentation is generated in a form of html-files.



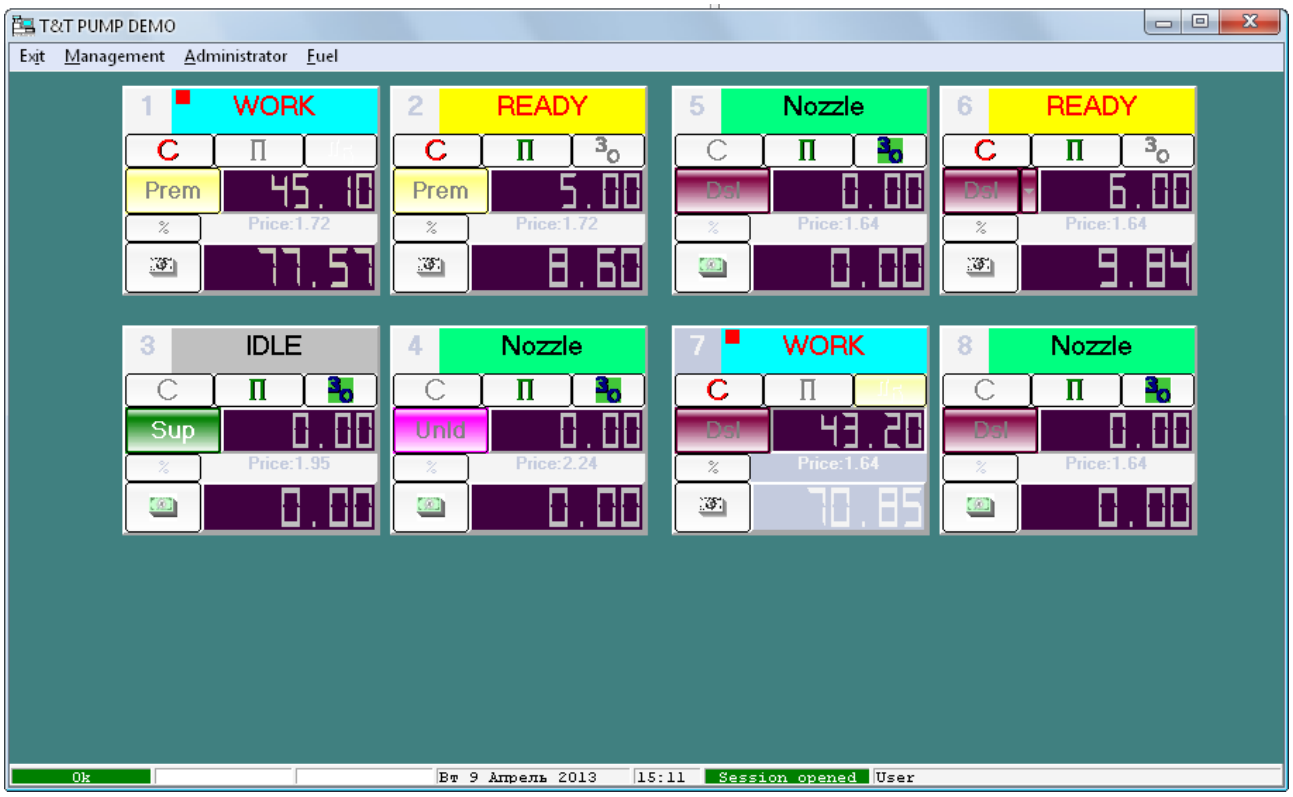
PumpDemo utility

PumpDemo utility is a contracted version of NaftaPOS software (http://technotrade.ua/petrol-station-software.html) used for debugging purposes. It does not require installation.

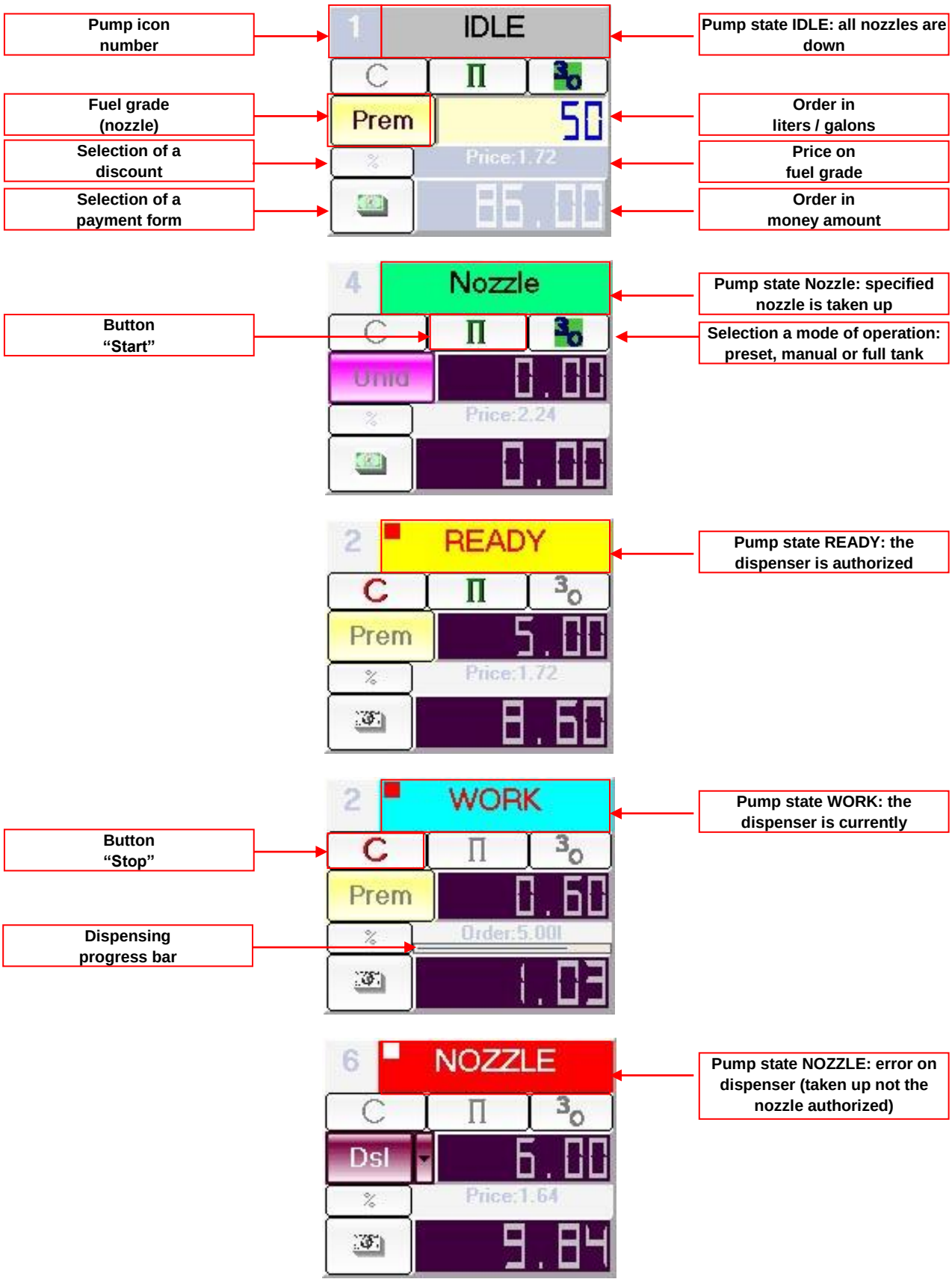
Configuration of the system is done by running a setup.bat file. Configuration is similar to configuration of NaftaPOS software for operation with PTS controller (see NaftaPOS software user manual):



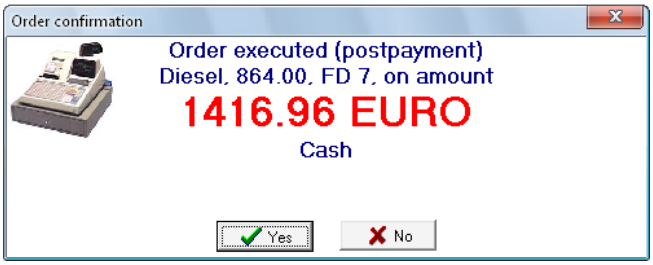
This allows to set configuration for communicating with PTS controller.
Graphical user interface is adjusted in a file AZSDemo.dat, where all information is stored in a view of text.



Operation of the PumpDemo utility is made same as operation of NaftaPOS software.



As a confirmation of the fuel dispensing ordered in preset mode or performed in manual or full tank modes a correspondent window is shown:



PTS controller test utilities

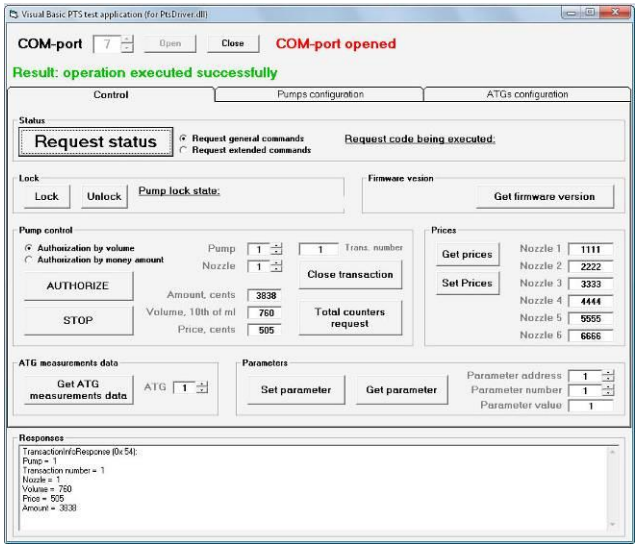
Purpose

PTS controller test utilities are written in the following languages:

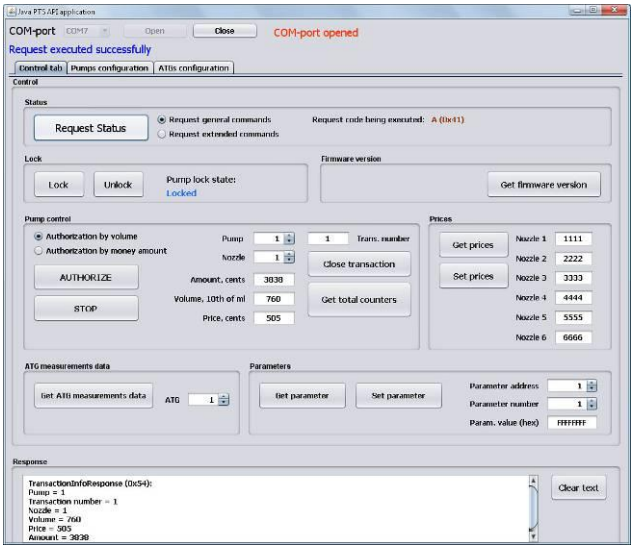
- C#
- VB 6.0
- VB.NET
- Java

It is written for developers in order to give open source test application, which shows how to communicate with PTS controller using commands from UniPump communication protocol without a necessity to implement this protocol from zero.

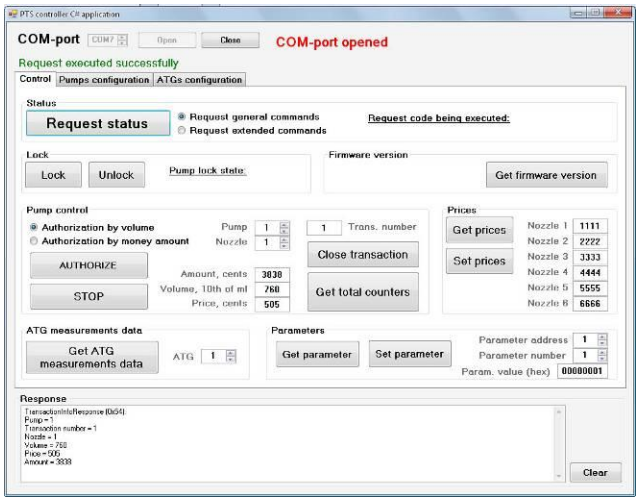
Utility provides all operations with a PTS controller. Thus developers using one of the above languages can view how control over PTS controller is provided in the utility and implement the same functions in own developed applications for petrol stations.



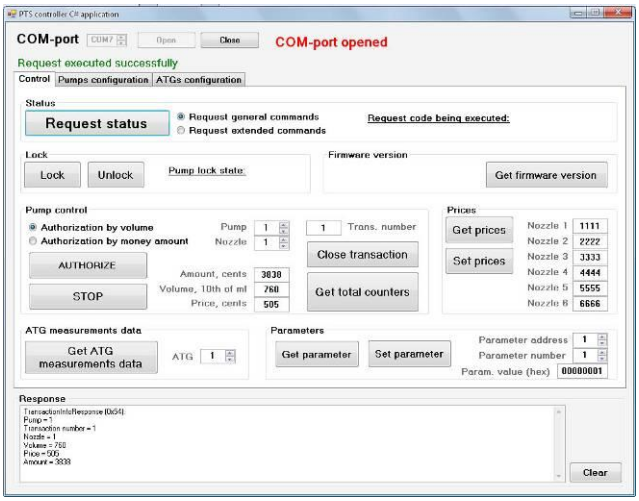
Visual Basic 6.0 (uses COM-object)



Java (developed in NetBeans IDE)



C# (developed in Visual Studio Express 2010)



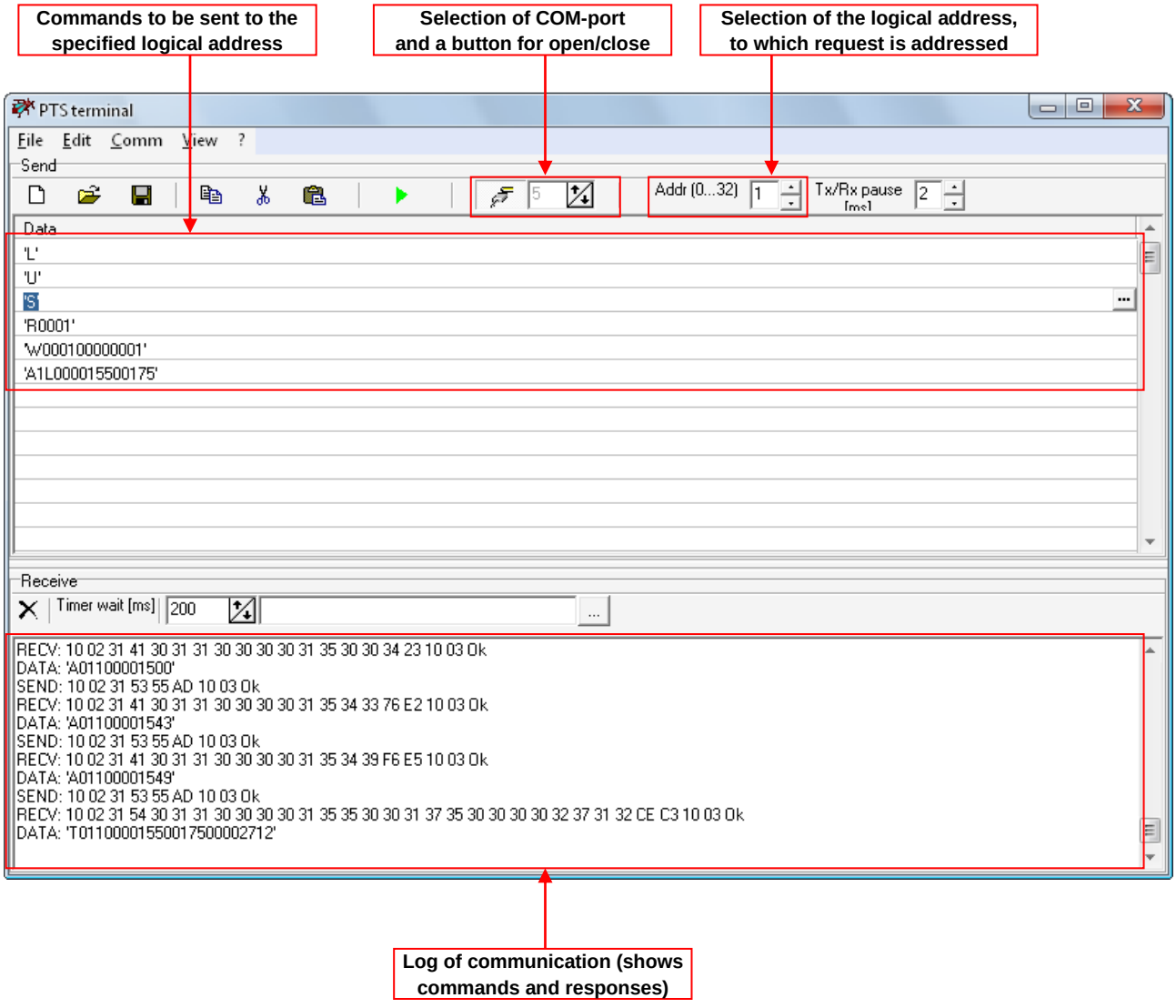
VB.NET (developed in Visual Studio Express 2010)

PTS terminal utility

Purpose

PTS terminal is used in order to provide debugging of PTS controller operation. It allows to send to PTS controller requests formed with bytes in accordance with UniPump communication protocol commands without a necessity to add framing bytes and CRC.

This utility can be useful during development of own control software, when developers can test sending of commands to PTS controller and receive its responses using this utility and in such a way compare then with responses processed in own developed control software.



Step-by-step configuration of the PTS controller SDK

Purpose

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

Step 1. Downloading of PTS controller SDK software

Using a link for download of PTS controller SDK software it is necessary to get all files from it. The files should include:

- API tools:
  - Open source application programming interfaces, libraries, test utilities, applications and documentation for development the third party software for communication with PTS controller using various programming languages and environments
  - UniPump communication protocol description for PTS controller
- Software tools
  - PumpDemo util
  - PTS controller configuration tool *Pts_config.exe*
  - PTS terminal utility
  - Latest stable PTS controller firmware
- Software simulators
  - Fuel dispensers software simulators
  - ATG systems (probes) software simulators
- Documentation
  - User manuals
  - Technical guides

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

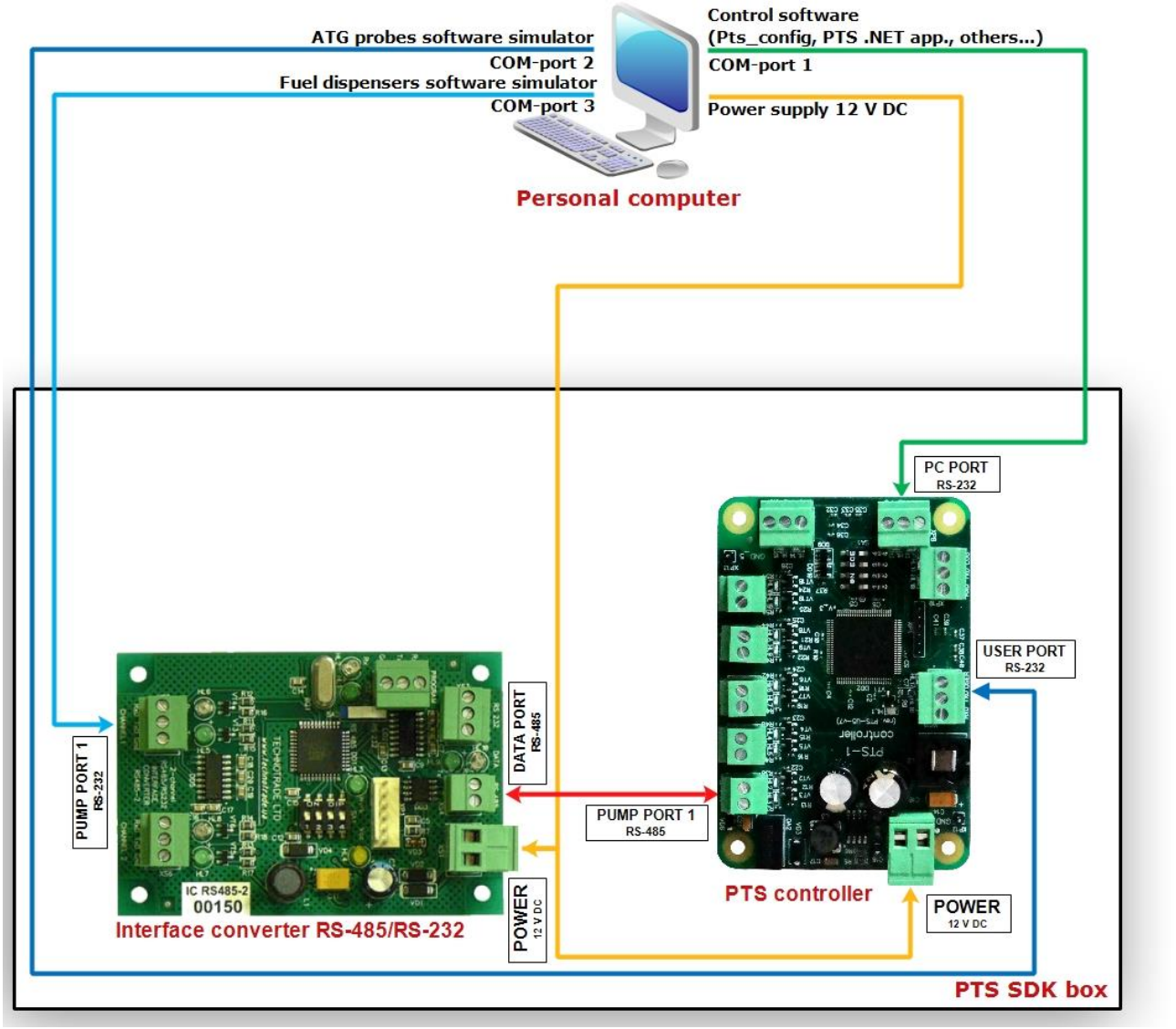
For connection of PTS controller SDK cabling it is necessary to have at least 2 COM-ports available in PC (one COM-port – for control system, other COM-port – for fuel dispenser software simulator or ATG probe software simulator). In case of absence of native COM-ports in the PC motherboard it is possible 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 controller SDK is generally supplied in a plastic box, in which the PTS controller and RS-485/RS-232 interface converter boards are mounted. All cables inside the PTS controller SDK are already connected. In order to start operation it is necessary to connect interfaces to PC COM-ports and power on the PTS 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 controller: connect cable coming from PC port of PTS controller to COM-port 1 of PC (where the control software is to be launched).
2. Connection of RS-485/RS-232 interface converter to PC: connect cable coming from PUMP PORT 1 of RS-485/RS-232 interface converter to COM-port 2 of PC, on which the pump software simulator is to be launched.
3. Make sure that PUMP PORT 1 of PTS controller is connected to DATA PORT (RS-485) of RS-485/RS-232 interface converter.
4. Make sure that all switches of DIP-switch SA1 are set into position OFF.
5. Make sure that power supply cable is connected to POWER connector of PTS controller and POWER connector of RS-485/RS-232 interface converter.
6. (Optional, may be skipped) In order to use software simulator of ATG system connect USER port of PTS controller to COM-port 3 of PC, on which the ATG system software simulator is to be launched.

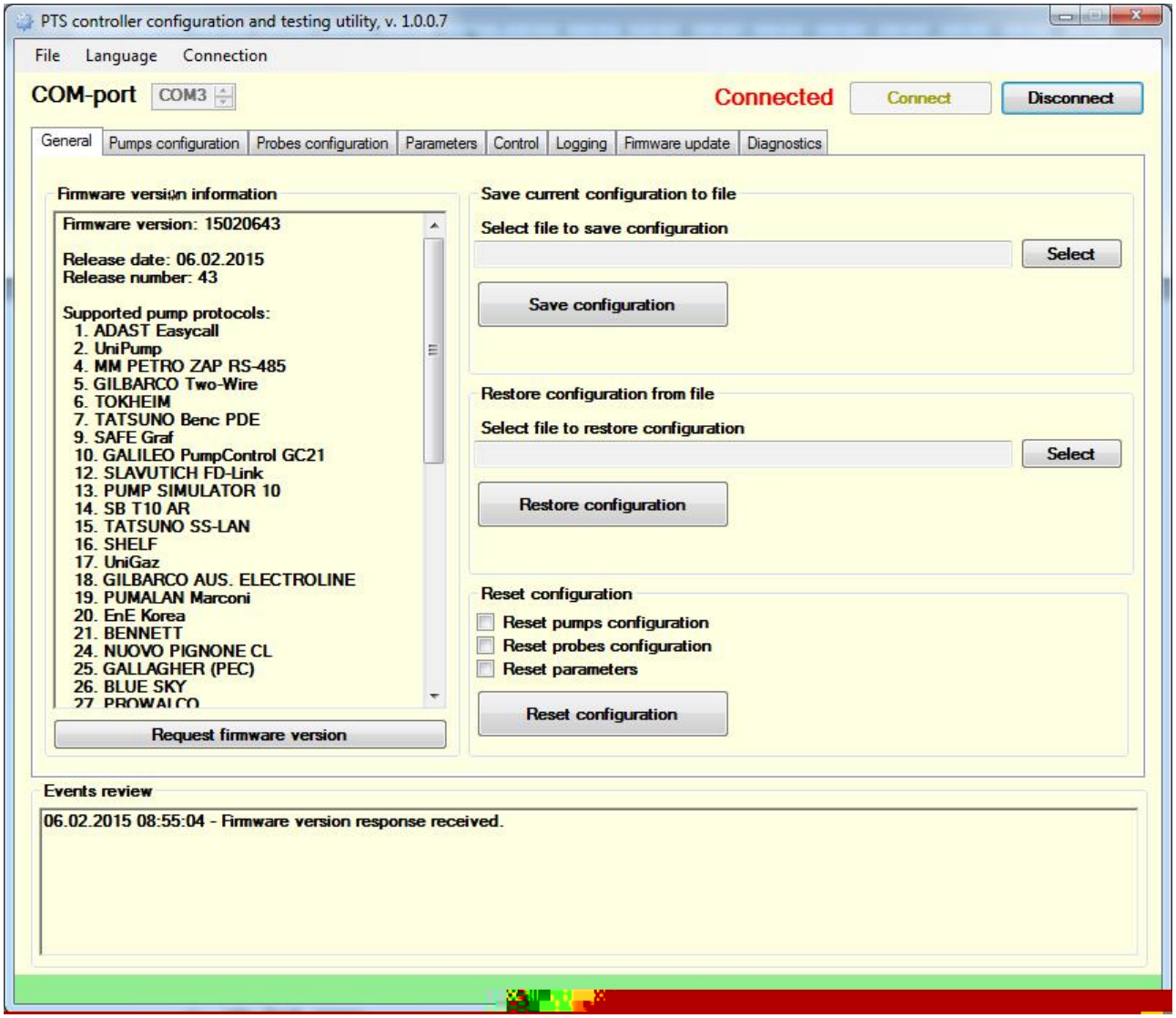
7. Switch on (power on) the PTS controller SDK (requires 12 V DC power supply source).

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 3. Starting of the PTS controller configuration utility Pts_config.exe

Run *Pts_config.exe* and from the main menu select connection type to be "*Direct connection to PC COM-port*", select COM-port with connected PTS controller and click on the "*Connect*" button. Make sure that the port is opened (red inscription "COM-port opened" should appear).

Click on button *"Request firmware version"* to get firmware information from PTS controller.

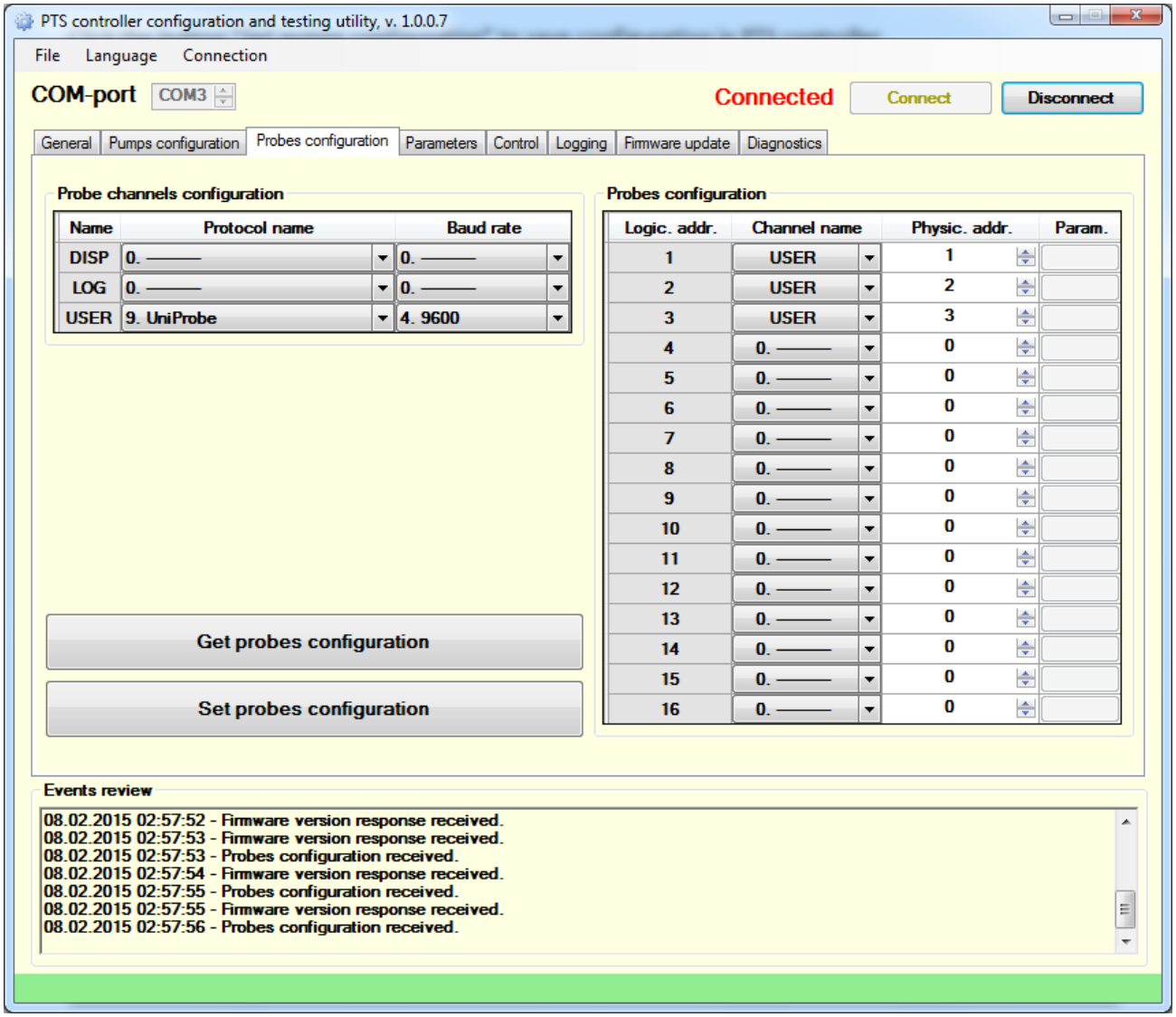


PTS-1 CONTROLLER OVER FUEL DISPENSERS AND ATG SYSTEMS FOR PETROL STATIONS (PTS-1, n. Tm g G1,)6(n. Tm g G360 G

Step 5. Configuration of probes ports

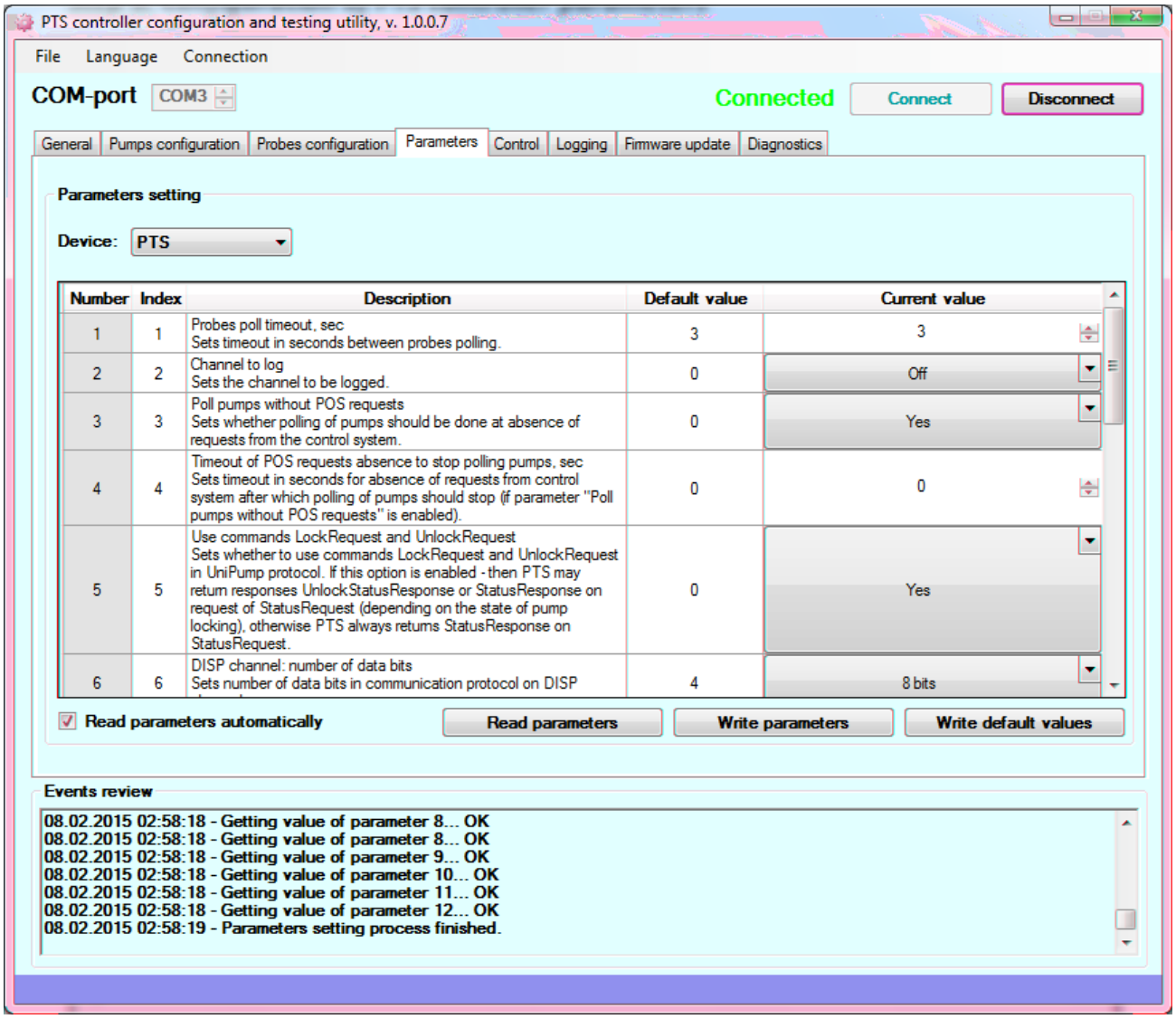
Go to tab "*Probes configuration*" and set probes ports configuration as shown on below screenshot. Set protocol "*9. UniProbe*" for probe port USER and baud rate "*4. 9600*". Assign this probe port to probes 1 - 3, set the physical addresses of these probes also 1 – 3.

Click the button "*Set pumps configuration*" to save configuration in PTS controller.



Step 6. Configuration of PTS controller parameters

Go to tab "*Parameters*" and select from a device list item "*PTS*", click on a button "*Write default parameters*".

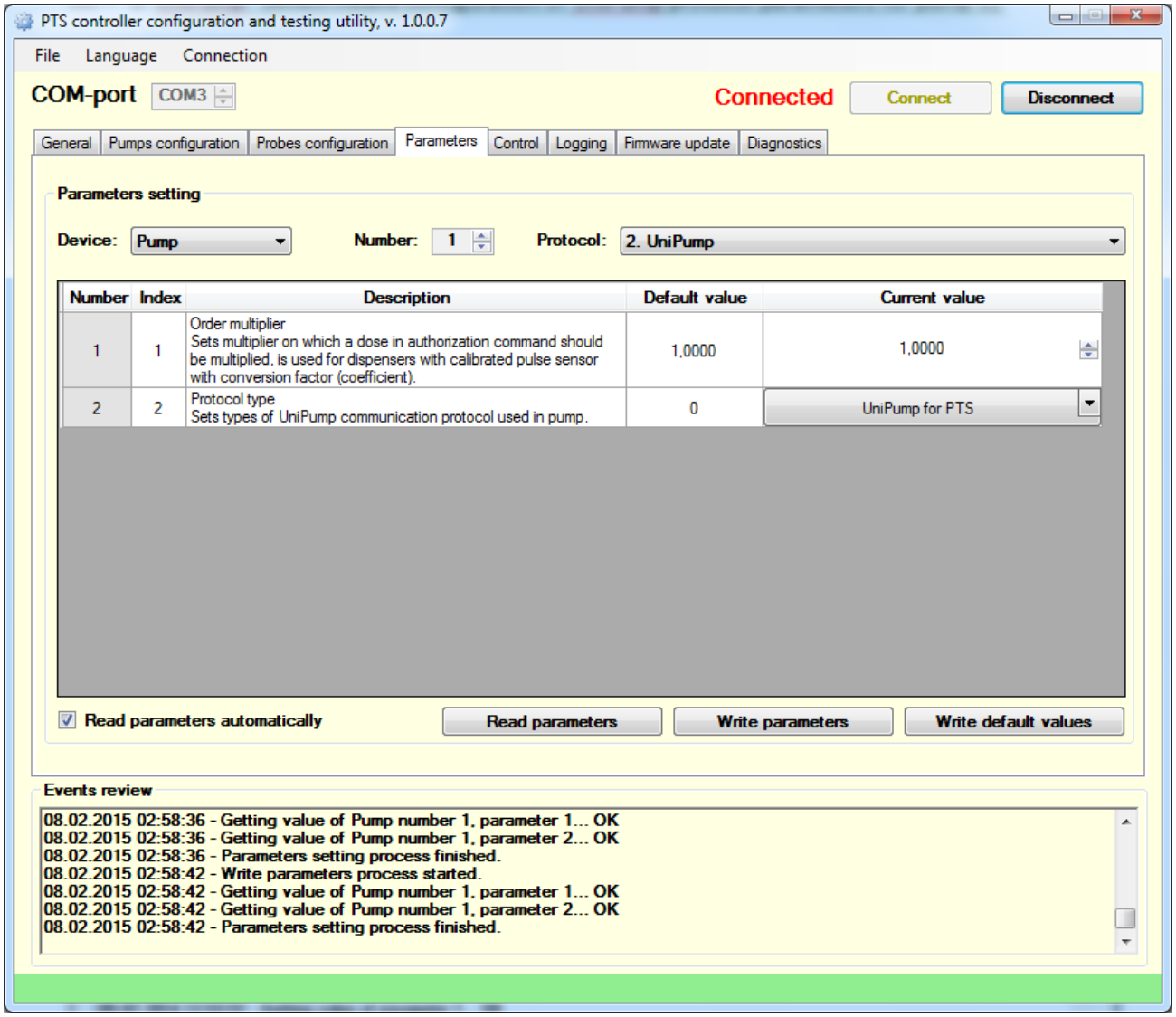


Step 7. Configuration of pumps parameters

On tab "*Parameters*" 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 "*Write default parameters*" to write default values. Change the parameter with index 2 "*Protocol type*" to value "*1. UniPump protocol for PTS*" as it is shown on below screenshot.

