



FUEL DISPENSERS

TATSUNO EUROPE

Installation and User Manual

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Created by:	Ing. Milan Berka
TATSUNO EUROPE a.s., Pražská 2325/68, 678 01 Blansko, Czech Republic, tel.+420 516 428411, http://www.tatsuno-europe.com	

© TATSUNO EUROPE a.s.
Pražská 2325/68 • 67801 Blansko
Czech Republic
Tel.: +420 516428411 • Fax: +420 516428410
e-mail: info@tatsuno-europe.com, <http://www.tatsuno-europe.com>



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INTRODUCTION

This manual is intended for the users of TATSUNO EUROPE electronic dispensers, service staff, project offices engaged in fuel station designing, and owners of fuel station where dispensers are installed and operated. TATSUNO EUROPE a.s. recommends thorough reading of this manual. The manual must be available to the dispenser attendant during installation, operation and regular maintenance of dispensers. The pictorial supplement of this manual is the document IN041 "TATSUNO EUROPE dispensers, Installation plans" where you can find plans of foundations, electrical connections and Ex zones for all types of dispensers described in this manual.

- Keep this manual together with all appendices for the entire operation period of the device.
- Make it available to other owners and users.
- Perform updates of regulations and manuals, see <http://www.tatsuno-europe.com/ke-stazeni/>

The contents of the manual at the time of its release corresponds to reality. The manufacturer reserves the right to alter the technical specifications of the device or its properties without a written notice, due to its development and continuous improvement.

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1. INTRODUCTORY INFORMATION

Symbols used in this manual:



Warning



Explosion hazard



Attention! Electrical device



Smoking forbidden



Open flame use forbidden



Use of mobile phones forbidden

Terms used in this manual requiring special attention:

CAUTION Failure to meet the requirements stated together with this term may create conditions leading to a personal injury or death or to extensive loss of property.

WARNING Failure to meet the requirements stated together with this term may lead to a personal injury and/or may cause dispenser damage.

NOTICE Items stated together with this term draw reader's attention to legal and/or statutory requirements that regulate the assembly and use of dispensers. Failure to meet these requirements may create a dangerous situation and/or result in dispenser damage.

NOTE Items stated together with this term are to draw reader's attention to assembly procedures, techniques and operating methods etc. that are important to ensure correct assembly and proper operation of dispensers and which, if not observed, may result in damage, failure or poor performance of dispensers.

CAUTION->B&D A caution only related to a dispenser/module for gasoline, (bio)diesel, ethanol(E85), etc.

WARNING->LPG A warning only related to an LPG dispenser/module.

NOTICE->LPG A notice only related to a dispenser/module for windshield washer fluid dispensing.

NOTE->ADB A warning only related to an AdBlue® dispenser/module.

NOTE->CNG A warning only related to a CNG (compressed natural gas) dispenser/module.

1.1. READ THE MANUAL AT FIRST

Read and understand appropriate sections of the Installation, Service and User Manual before the dispenser installation and operation. Take into account all hazards, notices and notes stated in the manual.

The manufacturer compiles this Installation, Service and User Manual in order to provide all necessary information and instructions for the full and efficient installation, use and maintenance of your TATSUNO EUROPE dispensers in OCEAN, SHARK and SUNNY-XE Euro type series.

This manual was prepared by the manufacturer and forms an integral part of dispenser accessories.

The user is fully responsible for using of this manual; all operations not described herein shall be considered forbidden. The attendant performing such operations shall be fully responsible for the results of his/her actions.

The manual is arranged in individual sections that are further divided into subsections so that each topic is independent and corresponds to the operating logic (learn – prepare – use – maintain).

The manual reliably reflects the technical condition at the time of dispenser sale and it is not possible to consider it non-corresponding due to subsequent changes and updates performed based on the latest facts.

NOTICE *Keep this manual and attached documents for the entire period of device operation for any potential future reference!*

1.2. PERMITTED USE

TATSUNO EUROPE dispensers, OCEAN, SHARK and SUNNY-XE Euro type series, are designed for stationary or mobile placement for the delivery of gasoline, diesel oil, biodiesel, light fuel oil, kerosine, aircraft fuel (AVGAS) and a mixture of ethanol and gasoline (max. E85), AdBlue® additive, liquefied propane-butane (LPG) and windshield washer fluid for motor vehicles (WSE) in a given amount from a fuel tank to a tank of a motor vehicles, or for refuelling motor vehicles with compressed natural gas (CNG).

CAUTION *Dispensers are complex devices that have to secure a whole range of difficult functions. Therefore, tanks and pipelines must be cleaned and fuel must be checked for cleanliness before commissioning (Filter clogging in a dispenser cannot be considered a reason for warranty repair!). An inspection of wiring and a check of connection correctness must be performed before commissioning in order to prevent any electric shock injuries and to ensure safety against explosion (fuels are combustibles of class I).*

NOTICE *Any modification of the dispenser may invalidate the device certification. Refer to certification documents and manufacturer instruction manuals if any modification of the wiring and/or device is considered.*

Each dispenser is properly tested in the factory in terms of its function, safety and metrology. The delivery of each dispenser contains also certification documents that must be submitted by the operator on demand.

1.3. BRIEF CHARACTERISTICS OF MEDIA USED

1.3.1. CHARACTERISTICS OF GASOLINE AND DIESEL OIL

Gasoline (also “petrol”) is a liquid of oil origin used mainly as a fuel in spark-ignition engines. It primarily consists of aliphatic hydrocarbons obtained by fractional distillation of oil, with and addition of isoctane or aromatic hydrocarbons of toluene and benzene in order to increase the octane number. Small amounts of different additives are also normally added, for example to improve engine performance and decrease harmful emissions. Some mixtures may contain a significant amount of ethanol as a partially alternative fuel (E85). An important feature of gasoline is its octane number which indicates how resistant gasoline is to premature detonation ignition (so called engine knocking). A higher-octane number allows to use a higher compression ratio and achieve higher performance. The EN 228 standard specifies a prescribed quality of unleaded automotive gasoline.

Diesel oil (rarely “diesel”) is a mixture of liquid hydrocarbons. It is obtained by distillation and refining of oil. The quality of diesel oil is indicated by a cetane number which specifies its compression-ignition characteristics. Diesel oil serves (besides other things) as a fuel for compression-ignition engines. Unlike gasoline, diesel may “freeze”. Gasoline contains hydrocarbons that have very good low-temperature properties thus there is no risk of gasoline freezing. It is the other way round for diesel. It contains paraffin hydrocarbons that create crystals under low temperatures and cause “freezing” – in most cases a reversible process of diesel paraffination. The ČSN EN 590 standard specifies a prescribed quality of diesel oil. It also specifies a distillation curve, burning point, sulphur content, obligatory content of FAME (Fatty Acid Methyl Ester) bio-component (currently up to 7%), water, impurities, and a cetane number.

Biodiesel (FAME – fatty acid methyl ester) is an eco-friendly fuel for compression ignition engines based on methyl esters of unsaturated fatty acids of vegetable origin. It is produced by a refining process called transesterification. It can be used as a fuel without any modification in a compression ignition engine (diesel engine). The importance and consumption of biodiesel in the European Union still increases. Nowadays, producers must obligatorily add 5% of biodiesel to diesel made of oil.

Mixed motor diesel (rarely SMN, SMN 30 or Eco-diesel) is a motor fuel that is produced from classic fossil motor diesel (69%) and FAME bio-component (31%) according to ČSN 656508. SMN is freely mixable with standard motor diesel. Thanks to tax advantages that is related to an Europe-wide subsidy for fuels from renewable resources SMN is by approx. 2.50 to 3.00 CZK/L cheaper than classic motor diesel.

1.3.2. LPG CHARACTERISTICS

LPG is a commercial name for a liquefied mixture of light hydrocarbons (Liquefied Petroleum Gas), mostly with three to four carbon atoms in a molecule. LPG is obtained during synthetic production of gasoline and recently also during natural gas processing. Liquefied LPG is a colourless, easily volatile liquid of a specific odour. By relieving overpressure liquefied LPG quickly evaporates and flammable gas is produced which is roughly twice as heavy as air. By evaporating 1 m³ of liquefied LPG (approx. 550 kg) into the air about 12.400 ÷ 83.330 m³ of an explosive mixture is created (while diluting gas to the lower explosive limit) which is heavier than air and is accumulated at the ground.

Table 1 - Physical properties of main components of an LPG mixture

Physical properties of a liquid state	propane	butane
formula	C ₃ H ₈	C ₄ H ₁₀
molecular weight	44.09	58.12
boiling temperature (°C)	-42.6	-0.6
density (kg/m ³ at 20°C)	502	579
Physical properties of a gaseous state		
density (kg/m ³ at atmospheric pressure)	1.865	2.76
density (air = 1)	1.562	2.091
calorific value (MJ/m ³ at 0 °C and atmosp. pressure)	93.57	123.76
Explosive limit in air mixture in a % volume		
lower	1.7	1.3
upper	10.9	9.3
Ignition temperature in °C	465	365

Physical properties of an LPG mixture are within the properties of individual components. Liquid LPG has similar properties as gasoline, it means that it dissolves and dries out sealing made of natural rubber, organic lubricants, varnish and other similar materials. On the contrary to this, synthetic rubber, graphite sealing, Teflon, etc. are resistant to LPG effects. A Teflon tape or LOCTITE are used to seal threaded connections for liquefied and also gaseous LPG. The use of alcohol sealants or sealants made of lampblack (HERMETIC, HERMOSAL) results in difficulties in disassembling such sealed connections. Teflon sealing rings or sealing rings made of klingerite suitable for LPG are used at flange connections.

Gaseous LPG influences human organism as a slight narcotic. Inhalation of gaseous LPG for a certain time causes headache, nausea, faintness, reduction of vigilance, and drowsiness. If no fire and burning of an affected person occurs, gaseous LPG may cause suffocation of workers even if it is not directly poisonous such as coal gas. Since it is heavier than air, it accumulates at the ground and in recesses and an unconscious lying person (injured, etc.) may be in an unbreathable atmosphere. Gaseous LPG also causes skin degreasing.

Liquefied LPG under a rapid decrease of overpressure to atmospheric pressure (e.g. emission of liquefied LPG from equipment) evaporates by boiling at -42 °C. Therefore, frostbites may occur after contact of liquefied LPG with skin.

1.3.3. ADBLUE® CHARACTERISTICS

AUS 32 reagent intended for reduction of NOx content in fumes, also known under a commercial name of AdBlue®, is a 32.5% solution of urea, water and other admixtures. This solution was selected because it has the lowest crystallization temperature. In order to ensure proper activity of the SCR system during its life, the quality of AdBlue® must be strictly checked. Therefore, it is specified in DIN 70070 and ISO 22241 standards. Some important physical properties of AdBlue®:

- AdBlue® freezes at -11 °C
- AdBlue® is highly corrosive because 67.5 % of it is formed by water
- AdBlue® shows strong crystallization and deformation effects

NOTE->ADB *Legislation and a technology of selective catalytic reduction.* All vehicles weighing over 3.5 tons belong to heavy vehicles and new European regulations for heavy vehicles relate to them. These regulations specify maximum values of PM and NOx emissions. In order for the vehicles to meet new European regulations of EUTO IV and EURO V, European automotive manufacturers have to implement new technologies. A technology of **selective catalytic reduction (SCR)** includes destruction of NOx by the reaction with ammonia when harmless water and nitrogen are produced. The solution of urea required by the SCR system is called **AdBlue®**. It is stored in a tank in a vehicle and injected to the exhaust system where the reaction occurs. In order to meet the Euro IV standards, the expected consumption of AdBlue® solution is about 5% of diesel consumption which requires a tank with a volume between 50 to 100 litres. A consumption of 6-7% is expected for Euro V.

1.3.4. WINDSHIELD WASHER FLUID CHARACTERISTICS

Windshield washer fluid for motor vehicles (hereinafter referred to as "WSE") is a solution of water, detergents, ethanol and other admixtures. A percentage content of individual components in the agent may differ. However, a maximum content of ethanol in the agent is limited to 85%.

CAUTION *It is prohibited to use a dispenser for dispensing an agent with a higher content of ethanol than 85% (max. E85)!*

1.3.5. CNG CHARACTERISTICS

CNG is a business name for Compressed Natural Gas. Natural gas is formed by 92–99 % of methane and the rest is formed by inert gases.

Table 2 - Physical properties of CNG and their comparison to other fuels

	CNG	Gasoline	Diesel	LPG
Octane number, range	128	91–98	-	100-110
Cetane number, range	-	-	51-55	-
Flash temperature [°C]	152	- 20	55	-69 to -60
Burning temperature [°C]	650	- 20	80	-40
Ignition temperature [°C]	537	340	250	400-450
Boiling temperature [°C]	- 161.6	30-210	180-370	-42 to -0.5
Density at 15 °C [kg/m³]	0.678	720-775	800-845	502-579
Min. heating value of gaseous phase [MJ/m³] or liquid phase [MJ/kg]	34	43.5	41.8	46.5 94
Explosive limit in air mixture [%]	4.4 to 15	0.6 to 8	0.6 to 6.5	1.5 to 9.5
Hazard class	IV	I	III	I

The table means the following:

- ▣ CNG is, compared to liquid fuels (petrol, diesel, LPG), lighter than air.
- ▣ The flash temperature of petrol and air mixtures is significantly lower than natural gas and air mixtures which increases the potential of the risk at petrol drives compared to natural gas drives.
- ▣ Natural gas has the most favourable explosive limit in the air mixture of all fuels.
- ▣ In terms of fire safety, CNG is less risky than petrol or diesel.