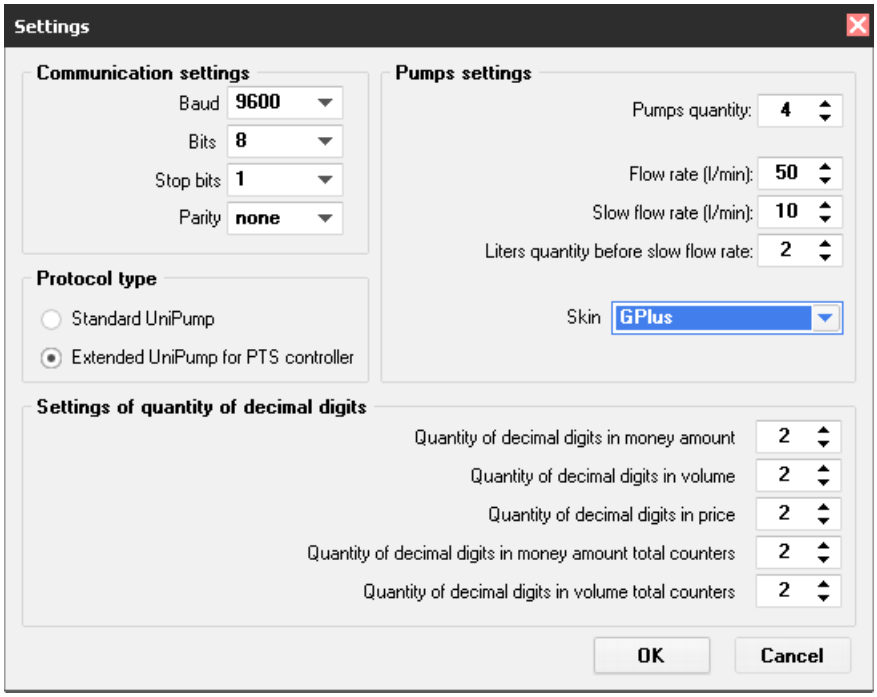
Save current configuration for each of 4 pumps (select pumps one by one using field "*Number*").



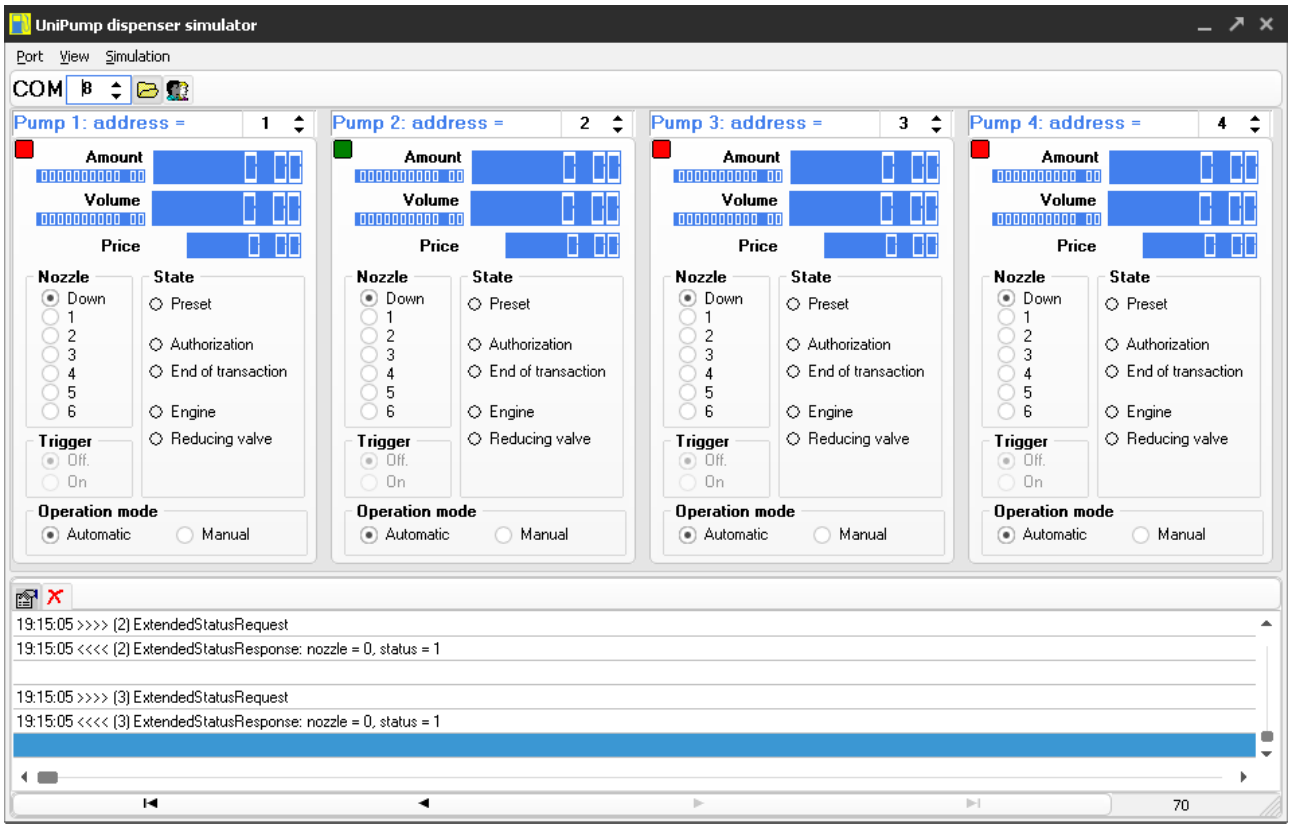
At this step configuration of the PTS controller is finished.

Step 8. 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 RS-485/RS-232 interface converter board is connected, and click "*Open*" button:



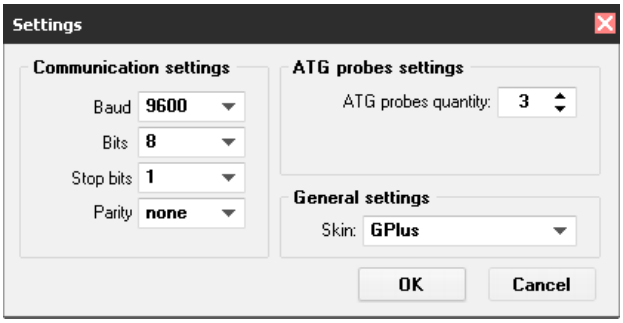
After COM-port is opened in case if there is communication between the PTS controller and pump simulator – you should see blinking of red squares located in left top corner of pump icons in pump simulator, and communication will be logged in log window of the simulator.

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

Step 9. Configuration of ATG probes software simulator

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

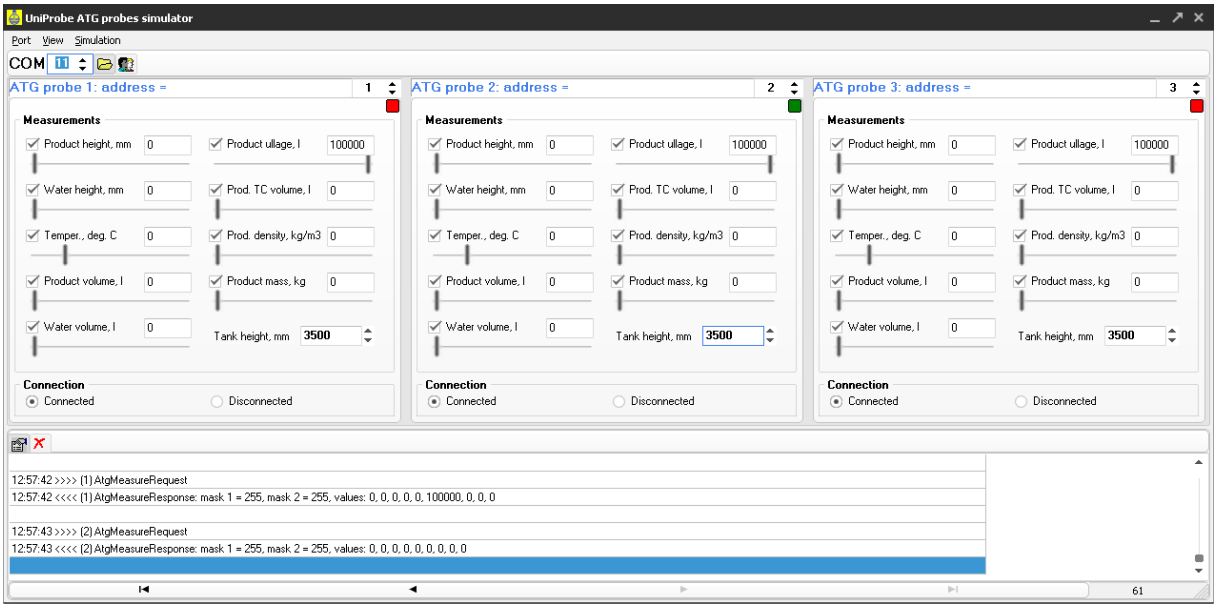


After properties are set click OK and on the main form select a COM-port, to which USER port of PTS controller is connected, and click "*Open*" button.

After COM-port is opened in case if there is communication between the PTS 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 controller on USER port green and red LEDs will begin to blink once per second. Blinking of the green LED means that PTS controller is sending requests to the ATG, blinking of the red LED means that the PTS controller receives responses from the ATG.

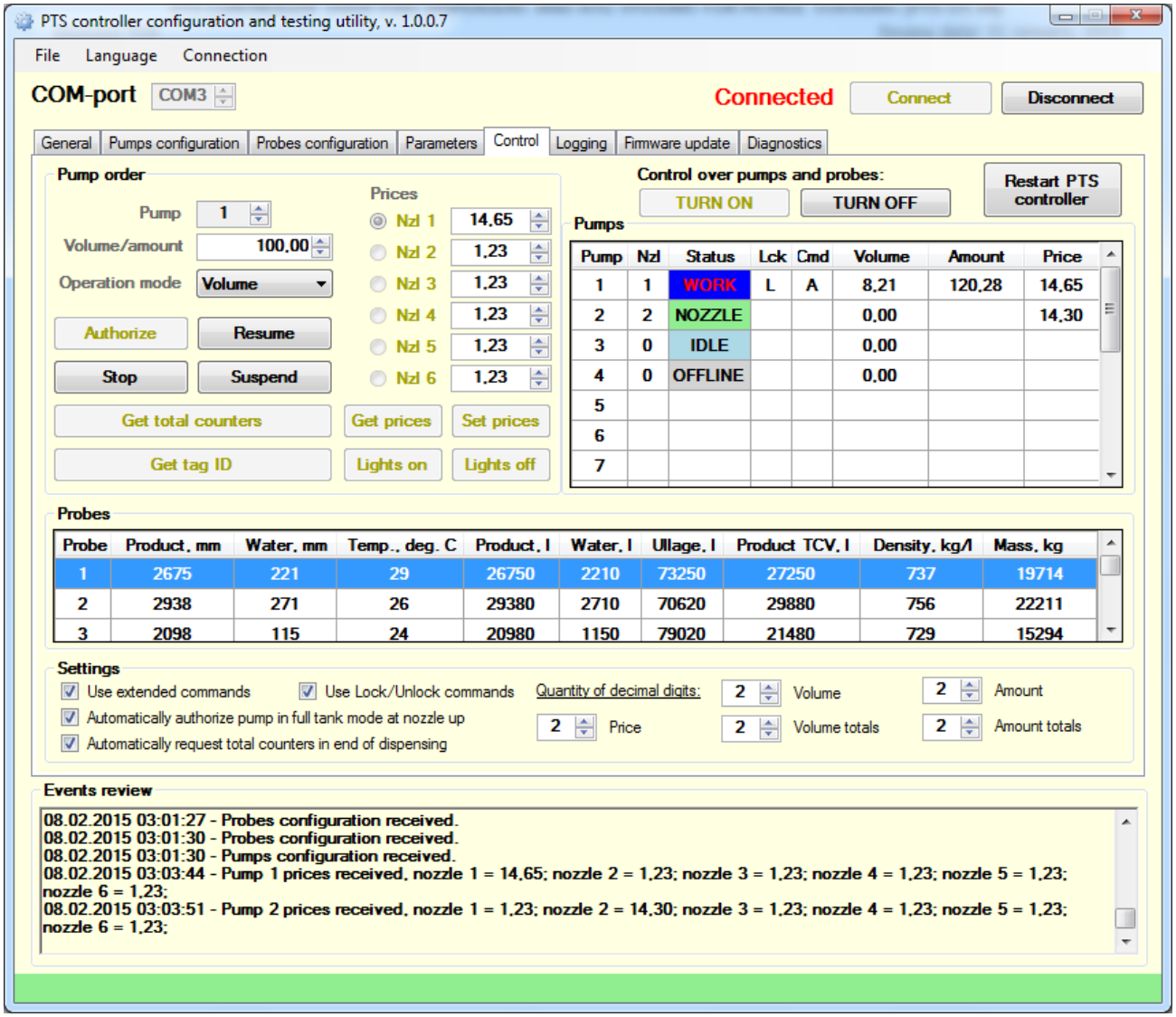
In case if only green LED is blinking on USER port – there is a mistake in wiring connection or configuration of the equipment (PTS controller or ATG).



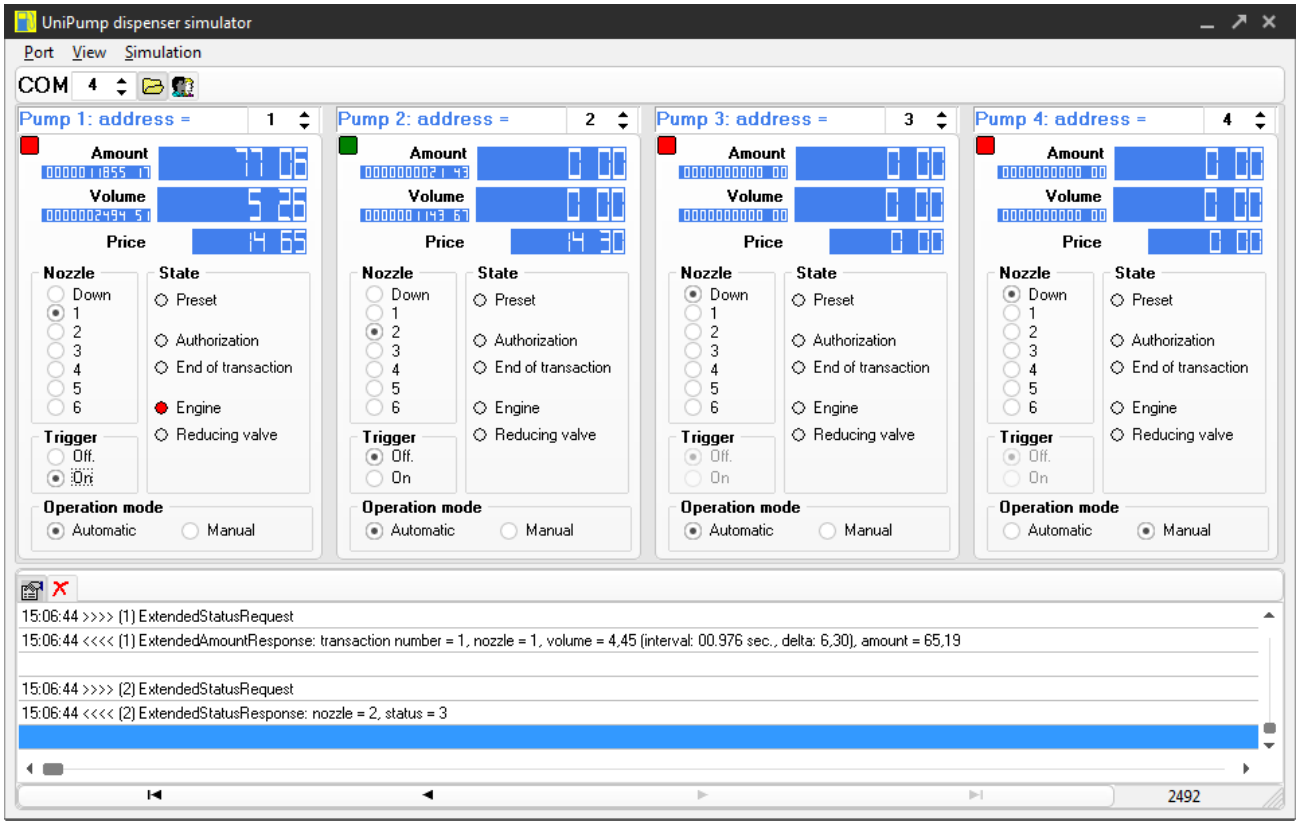
Step 10. Control over pumps and ATG probes in PTS controller configuration and testing utility

Go to tab "*Control*" in *Pts_config.exe* and click on the button "*TURN ON*".

Now it is necessary to set initial values in the pump simulator and ATG probes simulator to display them in the utility. Take up nozzles on the pumps and also set values for the ATGs (there is a possibility to emulate presence in the simulators to make them work if there was really process going on). In the *Pts_config.exe* utility you will see these changes.

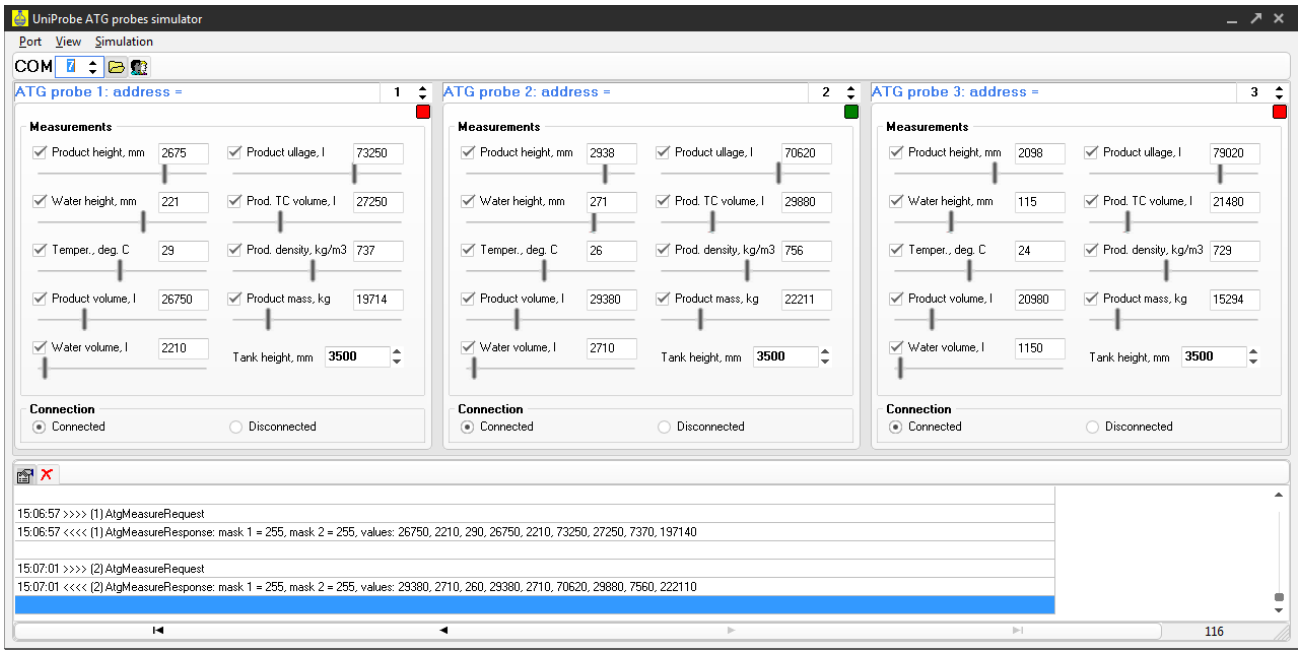


Now you are able to provide full control over the pumps and read receive data from the ATG probes:



Pumps software simulator

Try to make different operations with pumps: set/get prices, take up/down nozzles, get total counters, authorize a dispenser, others. Plays with decimal digits number to make them equal to used at your petrol stations (Note! Number of decimal digits should be also changed in pumps software simulator).



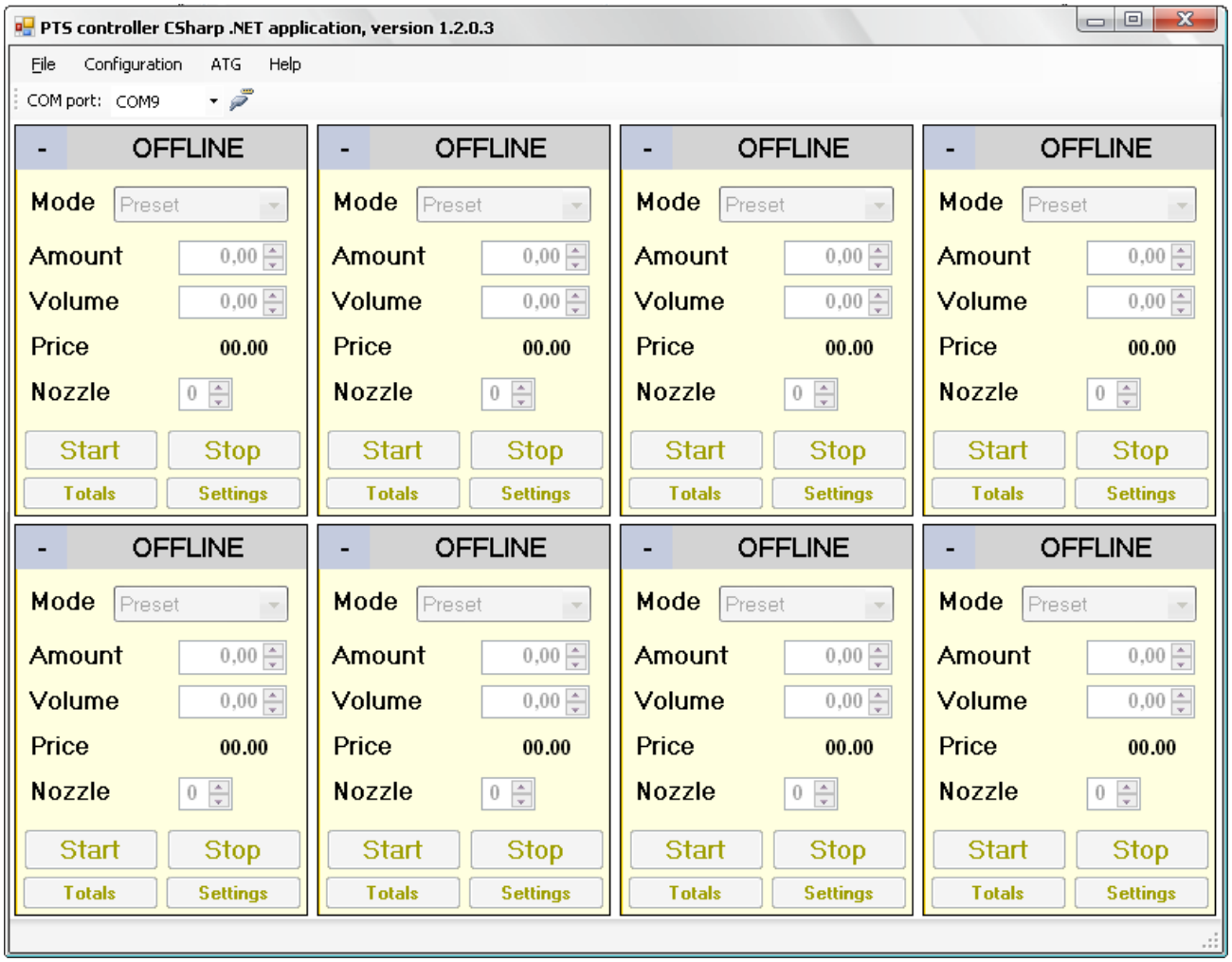
ATG probes software simulator

Try to change the measured values of fuel in tanks and see how soon they are updated in *Pts_config.exe* utility.

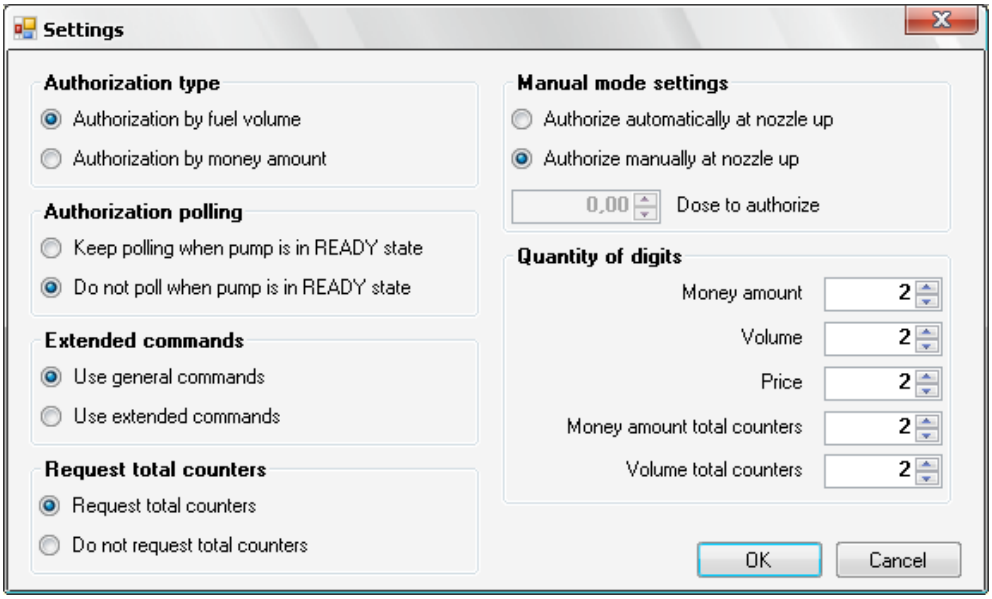
Step 11. Configuration of PTS controller .NET application for control over pumps and ATG probes

The open-source application written in C# and VB.NET is a good place to start development of new control software for petrol stations. In this section we will see how it is easy to configure and run it.

Compile "*PTS application*" project or simply run *PtsApplication.exe* (application is located in PTS SDK software kit and is located in API TOOLS folder for C# and VB.NET languages):



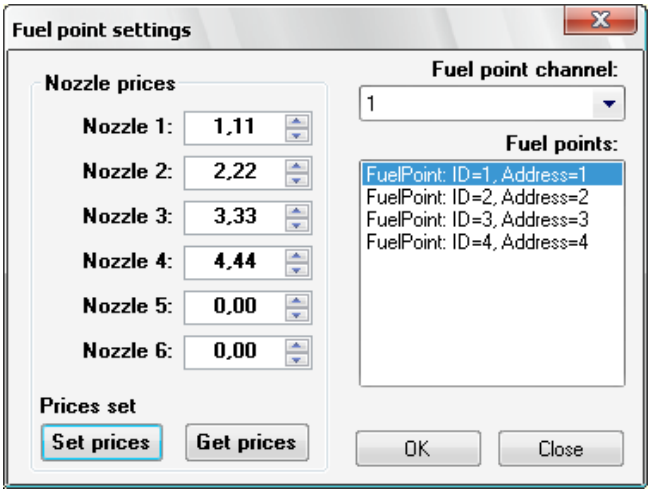
Go to main menu item "*Configuration*" → "*Settings*" and set configuration as shown below:



In main form of the application for each of the fuel point icons go to setting ("*Settings*" button) and set a correspondent fuel point number (from fuel point port 1) and prices for each of the nozzles:

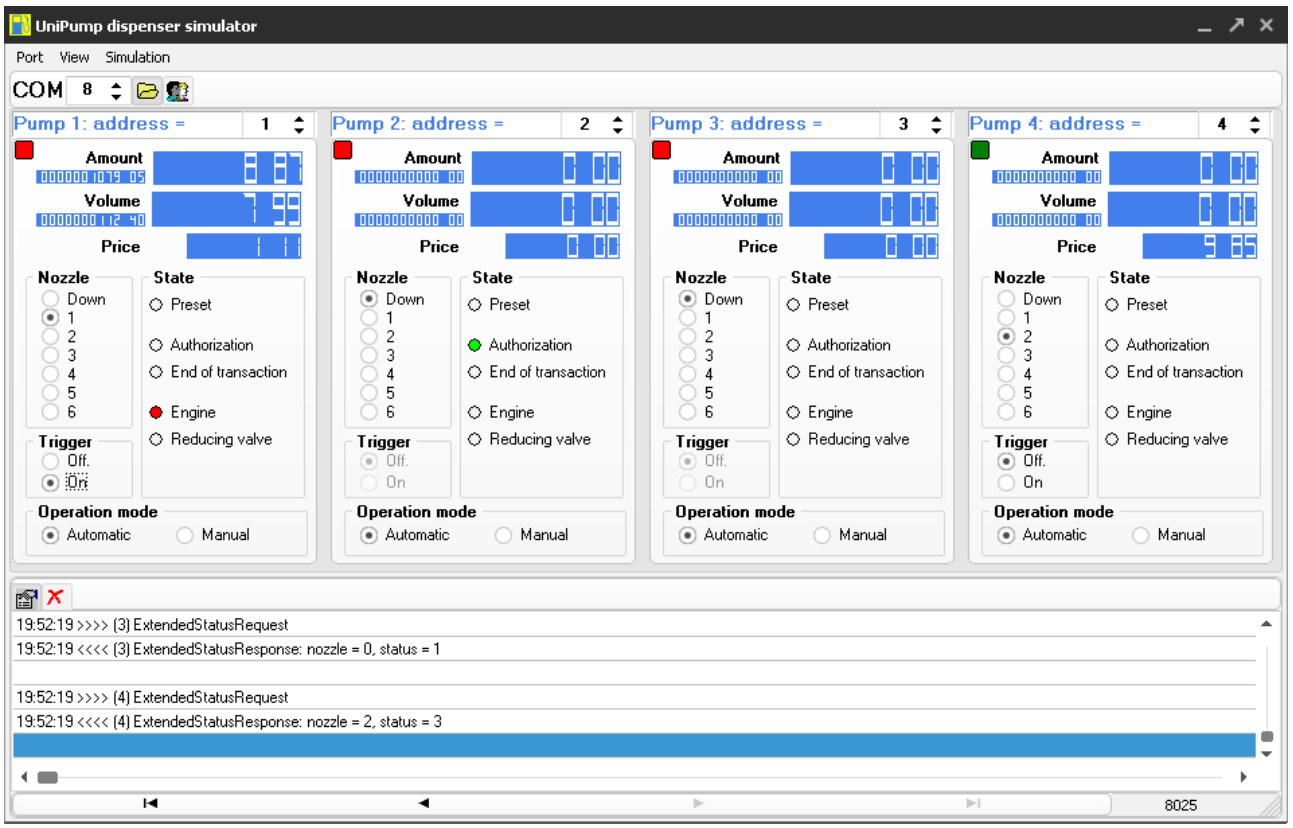
- Fuel point icon #1 → FuelPoint ID = 1, Address = 1
- Fuel point icon #2 → FuelPoint ID = 2, Address = 2
- Fuel point icon #3 → FuelPoint ID = 3, Address = 3
- Fuel point icon #4 → FuelPoint ID = 4, Address = 4

Also here set prices for each of the nozzles:



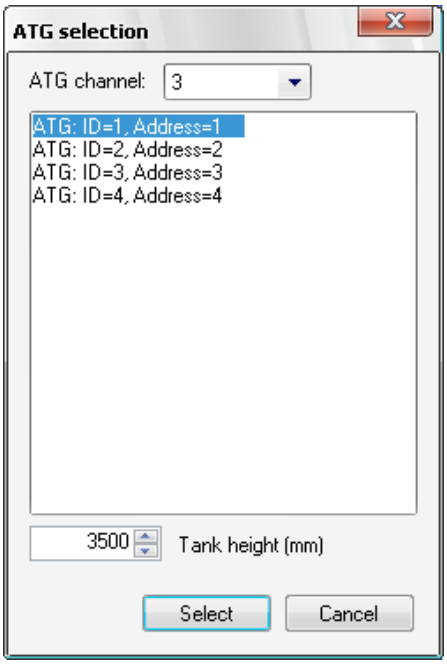
Now the main form of the application allows to provide control over pumps in pump software simulator (see configuration of the pumps simulator in step 7 above):



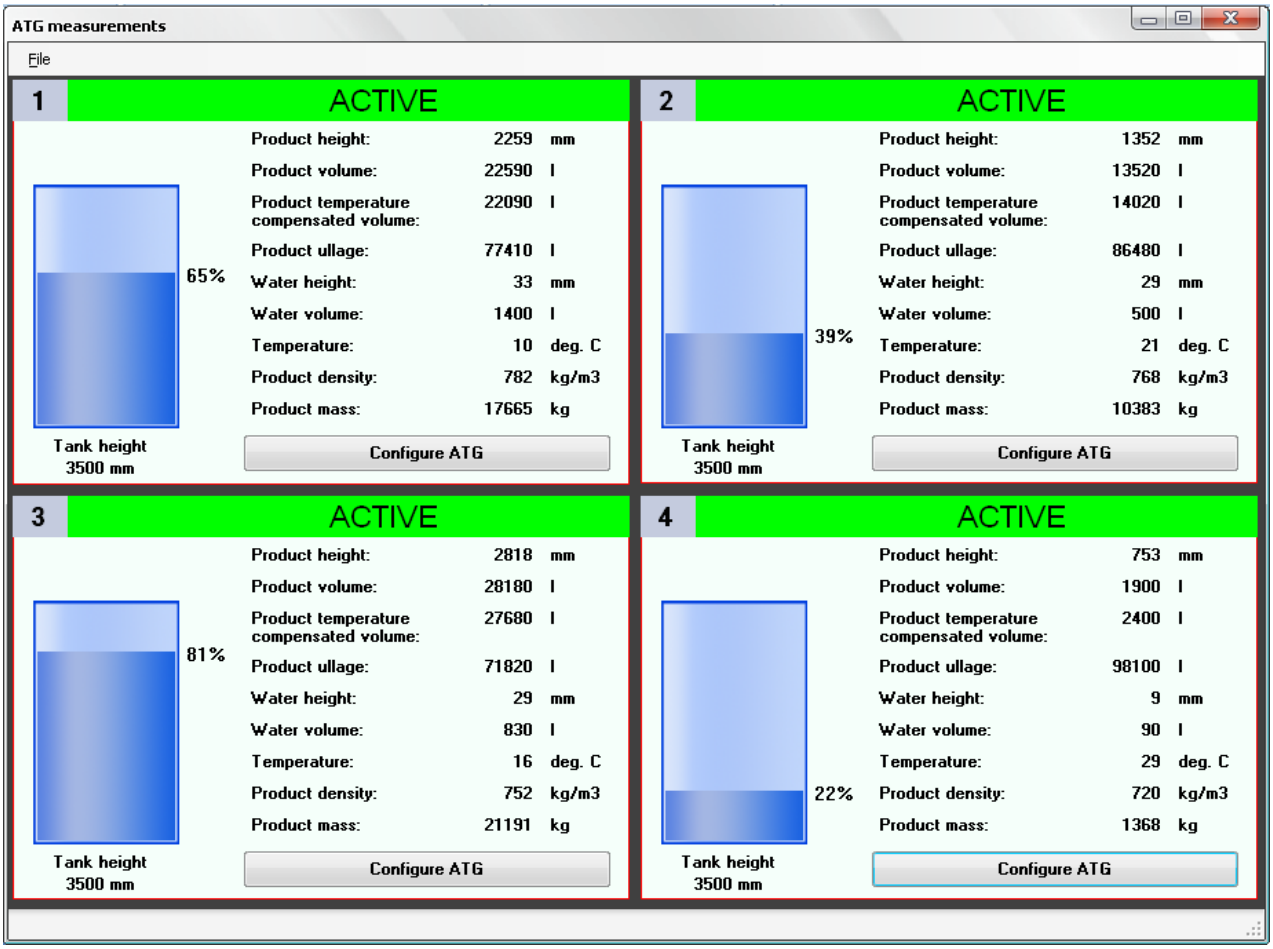


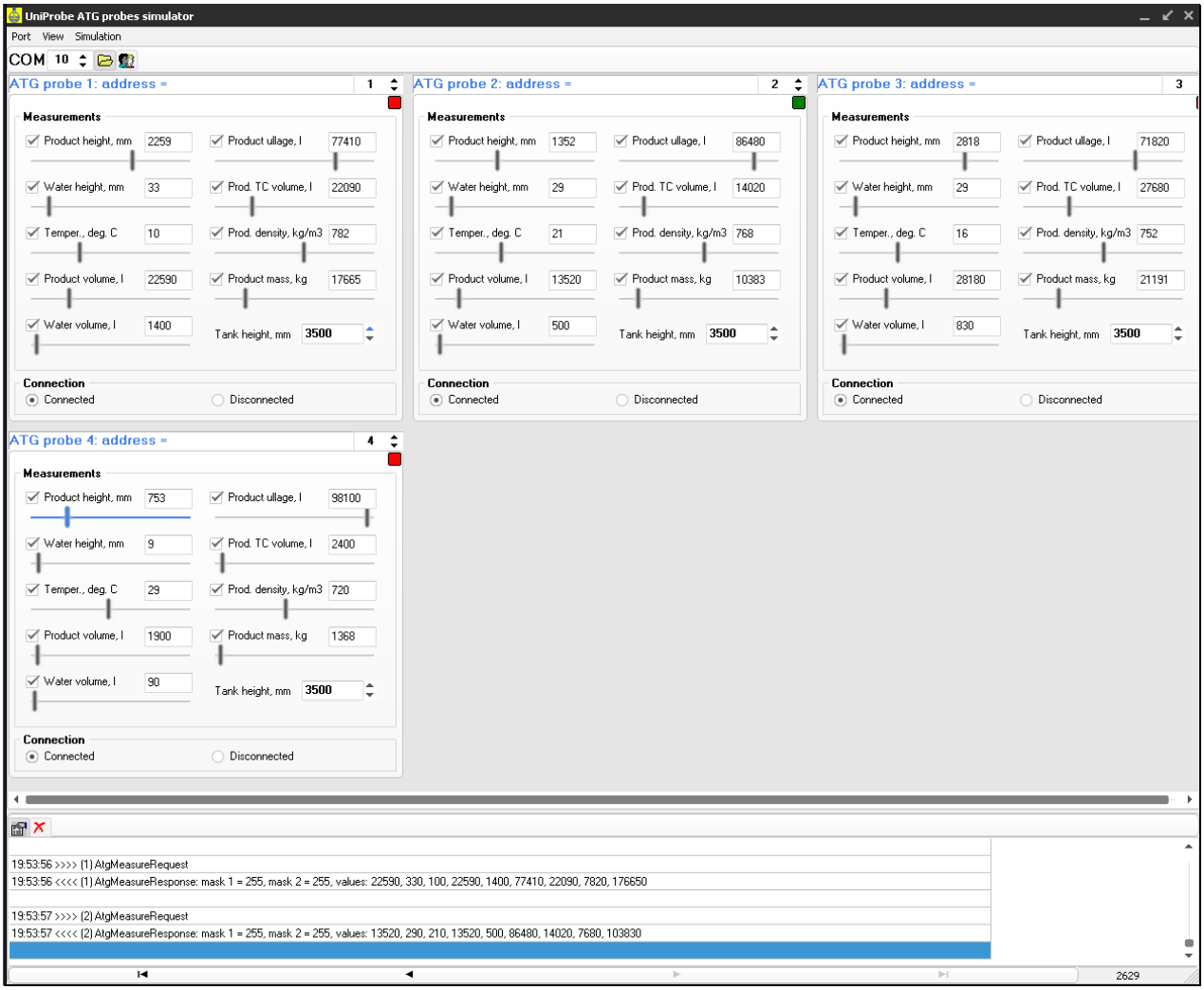
To view the measurement by the ATGs in PTS application go to main menu item "*ATG*" → "*ATG measurement data*", where for each of the ATG icons in settings set configuration of ATG to get measurement values and also set tank's height:





Now PTS application is able to indicate current level measurement data from ATG system:


ATG measurements
File
1
ACTIVE
Product height: 2259 mm
Product volume: 22590 l
Product temperature compensated volume: 22090 l
Product ullage: 77410 l
Water height: 33 mm
Water volume: 1400 l
Temperature: 10 deg. C
Product density: 782 kg/m3
Product mass: 17665 kg
65%
Tank height 3500 mm
Configure ATG
2
ACTIVE
Product height: 1352 mm
Product volume: 13520 l
Product temperature compensated volume: 14020 l
Product ullage: 86480 l
Water height: 29 mm
Water volume: 500 l
Temperature: 21 deg. C
Product density: 768 kg/m3
Product mass: 10383 kg
39%
Tank height 3500 mm
Configure ATG
3
ACTIVE
Product height: 2818 mm
Product volume: 28180 l
Product temperature compensated volume: 27680 l
Product ullage: 71820 l
Water height: 29 mm
Water volume: 830 l
Temperature: 16 deg. C
Product density: 752 kg/m3
Product mass: 21191 kg
81%
Tank height 3500 mm
Configure ATG
4
ACTIVE
Product height: 753 mm
Product volume: 1900 l
Product temperature compensated volume: 2400 l
Product ullage: 98100 l
Water height: 9 mm
Water volume: 90 l
Temperature: 29 deg. C
Product density: 720 kg/m3
Product mass: 1368 kg
22%
Tank height 3500 mm
Configure ATG



Now the PTS application correctly works with pumps and ATGs software simulators.