Natural gas is not dangerous for human health. It has no toxic or poisonous effects. In high concentrations it may cause suffocation because it reduces the amount of oxygen in inhaled air. When natural gas is

accumulated in a closed room or in an open space under windless conditions an explosive mixture may be formed (within the range of 4.4 ÷ 17 vol. %) and an explosion may occur after initiation (by open flame, spark, electric discharge). In rapid expansion from the higher pressure above approx. 15 bar cooling occurs and water vapour in the vicinity of the discharge opening may freeze – frostbite hazard. Condensate is flammable and saturated with methane at the moment of discharge. The recommended extinguishing agent is a dry-powder extinguisher.

1.4. HEALTH AND SAFETY

1.4.1. LIST OF SAFETY FACTORS

- Any odour of gasoline, LPG, CNG or ammonia (AdBlue®) must be immediately reported.
- It is necessary that all work at the fuel station, especially construction and repairs, is performed in compliance with this list.
- It is the obligation of the constructor that all his employees comply with all laws, directives and other regulations.
- All liquid fuels (gasoline, diesel, LPG, E85), technical liquids (WSE and AdBlue®) and gas (CNG) may only be stored in tanks and containers compatible with these liquids and gases.

Locations requiring higher carefulness

- The interior of a tank, pipes, shafts of storage tanks, filling shafts, relief shafts, containers and dispensers.
- All locations where accumulation of fuel, LPG and AdBlue® vapours may occur and when these vapours are heavier than air, such as in drainage shafts, low-lying rooms, cellars, trenches, etc.
- The surroundings of tank ventilation, especially during filling.
- Any locations nearby deliveries, truck tanks and other vehicles during deliveries, especially in windless conditions.
- A radius of 1 m around the pipes transporting gasoline or containing gasoline vapours.
- Filter.

1.4.2. OBLIGATIONS OF EMPLOYEES

- In order to ensure optimum prevention of injuries, in addition to general rules for employee protection it is necessary to take into account also national legislation about employee protection and actively support all measures improving safety standards.
- An employee is obliged to observe all company guidelines about accident prevention except for the cases when these guidelines are assessed as illegitimate.
- Employees must not act according to any instruction that violate safety rules.
- Employees may use designed tools only for their original purposes that are defined by the company itself.
- If an employee detects a tool unsuitable in terms of safety, he/she must immediately remove the defect. If the defect removal is not within the employee's job content or if an employee does not have enough knowledge for its removal, he/she must immediately inform his/her superordinate.

The same applies also to the following:

- 1) **Working materials** that are not properly packed or correctly described so that they correspond to safety requirements.
- 2) **Working methods and processes** that are not correctly coordinated or checked so that they correspond to safety requirements.
- 3) **If dangerous procedures are performed by several persons**, permanent flawless communication between them is necessary in order to prevent hazardous situations. In such a case a person must be appointed and authorized to perform overall supervision.

1.4.3. DANGER

Before starting work, the dispenser must be insulated (i.e. completely disconnected from the power supply) and the main switch must be switched off. The submersible pump (if used) and the control signals from the dispenser must also be insulated. This ensures technician safety. As a further precaution, turn off the main power supply in the fuel station booth and place there a clear warning to prevent it from being accidentally switched on. It is not allowed to turn on the dispenser before it is checked and approved by an authorized technician. This authorization is subject to the relevant national legislation. Removed packaging and facing material must be stored in such a way as to prevent damage to parts and personal injury. Covers that can be opened, such as the counter box, should be handled with care. Ensure that the fuse is in the correct position in order to prevent the lid from falling off on the head of the service technician or another person. For unmanned fuel stations, the Installation and User Manual must be available to all end-users. It should be placed visibly on the notice board and illuminated enough to be readable at night. For unmanned fuel stations, breakaway couplings must also be used in order to reduce the risk in the case of departure after the delivery nozzle has been forgotten in the vehicle tank.

WARNING *Only qualified personnel authorized to do so may perform connecting and disconnecting to/from the electrical system. Work in hazardous areas must be ensured by complying with all applicable legal standards.*

1.4.4. PERSONAL PROTECTIVE EQUIPMENT

Protective clothing

The following clothing must be worn **at all times** during dispenser installation and maintenance:

- Protective helmet.
- Protective footwear (conductive).
- Protective leather gloves.
- Anti-static clothing.
- Eye protection.

Protective equipment for work in a hazardous environment

The following safety equipment is required to work in a hazardous environment:

- Only spark-free tools are permitted when working on the dispenser.
- Work on bearings is only allowed using standard tools allowed for this type of work.
- It is strictly forbidden to use electric tools.
- Only explosion-protected working lights are permitted.
- It is strictly forbidden to use telecommunication tools in hazardous areas.

Safety instructions

The following safety instructions must be observed during installation and maintenance:

- Avoid inhalation of AdBlue® vapours. Take appropriate measures and use an inhaler if necessary.
- Avoid direct contact of the AdBlue® with the skin.
- Wear suitable protective clothing and gloves.
- Avoid spills of AdBlue®.
- Smoking and open fire are forbidden.
- Long hair and ties can be trapped in moving parts. Hair must be reasonably covered.

Safety instructions for CNG

While refilling motor vehicles with compressed natural gas (CNG) is it forbidden to smoke and use open flame within a radius of 10 m – applies also to passengers inside the vehicle. This ban must be located in a visible place. Safety labels and symbols are used according to ČSN 018013. A visible notice about switching off the engine of the refilled vehicle and its auxiliary heating with a combustion chamber must be located at the dispenser. The vehicle must be secured against spontaneous setting in motion. A carbon-dioxide extinguisher or dry-powder extinguisher with a filling of at least 6 kg must be located at each device. The device that is out of order must be secured against its misuse by an unauthorized person.

Device design safety

DEVICE DESIGN SAFETY IS GUARANTEED BY THE MANUFACTURER

The dispenser design meets the requirements of ČSN EN 13463-1 and ČSN EN 60079-0 standards and is designed for operation in environments designated by symbols Ex II 2G IIA T3 stated on the type label of the dispenser. With regard to the operation safety in the potentially explosive environment, dispenser compliance assessment was performed and documentation archiving was carried out according to article 10, par. 1b(2) of the Government Decree No. 116/2016 Coll. (article 13, par. 1b(ii) of the European Parliament and Council Directive No. 2014/34/EU) in a Physical-Technical Testing Institute in Ostrava – Radvanice, notified entity No. 1026 with the archive number A484 -16. In terms of pressure safety, EU verification of the unit (Procedure G) was performed at the CNG dispenser according to the Appendix No. 3, point 11 of the Government Decree No. 26/2003 Coll. as amended (Appendix No. III, point 10 of the European Parliament and Council Directive No. 2014/68/EU) by the notified entity No. 1017 TÜV SUD Czech s.r.o., Novodvorská 994, 142 21 Prague 4.

Operating safety

The operator is responsible for the fuel station operation and is obliged to entrust its operation only to trained employees having relevant authorization. The task of the attendant is, while observing all safety regulations, competently refill CNG pressure storage tanks of refilled motor vehicles and check the condition of

dispensers, reservoirs, machinery operation, gas pressure and keep prescribed operating records in regular intervals.

Attendant's responsibilities:

- Keep the operated devices in a safe and proper condition.
- Observe operating rules and regulations and operating instructions of gas devices.
- Immediately inform the operator about each failure, defect or abnormality during the gas device operation and immediately decommission the device in case of danger of delay.
- Permanently keep the gas device tidy and clean and ensure that no unauthorized persons are nearby the device.
- Immediately inform the operator about circumstances that impede the device operation for the attendant (in case of sudden indisposition).

Write down the records into the operation logbook about the shift start and finish, inspections performed by the attendant and maintenance work, repairs, inspections and audits.

- The fuel station and CNG dispenser attendant must not perform any repairs of the machinery and modify the settings of safety fittings on his/her own.

A special case is performing service interventions.

A service worker must not violate the operating safety during repairs and other activities. He/she must pay special attention to removing the covers of the dispenser not to cause any injury of him nor a casual customer. **While handling of electrical components, he/she must ensure safe disconnecting of electrical energy supply. Only approved components may be used for part replacements.** All parts subject to approval must be always put into condition which is prescribed by technical documentation (airtightness, grounding, electrostatically conductive delivery hoses, etc.).

Environmental safety

The CNG dispenser and the filling unit may be fitted with sensors of the gas leak detector (they are not a standard part of the dispenser delivery) which can be connected to the evaluation unit. In case of gas leak (low concentration) the unit shall automatically signal the leak and in case of danger (higher concentration) it shall immediately decommission the whole system. In case of a small gas leak the attendant of the fuel station shall check the system and if he/she does not find any defect, leaked gas shall be ventilated and the system shall be put again into operation (small leak while connecting and disconnecting the delivery hose, influence of exhaust fumes). In case of higher concentrations of leaked gas, the evaluation unit shall disconnect the electrical system from operation. The fuel station attendant shall decommission the fuel station and announce the defect to a specialized company that shall perform the repair.

Hygiene

CNG dispensers are hygienically harmless for the attendant and operator. It is advisable to protect hands, e.g. by wearing gloves, while performing regular maintenance and refilling motor vehicles with compressed natural gas (CNG).

1.4.5. FIRST AID PROCEDURES

Safety instructions for all products should be available at the fuel station. These instructions contain important health and safety information pertaining to individual products and specific precautions to be taken in case of prolonged contact, especially with AdBlue®, by its inhalation or ingestion.

Providing first aid after contacting AdBlue

AdBlue® is a transparent liquid with very little or no odour, making it more difficult to detect its leakage. After a certain time, the odour may turn into a strong ammonia odour. Decomposition due to heat can produce toxic fumes containing carbon monoxide, carbon dioxide, nitrous oxide and ammonia, which can lead to a reduction in the proportional amount of oxygen in the air.

In case of direct contact with AdBlue®, immediately perform the following procedures:

Eye injury

If your eyes get into contact with AdBlue® medium:

- Rinse your eyes with plenty of running clean water.
- Wash your eyes thoroughly and keep them open.
- Continue washing your eyes with running water for at least fifteen minutes.
- Removal of contact lenses after eye injury may only be carried out by a trained specialist.
- If irritation persists, seek medical advice.

Skin contact (burns)

If your skin gets into contact with AdBlue® medium:

- Immediately cool the affected area with cold water.
- Carefully remove any clothing that has been in contact with AdBlue® medium.
- Continue washing with running water for at least fifteen minutes.
- Apply an antiseptic adhesive bandage to the affected area.
- If the problem persists, seek medical advice.

Inhalation (AdBlue®/ammonia/biuret)

Do not enter the hazardous area without proper protection, including a respiratory mask and/or the above-mentioned protective clothing. In case of inhalation of toxic fumes:

- If possible, move the affected person out of the contaminated area to fresh air.
- Place the affected person and loosen his/her clothing, leave him/her in a warm and calm place.
- If the affected person is unconscious, place him/her in a rest position.
- If necessary, a trained professional will provide the affected person with artificial respiration or oxygen supply.
- If breathing difficulties persist, seek medical advice.

Ingestion

If AdBlue® fluid is ingested:

- Do not induce vomiting.

- If vomiting occurs, tilt the affected person forward to have a passable breathing tube and prevent aspiration.
- Wash the mouth of the affected person with water and try to let the affected person drink a lot of water.
- If symptoms persist or a great amount has been ingested, seek medical advice.

Providing first aid after contacting LPG

- **Poisoning – gaseous LPG**

Avoid inhalation of LPG vapours when pumping; risk of suffocation. The injured person must be brought out of the contaminated area. Caution! Danger of fire and explosion! LPG is not poisonous but it is suffocating. When a respiratory arrest occurs, artificial respiration from lungs to lungs must be performed immediately. When a blood circulation arrest occurs, an indirect cardiac massage in combination with artificial respiration must be performed. Immediately we will arrange the transport of the affected person to a medical facility.

- **Frostbite – liquid LPG**

Liquid LPG under a rapid decrease of overpressure to atmospheric pressure evaporates at -42 °C. After the contact with skin, e.g. when liquid LPG leaks from the device, frostbite occurs. Do not rub the frostbitten parts of the body but cover them with a sterile bandage and provide medical attention.

In case of LPG contact with eyes, rinse them with plenty of water and seek medical attention.

- **Burns – fire**

After burning, cool the wound with cold water, do not lubricate it, cover it with a sterile bandage and provide medical attention. Do not remove the clothing. In the case of the ignition of clothes – do not run, extinguish with water, blanket, rolling etc.

Providing first aid after contacting CNG

- **Avoid inhaling natural gas vapours while refilling motor vehicles with CNG. There is a risk of suffocation.** The affected person must be carried out from the dangerous area to fresh air. Pay attention to your own safety and be aware of the risk of fire and explosion. Comfortably lay the affected person down, loosen his/her clothing and keep him/her absolutely calm (he/she must not talk nor walk). Call medical help or transport the affected person to the hospital. In case of breathlessness or pulmonary arrest provide the affected person with oxygen or start mouth-to-mouth resuscitation.

- **In case of natural gas affecting eyes** a small amount of water must be immediately poured onto eyes, carefully open eyelids and rinse eyes with a huge amount of running water (for approx. 15 minutes) and then seek for medical advice.

- **In case of skin contact with natural gas** it is necessary to rinse the affected place with a huge amount of water, take off clothes and shoes affected by natural gas (be careful about the risk of fire or explosion) and rinse the affected skin parts with running water (for approx. 15 minutes).

- **In case of burning** it is advisable to immediately cool the affected place with cold water (for approx. 15 minutes). Do not lubricate the affected place and seek for medical help. Apply only sterile dressing as an emergency bandage. In case of extensive burns wrap the affected person

into a clean bed sheet – **do not take off clothes!** If the clothes start burning, **do not run** (fire becomes more intense), extinguish with water, put out flames with a blanket – coat, rolling on the ground. If someone appears to be in the middle of fire, **lie down immediately**. Flames that reach a face may cause life-threatening burns of the respiratory system.

1.4.6. ADBLUE® STORAGE

- AdBlue® fluid crystallizes at low temperatures and at higher temperatures (above +50 °C) it can produce biuret and ammonia. AdBlue® should always be stored away from sources of heat and fire in tanks suitable for this liquid and in locations that are sufficiently separated from such sources, approved and labelled.
- Store separately from incompatible materials and avoid contact with strong oxidizing agents, acids, alkalis, nitrates, sodium hypochlorites and calcium hypochlorites that may react with AdBlue® to form potentially explosive mixtures. Do not store the medium for a long time – for more than six months.
- Ensure that the storage tank is securely closed, protected against physical damage and regularly checked for leakage. If any other manufacturer's tank for AdBlue® liquid is located at the fuel station, resolve any questions with this manufacturer in terms of filling, emptying, cleaning, handling and storage of the tank.

1.4.7. ADBLUE® SPILL

Although AdBlue® is not classified as hazardous, after spilling it forms crystals and causes deformation. After a long time it causes a slippery surface. Each AdBlue® spill must be immediately reported to a fuel station manager.

Avoid inhalation of vapours and contact with the skin and eyes by using protective equipment.

AdBlue® spill at a fuel station:

- Cover the spilled media with plenty of sand, soil or other inert absorbent material.
- In case of spillage of large quantities, avoid spreading with sand or soil and avoid leakage into sewerage and water bodies.

NOTE *Do not discharge AdBlue® into surface water or water pipes!*

- Once the surface has dried, move the material to a suitable container for controlled disposal.
- If AdBlue® runs into the sewerage piping, pour a plenty of water into it.
- Observe local legal regulations for waste handling.

AdBlue® in a dispenser/vehicle:

- AdBlue® spilled on a dispenser or vehicle must be removed using a soft cloth.

WARNING *Risk of electric shock! Never use a hose or high-pressure spray near the AdBlue® dispenser.*

2. TATSUNO EUROPE DISPENSERS

2.1. DESCRIPTION OF DISPENSERS

All TATSUNO EUROPE dispensers are equipped with high quality Japanese hydraulics from TATSUNO Corporation (hereinafter referred to as TATSUNO) and a powerful reliable electronic counter of the Czech company TATSUNO EUROPE (hereinafter referred to as TE). All dispensers work in the manual mode – independently, offline – as well as the automated mode, when they are controlled remotely from the kiosk of a fuel station and connected to the cash register (POS) via a data line. All dispensers have body parts (covers, doors, lids, etc.) made of steel painted sheet metal or stainless-steel sheet metal. Supporting parts of dispenser frames are made of steel painted sheet metal of a thickness 0.8 to 2.5 mm, or stainless-steel sheet metal. Each dispenser is equipped with an electronic counter with its own diagnostics and displays showing the delivered amount of money in the currency of the country of installation, the amount of fuel in litres or kilograms and the fuel unit price. Displays of the fuel dispensers specified for private use display only the dispensed fuel volume in litres. The standard colour of TATSUNO EUROPE dispensers is white (RAL9016), silver (RAL 9006) and black (RAL9005).

Dispensers and modules for dispensing gasoline, diesel, biodiesel, E85, kerosene, light fuel oils and aircraft fuel are equipped with hydraulic (pumping monoblock, piston meter, pulse generator ... etc.) from a Japanese company TATSUNO Corporation, see Table 3. This is a time-tested and worldwide accredited type of hydraulics with a high reliability and a long service life. The pumping monoblock is equipped with an input and output washable stainless steel filter (100µm/70µm), vapour and gas separator, check valve and rotary pump with operating pressure control. The four-piston high precision meter can be controlled by a single piston. Each flow meter contains a non-explosive pulse generator (pulser) that senses the meter shaft speed and sends impulses to the electronic counter. The delivery hoses are made of high-quality gas-resistant rubber in an antistatic design and are finished with automatic delivery stop-nozzles. The delivered medium (gasoline, diesel ...) is sucked out of the fuel storage tank by the dispenser and passes through the flexible connection bellows and the check valve into the pumping monoblock where it is filtered and the air is separated. The separated air is freely discharged from the pump into the hydraulic part of the dispenser. Clean fuel flows from the monoblock by a check valve to the piston meter and from there through a solenoid valve controlling the fuel flow into the delivery hose and through the delivery nozzle it is transported to the vehicle storage tank.

In the case of pumping diesel, biodiesel and mixed diesel, a sensor measuring the flow of the separated air is at the output of the monobloc separator. In case of a high amount of air in the fuel (cracked piping, lack of fuel in the tank ... etc.) the sensor activates and causes the delivery to stop.

In the case of gasoline and ethanol (E85) delivery, the hydraulic module of the dispenser is supplemented with a gasoline vapour recovery system consisting of a pump, pipe and control valve. Gasoline vapour is sucked out of the vehicle tank by a vacuum pump and transported through the DN8 pipeline out of the dispenser into the return pipe into the fuel storage tank. The exhausted vapour flow is regulated in the dispenser to match the fuel flow rate (95% to 105%).

Table 3 – Gasoline, (bio)diesel, E85, kerosene and aircraft fuel dispensing and measuring equipment (AVGAS)

#	Device type	Marking	Manufacturer	ATEX certificate	MID certificate	Note
1	Pumping monoblock, Q _{max} 50 L/min.	FP-1001-B01	TATSUNO	FTZÚ13ATEX0168X	TCM141/07-4491	pump + separator
2	Pumping monoblock, Q _{max} 90 L/min.	FP-1001-B02	TATSUNO	FTZÚ13ATEX0168X	TCM141/07-4491	pump + separator
3	Pumping monoblock, Q _{max} 90 L/min.	FP-1022	TATSUNO	FTZÚ10ATEX0257X	ZR141/11-0080	pump + separator
4	Piston meter, Q _{max} 90 L/min.	FM-1007	TATSUNO	FTZÚ03ATEX0022*	TCM141/07-4491	
5	Piston meter, Q _{max} 90 L/min.	FM-1025	TATSUNO	FTZÚ10ATEX0258X	ZR141/11-0080	
6	Meter LOBE Ø32, Q _{max} 200 L/min.	FF-1006	TATSUNO	FTZÚ11ATEX0108X	ZR141/11-0082	
7	Meter LOBE Ø52, Q _{max} 400 L/min.	FF-1002	TATSUNO	FTZÚ14ATEX0054	-	
8	Meter LOBE Ø82, Q _{max} 1000 L/min.	FF-1004	TATSUNO	FTZÚ14ATEX0054	ZR141/14-0112	
9	Pulse generator, optoelectronic	EK-1025	TATSUNO	FTZÚ04ATEX0094X	TCM141/07-4491	part of the meter 4, Ex d design
10	Pulse generator, magnetic	ZE-1945	TATSUNO	FTZÚ06ATEX0292X	ZR141/11-0080	part of meters 5,6,7,8; Ex m design
11	Pulse generator, magnetic	EK-1129	TATSUNO	FTZÚ16ATEX0132X	TCM141/07-4491	part of the meter 5; Ex d design
11	Electronic counter	PDEX	TE	-	TCM141/07-4491	all types of dispensers
12	Electronic counter	PDEX5	TE	-	ZR141/XX-XXXX	all types of dispensers
13	Electronic counter	TBELTx	TE	-	TCM141/07-4491	all types of dispensers

LPG dispensers and modules are equipped with TATSUNO hydraulics with high reliability and long service life. The two-channel TATSUNO pulse generator is mounted on a piston meter or it is its integral part. The measuring unit consists of a piston meter, a filter, a separator, a liquid phase check valve, and a gaseous phase safety valve. The safety valve is adjusted to a pressure of 1.8 MPa and prevents the maximum operating pressure from being exceeded by discharging the liquid phase back into the storage tank. An electronic differential pressure sensor (formerly TATSUNO differential valve) is mounted at the output of the meter to check the pressure difference between the liquid medium and its gaseous phase. In case of insufficient pressure difference (<1 bar), the pumping of the medium is terminated to avoid inaccurate measurement due to the presence of the gaseous phase in the meter. The pumped medium (LPG) is supplied by a pump located outside the dispenser space, flows through the inlet safety solenoid valve (if installed) then through the G¾" shut-off ball valve through the particulate filter 25µm into the separator. If the liquid contains the gaseous components, these are separated and returned to the storage tank from the top of the separator by a return pipeline which must be opened (ball valve at the inlet G ½") if the dispensing module is in operation. Reverse piping inside diameter must be at least DN 16. From the separator, the liquid flows through the check valve to the piston meter and flows through the solenoid valve controlling the flow of the medium (if installed), the sight hole and the breakaway coupling into the delivery hose and through the delivery nozzle it is transported to the vehicle storage tank. The filling pressure can be monitored on a manometer located under the delivery nozzle hanger.

Table 4 - Measuring equipment for LPG (liquefied propane butane) dispensers

#	Device type	Marking	Manufacturer	ATEX certificate	MID certificate	Note
1	Piston meter, Q _{max} 50 L/min.	MP02524	TATSUNO	FTZÚ03ATEX0023*	TCM141/07-4493	
2	Piston meter, Q _{max} 50 L/min.	FM-1029	TATSUNO	FTZÚ11ATEX0216X	ZR141/12-0083	
3	Mass meter, DN15	LPGmass	E+H	PTB07ATEX2001	TC7286	
4	Pulse generator, optoelectronic	EK-1025	TATSUNO	FTZÚ04ATEX0094X	TCM141/07-4493	part of the meter 1; Ex d design
5	Pulse generator, magnetic	ZE-1945	TATSUNO	FTZÚ06ATEX0292X	ZR141/11-0083	part of the meter 2; Ex m design
6	Electronic counter	PDEX	TE	-	TCM141/07-4493	all types of dispensers
6	Electronic counter	PDEX5	TE	-	ZR141/XX-XXXX	all types of dispensers

7	Electronic counter	TBELTx	TE	-	TCM141/07-4493	all types of dispensers
8	Electronic counter	TBELTM	TE	-	ZR141/15-0119	dispenser with a meter 3

AdBlue® dispensers and modules have a hydraulic module fitted with a piston flow meter of the Japanese company TATSUNO, type FM1022 or LOBE meter FF-1141. It is an analogy of standard fuel meters in a chemically resistant stainless-steel design (internal stainless-steel parts + outer surface finish). The measuring unit consists of a pulse meter, a 70µm stainless steel particle filter with surface treatment and a solenoid control valve in a stainless-steel design. The pumped medium passes through the filter, the meter and the control valve, continues into the hose, through the sight hole (if required) into the delivery nozzle from where it is delivered into the AdBlue® tank in the vehicle. The delivery hoses are made of high quality, chemically resistant rubber in an antistatic design (the same type of a delivery hose as for LPG delivery). AdBlue dispensing modules are supplied as standard with delivery hose reels and automatic AdBlue® stop-nozzles. Depending on the installation site and customer requirements, the interior of the dispenser can be heated so that the temperature inside the module does not drop below 0 °C.

Windshield washer fluid (WSE) dispensers and modules are fitted with the same piston flow meter as the AdBlue® module. The measuring unit consists of a pulse meter, a 70µm particle filter and a solenoid control valve. The delivered medium passes through the filter, the meter and the control valve, continues into the hose, through the sight hole (if required) into the delivery nozzle from where it is delivered into the windshield washer fluid tank of the washer system in the vehicle. Freely suspended spiral delivery hoses are made of high-quality, chemically resistant rubber in an antistatic design and are finished with delivery nozzles in a stainless-steel design.