EXAMPLES OF FUEL DISPENSERS CONNECTION SCHEMES

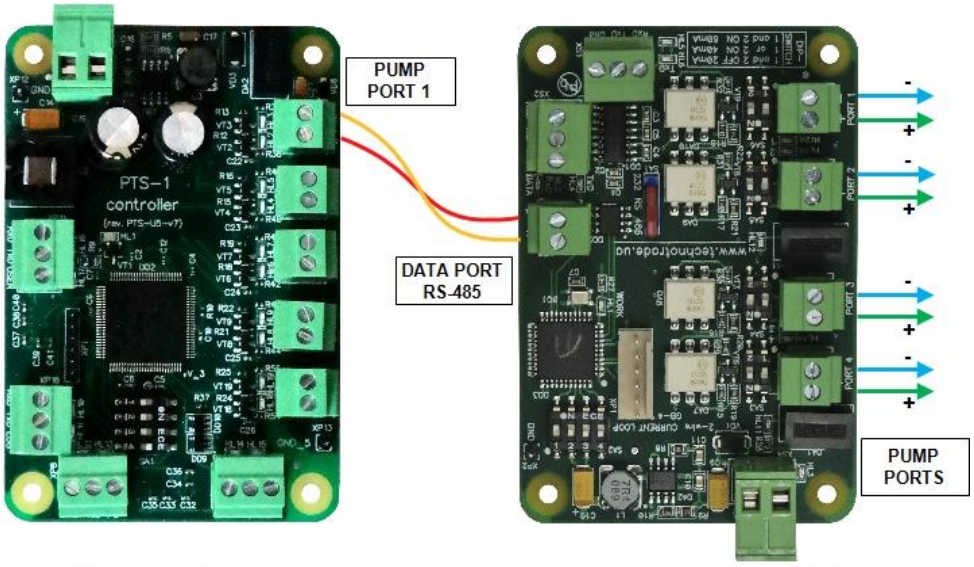
Below sections show examples of connection to various brands of fuel dispensers. This information is provided as an example. For reception of detailed information on connection to various brands of fuel dispensers, configuration of the fuel dispensers and configuration of PTS controller please refer 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 controller, others do not have RS-485 interface and thus require additional interface converter for connection to PTS 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.

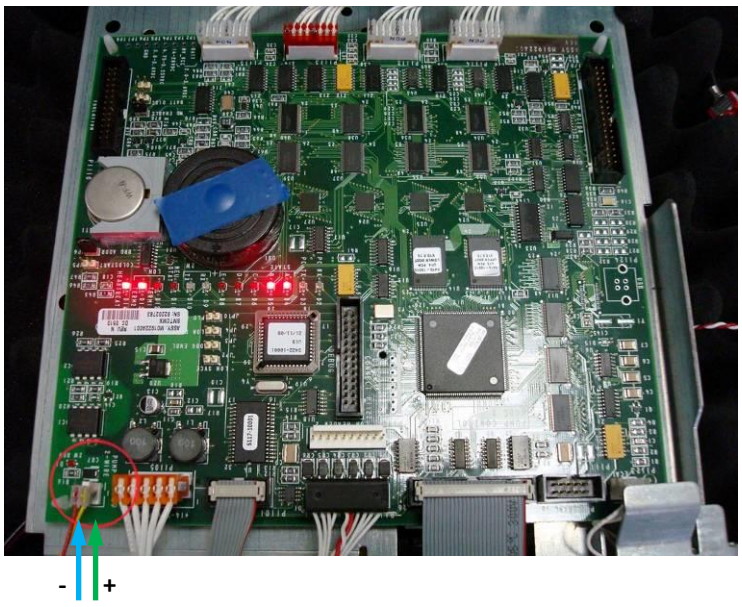
Gilbarco dispenser connection scheme

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



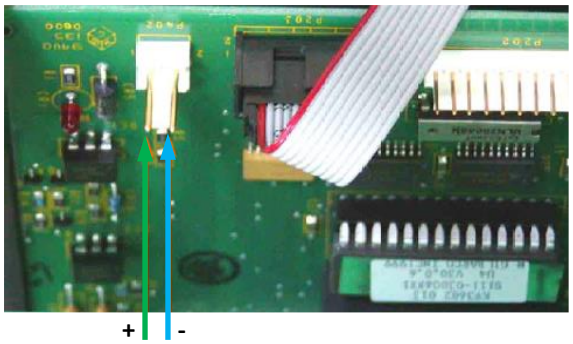
Gilbarco Encore 500 dispenser board



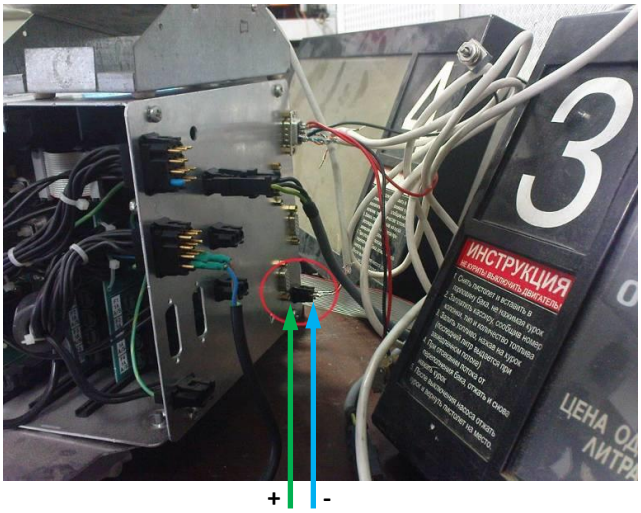
Gilbarco dispenser ASSY M06104A001 rev. B board



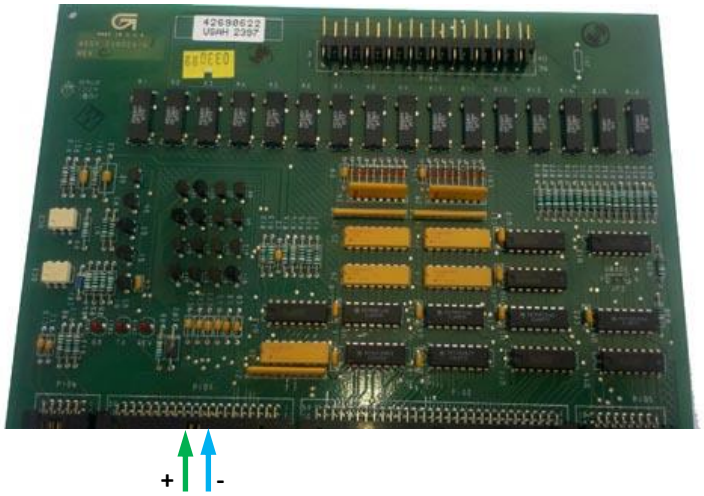
Gilbarco dispenser board



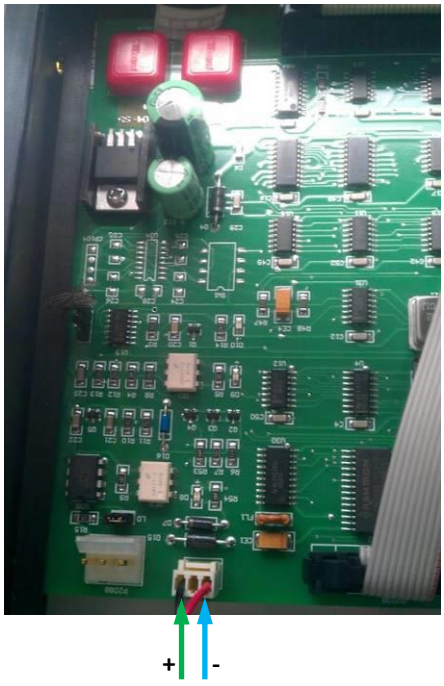
Gilbarco Euroline dispenser board



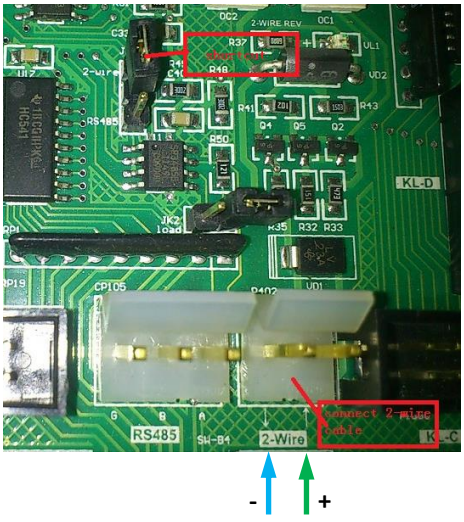
Gilbarco Highline / Dimension Assy dispenser board



Gilbarco Endeavor dispenser board

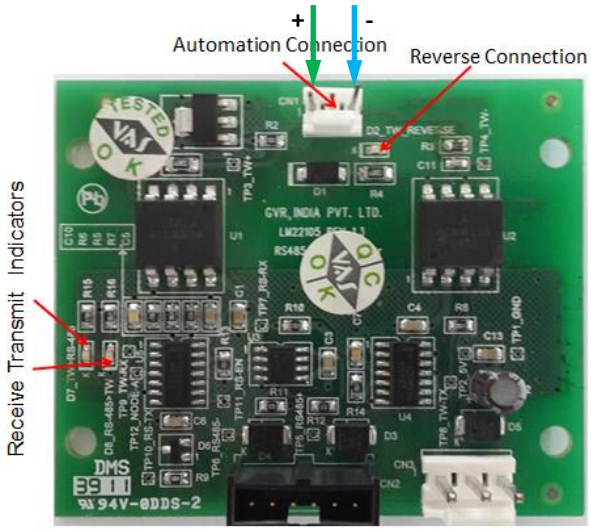


Gilbarco 3202 series dispenser board

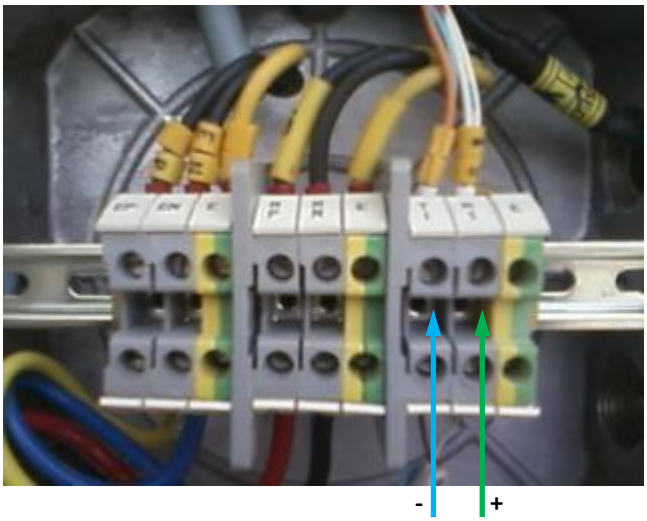


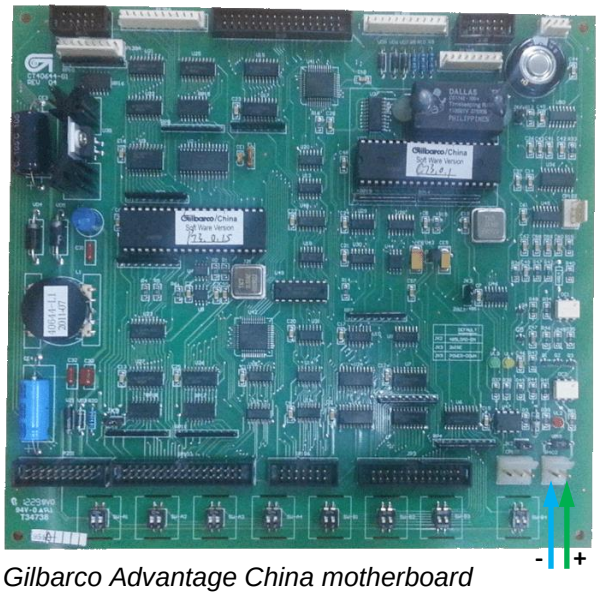


Gilbarco Endeavor dispenser board

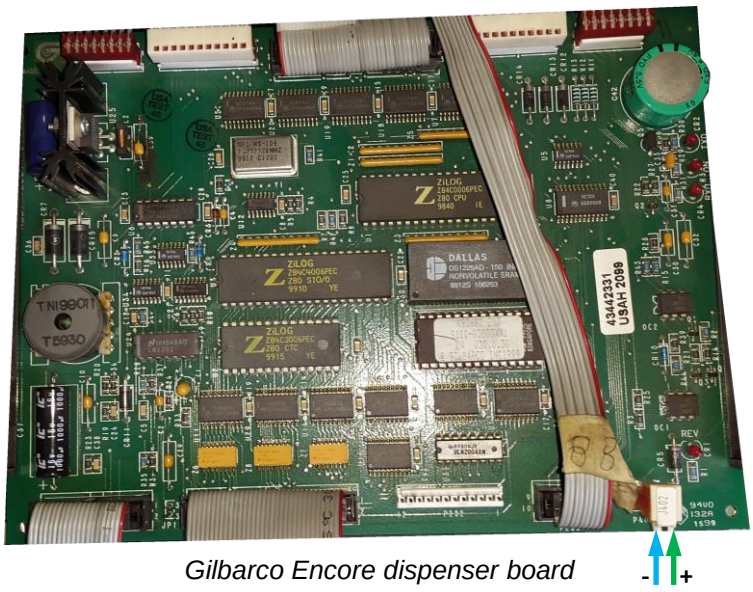


Gilbarco Frontier dispenser board





Gilbarco Advantage China motherboard

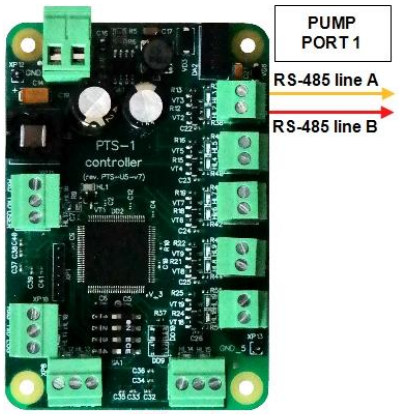


Gilbarco Encore dispenser board

Wayne Dresser dispenser connection scheme (RS-485 interface)

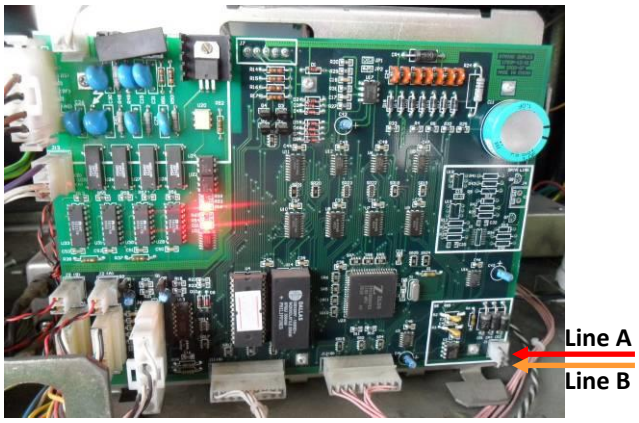
Connection to Wayne Dresser dispenser is made directly without any interface converter.

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



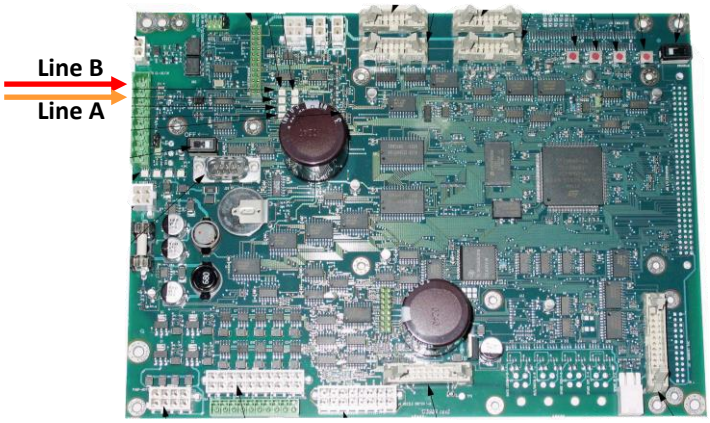
Wayne Dresser iGEM dispenser board





Wayne Dresser STMTAX Duplex dispenser

Wayne Dresser iGEM2 dispenser board



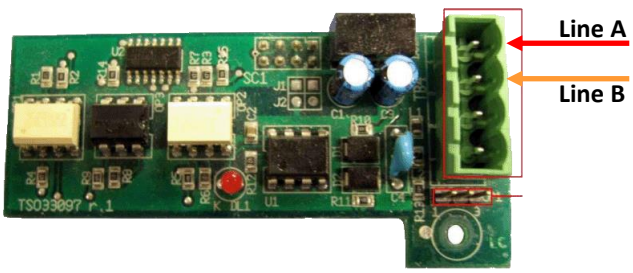


Wayne Dresser x2000/x2003 dispenser interface board





Wayne Dresser V387 dispenser board

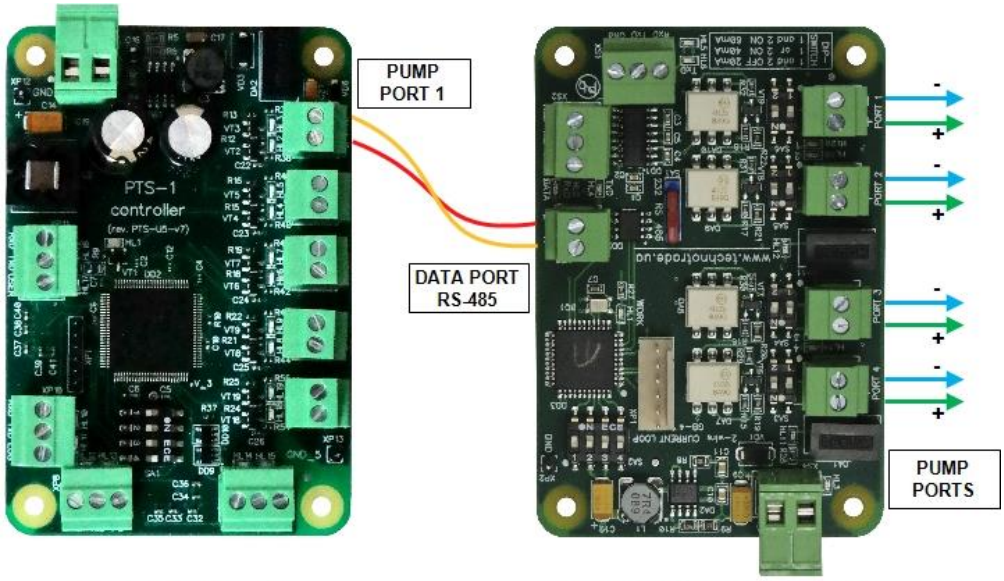


Wayne Dresser Global Vista CNG dispenser interface board

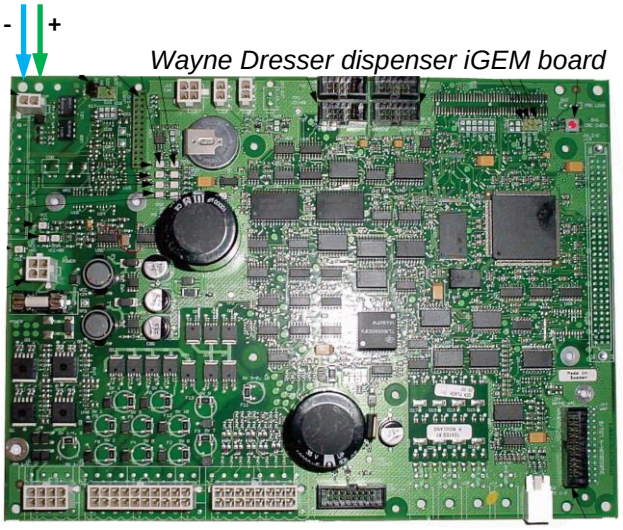
Wayne Dresser dispenser connection scheme (current loop interface)

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.

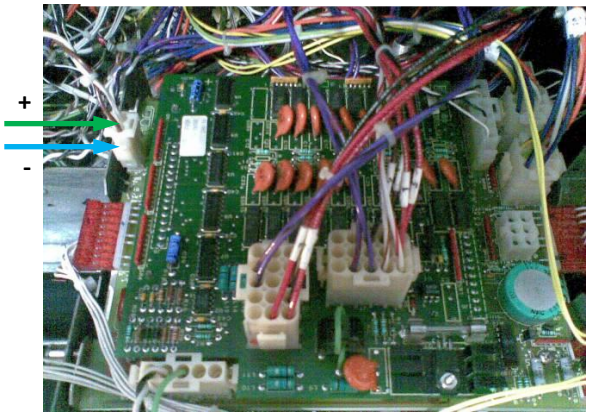
Configuration of PTS controller pump port: protocol "*23. WAYNE USCL*", baud rate "*4. 9600*".



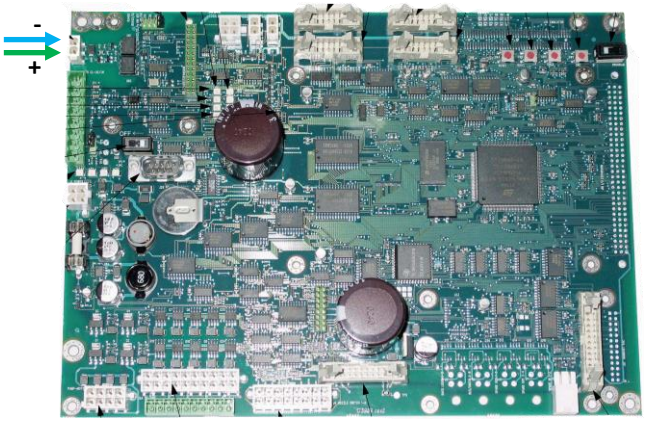
Wayne Dresser dispenser iGEM board



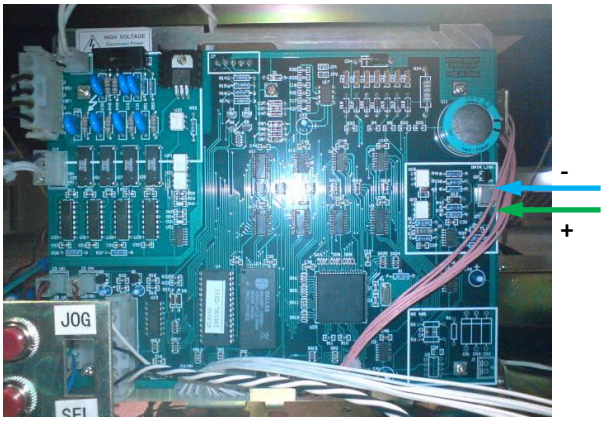
Wayne Dresser V387 dispenser board



Wayne Dresser iGEM2 dispenser board



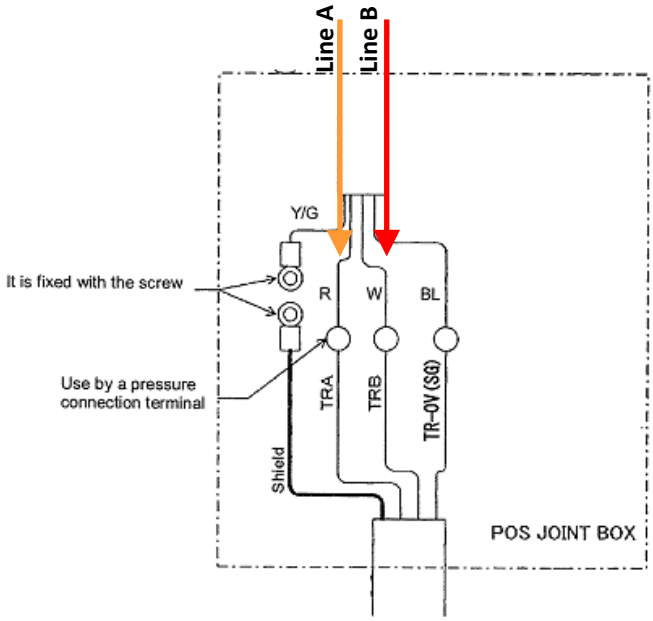
Wayne Dresser STMTAX Duplex dispenser



Tatsuno (Japan) dispenser connection scheme

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





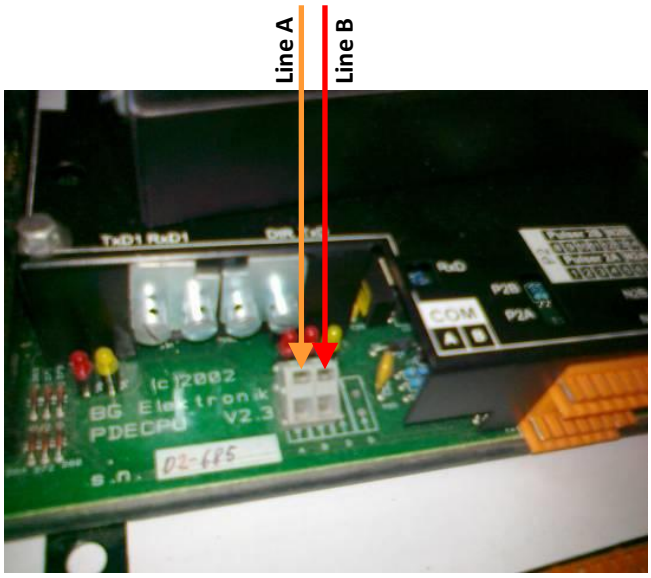


TATSUNO POS joint box

Tatsuno Europe (former Benc) dispenser connection scheme

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



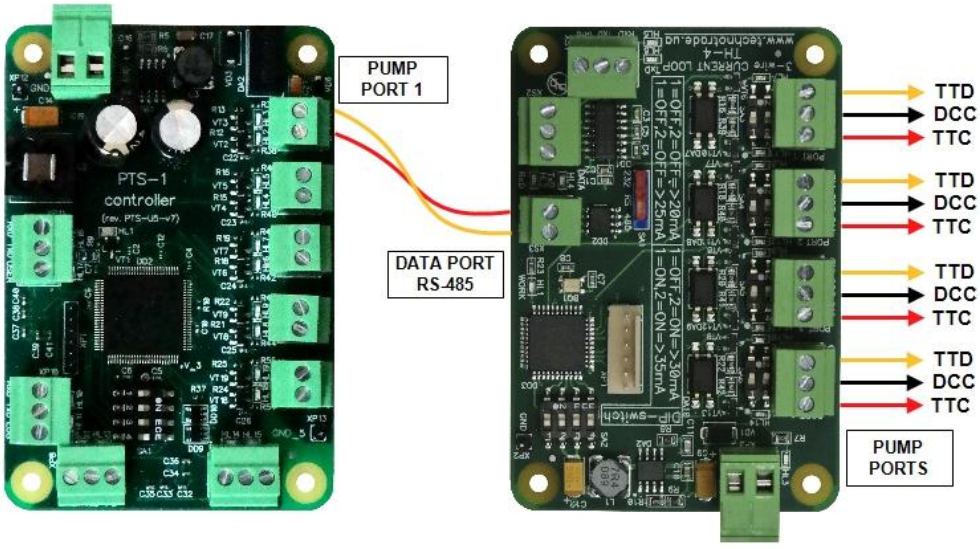


TATSUNO Benc pumphead

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.

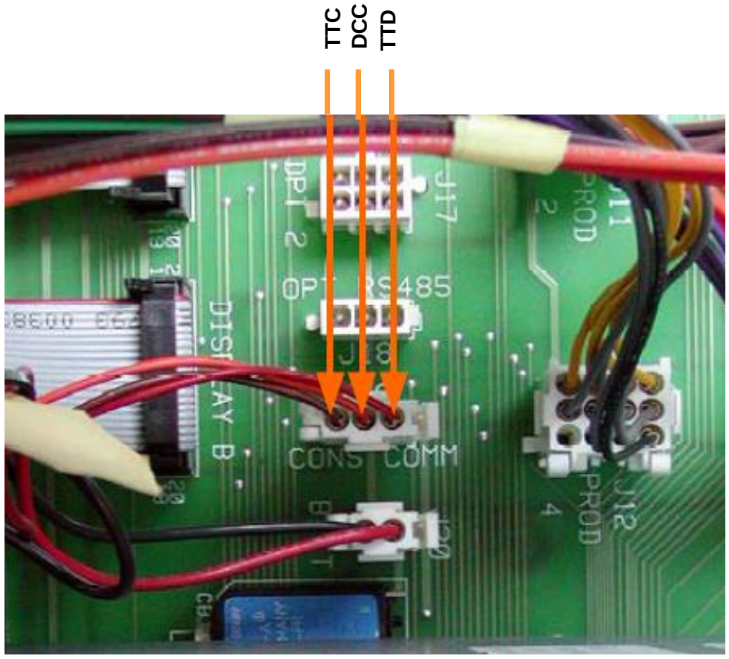
Configuration of PTS controller pump port: protocol "*6. TOKHEIM*", baud rate "*4. 9600*".