Table 5 - Measuring technology for AdBlue® (AUS 32) and windshield washer fluid (WSE) dispensers

#	Device type	Marking	Manufacturer	ATEX certificate	MID certificate	Note
1	Piston meter, Q _{max} 40 L/min.	FM-1022	TATSUNO	FTZÚ14ATEX0061	TCM141/07-4492*	
2	Meter LOBE Ø25, Q _{max} 40 L/min.	FF-1141	TATSUNO	FTZÚ17ATEX0011X	ZR141/17-0145	
3	Pulse generator, optoelectronic	EK-1025	TATSUNO	FTZÚ04ATEX0094X	TCM141/07-4492*	part of the meter 1; Ex d design
4	Pulse generator, magnetic	ZE-1945	TATSUNO	FTZÚ06ATEX0292X	ZR141/11-0083*	part of the meter 2; Ex m design
5	Electronic counter	PDEX	TE	-	TCM141/07-4492*	all types of dispensers
6	Electronic counter	PDEX5	TE	-	ZR141/XX-XXXX	all types of dispensers
7	Electronic counter	TBELTx	TE	-	TCM141/07-4492*	all types of dispensers

The compressed natural gas (CNG) dispensing module has a pressure part fitted with certified components made of stainless steel or galvanized steel. The access to the CNG pressure system is fitted with a lever-closable ball valve, then 25µm input particle filters to protect pressure component and equipment. Gas filling is regulated by valves and secured with check valves. The amount of gas flown through is measured with a mass meter the input of which is fitted with an electronic pressure sensor and mechanical pressure gauge (manometer). All such pressure connections are performed by using stainless or galvanized steel pipes with a high-quality connection system (two rings). All fixtures and brackets in the pressure section are made of galvanized sheet metal. The output of the pressure module and fixture of delivery hoses is secured with a fixed connection to which a delivery hose is connected which is fitted with a safety breakaway coupling that shuts the gas flow through the delivery hose on both sides in forcible tension stress with following disconnection. The delivery hose ends with a delivery nozzle. The pressure section of the CNG dispenser may be further equipped with a heat sensor for measuring the ambient temperature. Installation of the heat sensor allows activation of the filling temperature compensation

function Filling with temperature compensation ensures that the vehicle storage tank is always filled with a maximum amount of gas while observing the condition of maximum pressure in the tank of 20 MPa at 15 °C – see TPG 304 02 art. 4.5.4.

Table 6 - Measuring equipment for CNG (compressed natural gas) dispensers

#	Device type	Marking	Manufacturer	ATEX certificate	MID certificate	Note
1	Mass meter, ID=12mm	CNG050	Emerson	DMT01ATEXE159X	T0020	
2	Mass meter, DN15	CNGmass	E+H	PTB07ATEX2001	CPC-607296-1	
8	Electronic counter	TBELTM	TE	-	ZR141/15-0119	dispenser with a meter 3

The main advantages of TATSUNO EUROPE dispensers are:

- ▶ high performance, long service life and guaranteed quality
- ▶ high variability – a low-cost basic dispenser version can be converted into a high-end dispenser with a distinctive design using a wide scale of accessories and additional modules (LPG, CNG, AdBlue, WSE ...)
- ▶ easy maintenance and service, simple structure
- ▶ wide range of operating temperatures

2.2. CERTIFICATES & APPROVALS

TATSUNO EUROPE dispensers comply with all European standards of metrology and safety. Table 7 contains a list of valid European certificates in terms of metrology and safety.

Table 7 - MID & ATEX certificate of dispensers

#	Type designation	Delivered medium	ATEX certificate	MID certificate
1	SHARK BMP5xx.Sx	Gasoline, (bio)diesel, E85, AVGAS	FTZÚ 03 ATEX 0022	TCM 141/07-4491
2	OCEAN BMP4xxx.Oxx	Gasoline, (bio)diesel, E85, AVGAS	FTZÚ 10 ATEX 0259	TCM 141/07-4491
3	SUNNY XE Euro Sxx xxxx.Ex	Gasoline, (bio)diesel, E85, AVGAS	FTZÚ 11 ATEX 0243	TCM 141/07-4491
4	SHARK BMP5xx.Sx /LPG	Liquefied propane-butane (LPG)	FTZÚ 03 ATEX 0025	TCM 141/07-4493
5	OCEAN BMP4xxx.OEx /LPG	Liquefied propane-butane (LPG)	FTZÚ 10 ATEX 0064X	TCM 141/07-4493
6	SHARK BMP5xx.Sx /AdB	AdBlue®	-	TCM 141/07-4492
7	OCEAN BMP4xxx.OEx /AdB	AdBlue®	-	TCM 141/07-4492
8	SHARK BMP5xx.Sx /WSE	Windshield washer fluid (WSE)	-	TCM 141/13-5085
9	OCEAN BMP4xxx.OEx /WSE	Windshield washer fluid (WSE)	-	TCM 141/13-5085
10	OCEAN BMP4xxx.Oxx /CNG	Compressed natural gas (CNG)	A484-16 (FTZÚ)	R139/2014-CZ-16.01.*
11	OCEAN BMP4xxx.OEx+MOD4xxx.Oxx/xxx	Combined dispenser	FTZÚ 10 ATEX 0065X	Acc. to configuration

**Note: For CNG dispensers there is no European directive as for liquid dispensers (MID 2014/32/EU), therefore the dispensers have been tested and certified according to OIML R139 international recommendation. Typical metrological certification is conducted in each state according to their internal rules.*

2.2.1. METROLOGY

All series of dispensers have been tested and certified by the Czech Metrology Institute in Brno, notified European body No. 1383.

The conformity assessment for liquid dispensers – see Table 7, devices 1 to 9 – was carried out by procedures "B" (type examination) + "D" (quality assurance of the production process), according to the Government Decree No. 120/2016 Coll., which stipulates technical requirements for measuring instruments, and which implements the European Parliament and Council Directive 2014/32/EU in the Czech Republic. For all devices, OIML R117 and OIML D11 tests were performed and an EU type certificate (so-called MID certificate) was issued.

The conformity assessment for compressed natural gas dispensers – see Table 7, device 10 – was carried out by a type examination pursuant to the Act on Metrology No. 505/1990 Coll. and a Czech type certificate No. TCM 143/15-5321 was issued. Type tests have been carried out in accordance with the international recommendation OIML R139. Based on the aforementioned type tests the OIML BASIC CERTIFICATE OF CONFORMITY No. R139/2014-CZ-16.01 has been issued for CNG dispensers.

The company TATSUNO EUROPE a.s. has obtained a Certificate of System Quality Management No. 0119-SJC006-07 from The Czech Metrology Institute, thus fulfilling the eligibility prerequisite for declaration of type conformity based on quality assurance of the production of measuring instruments according to Appendix No. 2, procedure „D“ (Chapter 6) of the Government Decree No. 120/2016 Coll. The validity of the certificate is checked by audits annually.

2.2.2. SAFETY

The dispensers have been tested and certified by the authorized body No. 210 - Physical-Technical Testing Institute in Ostrava - Radvanice, notified body No. 1026 for use in potentially explosive atmospheres according to Directive 2014/34/EU. Dispensers were certified to comply with European standards for the construction of dispensers and machinery located in potentially explosive areas – ČSN EN 13617-1, ČSN EN 14678-1, ČSN EN 60079-0, ČSN EN 13463-1, ČSN EN 1127-1. All dispensers and their parts located in potentially explosive areas are in compliance with the European directive ATEX No. 2014/34/EU.

For the liquid dispensers located in a potentially explosive area the European type certificate called the ATEX certificate was issued – see Table 7.

The compliance assessment for compressed natural gas (CNG) dispensers and archiving of the documentation pursuant to Section 10(1)(b), point 2 of the Government Order No. 116/2016 Coll. article 13(1)(b)(ii) of the Directive 2014/34/EU of the European Parliament and Council was performed in the Physical-Technical Testing Institute, s.p., Ostrava – Radvanice under archival number A484 -16. In terms of pressure safety, EU verification of the unit (Procedure G) is performed at each CNG dispenser according to the Appendix No. 3, point 11 of the Government Decree No. 26/2003 Coll. as amended (Appendix No. III, point 10 of the European Parliament and Council Directive No. 2014/68/EU) by the notified entity No. 1017 TÜV SUD Czech s.r.o., Novodvorská 994, 142 21 Prague 4.

Each dispenser is subjected to electrical tests (connection integrity, insulation resistance, high voltage test, end cap resistance to the earthing point of the dispenser) during the manufacturing process, pressure tests and an operating pressure test. The results of all tests are recorded in the production documentation or a protocol (LPG, CNG) is issued.

TATSUNO EUROPE a.s. received from the Notification of quality assurance No. FTZÚ 02 ATEX Q030 for fuel dispensers and accessories from the Physical-Technical Testing Institute in Ostrava - Radvanice. The validity of this notification is checked by audits annually.

2.2.3. ELECTROMAGNETIC COMPATIBILITY (EMC)

All TATSUNO EUROPE dispensers have been certified by the Czech Metrology Institute in Brno, notified body No. 1383. The conformity assessment of the equipment was carried out in accordance with the Directive 2014/30/EU of the European Parliament and Council and in accordance with the Government Order No. 117-2016 on conformity assessment of products in terms of electromagnetic compatibility and in accordance with OIML R117 and OIML R139.

2.3. BASIC TECHNICAL PARAMETERS

Table 8 – Dispensers and modules (gasoline, diesel, biodiesel, mixed diesel, E85, aircraft fuel)

Pumping performance	Standard	Increased (/H)	Very high (/UH)
Maximum flow rate Q_{\max} [L/min]	30 to 50	70 to 80	120 to 170
Minimum flow rate Q_{\min} [L/min]	3 to 5*	5	10
Lowest metering MMQ [L]	2	5	10
Maximum pressure [MPa] - suction version	0.18	0.25	0.25
- pressure version	0.35		
Minimum pressure [MPa]	0.16		
Maximum unit price (number of digits)	9999(4)		
Maximum amount to pay (number of digits)	999999(6)		
Scale interval [L]	0.01		
Display type	Electronic		
Type of delivered fluid	Gasoline, diesel, biodiesel, mixed diesel, ethanol (E85), aircraft fuel (AVGAS)		
Liquid dynamic viscosity range [mPa.s]	0,5 to 10		
Filtration of mechanical particles	Pump inlet filter > 100µm; pump outlet filter > 70µm		
Fluid temperature range [°C]	-20° to +50**		
Ambient temperature range [°C]	-25 to +55 (standard dispenser version); -40 to +55 (special dispenser version with heating)		
Accuracy class	0.5		
Mechanical class	M1, M2 for counters PDEX5 and TBELTx		
Electromagnetic class	E1, E2 for the counter PDEX5		
Humidity	Condensing		
Location	Open		
Measured unit	Volume [L] or volume at 15 °C [L]		
Electronic counter	TBELTx	PDEX	PDEX5
Program version (W&M check sum)	1.01 (8CA4)	1.03 (20260)	1.01 (4573)
Calculator powering	230V ± 10%; 50Hz; max. 300VA		
Pump electric motor	3x400V/230V; 50Hz; 0.75kW; 1410 rpm		
Electro-magnetic valves	Proportional; +24V DC/max. 1A		

*Flow rate range Q_{\max} : Q_{\min} must be 10:1

**The temperature range of the liquid is defined by the range of the measuring temperature sensor

Table 9 - LPG (liquefied propane butane) dispensers and modules

Maximum flow rate Q_{\max} [L/min]	30 to 50		
Minimum flow rate Q_{\min} [L/min]	5		
Lowest metering MMQ [L]	5		
Maximum pressure [MPa]	1.8		
Minimum pressure [MPa]	0.7		
Maximum unit price (number of digits)	9999(4)		
Maximum amount to pay (number of digits)	999999(6)		
Scale interval [L]	0.01		
Display type	Electronic		
Type of delivered fluid	LPG (liquefied propane-butane)		
Filtration of mechanical particles	Input filter >25µm		
Fluid temperature range [°C]	-20 to +50		
Ambient temperature range [°C]	-20 to +50 (standard dispenser version); -40 to +55 (special dispenser version with heating)		
Accuracy class	1.0		
Mechanical class	M1, M2 for counters PDEX5 and TBELTx		
Electromagnetic class	E1, E2 for the counter PDEX5		
Humidity	Condensing		
Location	Open		
Measured unit	Volume [L] or volume at 15 °C [L]		
Electronic counter	TBELTx	PDEX	TBELTM
Program version (W&M check sum)	1.01 (8CA4)	1.03 (20260)	1.01 (4092)
Calculator powering	230V ± 10%; 50Hz; max. 300VA		
Electro-magnetic valves	Proportional or two-state; + 24VDC / max.1A		

Table 10 - AdBlue® dispensers and modules (AUS32)

Pumping performance	Standard	LV (passenger cars)*
Maximum flow rate Q _{max} [L/min]	40	10
Minimum flow rate Q _{min} [L/min]	4	4
Lowest metering MMQ [L]	2 / 5**	2 / 5**
Maximum working pressure [MPa]	0.3	
Minimum working pressure [MPa]	0.1	
Maximum unit price (number of digits)	9999(4)	
Maximum amount to pay (number of digits)	999999(6)	
Scale interval [L]	0.01	
Display type	Electronic	
Type of delivered fluid	AdBlue® (32.5% aqueous urea solution according to DIN 70070 and ISO 22241)	
Filtration of mechanical particles	Input filter >70µm	
Fluid temperature range [°C]	-10 to +30	
Ambient temperature range [°C]	-25 to +55 (standard dispenser version); -40 to +55 (special dispenser version with heating)	
Accuracy class	0.5	
Mechanical class	M1, M2 for counters PDEX5 and TBELTx	
Electromagnetic class	E1, E2 for the counter PDEX5	
Humidity	Condensing	
Location	Open	
Measured unit	Volume [L] or volume at 15 °C [L]	
Electronic counter	TBELTx	PDEX
Program version (W&M check sum)	1.01 (8CA4)	1.03 (20260)
Calculator powering	230V ± 10%; 50Hz; max. 300VA	1.01 (4573)
Electro-magnetic valves	Proportional or two-state; + 24VDC / max.1A	

*The LV measuring system contains a ZVA AdBlue delivery nozzle that limits the maximum flow to 10 L/min