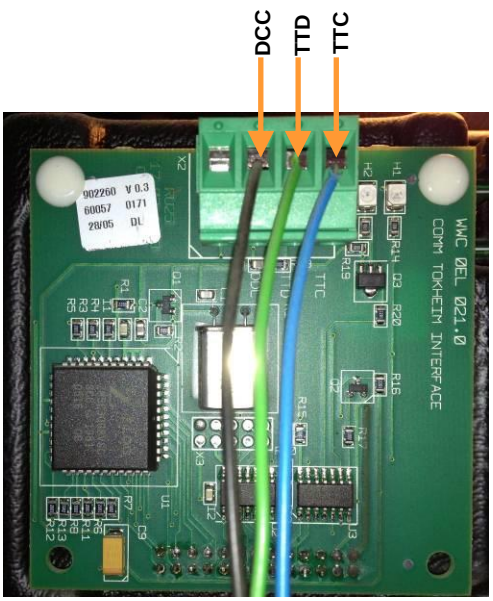
PTS-1 controller TH-4 interface converter



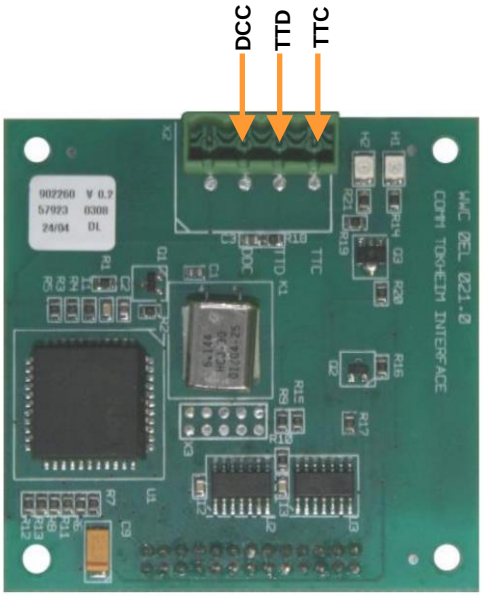
Tokheim dispenser board



Tokheim dispenser board



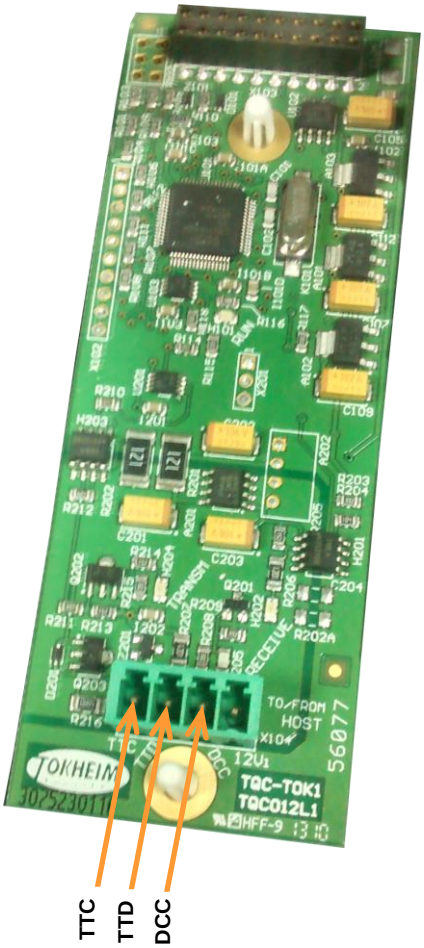
Tokheim dispenser interface board



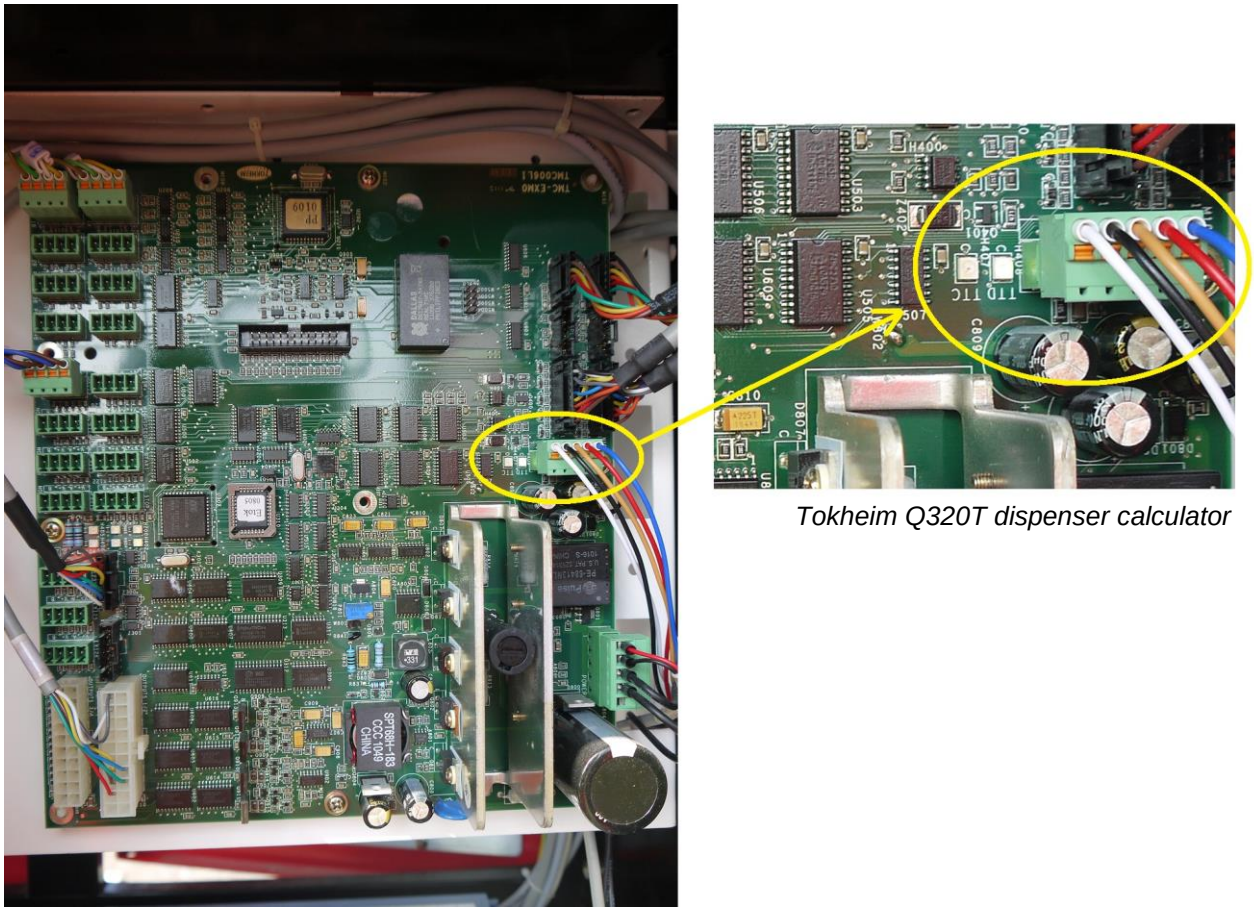
Tokheim dispenser interface board



Tokheim dispenser calculator with interface board



Tokheim dispenser interface board



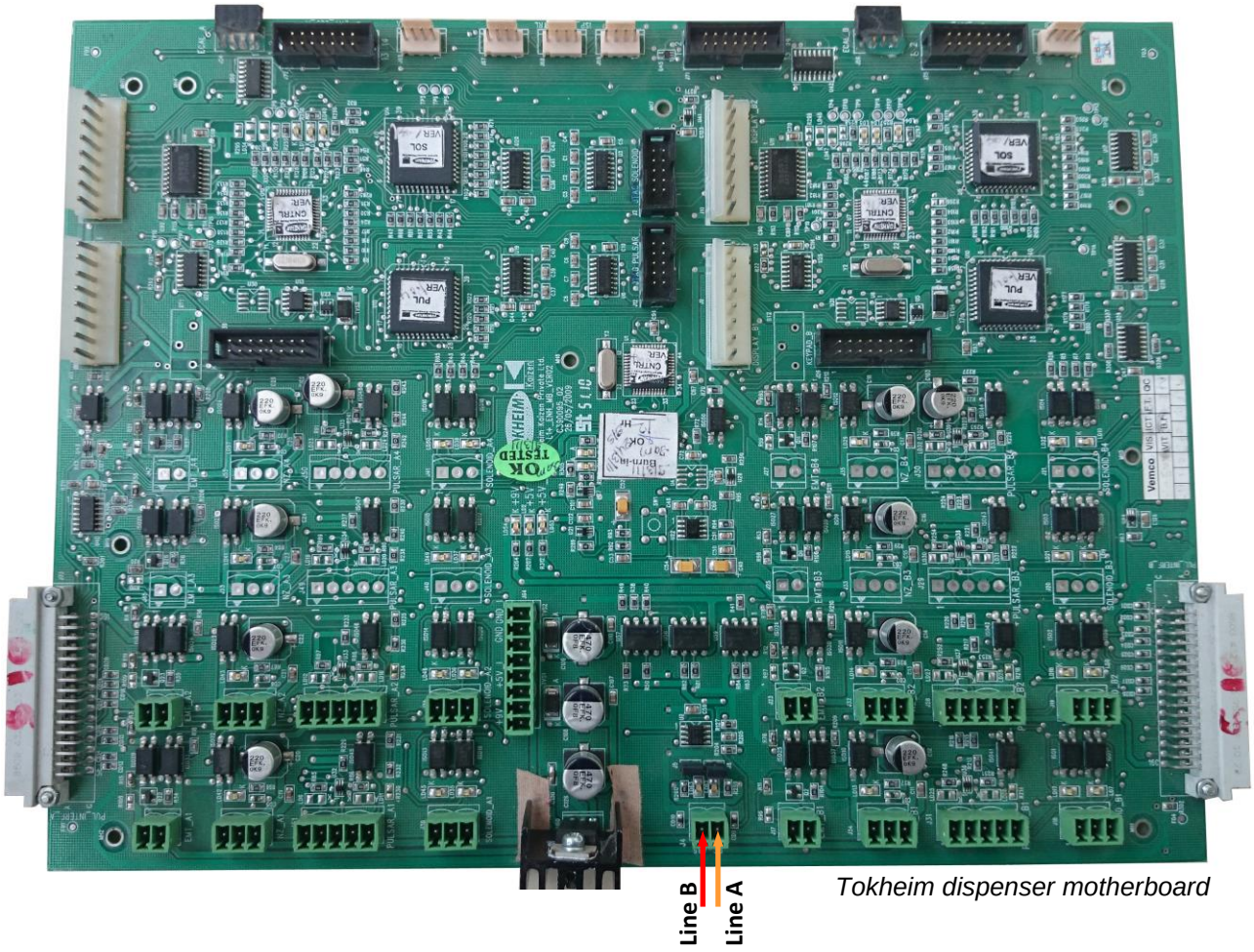
Tokheim Q320T dispenser calculator

Tokheim dispenser connection scheme (RS-485 interface)

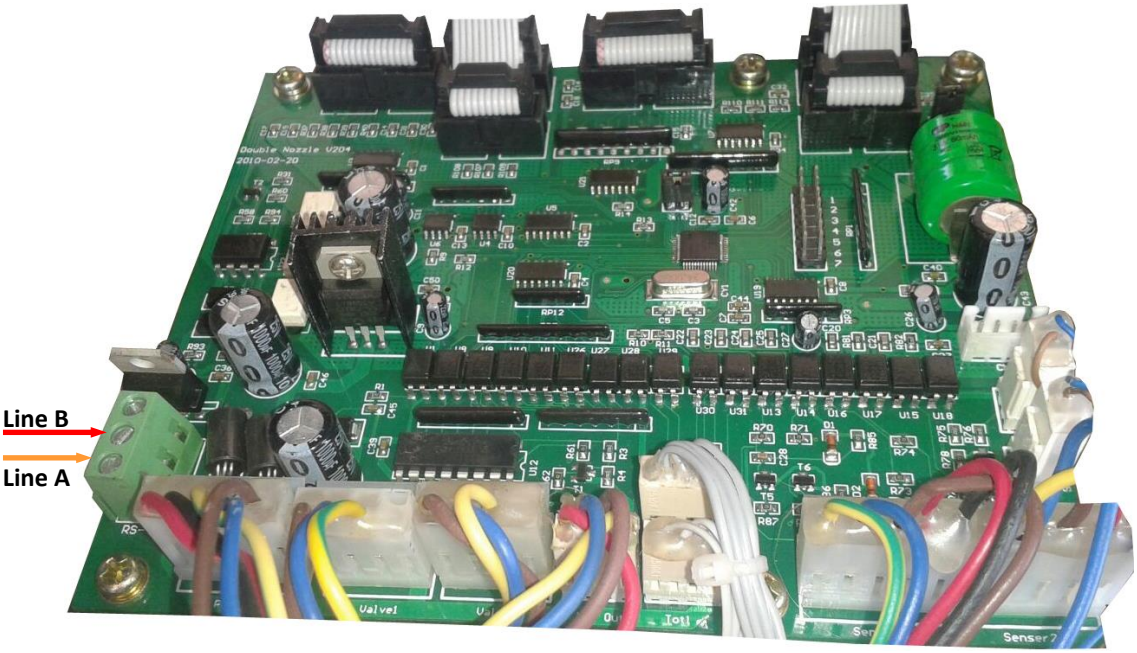
Connection to Tokheim dispenser through RS-485 interface is made directly without any interface converter.

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





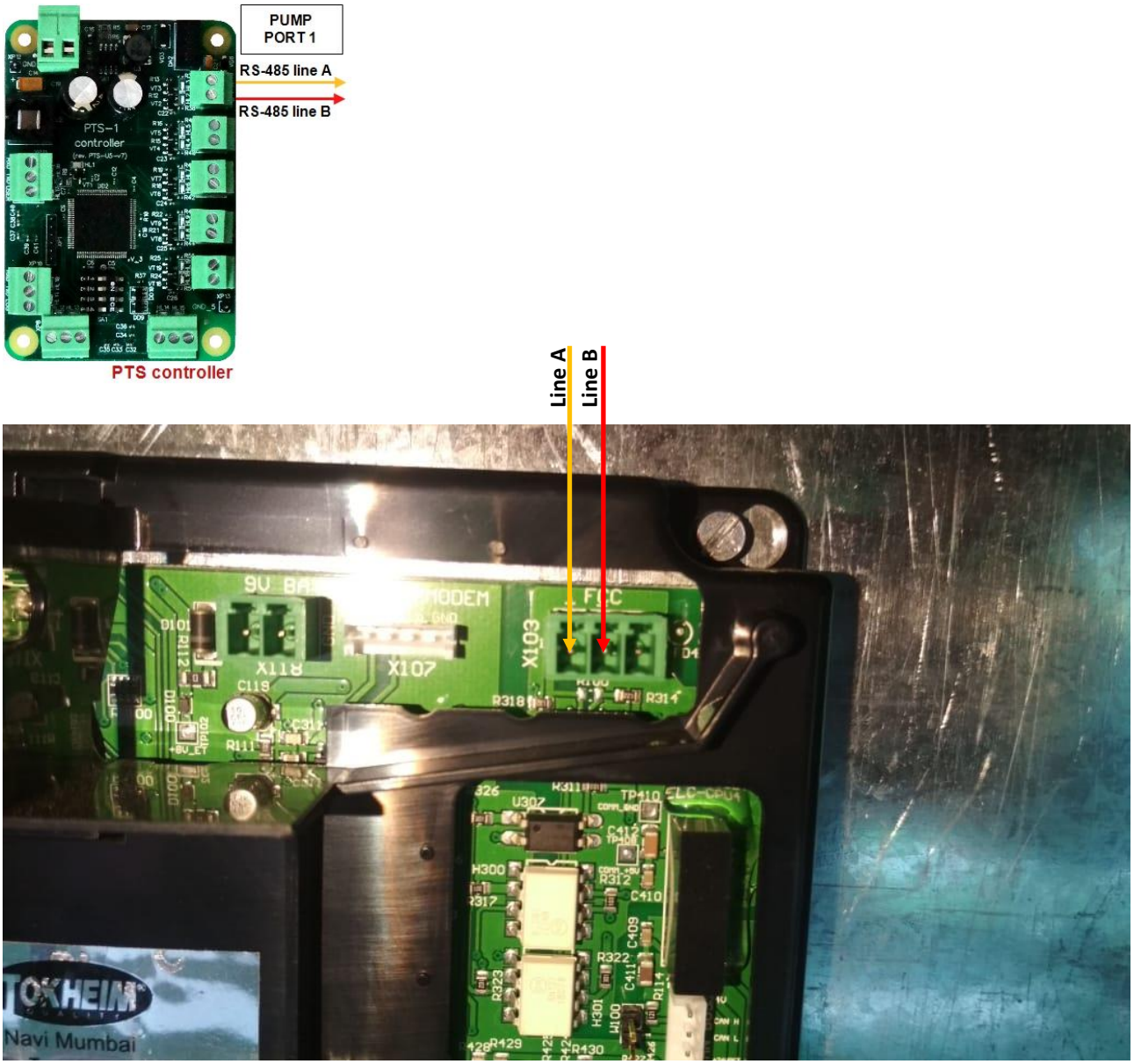
Tokheim dispenser motherboard



Tokheim dispenser motherboard

Tokheim India dispenser connection scheme

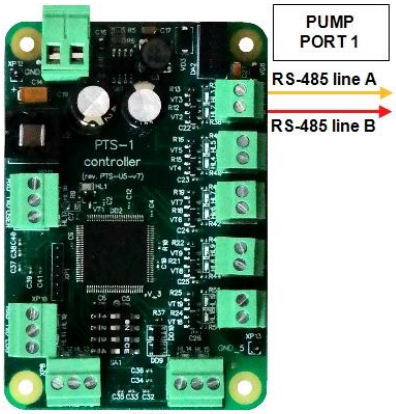
Connection to Tokheim India dispenser is made directly without any interface converter. Configuration of PTS controller pump port: protocol "59*. Tokheim TQCL*", baud rate "*4. 9600*".



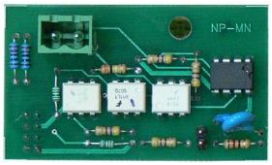
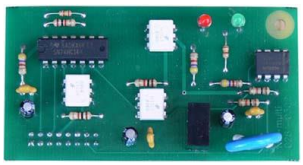
Nuovo Pignone dispenser connection scheme (RS-485 interface)

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 controller pump port: protocol "*3. WAYNE Dart*", baud rate "*4. 9600*".



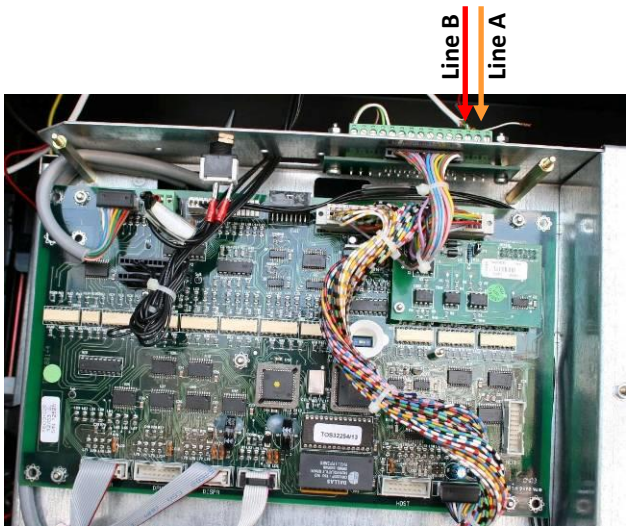
PTS controller

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

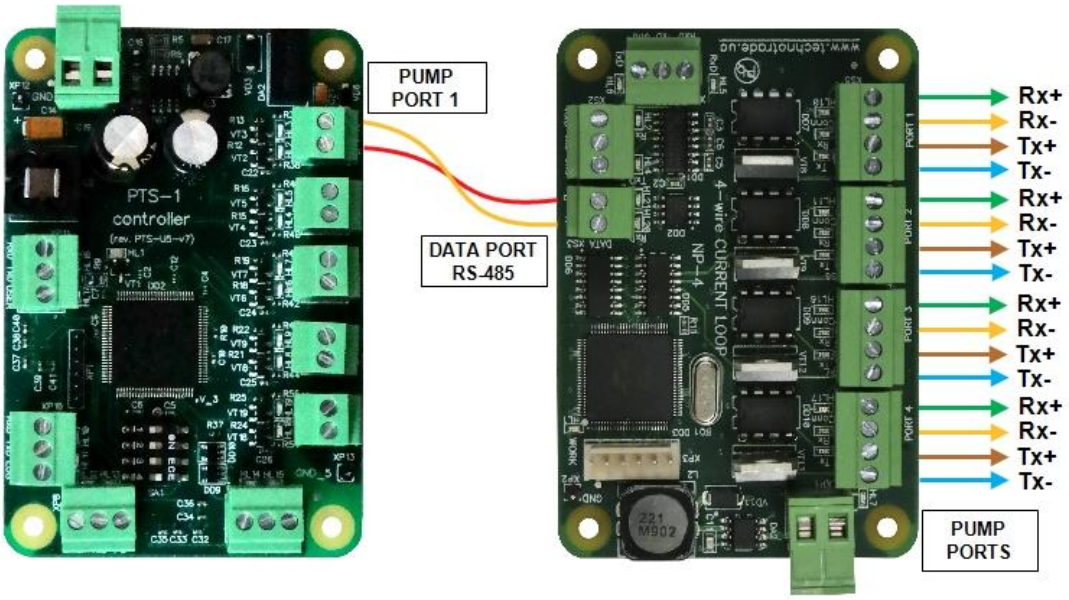


Nuovo Pignone multiproduct dispenser board

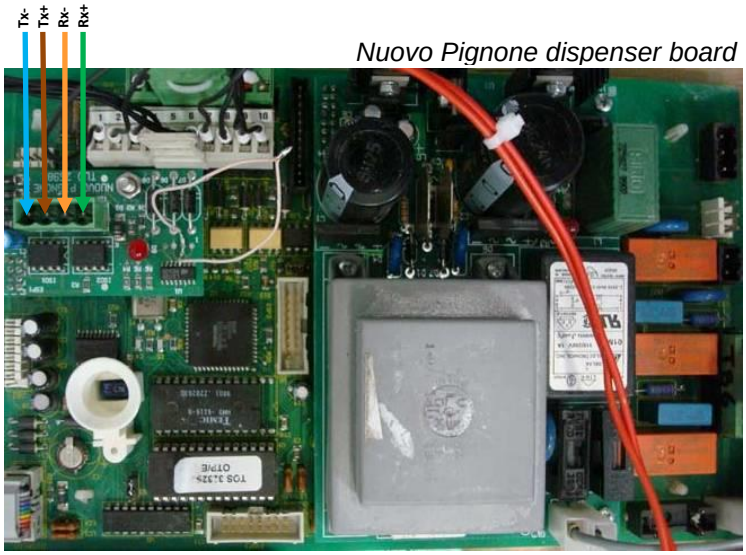
Nuovo Pignone dispenser connection scheme (4-wire current loop interface)

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 controller pump port: protocol "*24. NUOVO PIGNONE CL*", baud rate "*1. 2400*".



PTS-1 controller NP-4 interface converter



Nuovo Pignone dispenser board

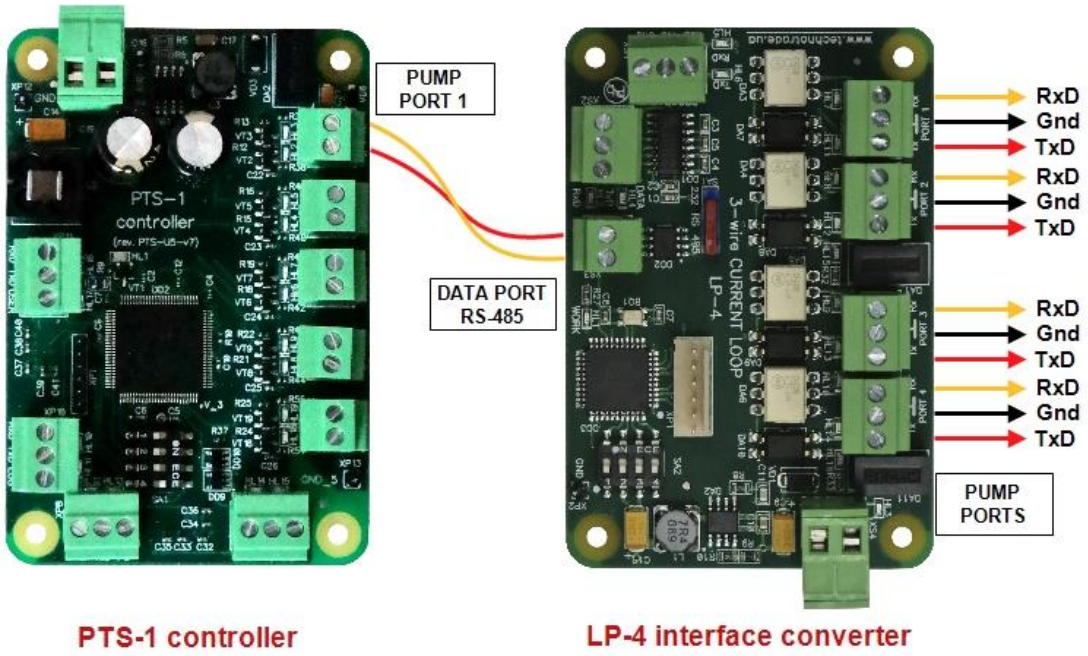


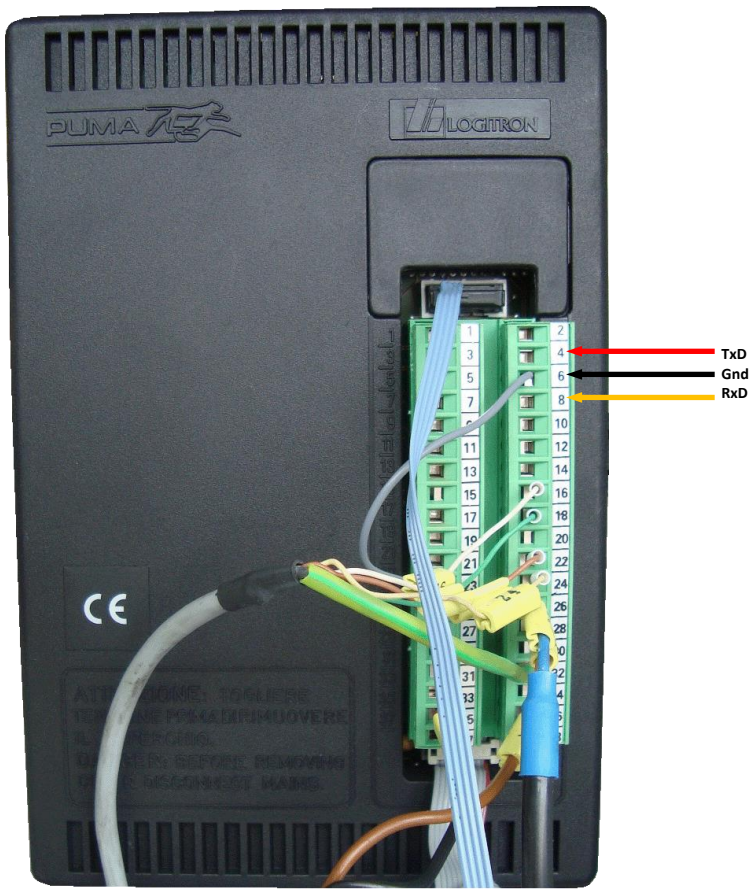
Nuovo Pignone dispenser board

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 controller pump port: protocol "*19. PUMALAN Marconi*", baud rate "*1. 4800*".



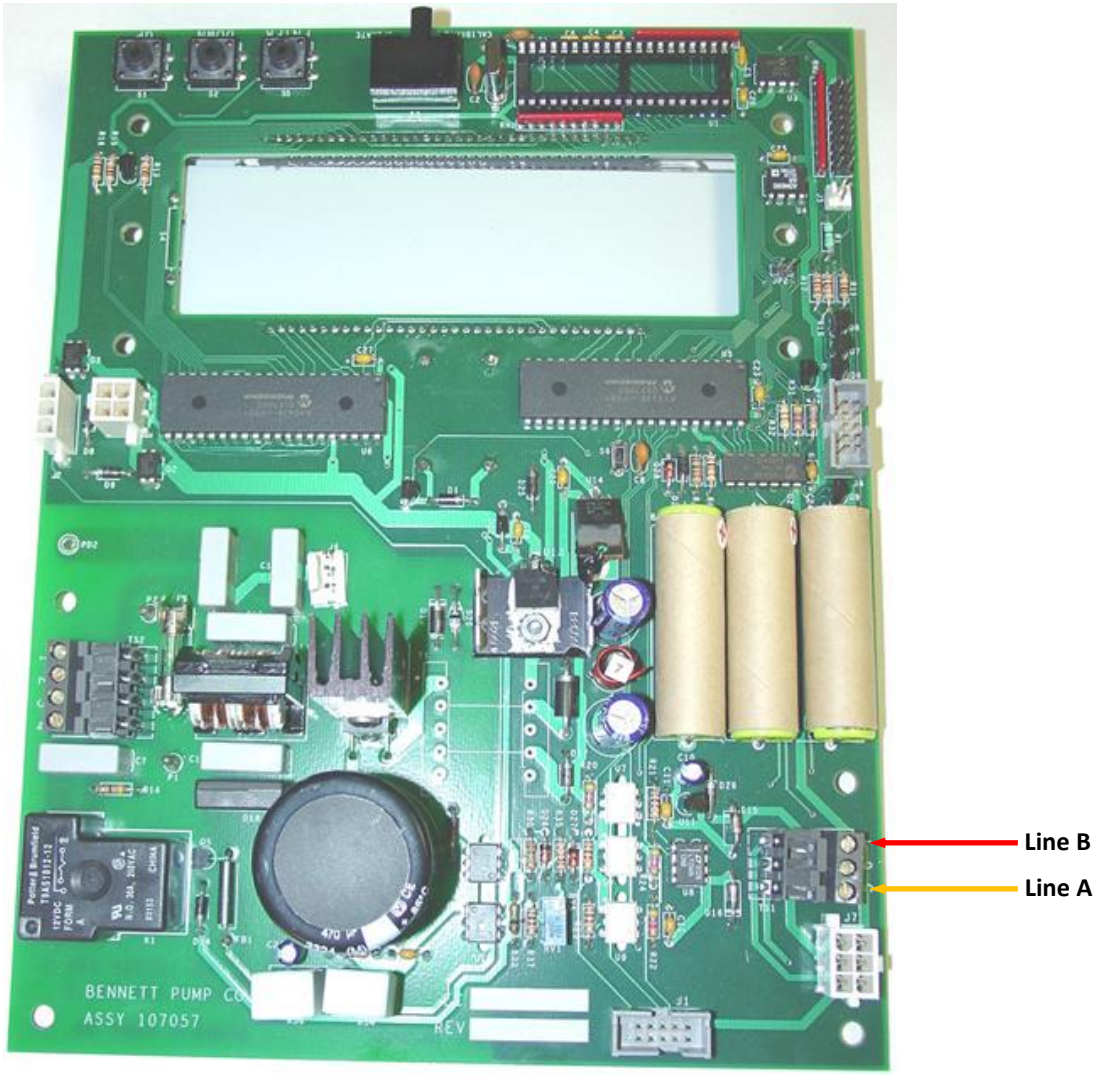


PUMA Logitron computer

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 controller pump port: protocol "22. *BENNETT 485*", baud rate "2.*4800*".

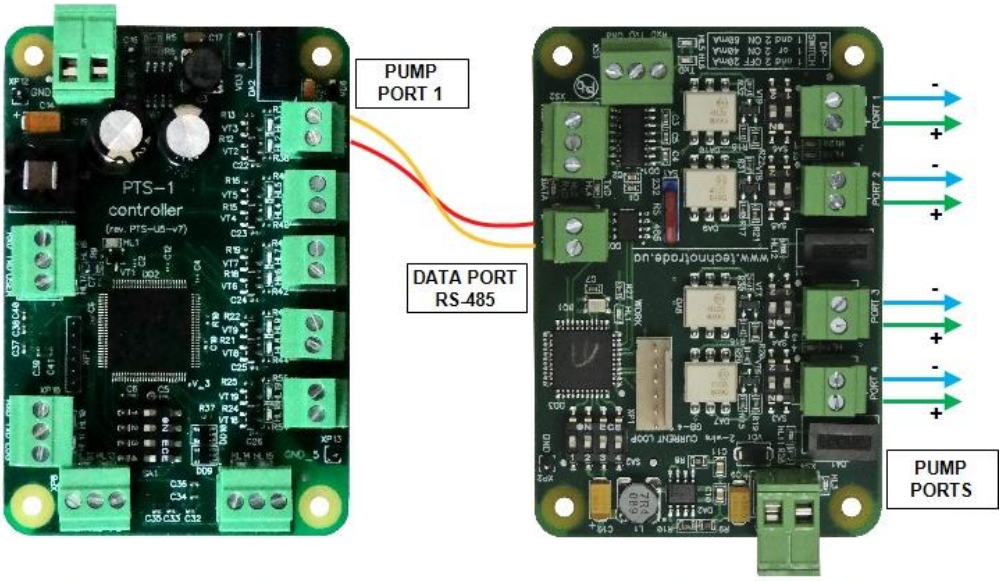


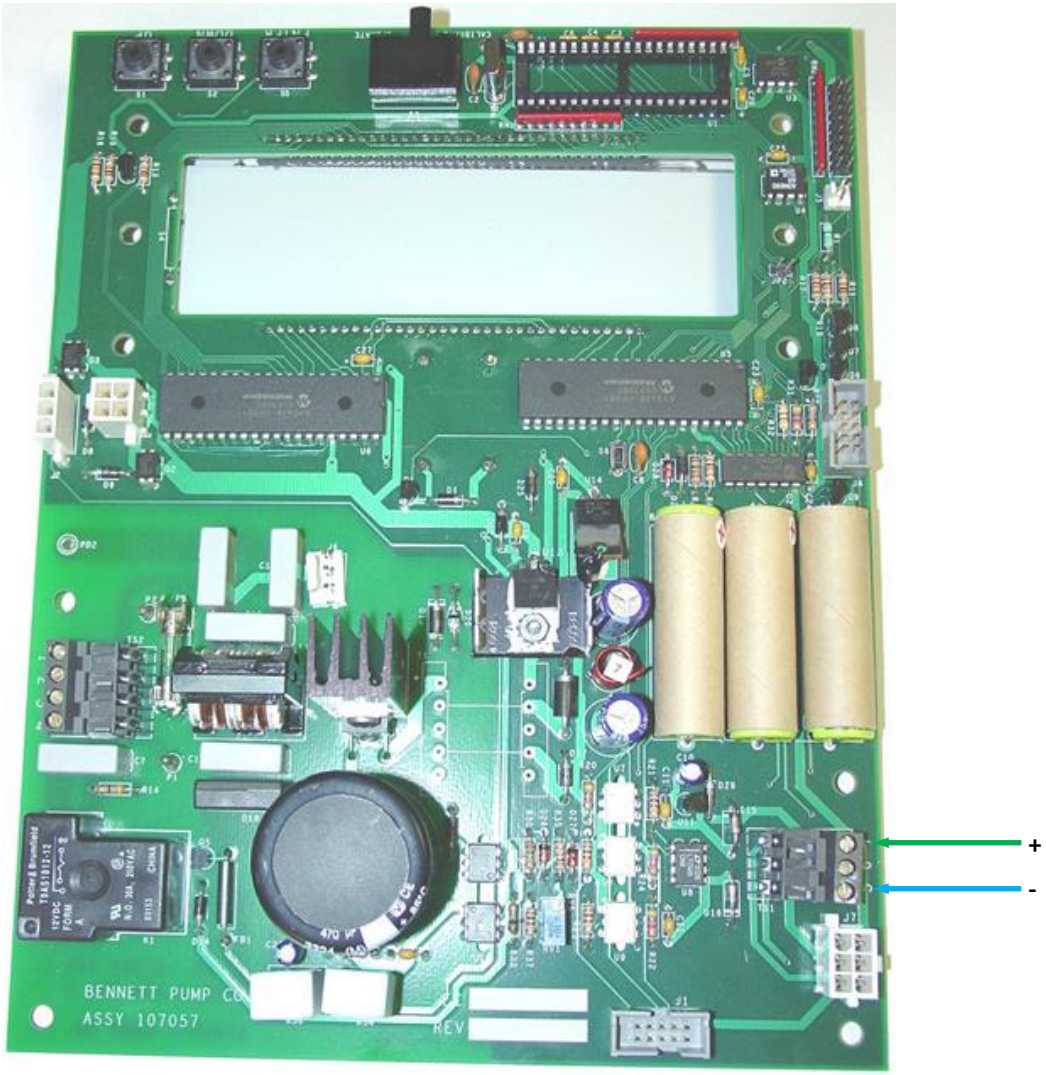


Bennett dispenser board

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 controller pump port: protocol "21. *BENNETT*", baud rate "2.*4800*".



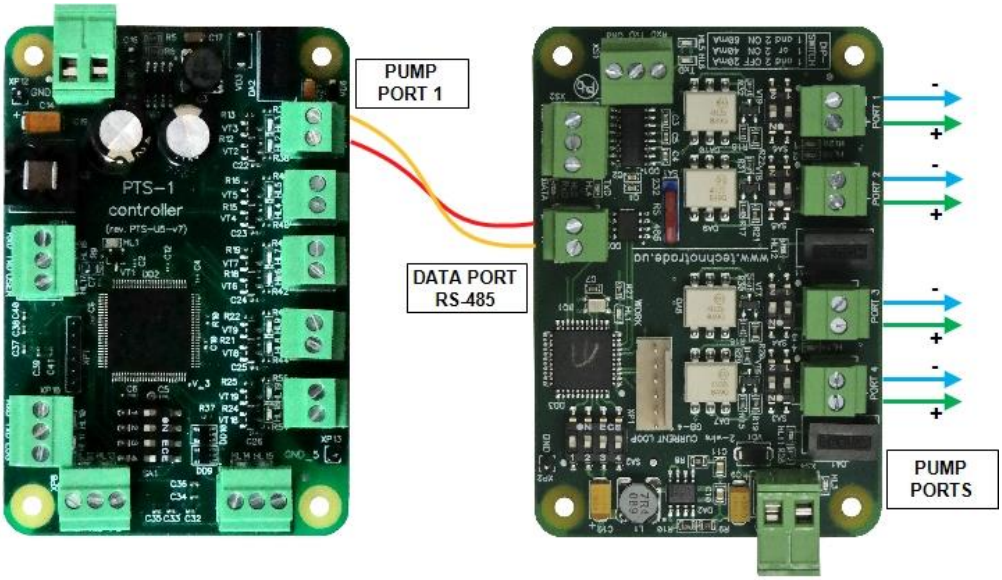


Bennett dispenser board

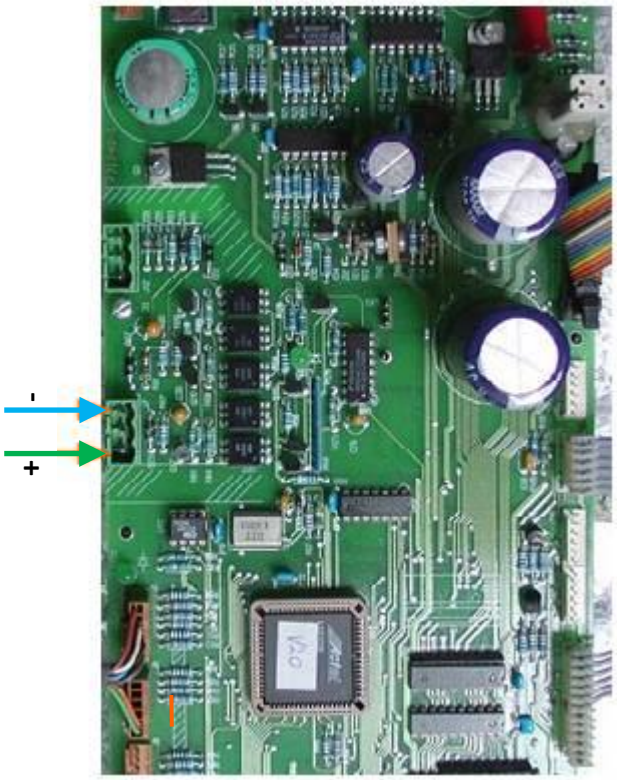
Batchen Email dispenser connection scheme

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.

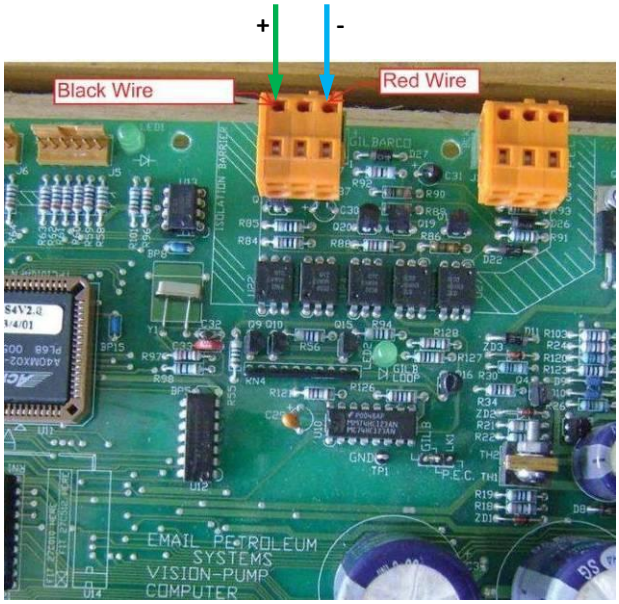
Configuration of PTS controller pump port: protocol "*18. BATCHEN Electroline*" (for single-product dispensers) or "*39. BATCHEN MPP*" (for multi-product dispensers), baud rate "*2. 4800*".



PTS-1 controller GB-4 interface converter



Batchen dispenser board



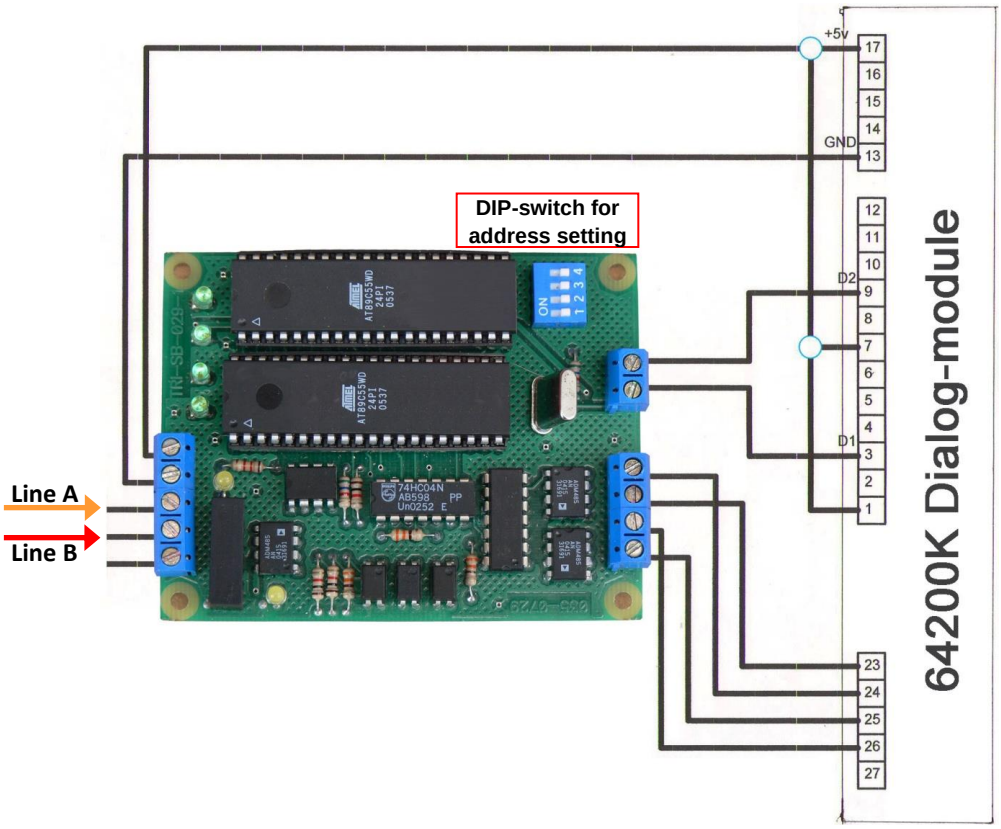
Batchen dispenser board

Scheidt & Bachmann T20 dispenser connection scheme

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

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





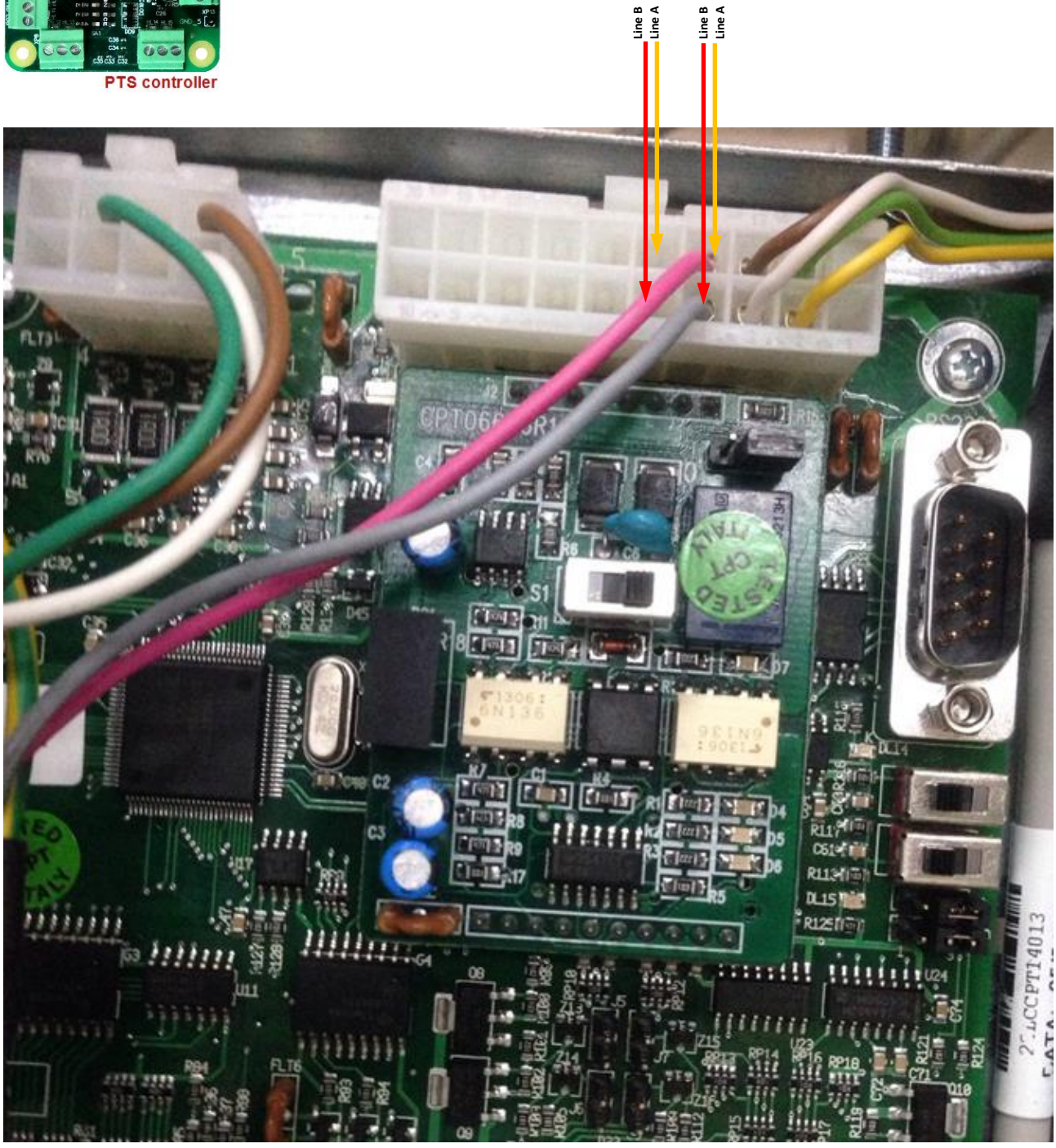
Address setting on S&B T20 interface converter board using a DIP-switch

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 controller pump port: protocol “33. *DART Simplex*”, baud rate “4. *9600*”.



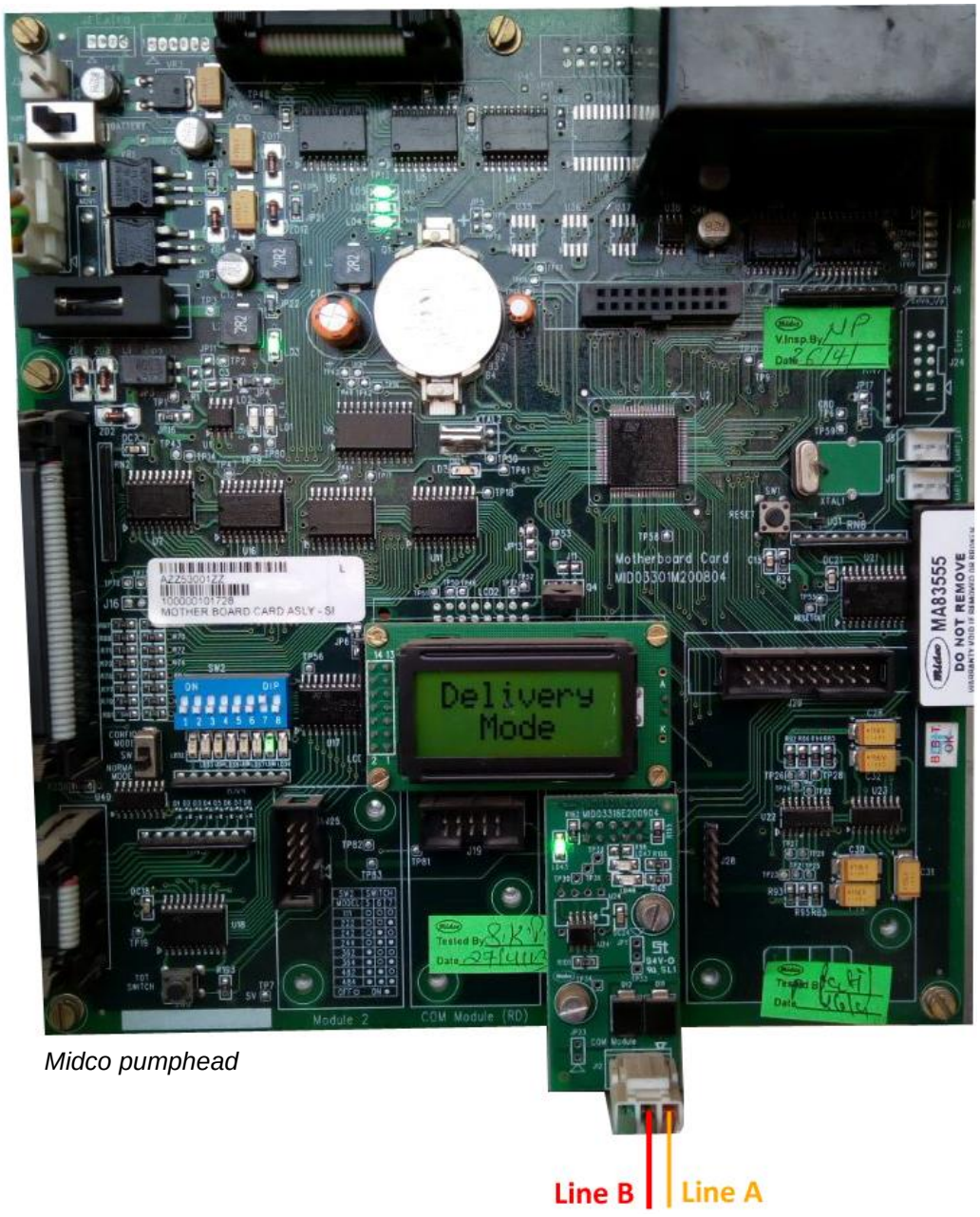


Coptron pumphead

Midco dispenser connection scheme

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



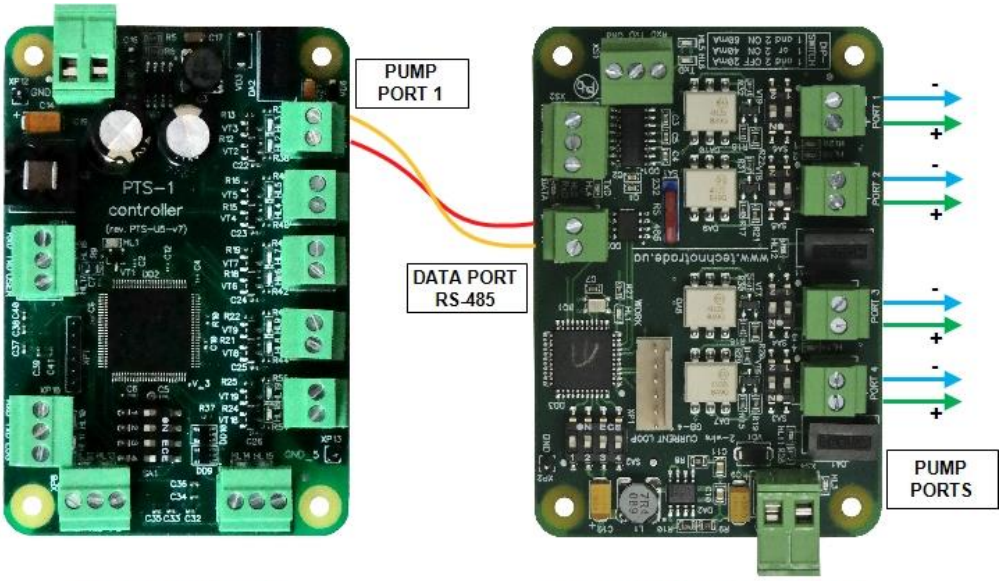


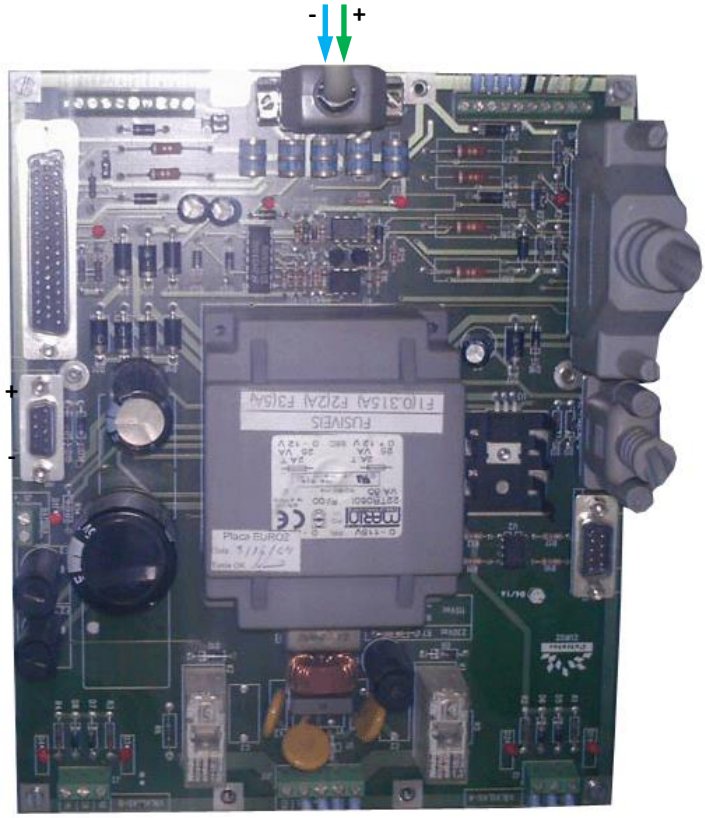
Midco pumphead

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 controller pump port: protocol "5. *Gilbarco Two-Wire*", baud rate "3. *5787*".



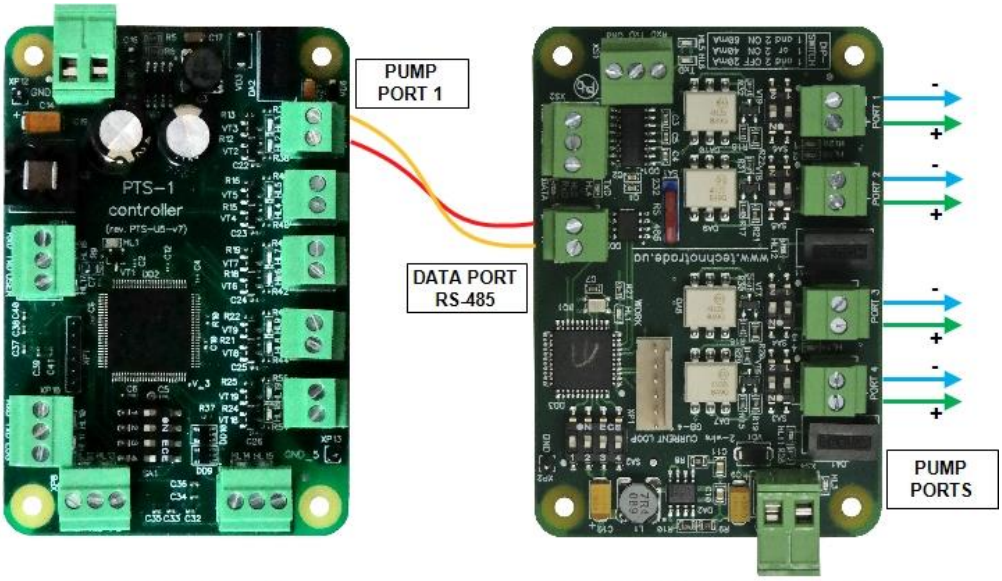


Petrotec dispenser board

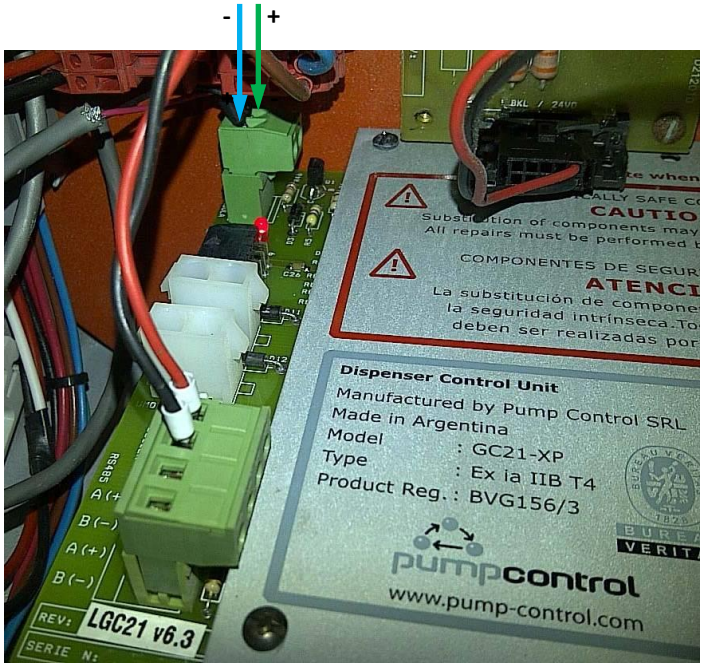
Galileo dispenser connection scheme

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



PTS-1 controller **GB-4 interface converter**

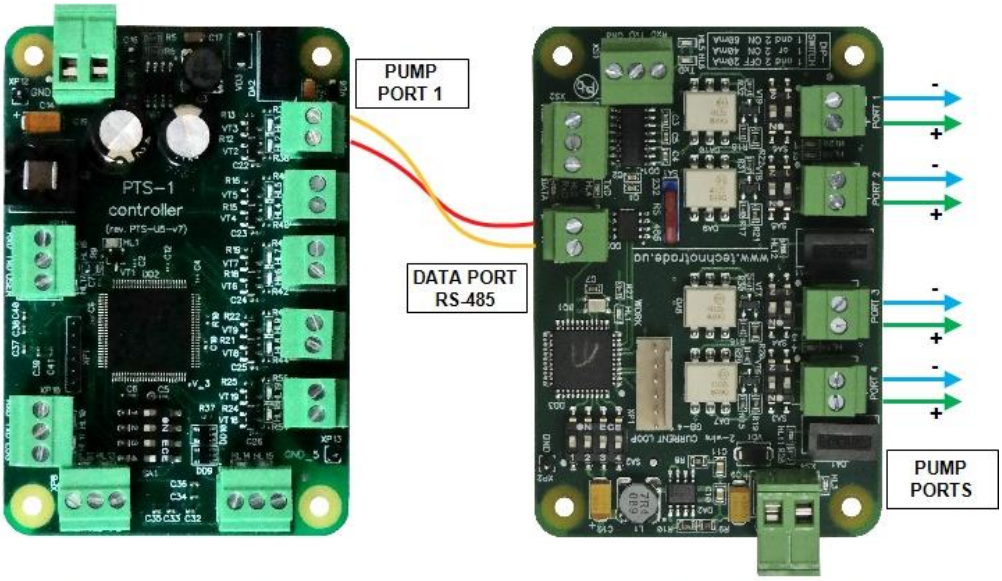


Galileo dispenser board

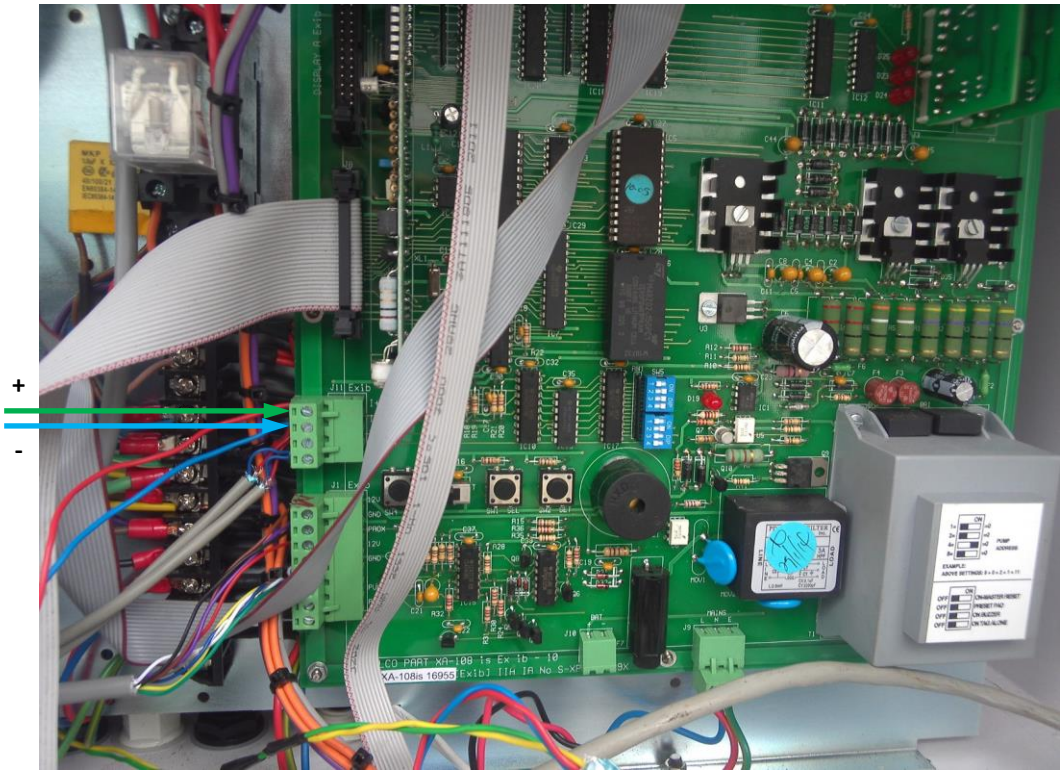
Prowalco dispenser connection scheme

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 controller pump port: protocol "*27. PROWALCO*", baud rate "*2. 4800*".



PTS-1 controller **GB-4 interface converter**

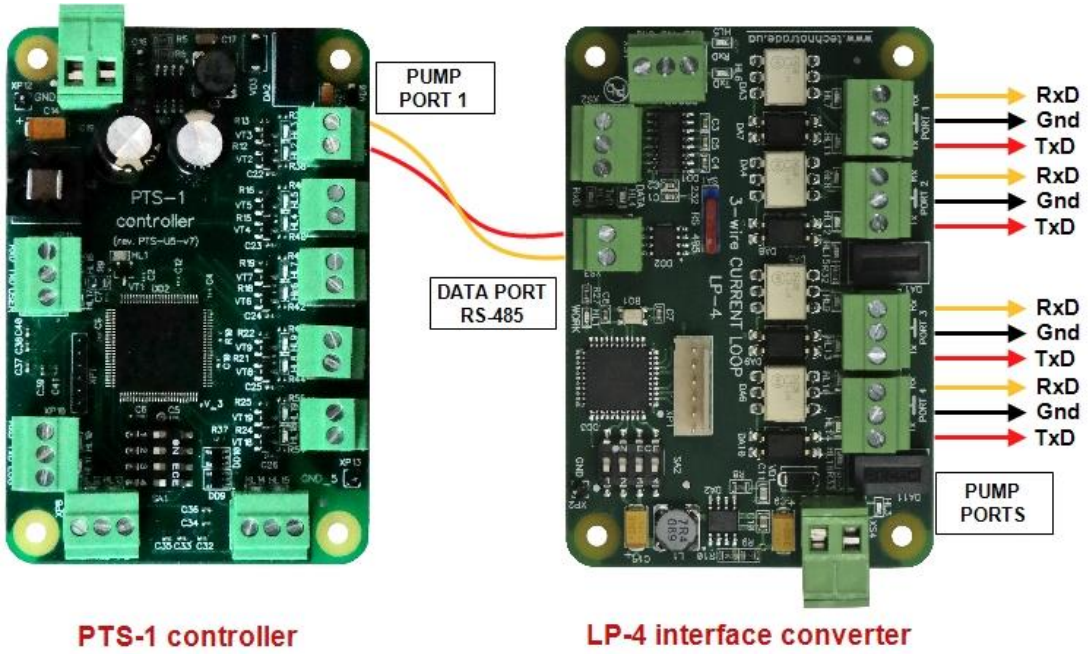


Prowalco dispenser board

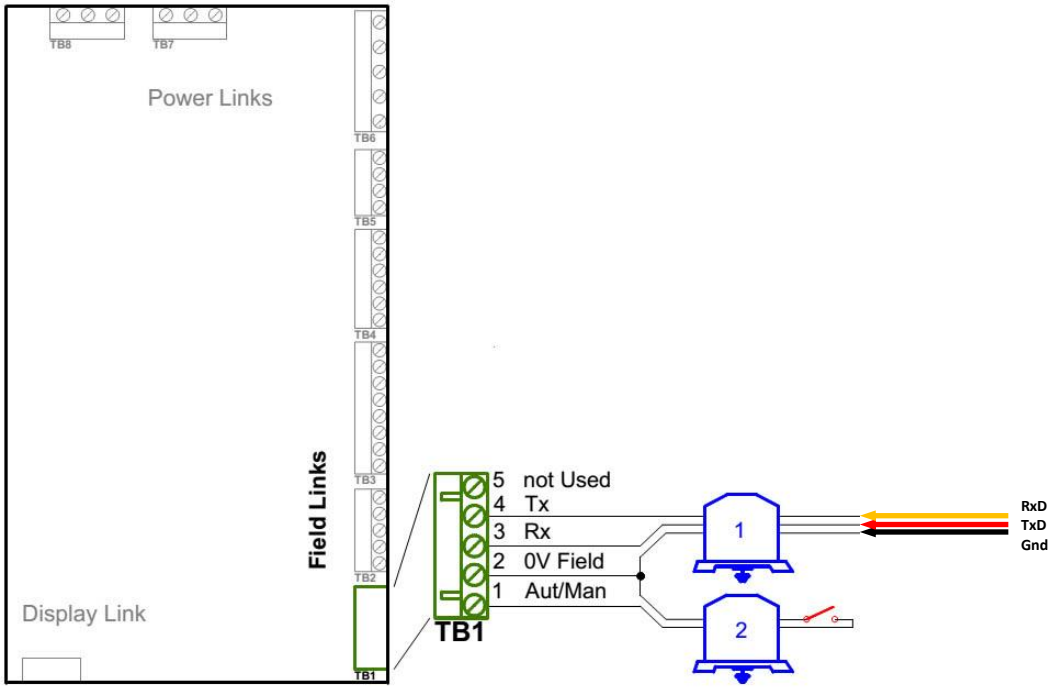
Emgaz Dragon / Fornovo LPG dispenser with EsiWelma pumphead connection scheme

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



PTS-1 controller **LP-4 interface converter**



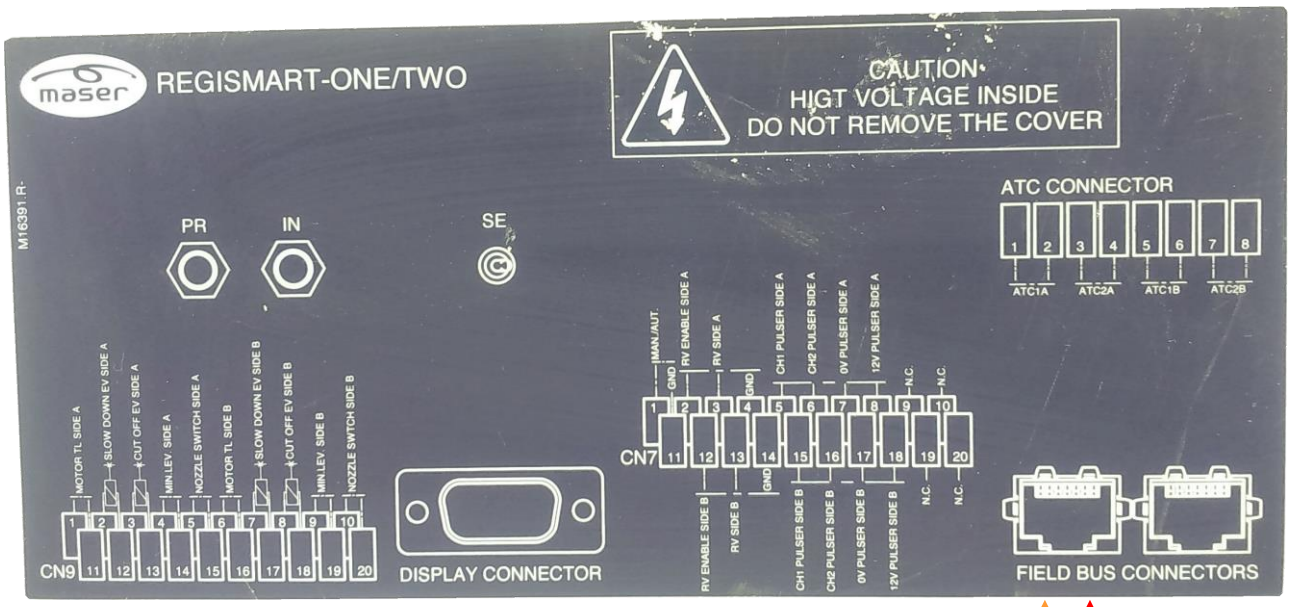
EsiWelma pumphead

Maser dispenser connection scheme

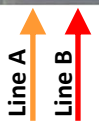
Connection to Maser dispenser is made directly without any interface converter.

Configuration of PTS controller pump port: protocol "45*. MASER GMS*", baud rate "*4. 9600*".





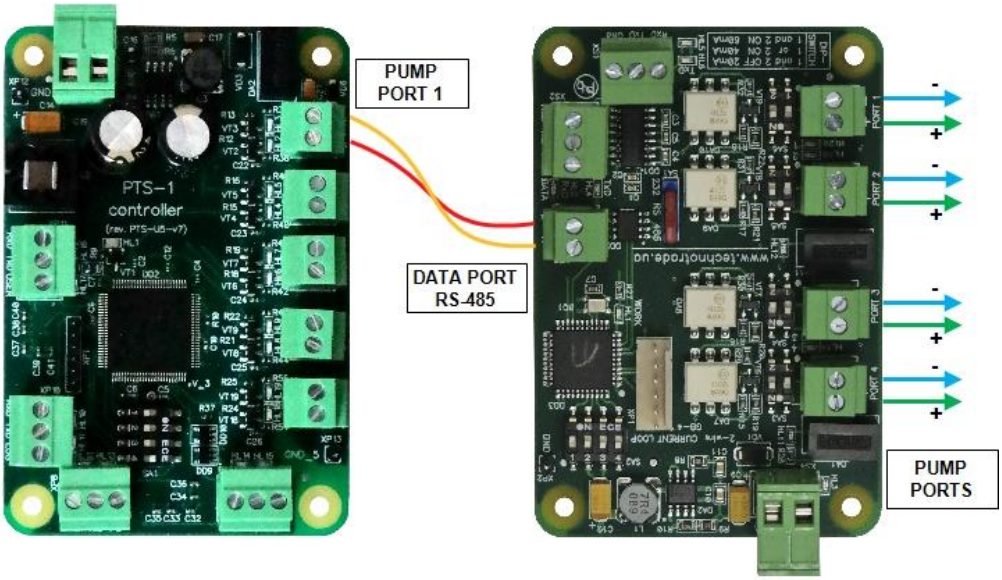
Maser dispenser computer connections label

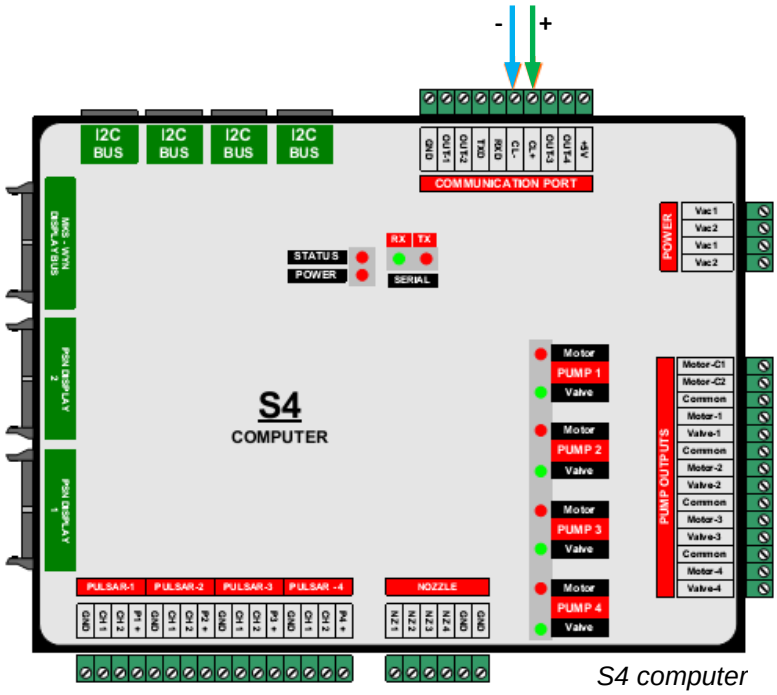


Petposan-S4 / Meksan-S4 / Europump-S4 / Yenen dispensers connection scheme

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 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



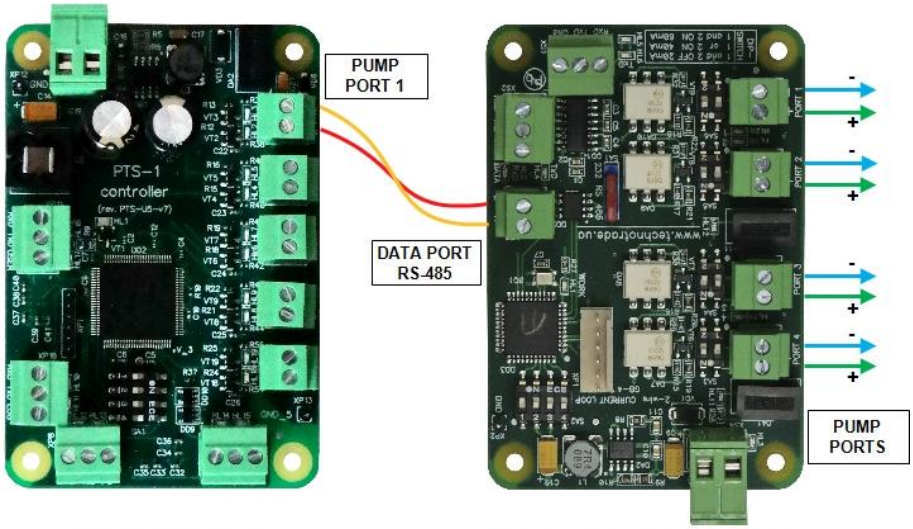


S4 computer

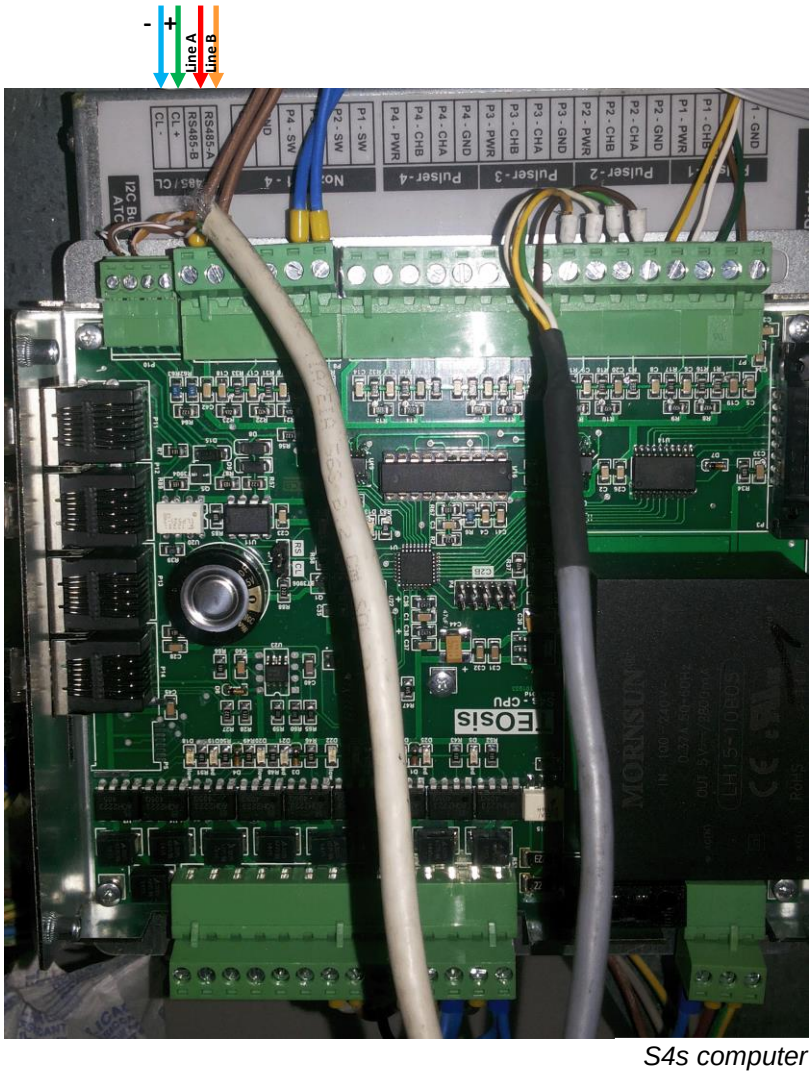
Yenen dispensers connection scheme

Connection to S4s computer is made either directly from the PTS 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 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



PTS-1 controller GB-4 interface converter

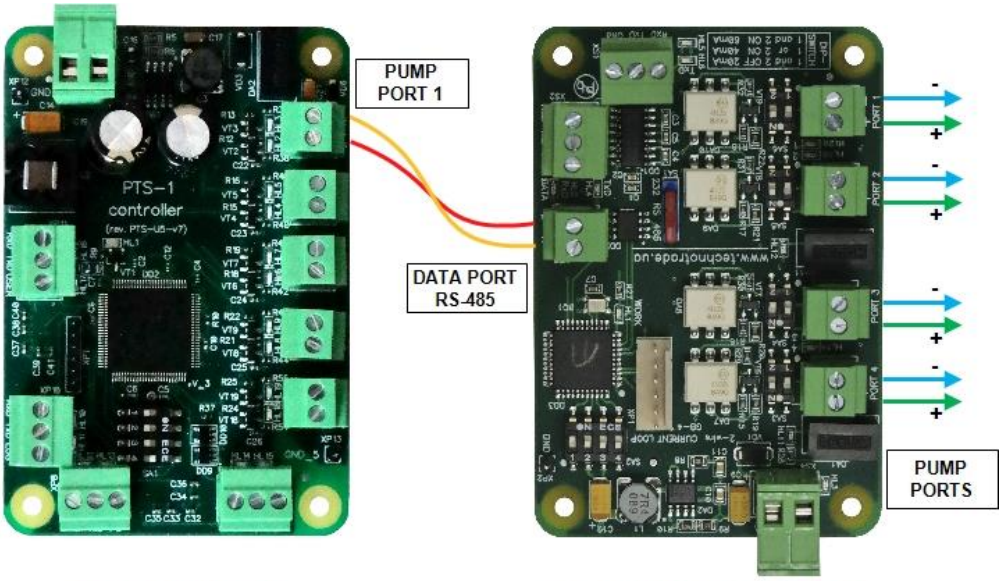


S4s computer

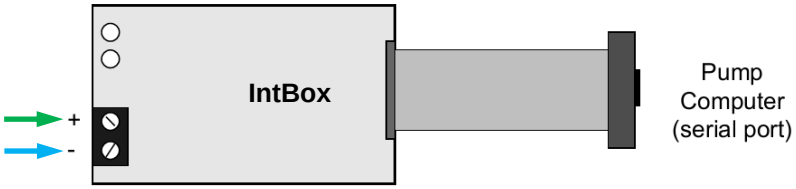
Petposan-Beta / Europump-Beta dispensers connection scheme

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 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



PTS-1 controller GB-4 interface converter



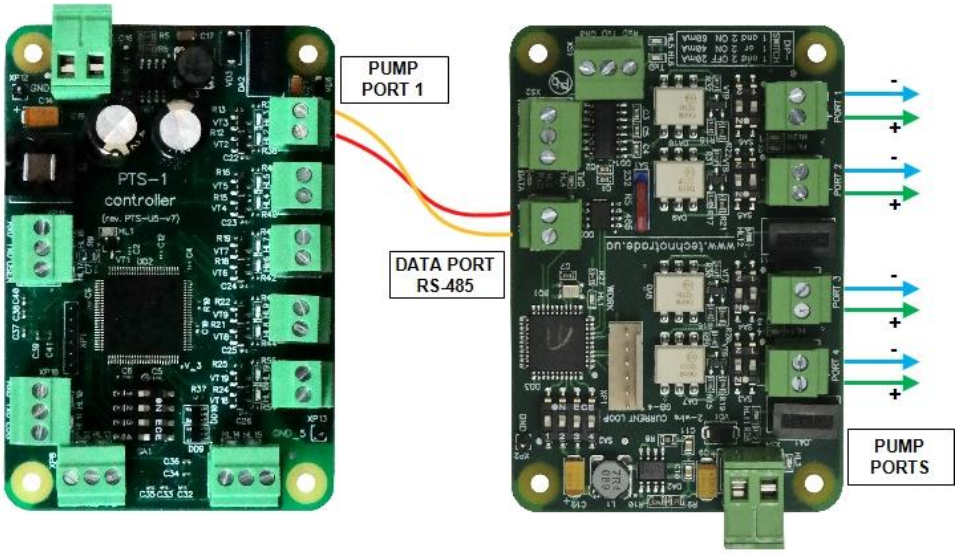


Petposan-Beta CPU

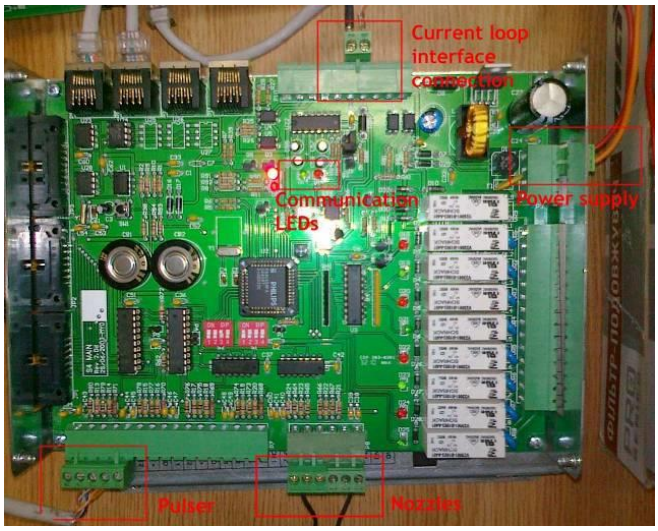
EuroPump dispenser connection scheme

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.