**When the Elaflex hose is installed then MMQ = 2L; if the IVGBLUE hose is installed, MMQ = 5L

Table 11 - WSE (for dispensing windshield washer fluid) dispensers and modules

Maximum flow rate Q _{max} [L/min]	20	
Minimum flow rate Q _{min} [L/min]	2	
Lowest metering MMQ [L]	2	
Maximum working pressure [MPa]	0.3	
Minimum working pressure [MPa]	0.1	
Maximum unit price (number of digits)	9999(4)	
Maximum amount to pay (number of digits)	999999(6)	
Scale interval [L]	0.01	
Display type	Electronic	
Type of delivered fluid	WSE (mixture of water, detergents and ethanol)	
Filtration of mechanical particles	Input filter >70µm	
Fluid temperature range [°C]	-20 to +50	
Ambient temperature range [°C]	-25 to +55 (standard dispenser version); -40 to +55 (special dispenser version with heating)	
Accuracy class	0.5	
Mechanical class	M1, M2 for counters PDEX5 and TBELTx	
Electromagnetic class	E1, E2 for the counter PDEX5	
Humidity	Condensing	
Location	Open	
Measured unit	Volume [L] or volume at 15 °C [L]	
Electronic counter	TBELTx	PDEX
Program version (W&M check sum)	1.01 (8CA4)	1.03 (20260)
Calculator powering	230V ± 10%; 50Hz; max. 300VA	1.01 (4573)
Electro-magnetic valves	Proportional or two-state; + 24VDC / max.1A	

Table 12 - CNG (compressed natural gas) dispensers and modules

Mass meter	CNG050	CNGmass
Maximum flow rate Q_{\max} [kg/min]	30 / 70	30 / 70
Minimum flow rate Q_{\min} [kg/min]	2	0.8
Lowest metering MMQ [kg]	2	2
Fluid temperature range [°C]	-25 to +55	-50 to +80
Ambient temperature range [°C]	-40 to +55	-40 to +60
Maximum tank pressure P_{st} [MPa]	30.0	
Maximum gas pressure P_{\max} [MPa]	30.0	
Minimum gas pressure P_{\min} [MPa]	2.0	
Maximum delivering gas pressure P_v [MPa]	20.0 @ 15°C / 26.5	
Maximum unit price (number of digits)	9999(4)	
Maximum amount to pay (number of digits)	999999(6)	
Scale interval [kg]	0.01 or 0.001	
Display type	Electronic	
Type of medium	Compressed natural gas	
Filtration of mechanical particles	Input filter >25µm	
Accuracy class	1.0 (1.5 OIML certificate)	
Mechanical class	M1, M2 for counters PDEX5 and TBELTx	
Electromagnetic class	E1, E2 for the counter PDEX5	
Humidity	Condensing	
Location	Open	
Measured unit	Mass [kg]	
Electronic counter	TBELTM	
Program version (W&M check sum)	1.01 (4092)	
Calculator powering	230V ± 10%; 50Hz; max. 300VA	
Electro-magnetic valves	Two-state; +24VDC/max.1A	

2.4. DISPENSER MODEL IDENTIFICATION

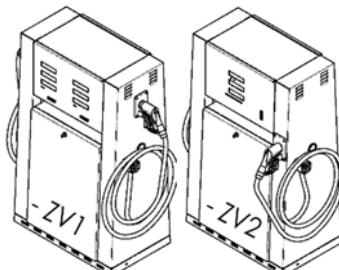
The following paragraph explains the marking method (codes) of dispensers.

The basic design of the OCEAN and SHARK series business branding is:

1	2	3	4	5	6	7	1	2	3	4	5	6	7								
BMP	4	0	4	8	.O	E	D	/H	/VR2	+	MOD	4	0	1	2	.O	E	D	/AdB	+	...

A stand-alone dispenser always starts with a BMP abbreviation followed by a clarification of the dispenser configuration and design. As for the combined dispenser, i.e. the dispenser with one or more additional dispensing modules, the individual modules are marked with the MOD abbreviation and specification of the module configuration.

Field	Values	Description
1	-----> BMP MOD	Device type Dispenser. Standalone dispenser. Dispensing module. Measuring and dispensing system without an electronic counter. It does not work independently. The dispensing modules are only in OCEAN EURO or OCEAN NX versions.
2	-----> 5 40	Series of dispensers SHARK. Simple single-product to two-product dispensers of the SHARK JUNIOR and SHARK ECONOMY series. OCEAN. Single to five-product dispensers of the OCEAN EURO, OCEAN TALL, OCEAN SMART, OCEAN NX series.
3	1.2 to 5	Number of products. Number of fuel pumps or number of fuel inputs for pressure dispensers.
4	1, 2 to 10	Number of delivery hoses. It corresponds to the number of measuring systems.
5	-----> S SX OE OT OS OX	Dispenser design. SHARK JUNIOR dispensers. Single-product, one- to two-hose dispensers with a height of 1400 mm. SHARK ECONOMY dispensers. Two-product, one- to two-hose dispensers with a height of 1400 mm. OCEAN EURO dispensers. Multi-product, one- to ten-hose dispensers with a height of 1900 mm. OCEAN TALL dispensers. Multi-product, one- to ten-hose dispensers with a height of 2300 mm. OCEAN SMART dispensers. Single-product, one- to four-hose dispensers with a height of 1900 mm. OCEAN TOWER dispensers. Multi-product, one- to ten-hose dispensers with a height of 1900 mm.
6	-----> D L R	Dispenser orientation Double-sided dispenser. Single-sided dispenser – left. Single-sided dispenser – right.
7	-----> - without - /LPG /AdB /WSE /CNG -ZV1 -ZV2 /H /UH /VRx /S3 /MAS /SAT /LON; /TAT /CUBE; /FIN; /WAVE -HS; -HR -SC -NC -2C -4C	Specifying abbreviation The dispenser or module for pumping liquid fuels (gasoline, diesel, ...). The LPG (liquefied propane-butane) dispenser or module. AdBlue® (AUS32 reducing agent) dispenser or module Dispenser or module for WSE (windshield washer fluid dispensing). CNG (compressed natural gas) dispenser or module. The dispenser where the hose exits from the rear cover and the nozzle is also located on the rear cover, see figure. The dispenser where the hose exits from the rear cover of the dispenser and the nozzle is located on the front of the dispenser, see figure. Increased power of one fuel pump (80L/min) or increased filling power of one CNG hose (<70 kg/min). If several pumps with increased power are used in the rack, use /H/H or /H/H/H. Ultra-high performance of one delivery hose (120 to 150L/min). For two hoses in the dispenser, the /UH/UH is used. The number of exhausted products in the fuel dispenser where x = 1, 2, 3, 4 or 5. Pressure dispenser. The dispenser does not contain a pump. The submersible pump is located in the tank. A dispenser with one output for a satellite stand. If two satellite outlets are in the dispensers, /MAS/MAS is used. A dispenser with a satellite delivery hose. If two satellite hoses are used in the dispenser, /SAT/SAT is used. Data communication IFSF-LON; data communication TATSUNO SUNNY (RS485) Design variants of the dispenser created by adding decorative elements to the base version of the dispenser (OCEAN dispensers only). A spring hose holder (SHARK); hose reel (OCEAN) Simultaneous delivery of hoses on a two-hose dispenser. Non-simultaneous delivery of hoses on a two-hose dispenser. Simultaneous delivery of two delivery hoses on one side of the multi-product dispenser. Simultaneous pumping of four delivery hoses on a double-sided multi-product dispenser.



The basic design of the SUNNY-XE EURO series business branding is:

1	2	3	4	5	6	7	8	9	10
S	D	B	4	8	8	2	.	E	-S /H/VR2

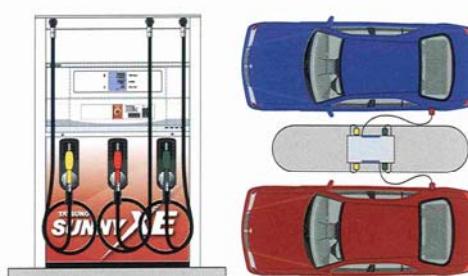
Field	Values	Description
1	-----> S	Series of dispensers SUNNY. One- to four-product, one- to eight-hose dispensers in WIDE design (1280 mm) or NARROW design (914 mm) with a height of 1950 mm.
2	-----> D S	Type of the dispenser in terms of the delivery method Suction dispenser. The dispenser contains suction pumps that suck fuel from fuel storage tanks. Pressure dispenser. The dispenser does not contain a pump, only filters and meters. The submersible pump is located in the tank and pushes the fuel into the dispenser.
3	-----> A B C F	Dispenser design. Narrow version of the dispenser (NARROW) with standard (40 L/min) or increased (80 L/min) pumping performance. Wide version of the dispenser (WIDE) with standard (40 L/min) or increased (80 L/min) pumping performance. Narrow version of the dispenser (NARROW) with very high (120-150 L/min) pumping performance. Wide version of the dispenser (WIDE) with very high (120-150 L/min) pumping performance.
4	1,2 3, 4	Number of products. Number of fuel pumps or number of fuel inputs for pressure dispensers.
5	1, 2 to 8	Number of meters.
6	1, 2 to 8	Number of delivery hoses. It corresponds to the number of measuring systems.
7	1, 2 to 4	Number of dispensing sites. It corresponds to the number of current deliveries and the number of main display screens.
8	-----> E	Dispenser version. the European version of the original SUNNY-XE dispenser
9	-----> - without - -S	Location of delivery nozzles. The delivery nozzles are located at the front of the dispenser in the lane (LANE) - see fig. 2 The delivery nozzles are located on the side of the dispenser, so-called island dispenser (ISLAND) - see fig. 1
10	-----> - without - /1L /1R /H /UH /VRx /MAS /SAT /LON /TAT	Specifying abbreviation Dispensers for pumping liquid fuels (gasoline, diesel, E85, aircraft gasoline ...). Single-sided dispenser – left. Single-sided dispenser – right. Increased power of one fuel pump (80L/min). If several pumps with increased power are used in the rack, use /H/H. Ultra-high performance of one delivery hose (120 to 150L/min). For two hoses in the dispenser, the /UH/UH is used. The number of exhausted products in the fuel dispenser where x = 1, 2, 3, 4 or 5. A dispenser with one output for a satellite stand. If two satellite outlets are in the dispensers, /MAS/MAS is used. A dispenser with a satellite delivery hose. If two satellite hoses are used in the dispenser, /SAT/SAT is used. Data communication IFSF-LON Data communication TATSUNO SUNNY (RS485)

Island Oriented



Figure 1 - Dispenser with nozzles on the side (-S)

Lane Oriented



Picture 2 - Dispenser with nozzles in the lane

2.4.1. DISPENSER PARTS MARKING CONVENTIONS

Figure 3 illustrates the TATSUNO EUROPE dispenser marking and sorting system. In dispensers where it is not clear if the left or right side of the dispenser concerns (SUNNY EX EURO and SHARK ECONOMY), the location of the nameplate which is always closest to product No. 1 and nozzle No. 1 (1A) is decisive. In the case of a double-sided dispenser, the right side of the dispenser is also referred to as side A and the left side is referred to as side B. For a one-sided left or one-sided right dispenser, it is always only side A.

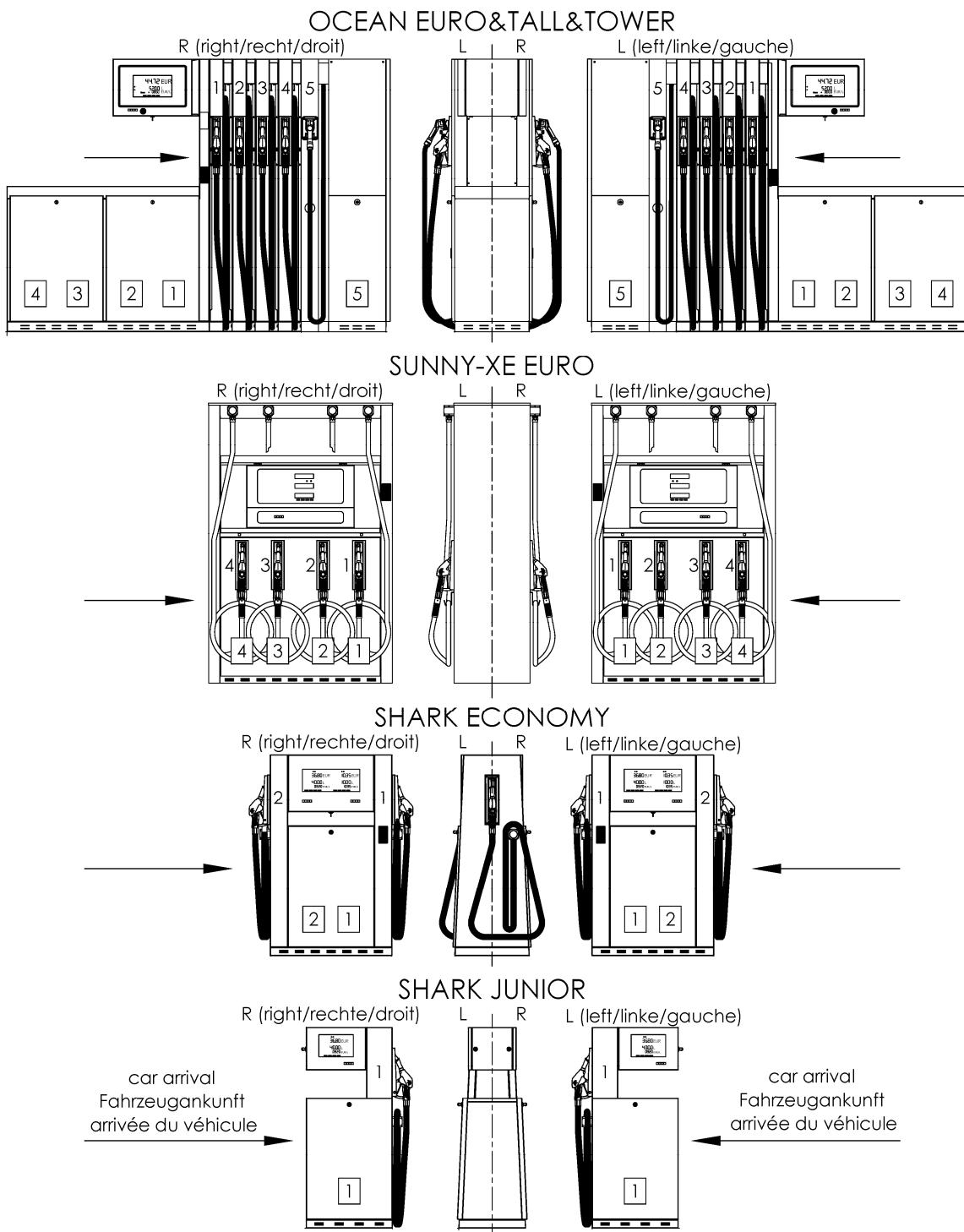


Figure 3 - Dispenser marking system with the recommended arrival direction

2.5. STANDARD MODELS OF DISPENSERS

Individual models of TATSUNO EUROPE dispensers are distinguished by the following features:

- a) depending on the type of pumped / delivered medium

- **dispensers with one type of media**

- **multi-media dispensers - combined dispensers**

Note: The most common types of combined dispensers diesel + AdBlue®; gasoline + CNG; gasoline, diesel + LPG, etc.

- b) by the delivery method

- **suction dispensers (SUCTION)**; equipped with suction pumps

- **pressure dispensers (REMOTE)**; without suction pumps, equipped only with filters and meters.

The fuel is pumped off the dispenser (e.g. in the tank) and pushed into the dispenser.

Note: LPG, AdBlue, WSE and CNG dispensers and modules are standardly in a pressure design.

- c) by the number of simultaneous delivery points

1 to 4 independent delivery points

Note: "Delivery point" means a part of a dispenser where a customer can independently deliver fuel. TATSUNO EUROPE dispensers are standardly equipped with one or two delivery points. At the customer's specific request, the dispenser can be equipped with up to four delivery points, i.e. 4 independent delivery sites, 4 displays = 2 displays on each side of the dispenser. In the case of two displays on each side of the combined dispenser, one display is designed for pumping liquid fuel and the other for the delivery of the add-on module product (LPG, AdBlue, WSE, CNG).

- d) by access to the dispenser

- **double-sided dispensers**; access to the dispenser from two sides (TWO-SIDED)

- **single-sided dispensers**; access to the dispenser from one side (ONE-SIDED)

- e) by the number of fuel products

- by the type the dispenser can deliver **from one to five different fuel products**.

- f) by the number of delivery hoses and delivery nozzles

- **1 to 10 delivery hoses of the dispenser**; each delivery point of the dispenser is equipped with one to five delivery hoses ending with delivery nozzles.

- g) by delivery nozzle location

- **with the delivery nozzle located at the front** of the dispenser in the lane (LANE)

- **with the delivery nozzle located on the side** of the dispenser (ISLAND; -S)

- **the hose exits from the rear cover, the nozzle is located on the rear cover** (-ZV1)

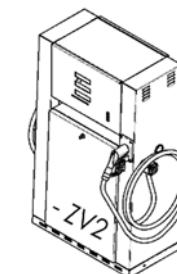
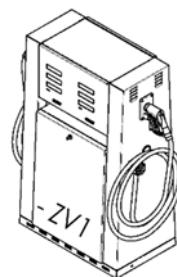
- **the hose exits from the rear cover of the dispenser and the nozzle is located on the front of the dispenser** (-ZV2)

- h) by pumping / filling performance of the fuel dispenser

- **dispensers with standard pumping performance**

- **dispensers with increased pumping performance** (marking /H)

- **dispensers with high pumping performance** (marking /UH)



Note: The pumping performance means maximum achievable fuel flow through the delivery nozzle. It is expressed in litres per minute or in kilograms per minute (CNG). The actual pumping/filling performance depends on the actual conditions at the fuel station - on the quality and length of the suction piping diameter, the suction height etc.

i) by the type of displays;

- **dispensers with public delivery displays** (amount / volume / price)
- **dispensers with non-public delivery displays** (volume - only litre display)

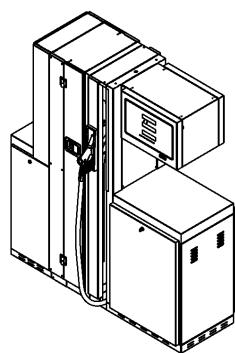
Note: According to the displayed values, all displays can be divided into litre displays and public delivery displays. The litre displays contain only information about the amount of fuel in centilitres and are used for non-public delivery dispensers (i.e. for internal corporate fuel stations). In addition to information about the delivered volume, the public delivery displays also include the amount you have spent in € and information on the fuel unit price.

j) by dispenser appearance

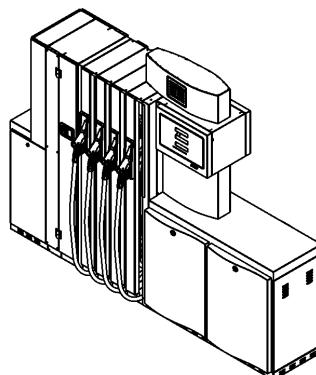
- **BASIC model**; basic dispenser model with no decorative elements
- **WAVE model**; dispenser with wave-shaped decorative elements - marking /WAVE
- **CUBE model**; dispenser with cube-shaped decorative elements - marking /CUBE
- **FIN model**; dispenser with sail/fin-shaped decorative elements - marking /FIN

Note: Several design variants are available only for OCEAN dispensers.

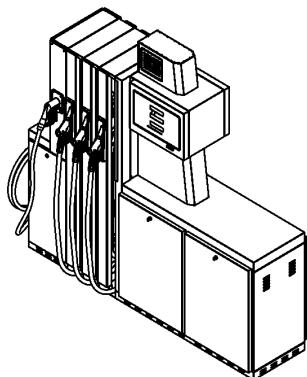
Examples of design variants of OCEAN dispensers:



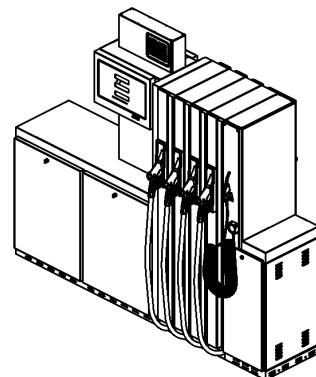
BASIC



WAVE



FIN



CUBE

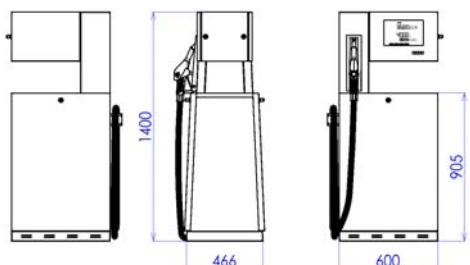
2.5.1. SHARK JUNIOR DISPENSERS

SHARK JUNIOR dispensers are standardly manufactured in a suction version in a single-sided left (L), single-sided right (R) or double-sided (D) design with one delivery hose for liquid fuel (gasoline, diesel, E85 ...) and a delivery nozzle on the side of the dispenser. The hose is freely suspended or hinged by a spring hinge (-HS).

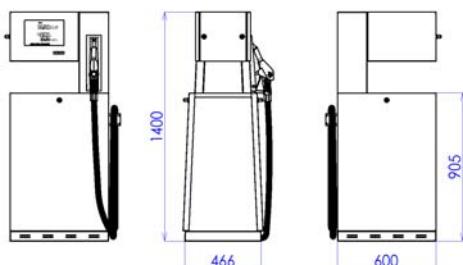
List of standard SHARK JUNIOR models:

Dispenser model	Access to dispenser (2-double-sided, 1-single-sided)	Number of products (number of pumps or inputs)	Number of meters (number of measuring systems)	Number of delivery nozzles (number of delivery hoses)	Number of displays	Pumping performance (L/min)
BMP511.SL	1	1	1	1	1	40
BMP511.SR	1	1	1	1	1	40
BMP511.SL-ZV2	1	1	1	1	1	40
BMP511.SR-ZV2	1	1	1	1	1	40
BMP511.SD	2	1	1	1	2	40
BMP511.SL /H	1	1	1	1	1	80
BMP511.SR /H	1	1	1	1	1	80
BMP511.SL /H-ZV2	1	1	1	1	1	80
BMP511.SR /H-ZV2	1	1	1	1	1	80
BMP511.SD /H	2	1	1	1	2	80
BMP521.SL /UH	1	2	2	1	1	130
BMP521.SR /UH	1	2	2	1	1	130
BMP521.SL /UH-ZV2	1	2	2	1	1	130
BMP521.SR /UH-ZV2	1	2	2	1	1	130
BMP521.SD) /UH	2	2	2	1	2	130

Notes: Special models (see chap. 2.4) can also be produced in a pressure version without pumps (/ S3) where the submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. Dispensers can be equipped with a vapour recovery system (/VR) of the 2nd level and optionally with an electronic system that monitors the correct function and efficiency of the recovery system. For each dispenser model it is possible to provide a hose for diesel delivery. This allows one delivery (one transaction) from two hoses at a time. The dispenser with an output for the satellite hose is supplemented with /MAS abbreviation and the dispenser with a satellite hose with /SAT abbreviation. The pumping performance is strongly dependent on the conditions at the station (distance from the tank, suction height, pipe inner diameter... etc.). The standard performance ranges from 35 to 50 L/min, increased performance from 70 to 90 L/min and ultra-high performance from 120 to 150 L/min. When using a special meter (LOBE), the ultra-high pumping performance can be increased up to 170 L/min and in a pressure version up to 200 L/min. (depending on the submersible pump power).

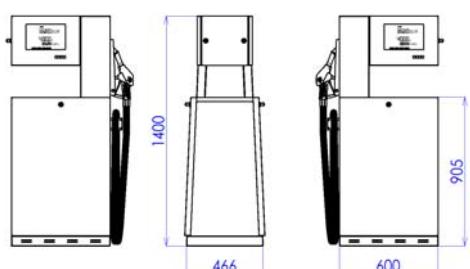


BMP511.SL-ZV2; BMP511.SL/H-ZV2; BMP521.SL/UH-ZV2

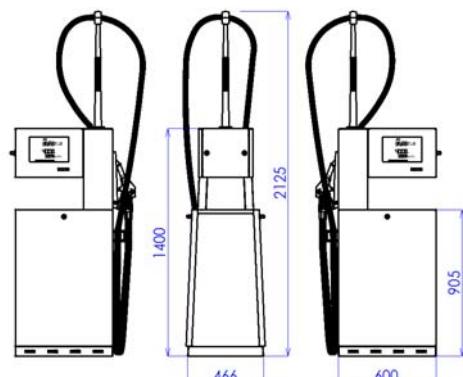


BMP511.SR-ZV2; BMP511.SR/H-ZV2; BMP521.SR/UH-ZV2

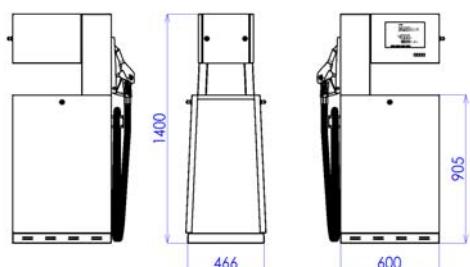
Figure 4- Standard SHARK JUNIOR dispenser models with a nozzle positioned at the front



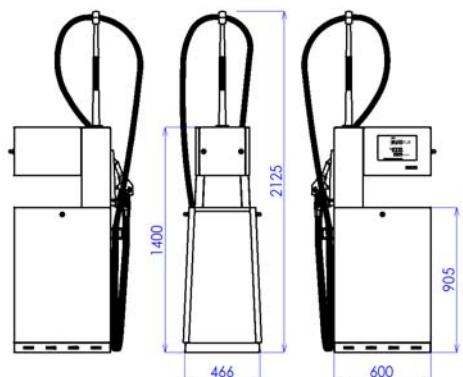
BMP511.SD; BMP511.SD/H; BMP521.SD/UH



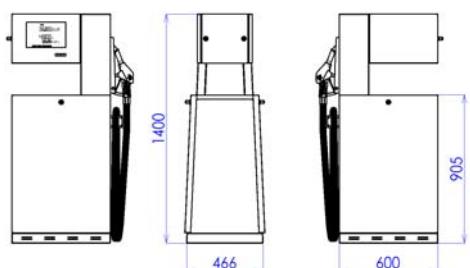
BMP511.SD-HS; BMP511.SD/H-HS; BMP521.SD/UH-HS



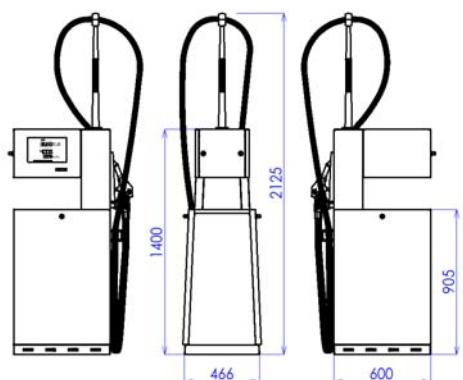
BMP511.SL; BMP511.SL/H; BMP521.SL/UH



BMP511.SL-HS; BMP511.SL/H-HS; BMP521.SL/UH-HS



BMP511.SR; BMP511.SR/H; BMP521.SR/UH



BMP511.SR-HS; BMP511.SR/H-HS; BMP521.SR/UH-HS

Figure 5 - Standard SHARK JUNIOR dispenser models with a nozzle positioned on the side

2.5.2. SHARK JUNIOR LPG DISPENSERS

SHARK JUNIOR LPG dispensers are produced only in a pressure version, i.e. without a pump, in a single-sided left (L), single-sided right (R) or double-sided (D) version with one free-hanging delivery hose for LPG (liquefied propane butane) delivery.