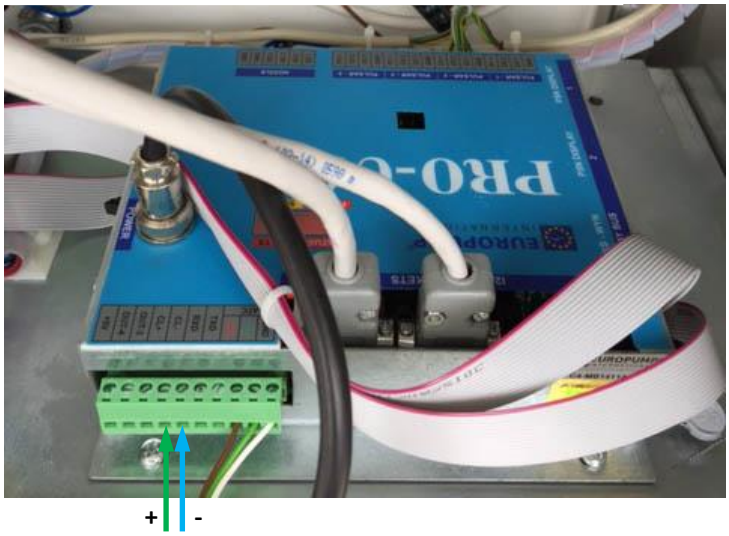
Configuration of PTS controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



PTS-1 controller **GB-4 interface converter**



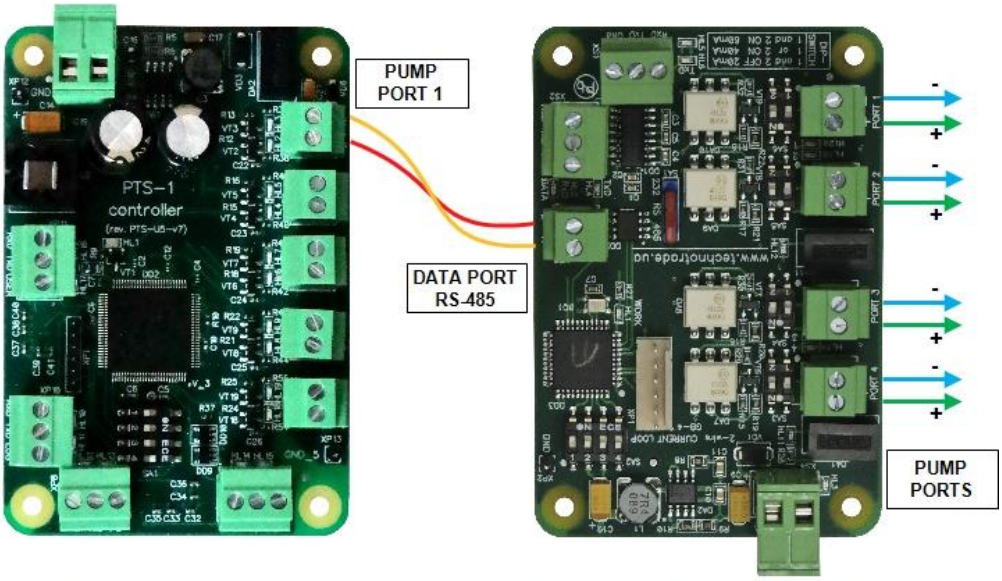
EuroPump EUROSTAR E2-SL dispenser computer *EuroPump dispenser computer*

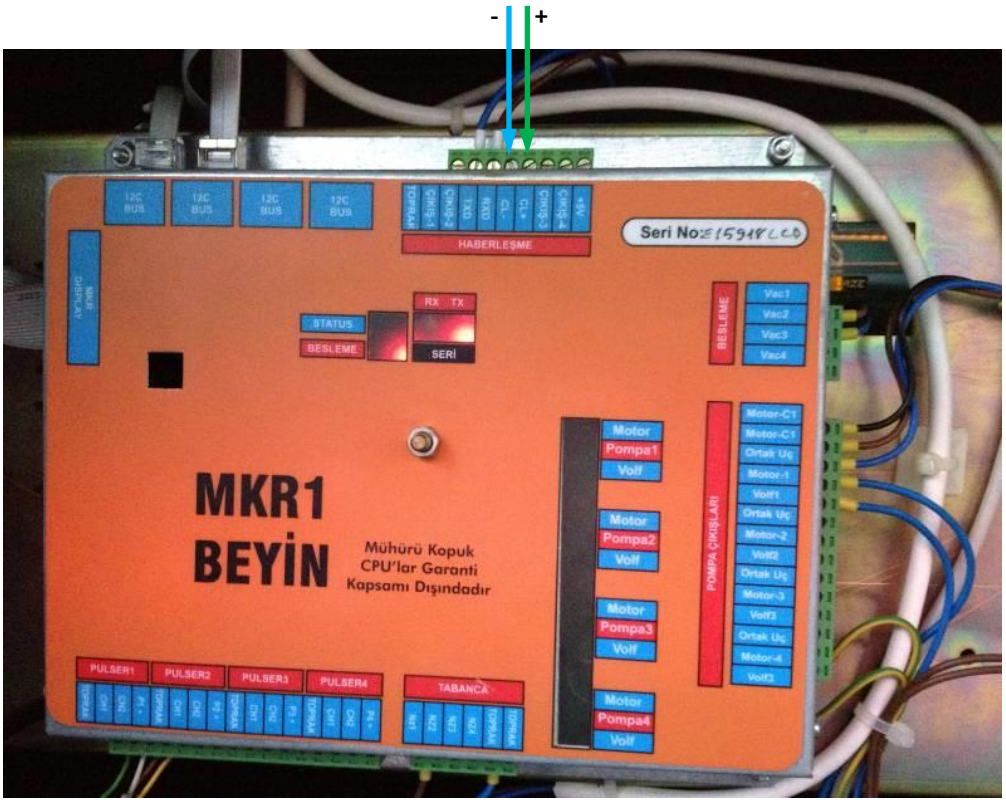


Mekser dispenser connection scheme

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 controller pump port: protocol "*33. Dart Simplex*", baud rate "*4. 9600*".



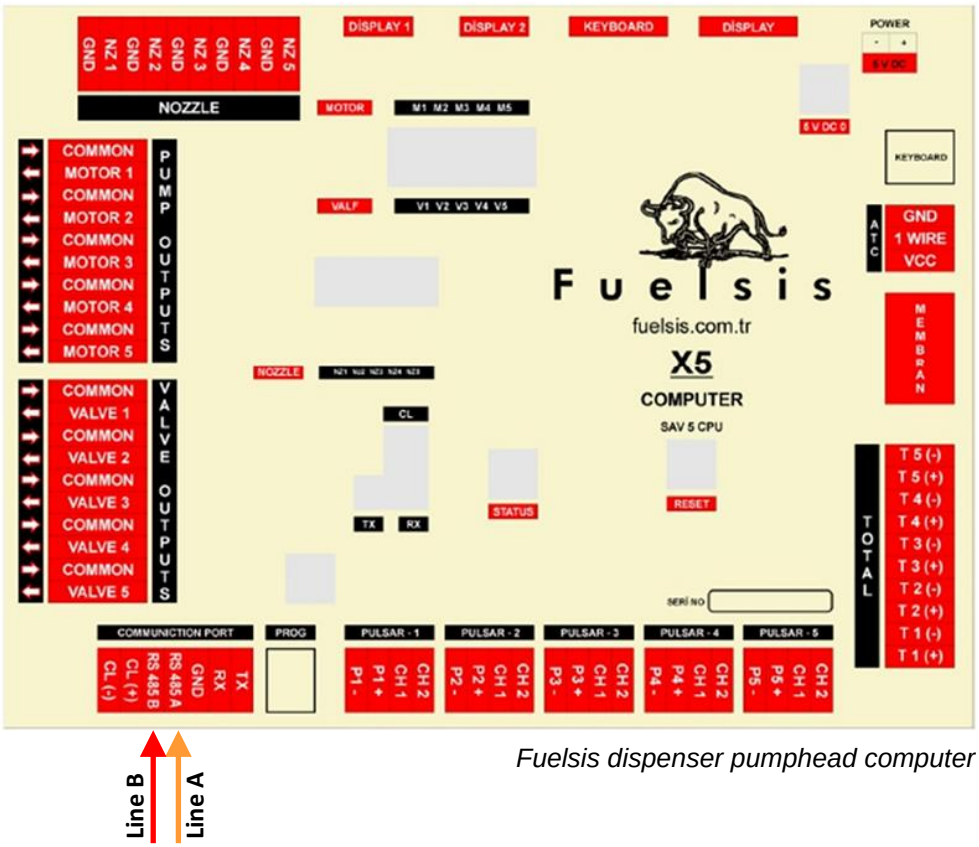


Mekser dispenser board

Fuelsis dispenser connection scheme

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





Fuelsis dispenser pumphead computer

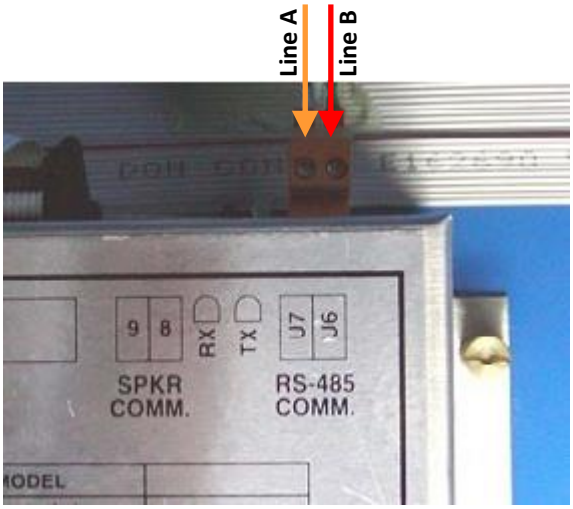
Mepsan Unimep dispenser connection scheme

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

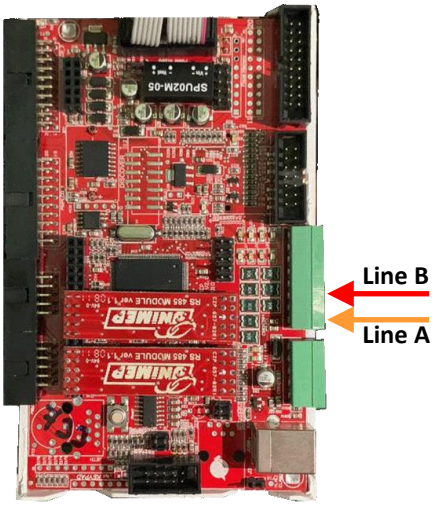


Mepsan Unimep dispenser calculator





Mepsan Unimep dispenser calculator



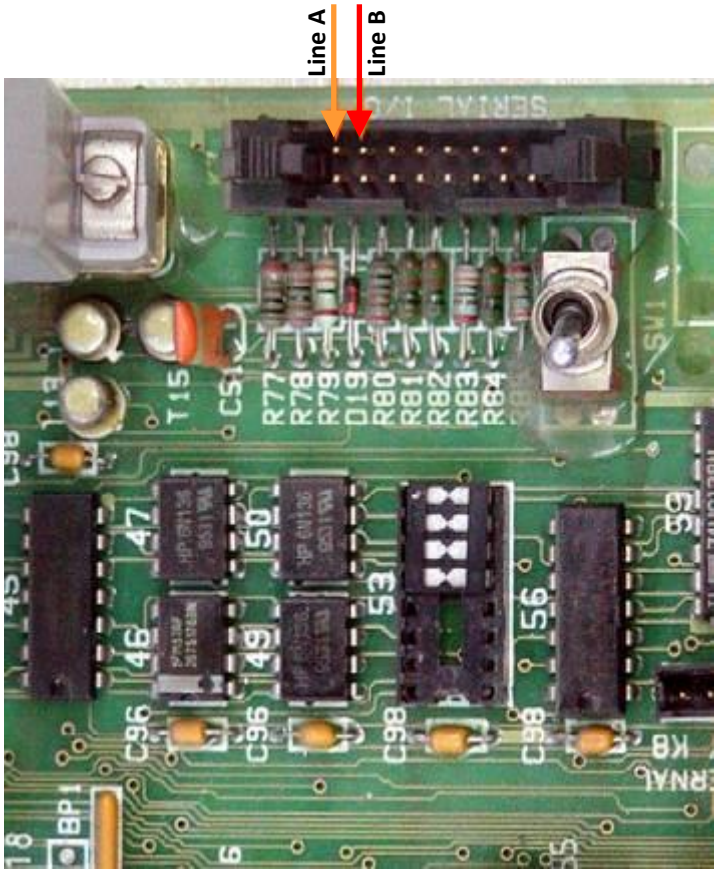


Mepsan dispenser board

Meksan / Wayne SU86 dispenser connection scheme

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



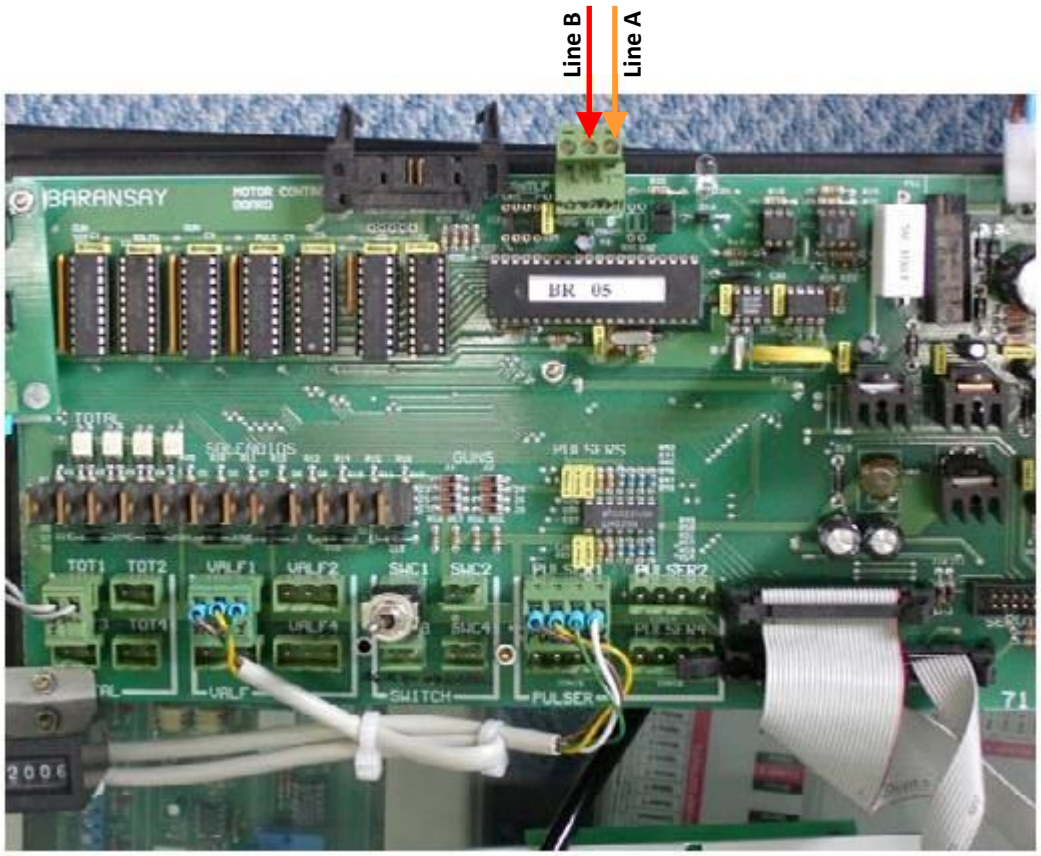


MEKSAN / WAYNE SU86 dispenser board

Baransay dispenser connection scheme

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





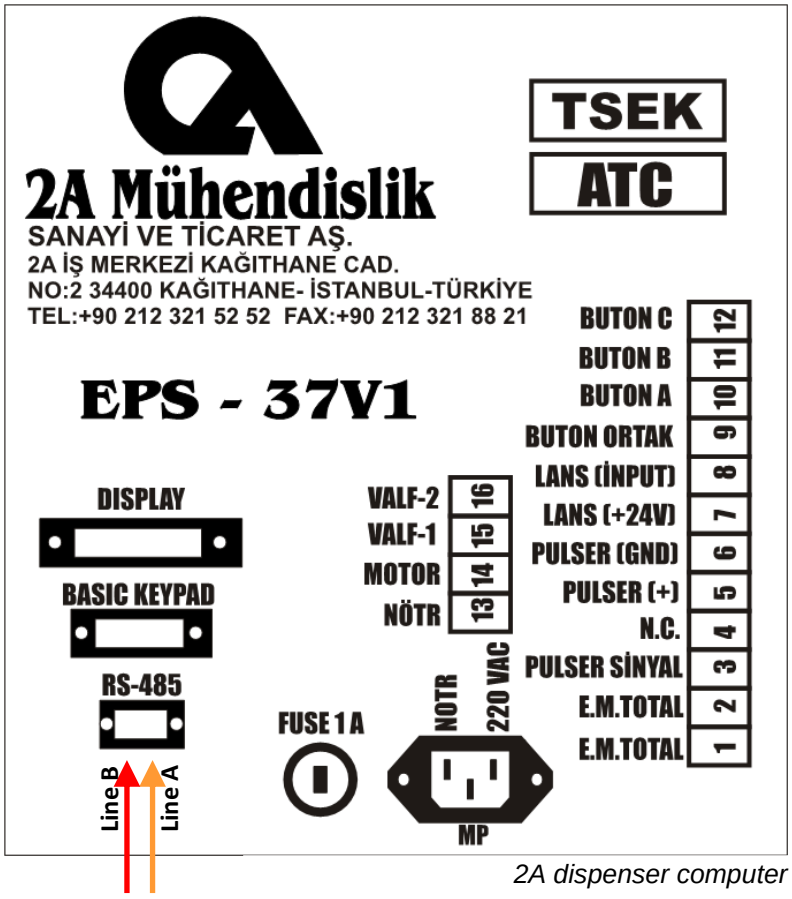
Baransay dispenser board

2A LPG dispenser connection scheme

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

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



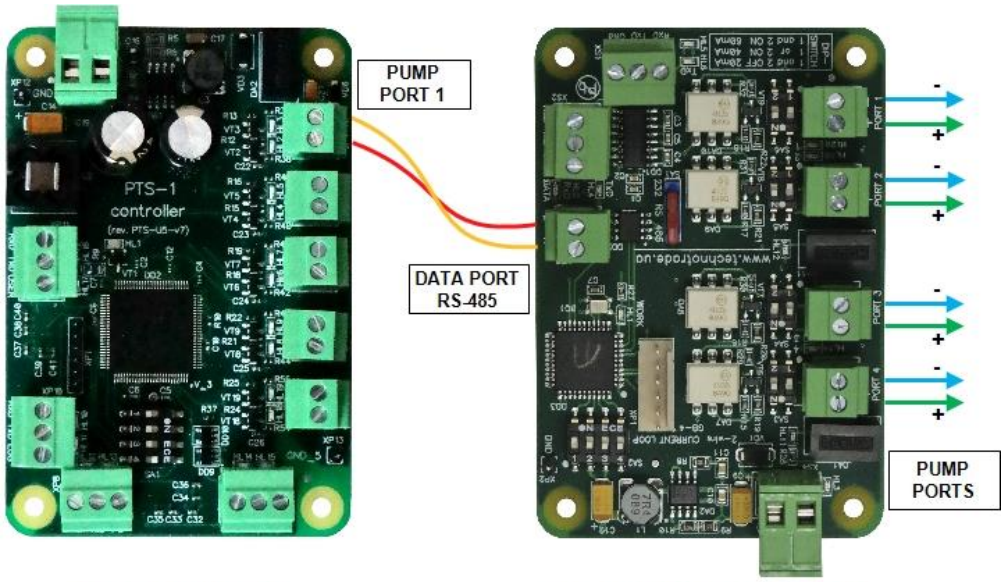


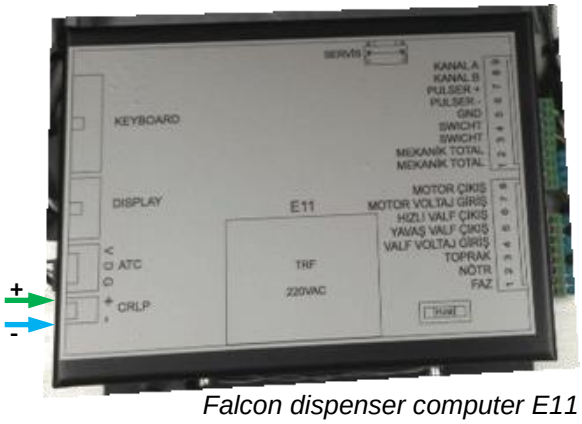
2A dispenser computer

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 controller pump port: protocol "*43. FALCON LPG*", baud rate "3. *5787*".





Falcon dispenser computer E11

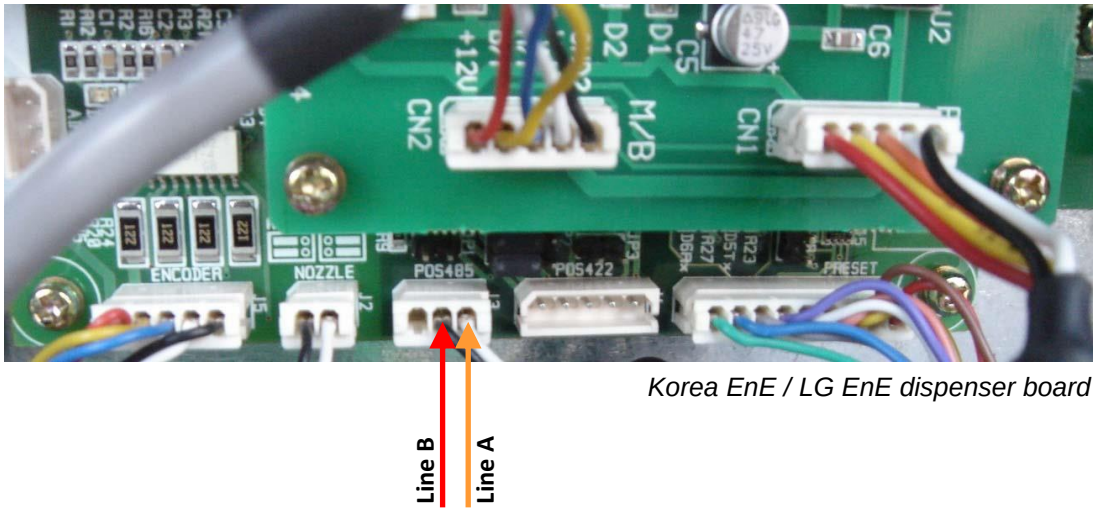


Falcon dispenser computer E22

Korea EnE (LG EnE) dispenser connection scheme

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





Korea EnE / LG EnE dispenser board

Dong Hwa Prime dispenser connection scheme

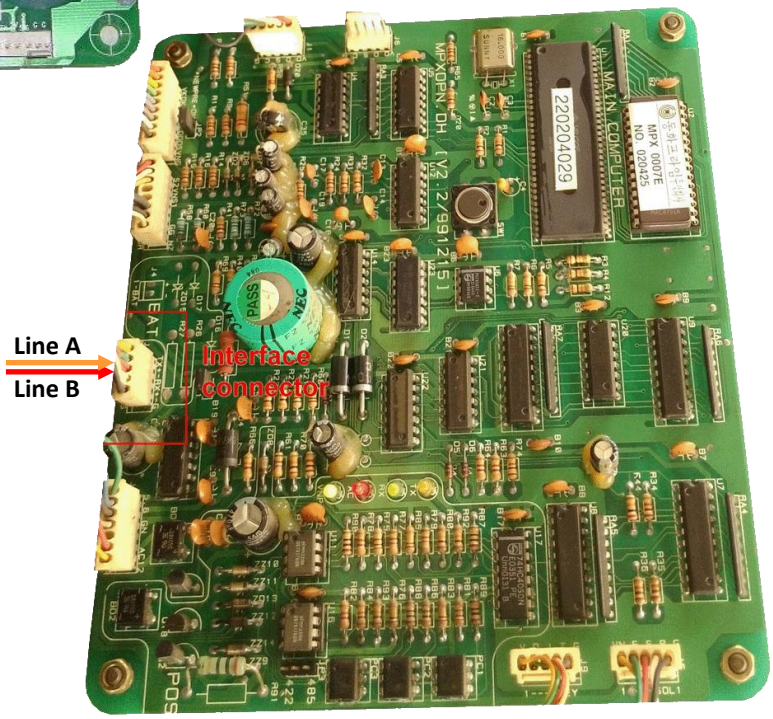
Connection to Dong Hwa dispenser is made directly without any interface converter.

Configuration of PTS controller pump port: protocol "31. *DONG HWA Prime*", baud rate "*4. 9600*".





Dong Hwa dispenser board

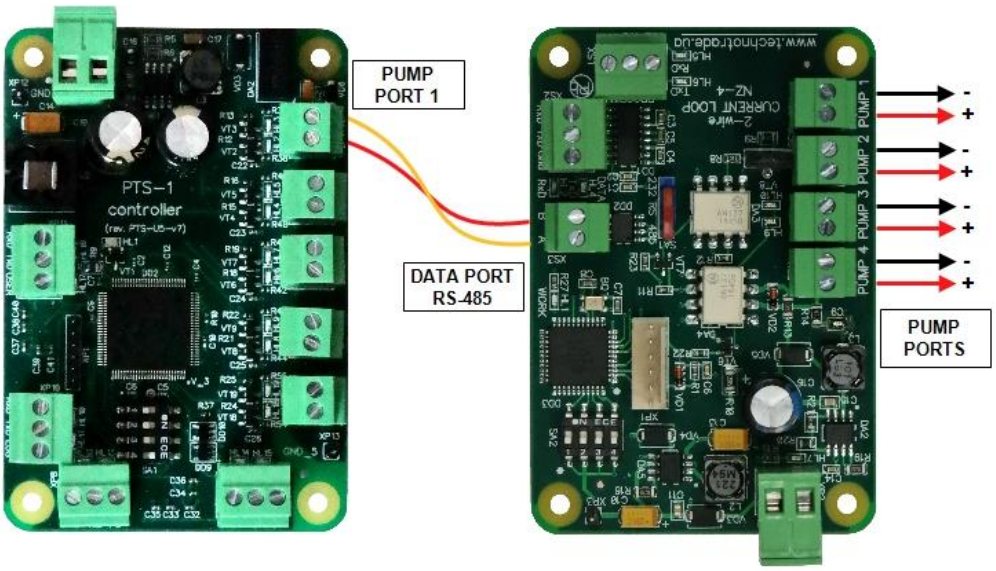


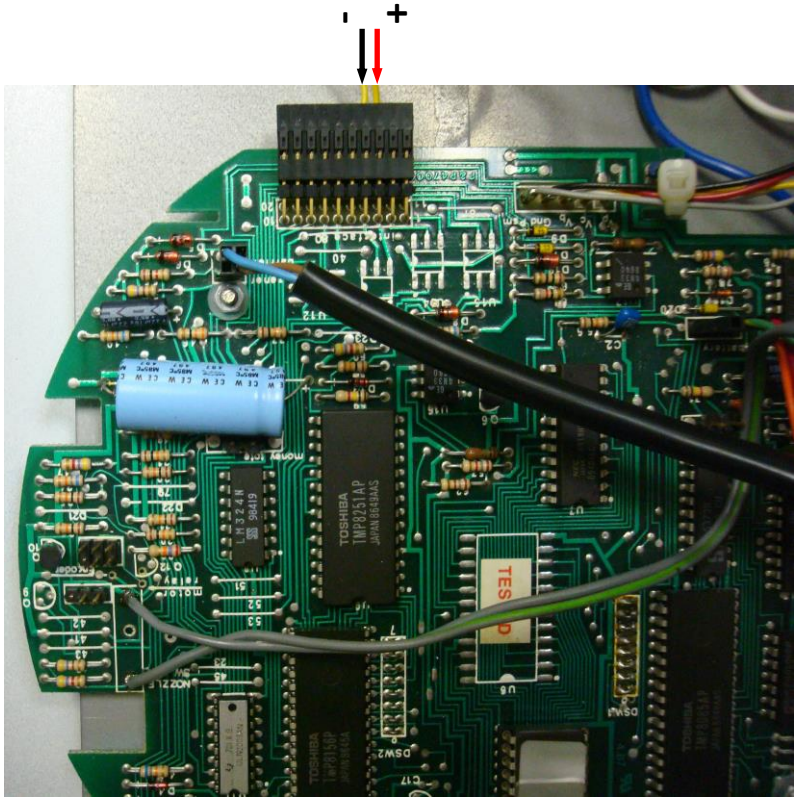
Dong Hwa dispenser board

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 controller pump port: protocol "25. *GALLAGHER (PEC)*", baud rate "*6. 1200*".



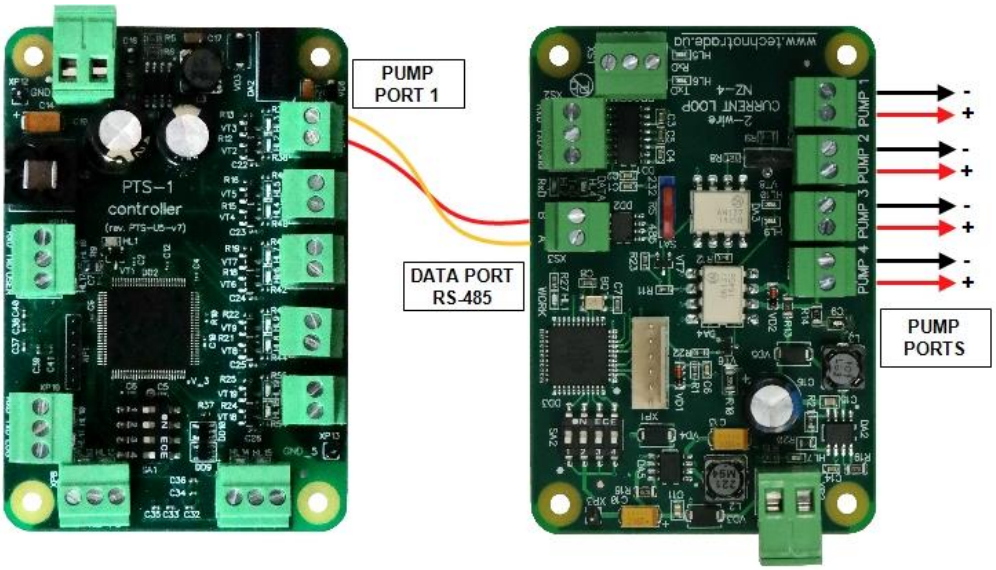


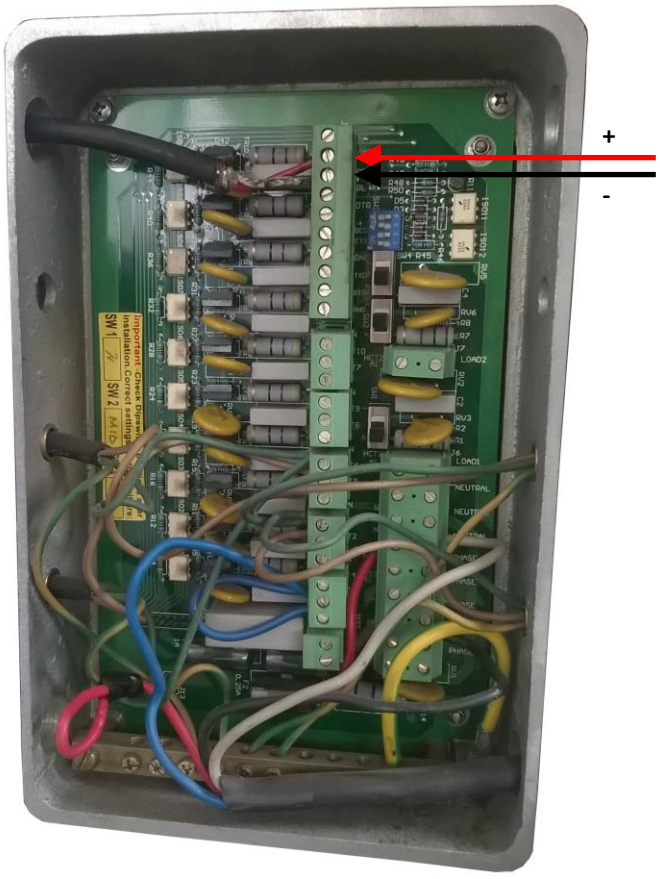
Retron 80 dispenser board connection

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 controller pump port: protocol "25. *GALLAGHER (PEC)*", baud rate "*6. 1200*".





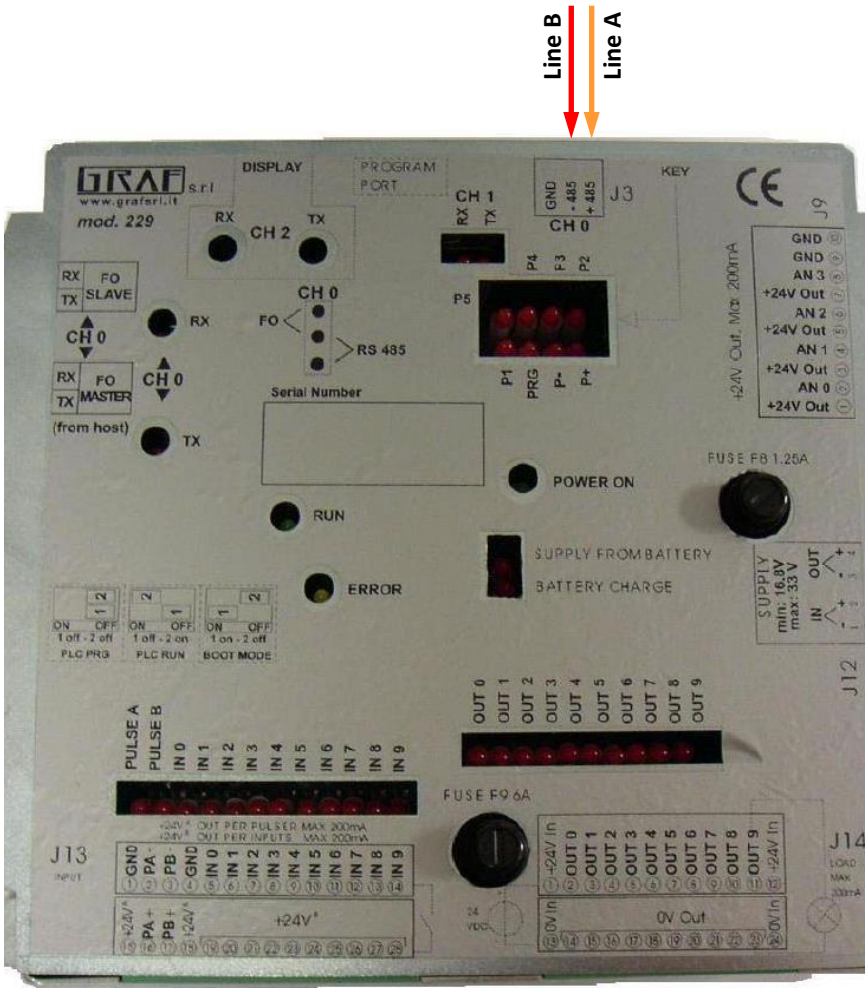
Compac dispenser junction box

Safe dispenser connection scheme

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

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



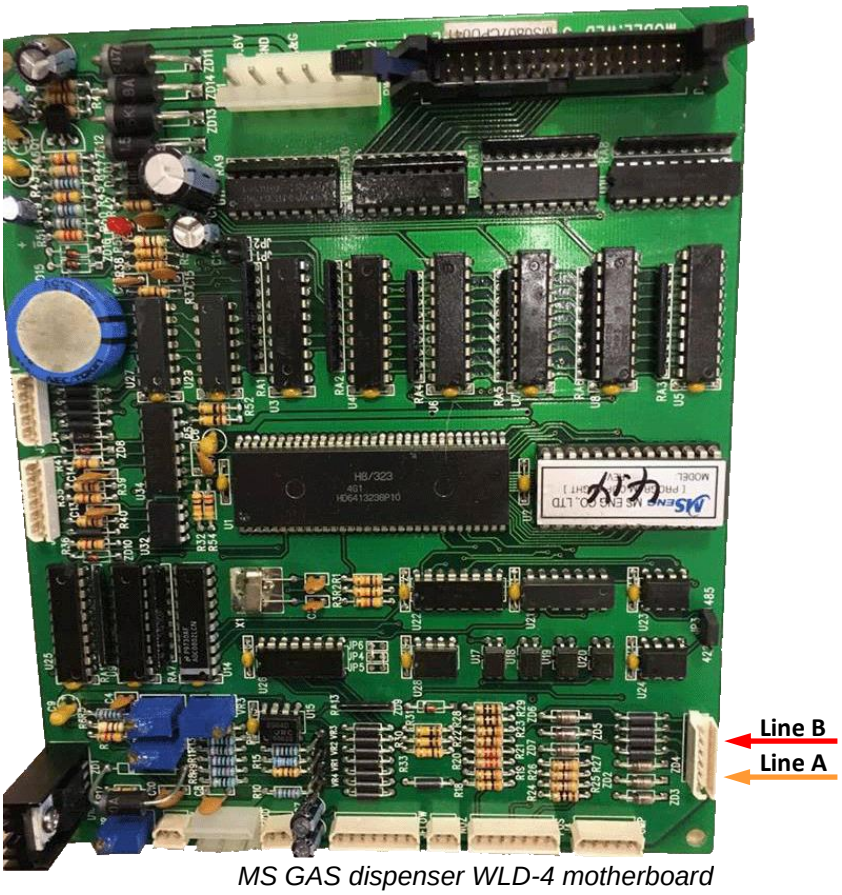


SAFE Graf electronic head PMII

MS Gas dispenser connection scheme

Connection to MS GAS dispenser is made directly without any interface converter.
Configuration of PTS controller pump port: protocol "*53. KOREA CNG*", baud rate "*4. 9600*".



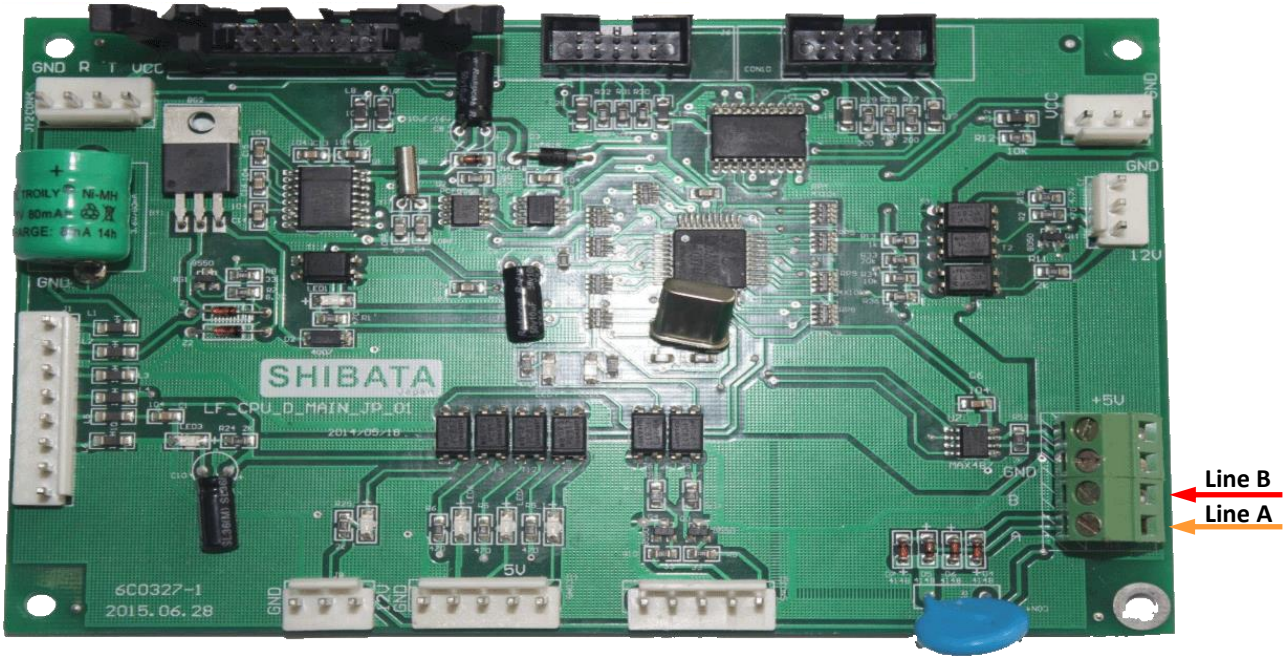


MS GAS dispenser WLD-4 motherboard

Shibata dispenser connection scheme

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



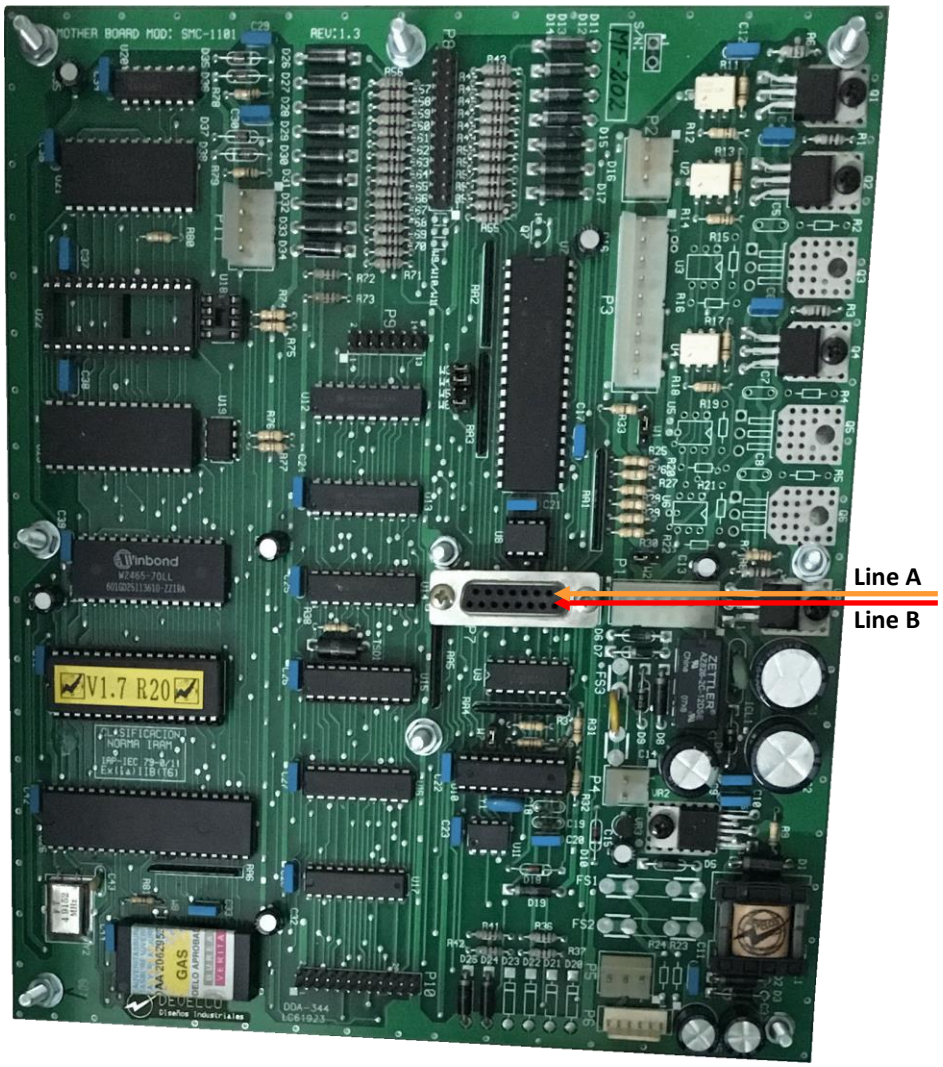


SHIBATA dispenser motherboard

Aspro Develco dispenser connection scheme

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



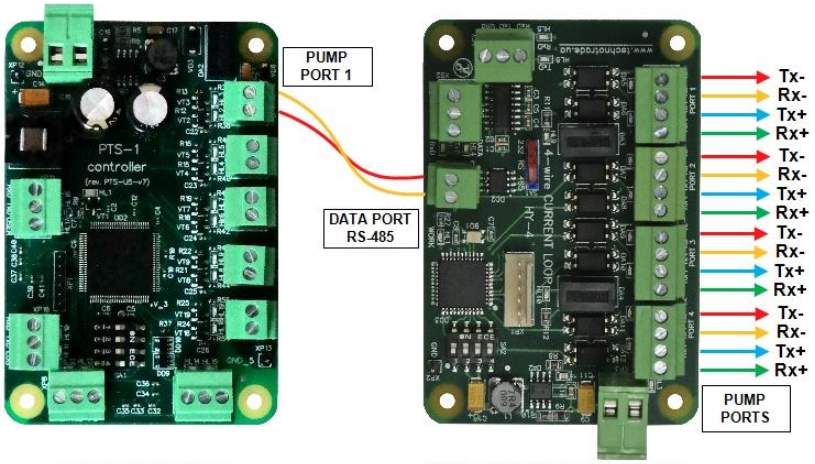


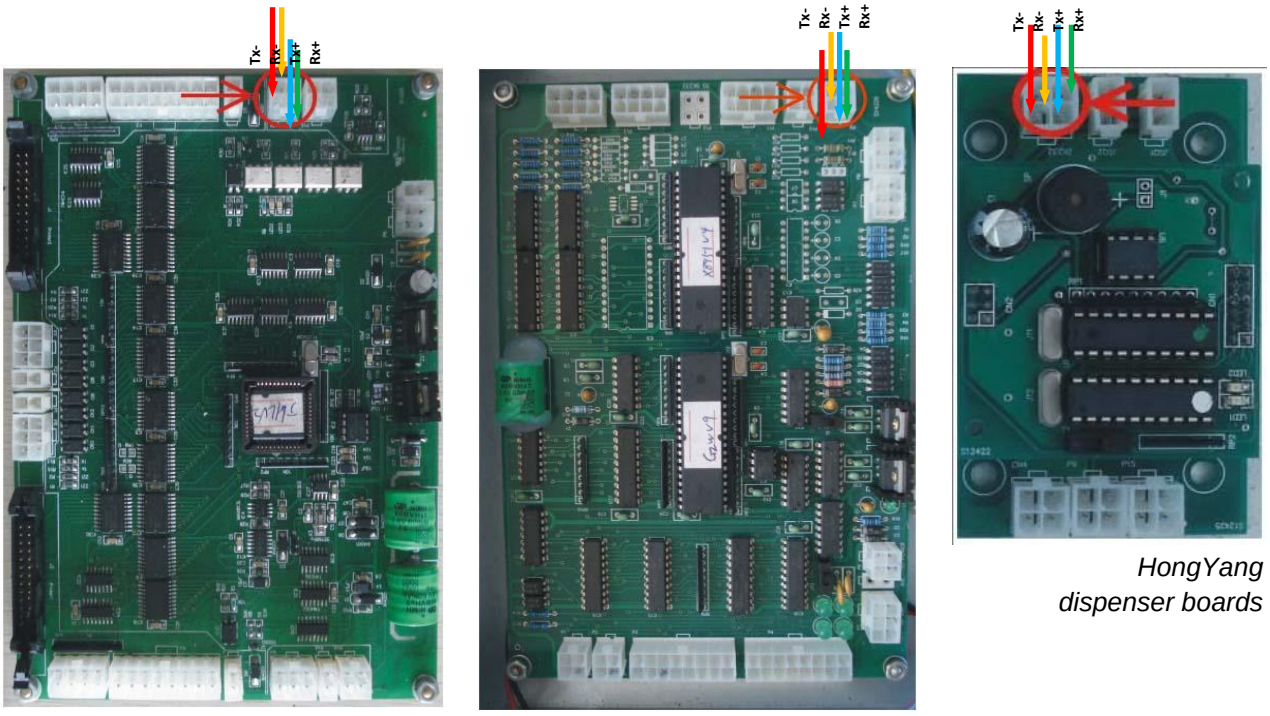
Develco dispenser motherboard

HongYang dispenser connection scheme

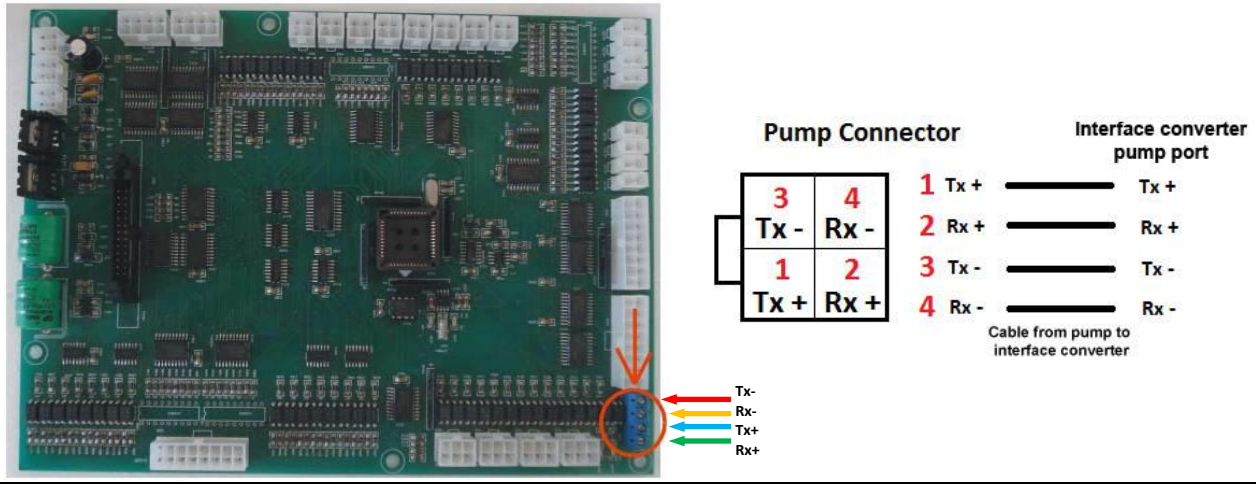
Connection to HongYang dispenser dispenser is made through 4-wire HY interface converter (*http://www.technotrade.ua/hongyang-interface-converter.html*), which provides connection of RS-232/RS-485 interfaces to 4-wire current loop interface.

Configuration of PTS 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*".





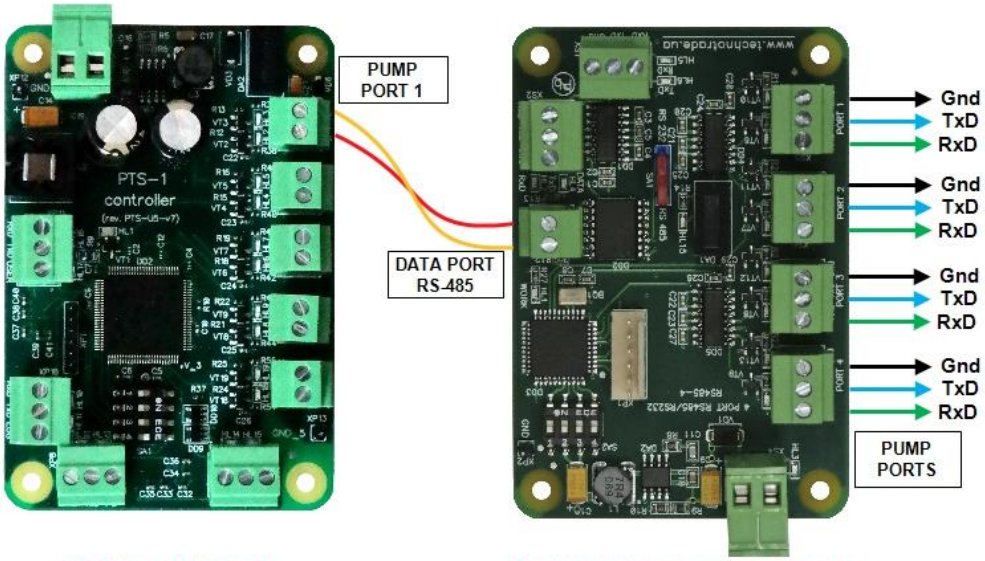
HongYang dispenser boards



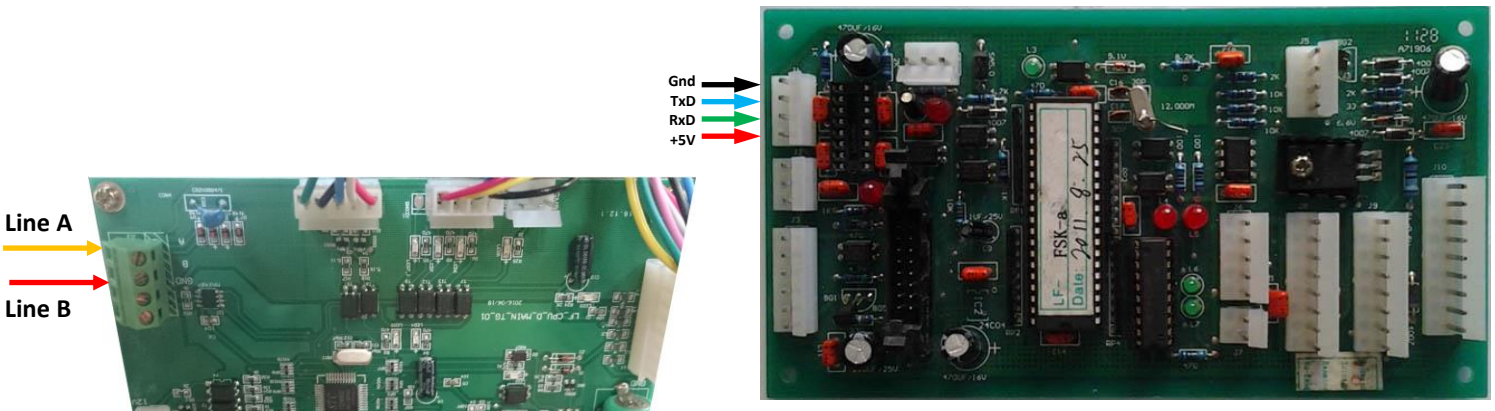
Lanfeng dispenser connection scheme

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 controller pump port: protocol "*30. LANFENG*", baud rate "*4. 9600*".



PTS-1 controller **RS485-4 interface converter**



Lanfeng RS-232 dispenser board

Lanfeng RS-485 dispenser board



Lanfeng RS-485 dispenser board

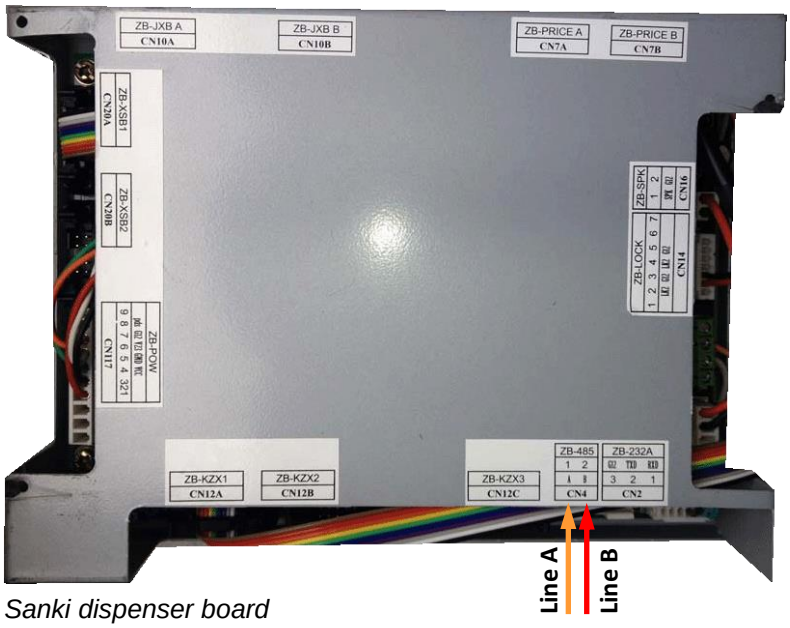
Sanki dispenser connection scheme

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

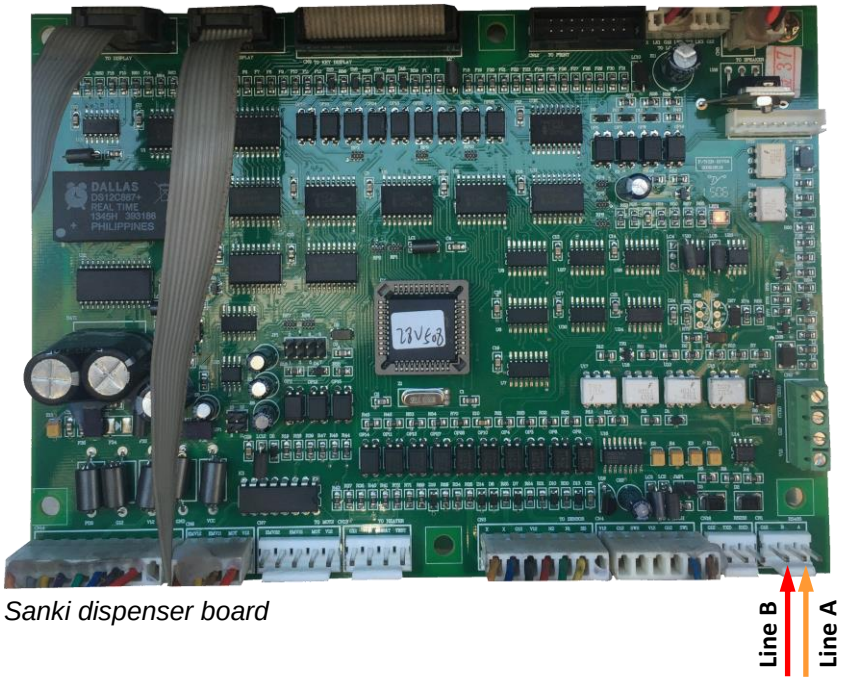
Configuration of PTS controller pump port: protocol "*52. SANKI NG*", baud rate "*4. 9600*".



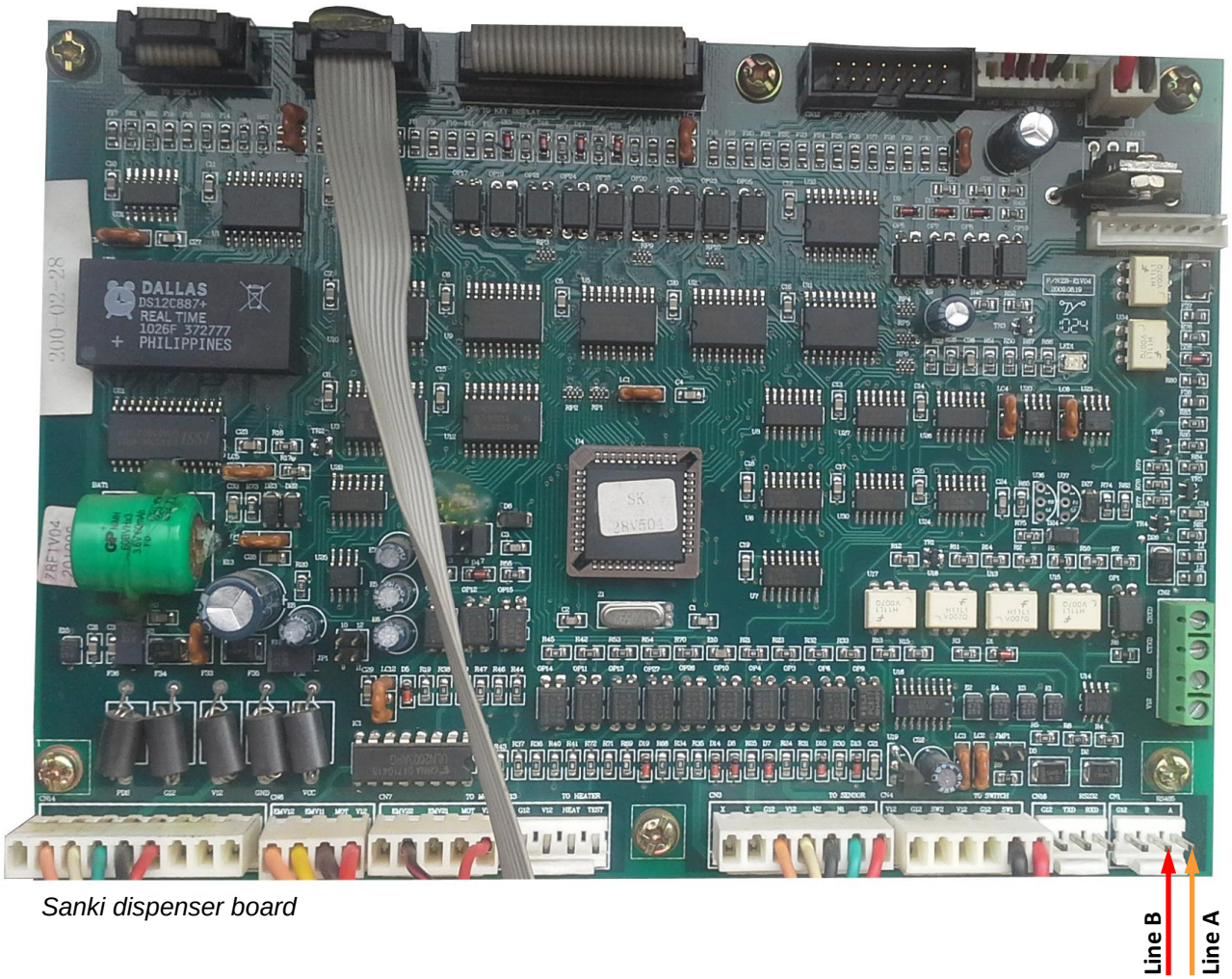
PTS controller



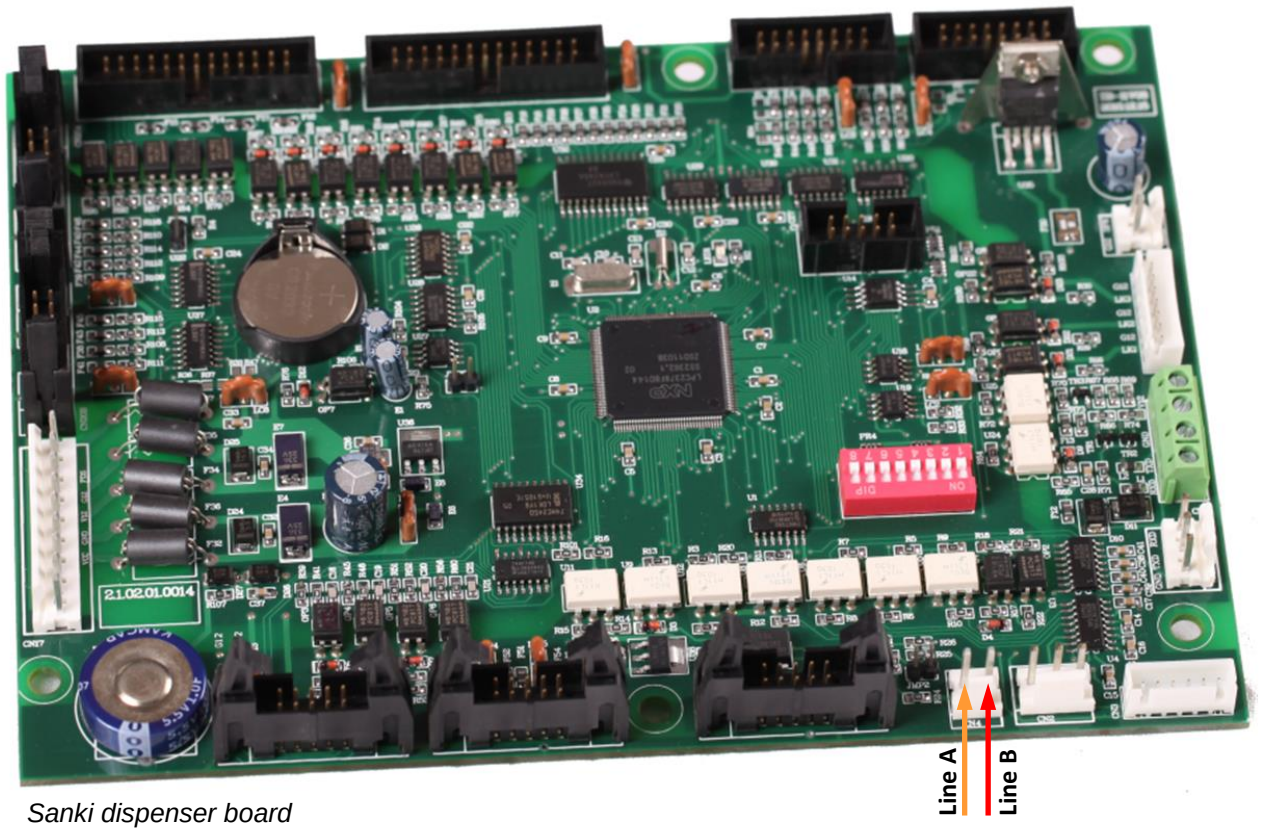
Sanki dispenser board



Sanki dispenser board



Sanki dispenser board

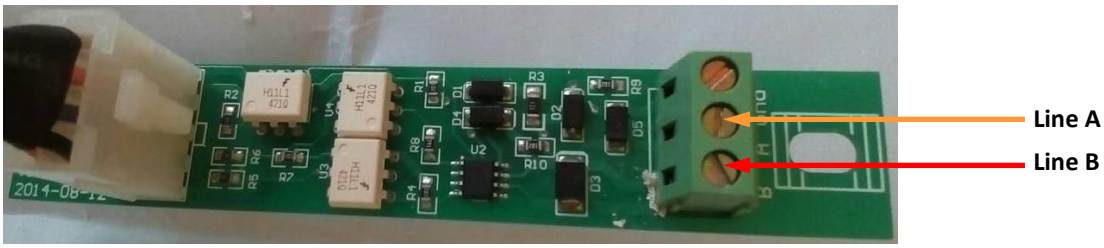


Sanki dispenser board

Datian Machines dispenser connection scheme

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





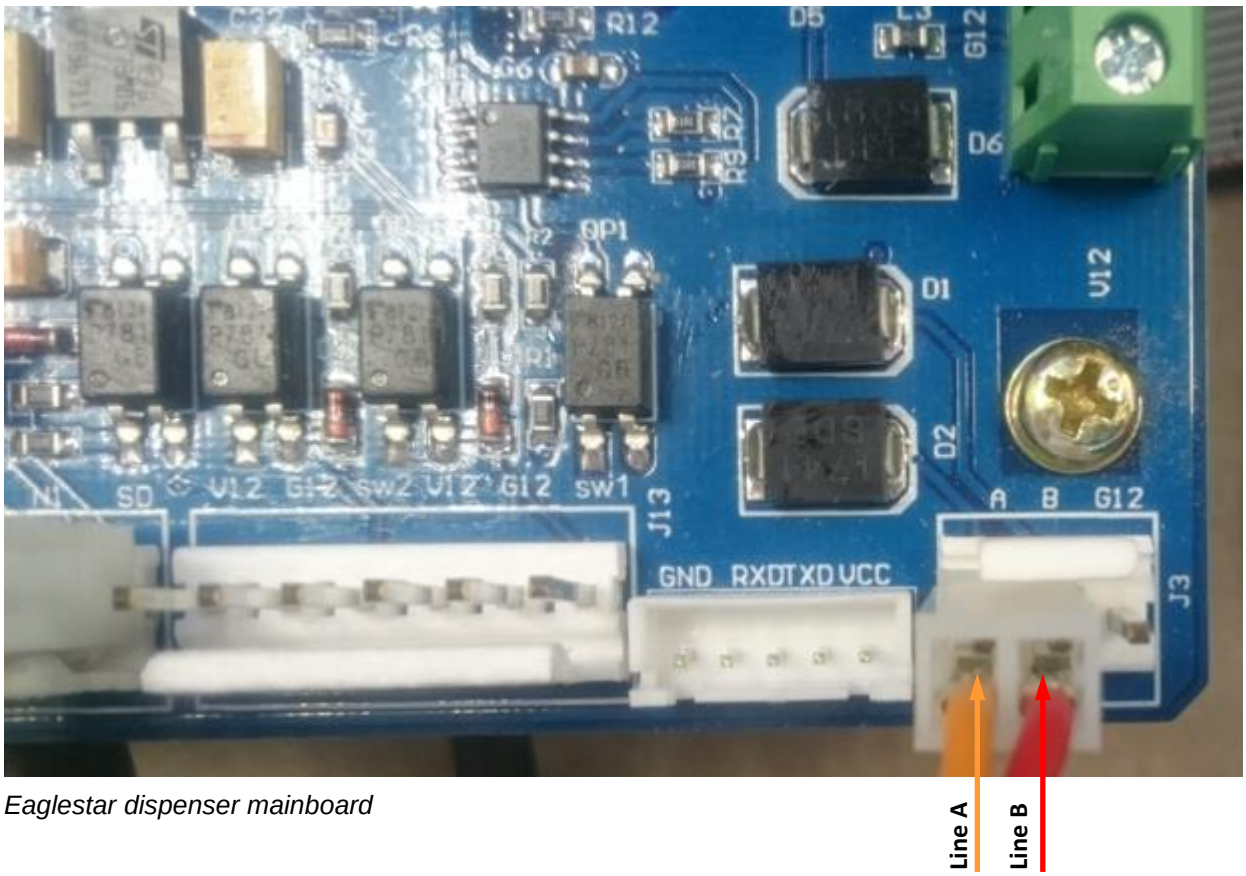
Datian Machines dispenser interface board

Eaglestar dispenser connection scheme

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

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



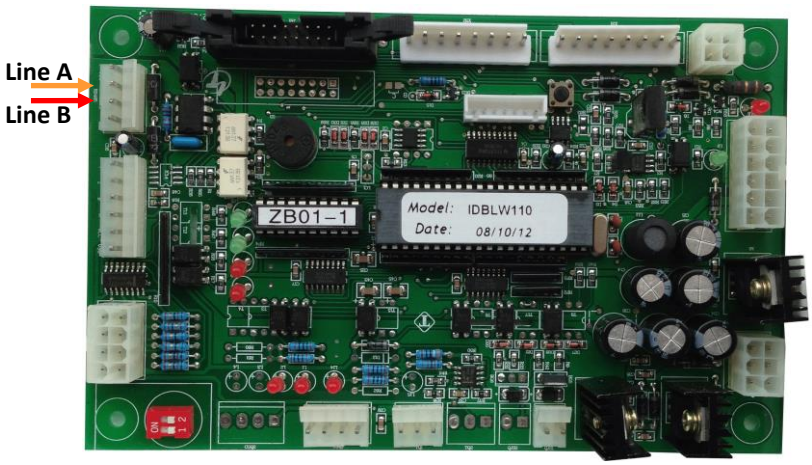


Eaglestar dispenser mainboard

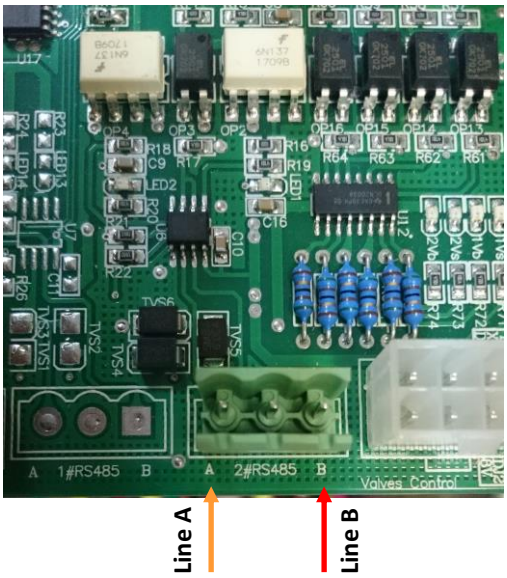
Blue Sky dispenser connection scheme

Connection to Blue Sky dispenser is made directly without any interface converter.
Configuration of PTS controller pump port: protocol "*26. Blue Sky*", baud rate "*2. 4800*".