List of standard SHARK JUNIOR LPG models:

Dispenser model	Access to dispenser (2-double-sided, 1-single-sided)	Number of products (number of pumps or inputs)	Number of meters (number of measuring systems)	Number of delivery nozzles (number of delivery hoses)	Number of displays	Pumping performance (L/min)
BMP511.SL /LPG	1	1	1	1	1	50
BMP511.SR /LPG	1	1	1	1	1	50
BMP511.SD /LPG	2	1	1	1	2	50

Notes: The pumping performance depends on the conditions at the station (pump distance, pump pressure ... etc). The standard pumping per is 50 L/min. Note that when exceeding the maximum operating pressure of 18 bar (0.18 MPa), higher pumping performance may also occur but also a lack of separation of the gaseous phase from the LPG fuel. By default, LPG dispensers are equipped with DISH standard connector most widely used in Europe. At customer's request, the dispensers can be equipped with ACME standard nozzles (Belgium, Germany, Ireland and Austria), BAYO, or EURO nozzles (Spain, Portugal).

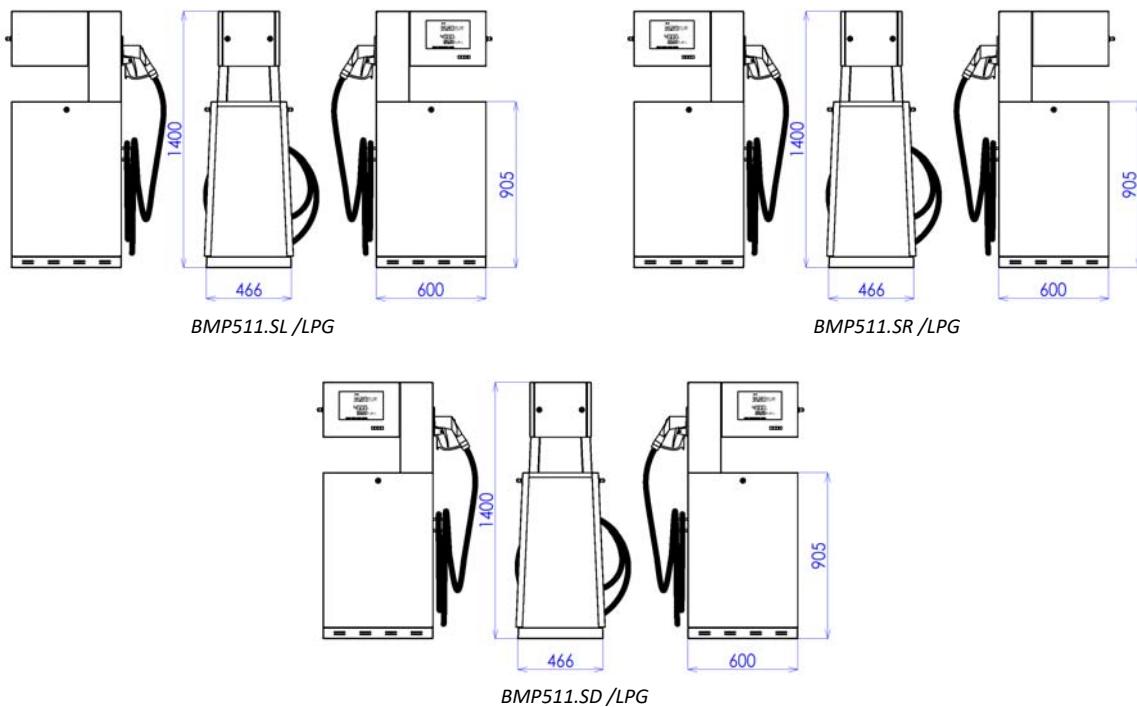


Figure 6 – Standard SHARK JUNIOR LPG models

2.5.3. SHARK JUNIOR ADBLUE® DISPENSERS

SHARK JUNIOR ADBLUE® dispensers are standardly manufactured in a pressure version, single-sided left (L), single-sided right (R) or double-sided (D) version with one or two delivery hoses for the delivery of AdBlue® reduction agent (32.5% urea solution; AUS32). The hoses are freely hanging or hung by a spring hinge (HS). The maximum pumping performance of the delivery hoses is 40 L/min for trucks or 10 L/min for passenger cars.

List of standard SHARK JUNIOR ADBLUE® models:

Dispenser model	Access to dispenser (2-double-sided, 1-single-sided)	Number of products (number of pumps or inputs)	Number of meters (number of measuring systems)	Number of delivery nozzles (number of delivery hoses)	Number of displays	Pumping performance (L/min)
BMP511.SL(R) /AdB	1	1	1	1	1	40/10
BMP511.SL(R) /AdB-ZV2	1	1	1	1	1	40/10
BMP511.SD /AdB	2	1	1	1	2	40/10
BMP512.SD /AdB-ZV2	2	1	1	1	2	40/10
BMP512.SL(R) /AdB	2	1	1	1	1	40/10
BMP512.SD /AdB	2	1	1	1	2	40/10

Note: SHARK JUNIOR ADBLUE® dispensers are not standardly equipped with heating. For the installation of dispensers in an environment where the temperature drops below -5 °C, it is possible to equip the dispenser at the customer's request by heating the hose and the hydraulic part of the dispenser.

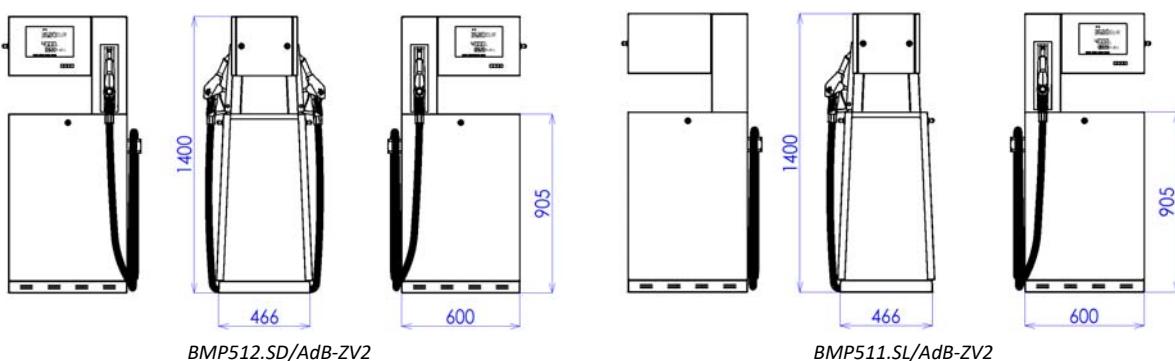


Figure 7- Standard SHARK JUNIOR ADBLUE® dispenser models with nozzles positioned at the front (-ZV2)

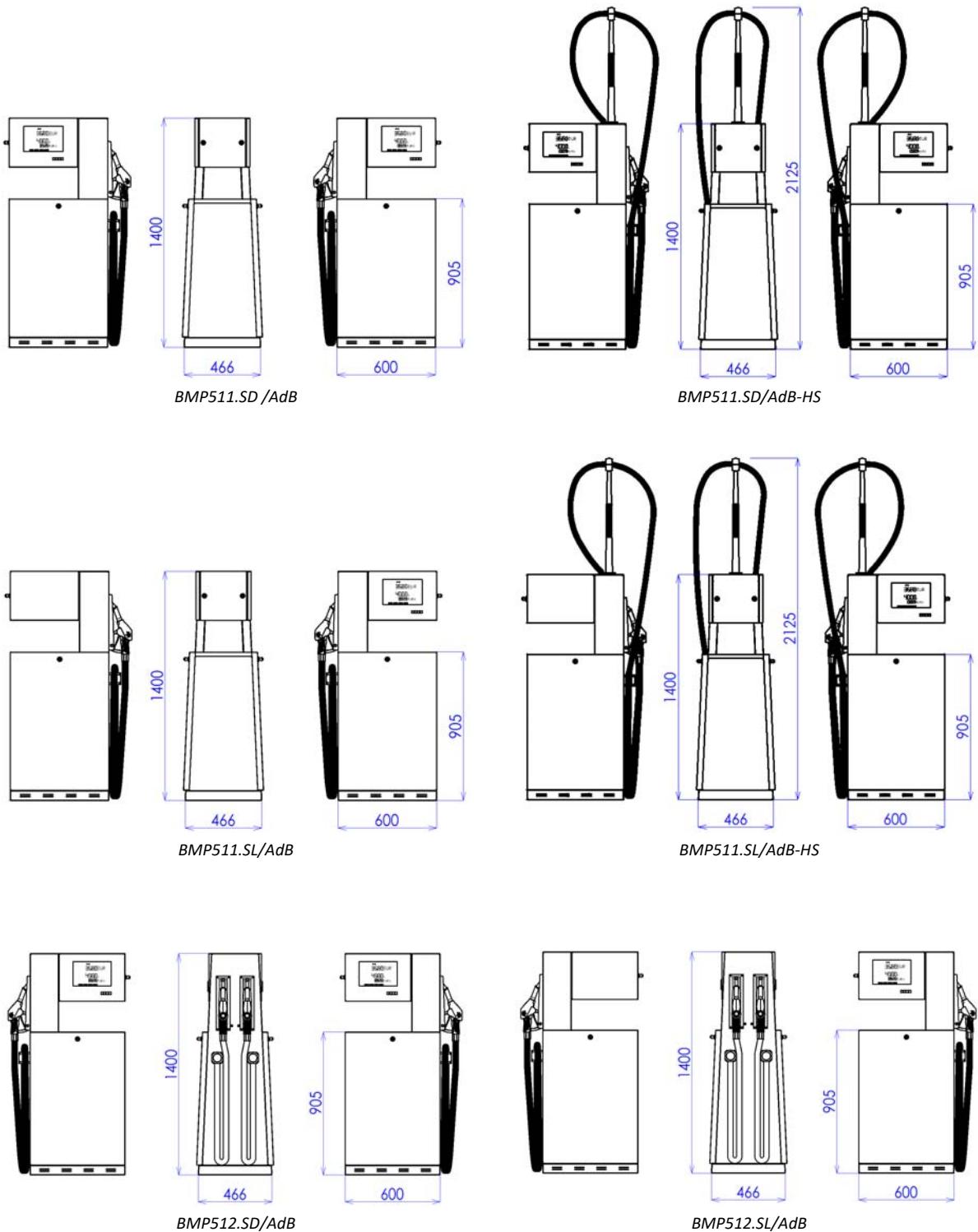
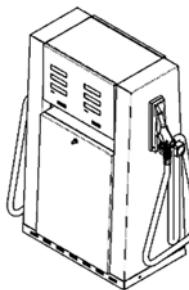


Figure 8 - Standard SHARK JUNIOR ADBLUE® dispenser models with nozzles positioned on the side

2.5.4. SHARK ECONOMY DISPENSERS

SHARK ECONOMY dispensers are standardly manufactured in a suction version in a single-sided left (L) or double-sided (D) design with one or two delivery hoses for liquid fuel (gasoline, diesel, E85 ...) ended with delivery nozzles located on the side of the dispenser. The hoses may be freely hanging or hung by a spring hinge (HS).