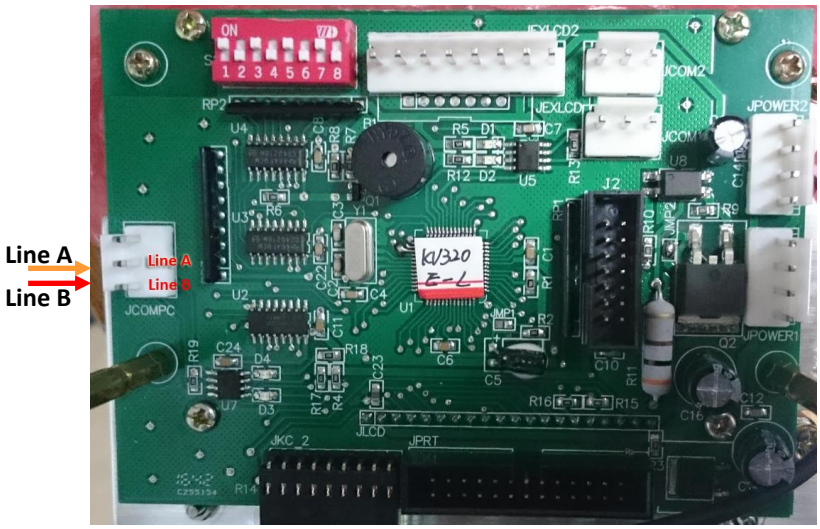




Blue Sky LT-B dispenser board



Blue Sky LT-L/LT-LG dispenser board



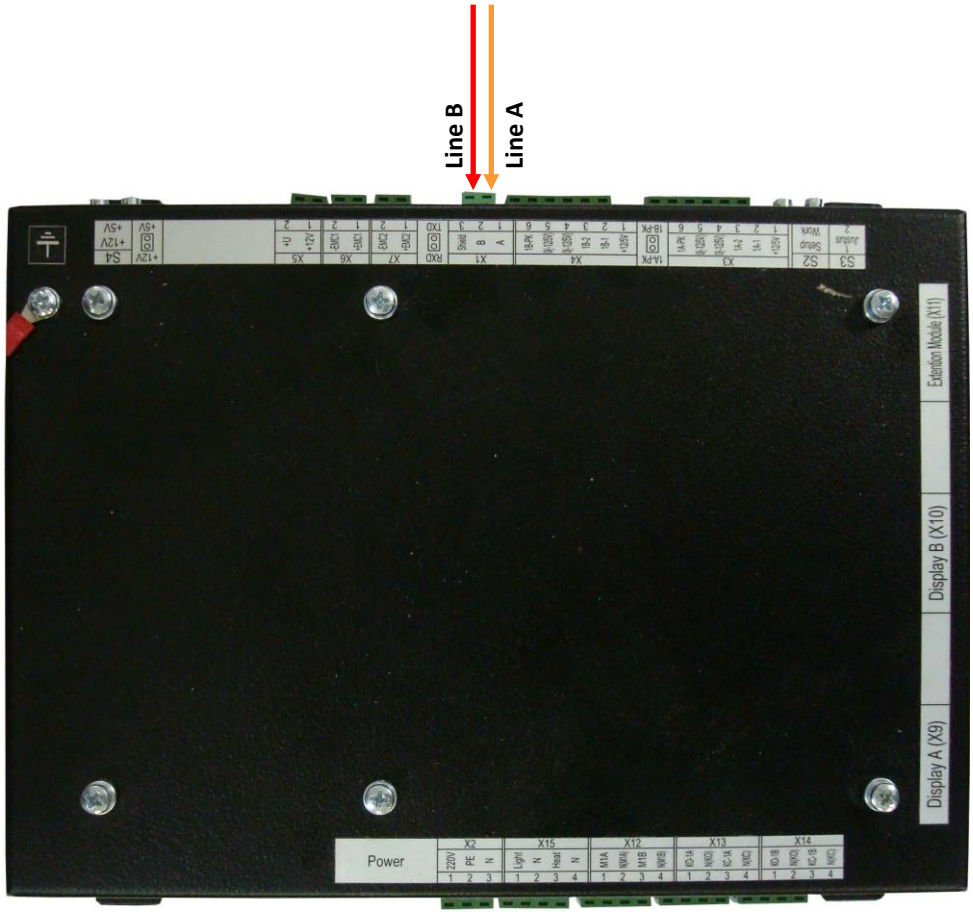
Blue Sky LT-C/LT-H dispenser board

Topaz dispenser connection scheme

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

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





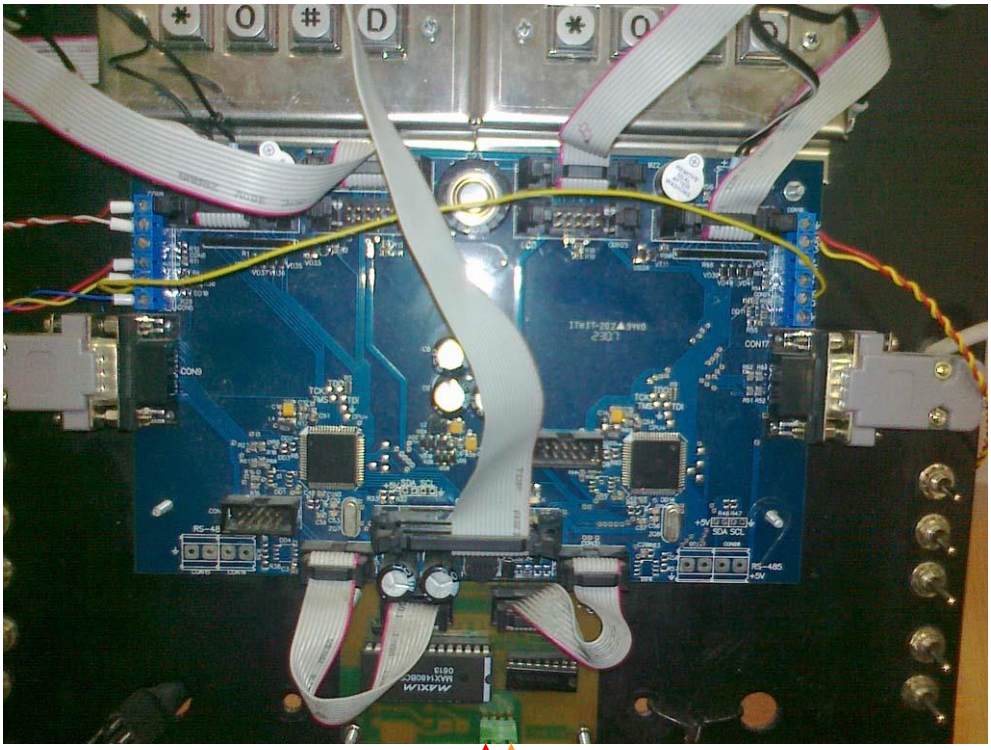
Topaz dispenser system board

Shelf dispenser connection scheme

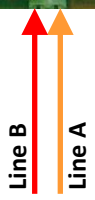
Connection to SHELF dispenser is made directly without any interface converter.

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





UniCon dispenser system board

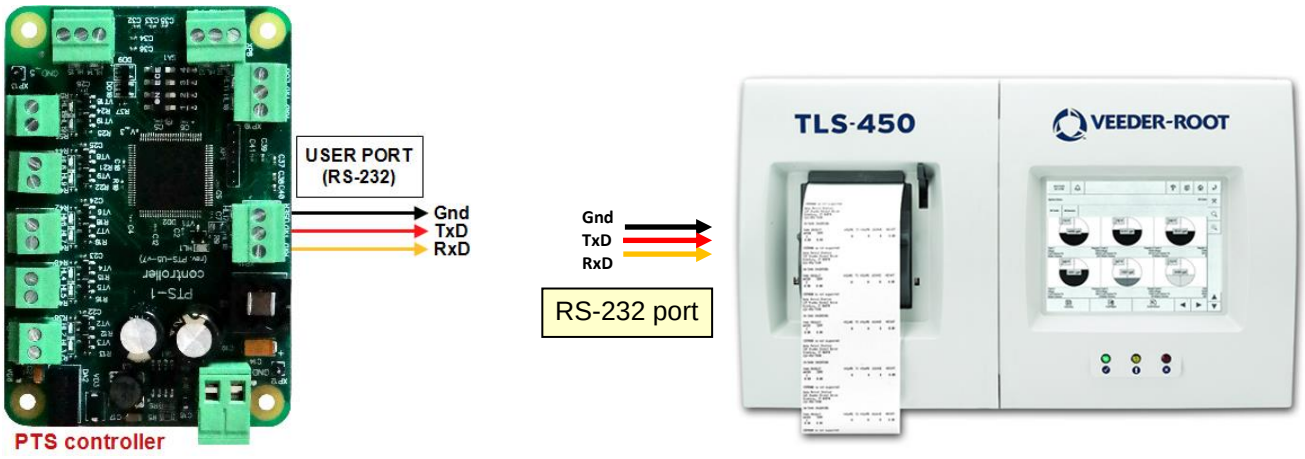
EXAMPLES OF ATG SYSTEMS CONNECTION SCHEMES

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 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 controller (RS-232 interface).

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

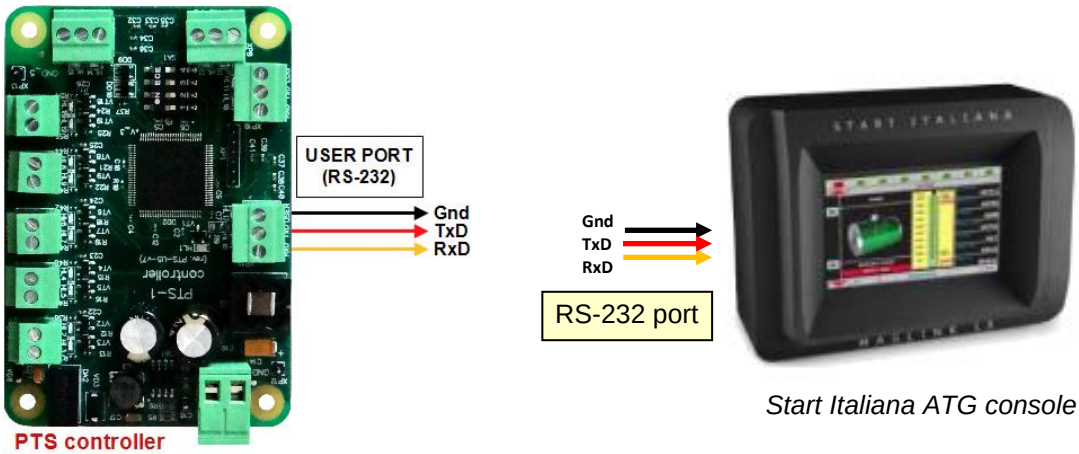


Gilbarco Veeder Root TLS ATG console

Start Italiana console connection scheme

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

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

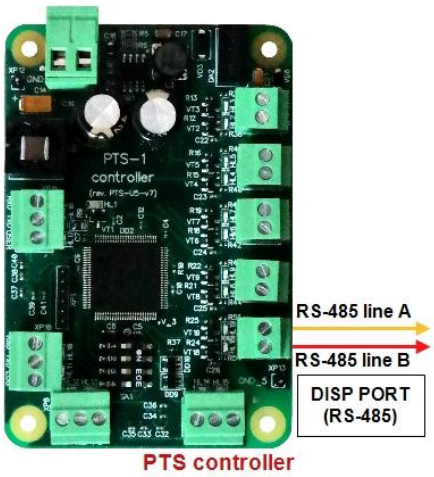


Start Italiana ATG console

Start Italiana wired probes connection scheme

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

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



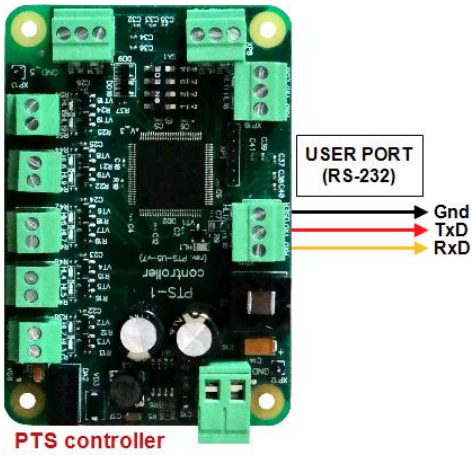


Start Italiana probe (RS-485)

Start Italiana wireless probes connection scheme

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

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



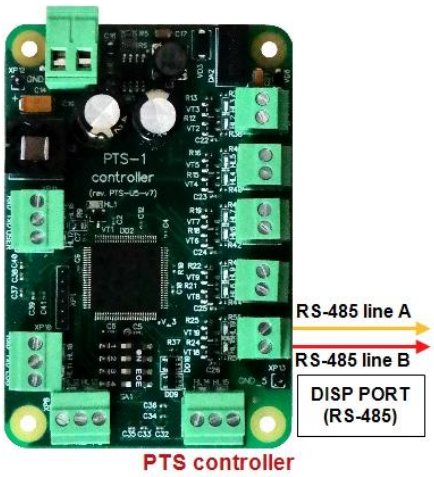


Start Italiana wireless repeater

Alisonic wired probes connection scheme

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

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



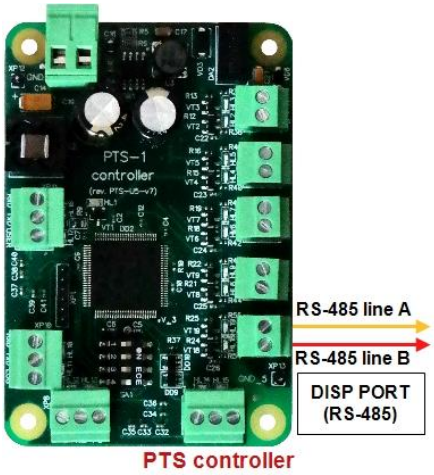


Alisonic probe (RS-485)

Alisonic wireless probes connection scheme

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

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

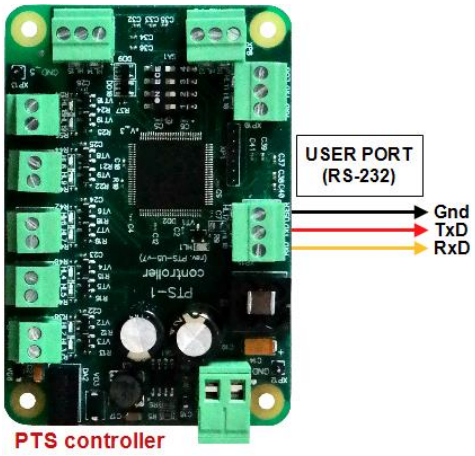




Alisonic wireless receiver

Struna ATG system connection scheme

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

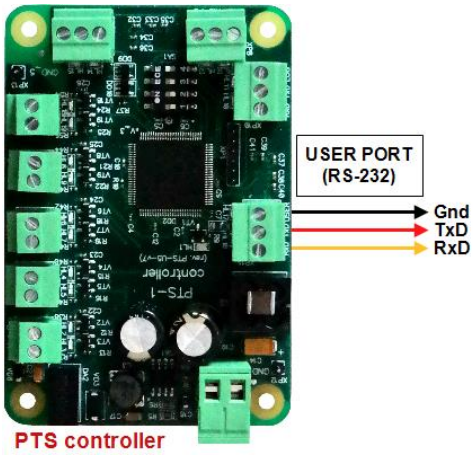


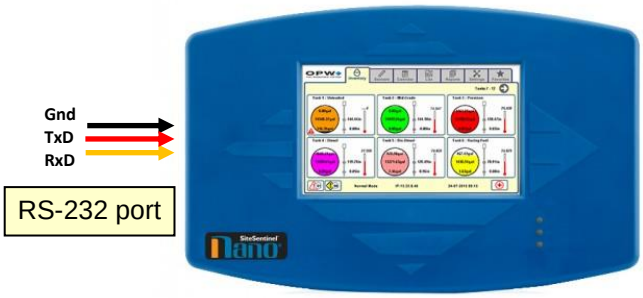


Struna ATG calculation unit

OPW Site Sentinel ATG system connection scheme

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

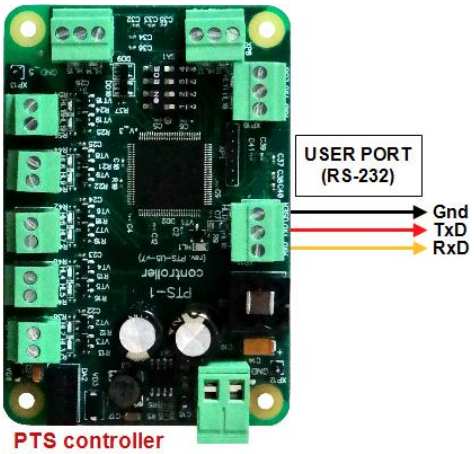


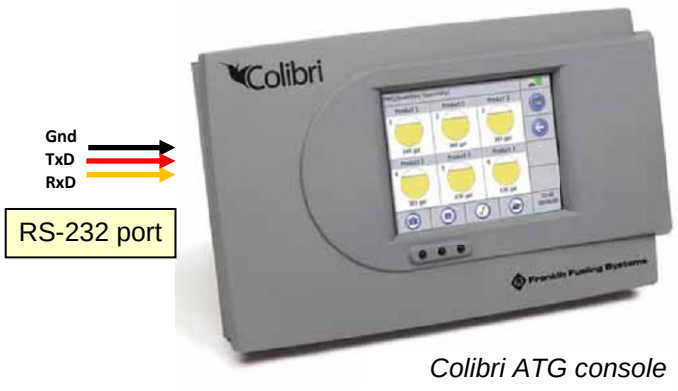


OPW ATG console

Colibri ATG system connection scheme

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

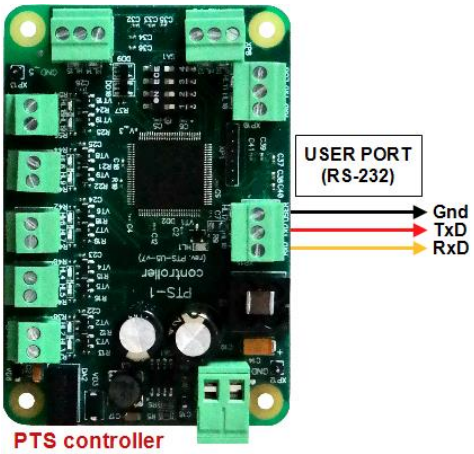


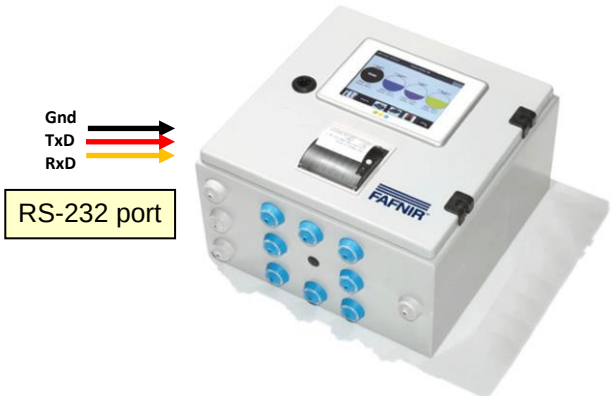


Colibri ATG console

Fafnir ATG system connection scheme

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



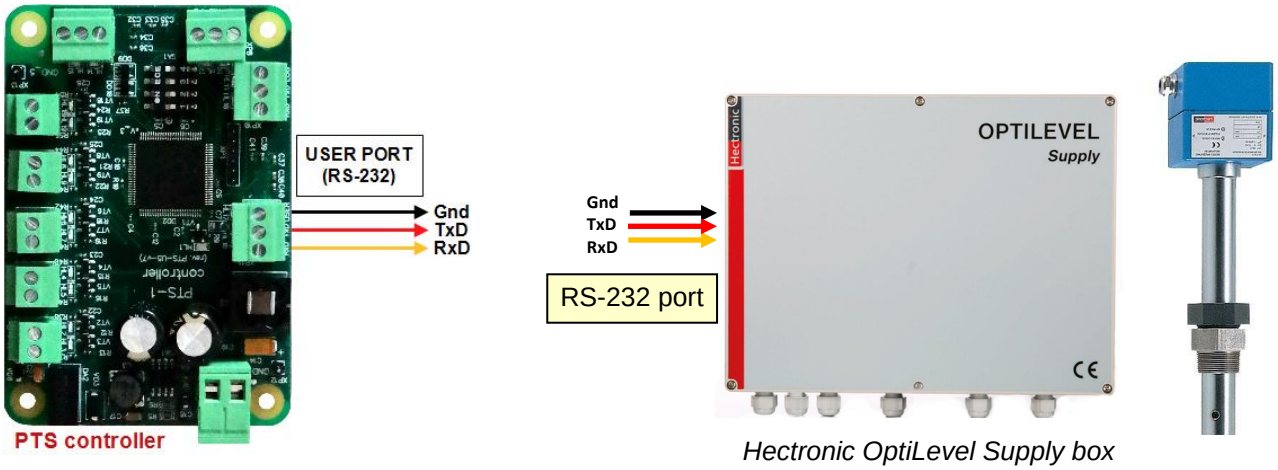


FAFNIR-Command ATG console

Hectronic ATG probes connection scheme

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

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

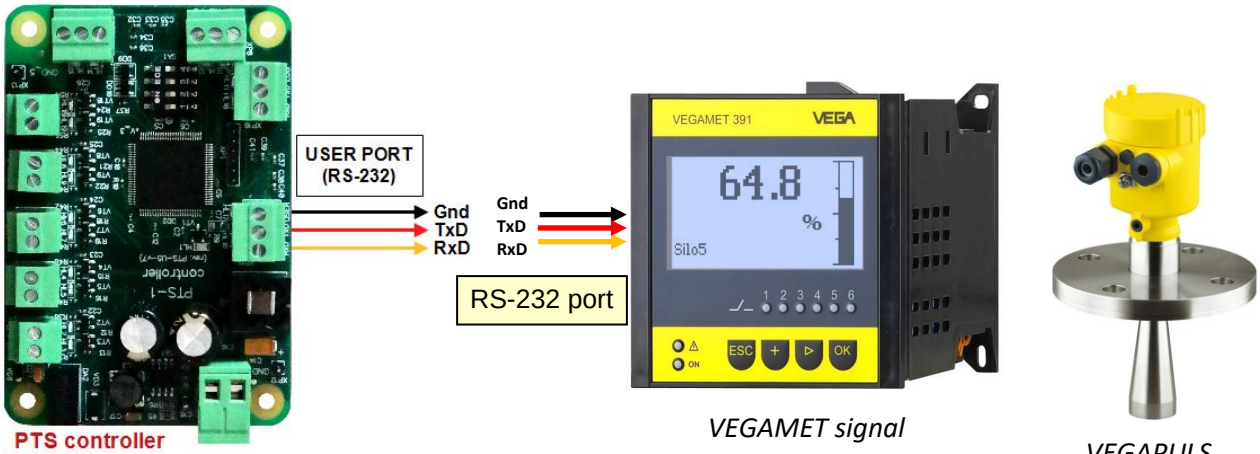


Hectronic OptiLevel Supply box

Vega radar level meters

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

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

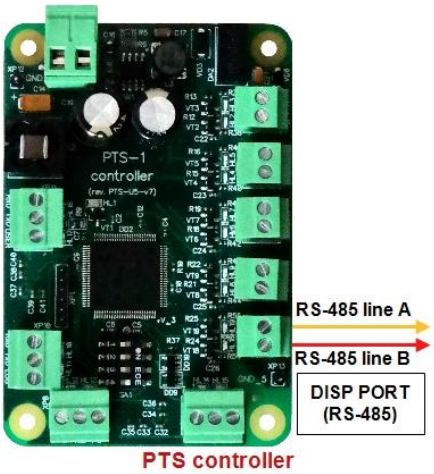


VEGAMET signal conditioning instrument

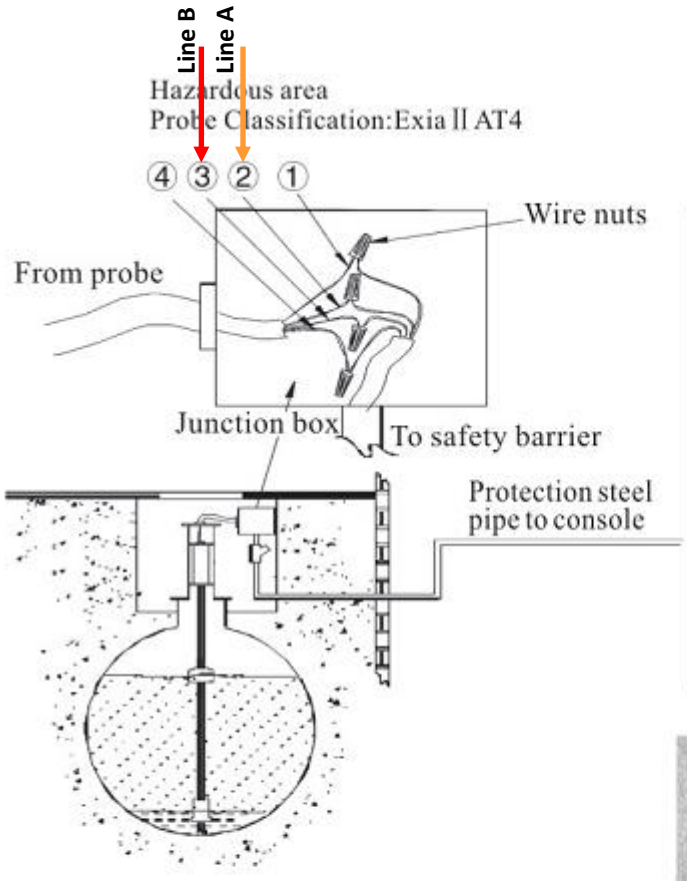
VEGAPULS radar meter

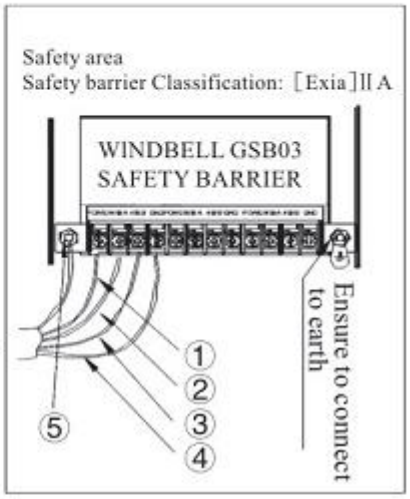
Windbell magnetostrictive probes connection scheme

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

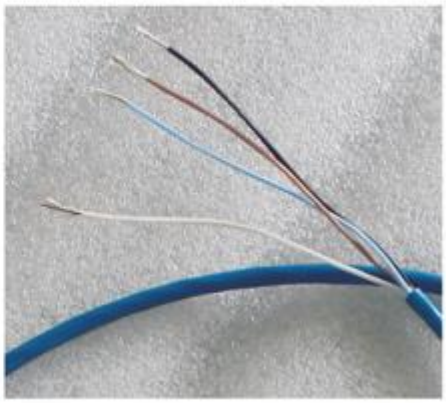








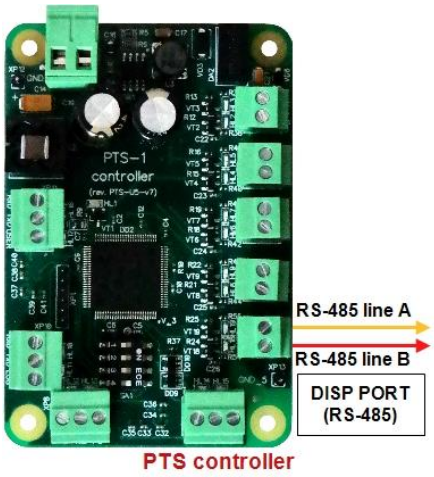
No.	Power wires	Port of safety barrier
①	Blue wire	Power (Power +)
②	Brown wire	485A
③	White wire	485B
④	Black wire	GND (Power-)
⑤	Shielded wire	



North Falcon wired probes connection scheme

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

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



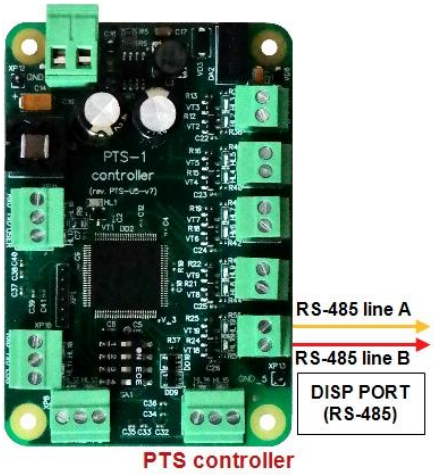


North Falcon probe (RS-485)

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 controller (RS-485 interface).

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

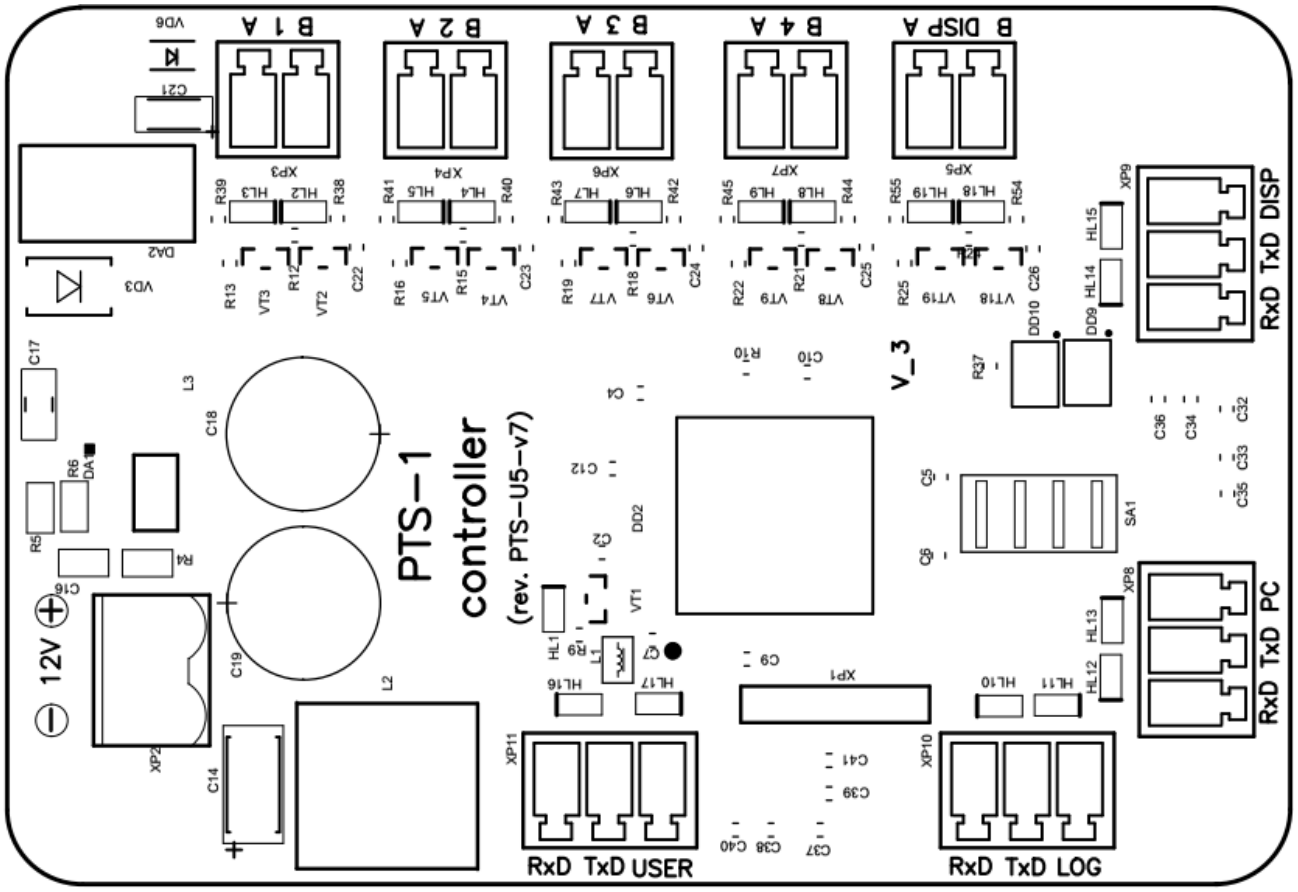




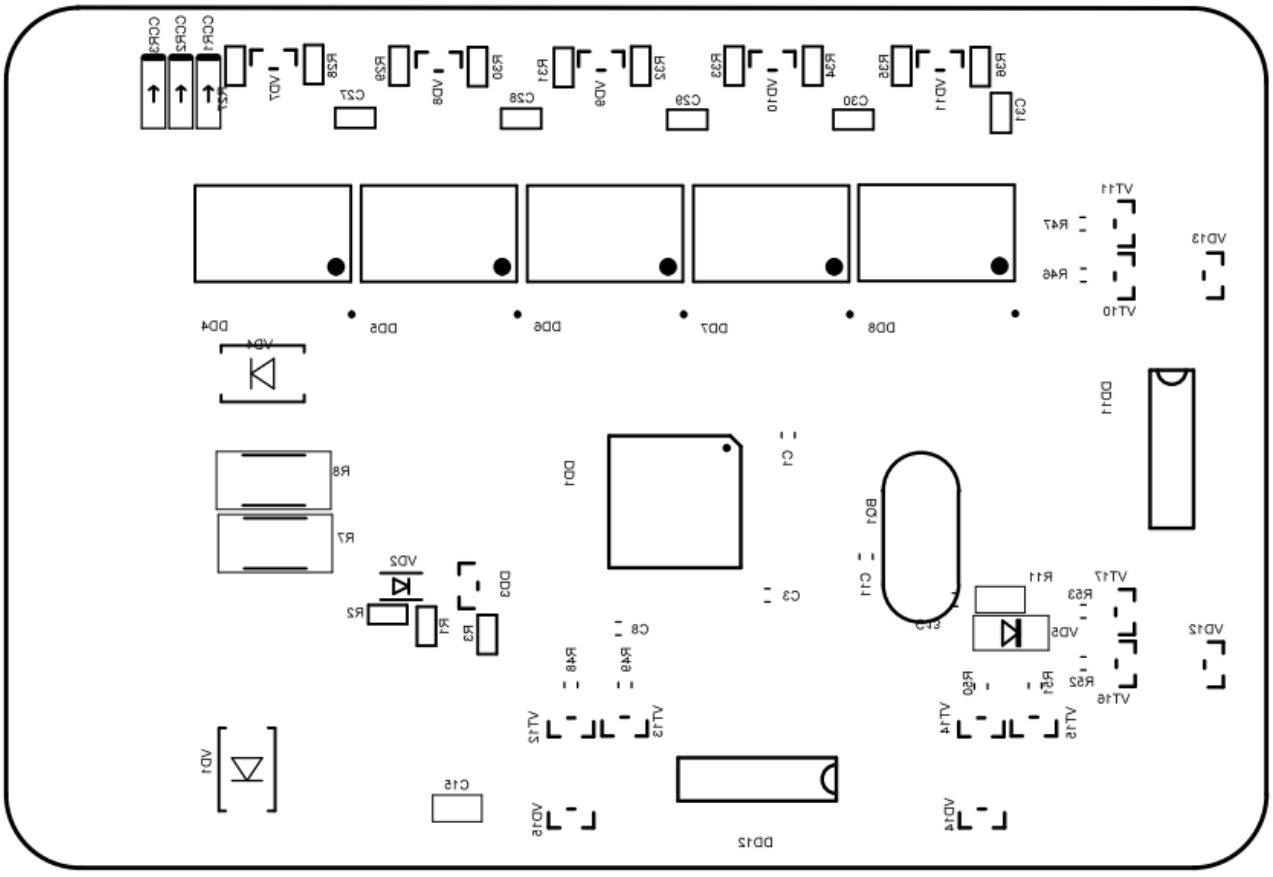
North Falcon wireless receiver

PTS CONTROLLER PCB BOARD

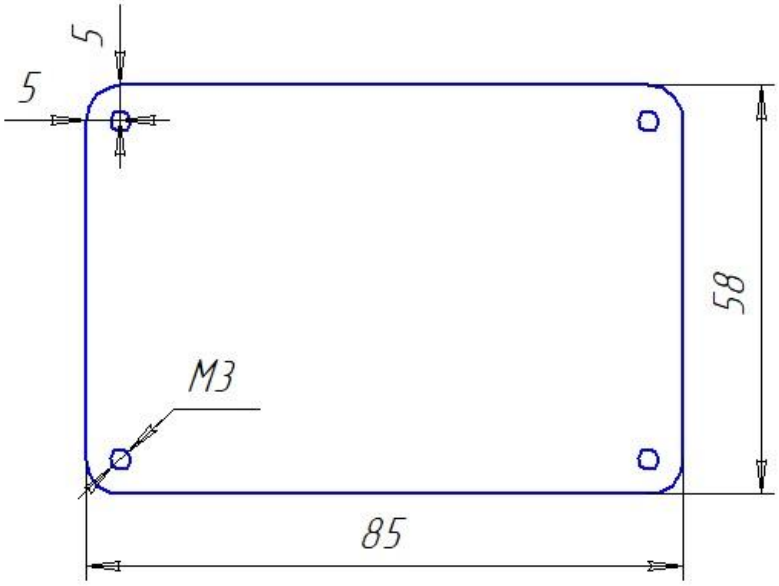
PCB board top view



PCB board bottom view



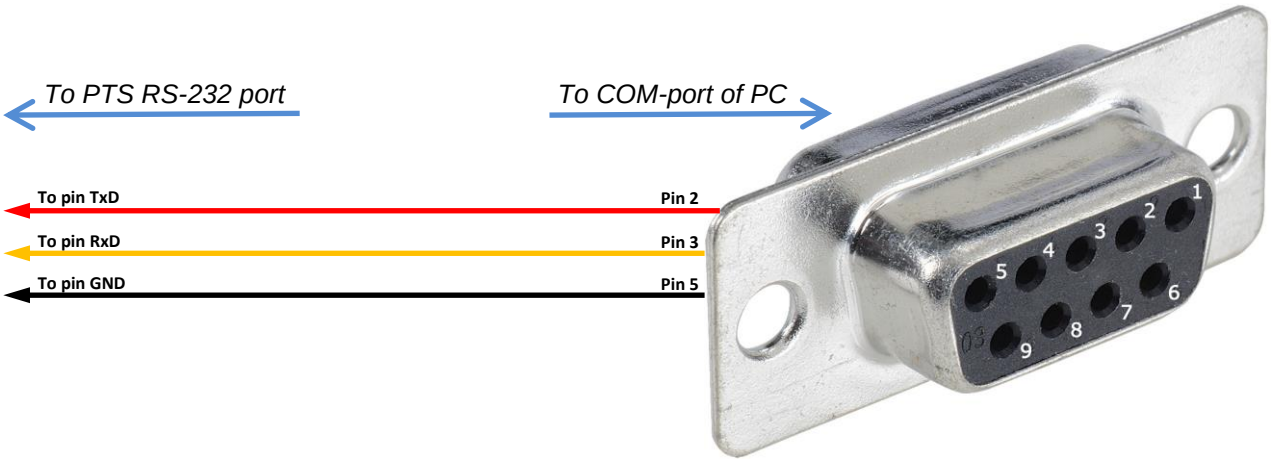
Board dimensions



RS-232 PORT CABLE CONNECTOR

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

DB-9F connector



CERTIFICATES

PTS controller over fuel dispensers and ATG systems for petrol stations complies with the essential requirements of the European Directive:

- Electromagnetic Compatibility (EMC) Directive 2004/108/EC

Conformity is assessed in accordance to the following standards:

1. Radio disturbance characteristics – EN 55022:2010 (IEC CISPR 22:2008), Class A
2. Immunity characteristics – EN 55024:2010 (IEC CISPR 24:2010)

We hereby declare that the apparatus named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directive.

The conducted tests are documented in the test reports No. 1047/1-5-2014 and 1047/2-5-2014 and are maintained at the corporate headquarters of Technotrade LLC as an evidence of conformity.

ORDER INFORMATION

Variant of PTS controller supply is marked with *PTS1-y-z*, where

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

Examples of order:

- order of PTS-1 controller in a view of electric board: PTS1-PCB-001;
- order of PTS-1 controller installed in a plastic box: PTS1-BOX-001;
- order of PTS-1 controller SDK: PTS1-SDK-001