List of standard SHARK ECONOMY models:



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Number of products (number of pumps or inputs)	Number of meters (number of measuring systems)	Number of delivery nozzles (number of delivery hoses)	Number of displays	Pumping performance (L/min)
BMP522.SXL	1	2	2	2	2	40+40
BMP522.SXL-NC	1	2	2	2	1	40+40
BMP522.SXD	2	2	2	2	4	40+40
BMP522.SXD-NC	2	2	2	2	2	40+40
BMP522.SXL /H	1	2	2	2	2	80+40
BMP522.SXL /H-NC	1	2	2	2	1	80+40
BMP522.SXD /H	2	2	2	2	4	80+40
BMP522.SXD /H-NC	2	2	2	2	2	80+40
BMP522.SXL /UH	1	2	3	2	2	130+40
BMP522.SXL /UH-NC	1	2	2	2	1	130+40
BMP522.SXD /UH	2	2	3	2	4	130+40
BMP522.SXD /UH-NC	2	2	2	2	2	130+40
BMP522.SXL /UH/H	1	2	3	2	2	130+80
BMP522.SXL /UH/H-NC	1	2	2	2	1	130+80
BMP522.SXD /UH/H	2	2	3	2	4	130+80
BMP522.SXD /UH/H-NC	2	2	2	2	2	130+80

Notes: Special models (see chap. 2.4) can also be produced in a pressure version without pumps (/S3) where the submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. According to the number of gasoline products, dispensers can be equipped with a vapour recovery system (/VR1, /VR2) of the 2nd level and optionally with an electronic system that monitors the correct function and efficiency of the recovery system. For each dispenser model it is possible to provide one or two hoses for diesel delivery. This allows one delivery (one transaction) from two hoses at a time. The dispenser with an output for the satellite hose is supplemented with /MAS abbreviation and the dispenser with a satellite hose with /SAT abbreviation. The pumping performance is strongly dependent on the conditions at the station (distance from the tank, suction height, pipe inner diameter... etc.). The standard performance ranges from 35 to 50 L/min, increased performance from 70 to 90 L/min and ultra-high performance from 120 to 150 L/min. When using a special meter (LOBE), the ultra-high pumping performance can be increased up to 170 L/min and in a pressure version up to 200 L/min. (depending on the submersible pump power).

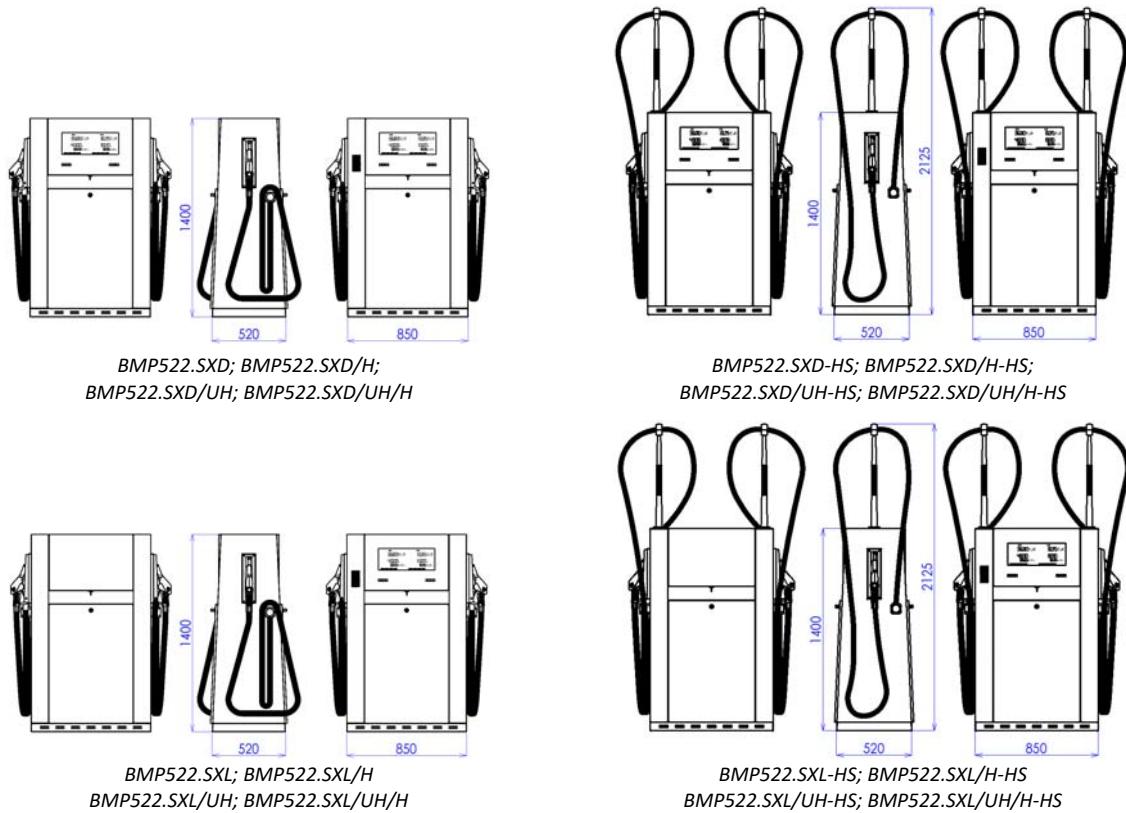


Figure 9 - Standard models of SHARK ECONOMY dispensers (two simultaneous deliveries)

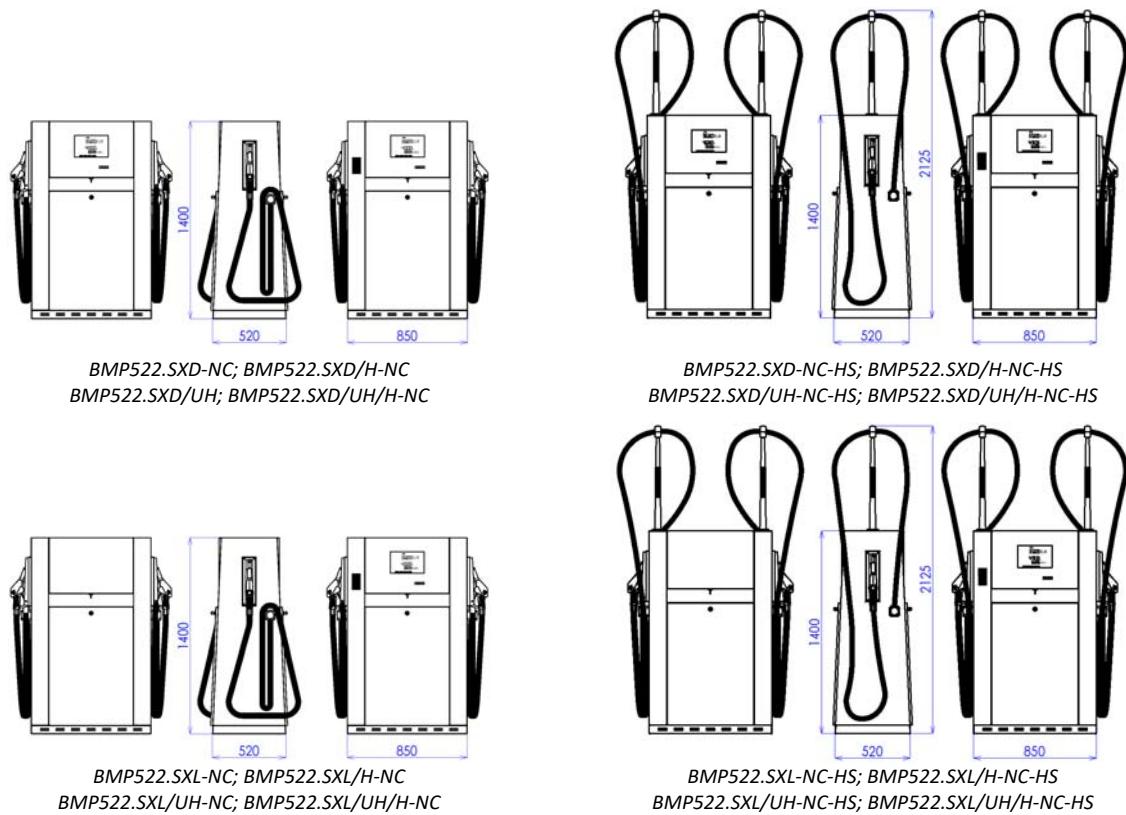


Figure 10 – Standard SHARK ECONOMY models (no simultaneous deliveries -NC)

2.5.5. SHARK ECONOMY LPG DISPENSERS

SHARK ECONOMY LPG dispensers are produced only in a pressure version, i.e. without a pump, in a single-sided left (L) or double-sided (D) version with one or two free-hanging delivery hoses for LPG (liquefied propane butane) delivery. The delivery nozzles may be located on the front (-ZV2) or on the side of the dispenser. List of standard SHARK ECONOMY LPG models:

Dispenser model	Access to dispenser (2-double-sided, 1-single-sided)	Number of products (number of LPG inputs and separators)	Number of meters (number of measuring systems)	Number of delivery nozzles (number of delivery hoses)	Number of displays (number of simultaneous deliveries)	Pumping performance (L/min)
BMP522.SXL /LPG	1	2	2	2	2	50+50
BMP512.SXL /LPG	1	1	2	2	2	35+35
BMP522.SXD /LPG	2	2	2	2	4	50+50
BMP522.SXD /LPG	2	1	2	2	4	35+35
BMP522.SXD /LPG-ZV2	2	2	2	2	2	50+50
BMP522.SXD /LPG-ZV2	2	1	2	2	2	35+35

Notes: The pumping performance depends on the conditions at the station (pump distance, pump pressure ... etc). Standard pumping performance for models with two inlets, two hoses (22) is 50 L/min. For models with one input, two hoses (12) the performance is 35 L/min. Note that when exceeding the maximum operating pressure of 18 bar (0.18 MPa), higher pumping performance may also occur but also a lack of separation of the gaseous phase from the LPG fuel. By default, LPG dispensers are equipped with DISH standard connector most widely used in Europe. At customer's request, the dispensers can be equipped with ACME standard nozzles (Belgium, Germany, Ireland and Austria), BAYO, or EURO nozzles (Spain, Portugal).

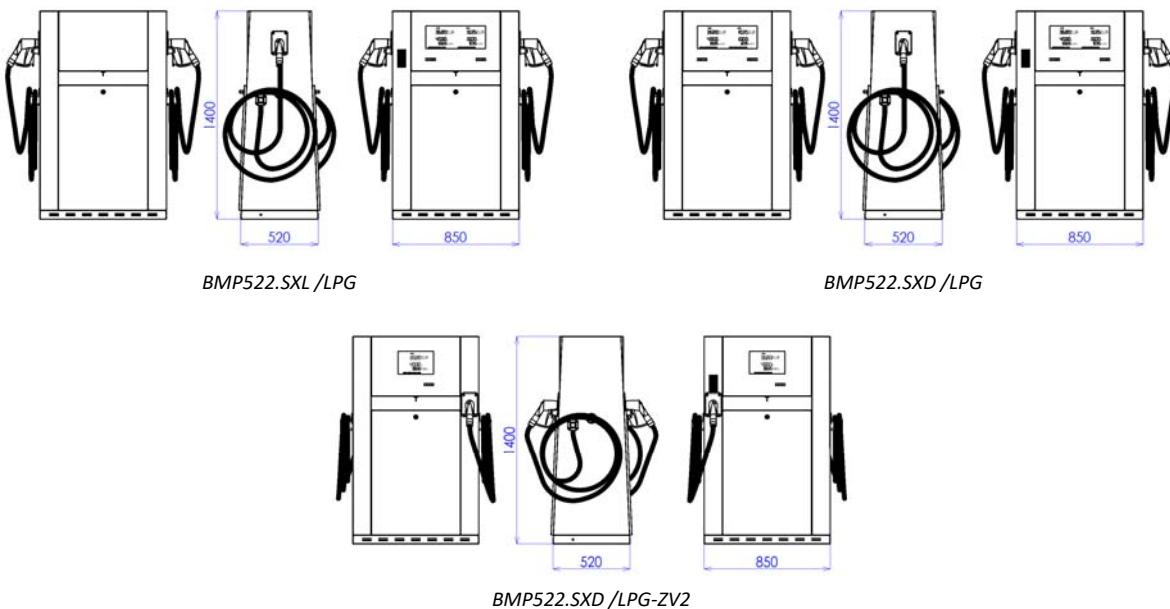
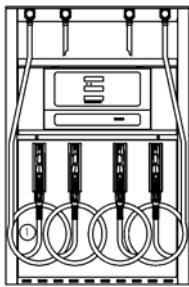


Figure 11 – Standard SHARK ECONOMY LPG models

2.5.6. SUNNY-XE EURO DISPENSERS

Multi-product SUNNY-XE EURO dispensers are standardly manufactured in a suction version in a single-sided left (/1L) or double-sided (D) design with one to eight delivery hoses for liquid fuel (gasoline, diesel, E85 ...) located on the front or on the side of the dispenser (-S). Hoses are free-hanging on the dispenser. In terms of the width of the dispenser, there are two versions - wide (WIDE) with a width of 1280 mm and narrow (NARROW) with a width of 914 mm.

Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Total number of products (i.e. number of pumps or inputs)	Number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
SDB 2221.E /1L	1	2	2	2	1
SDB 2442.E	2	2	4	4	2
SDB 2222.E /1L	1	2	2	2	2
SDB 2444.E	2	2	4	4	4
SDB 3331.E /1L	1	3	3	3	1
SDB 3662.E	2	3	6	6	2
SDB 3332.E /1L	1	3	3	3	2
SDB 3664.E	2	3	6	6	4
SDB 3333.E /1L	1	3	3	3	3
SDB 3666.E	2	3	6	6	6
SDB 4441.E /1L	1	4	4	4	1
SDB 4882.E	2	4	8	8	2
SDB 4442.E /1L	1	4	4	4	2
SDB 4884.E	2	4	8	8	4
SDB 4443.E /1L	1	4	4	4	3
SDB 4886.E	2	4	8	8	6
<hr/>					
SDA 1111.E-S /1L	1	1	1	1	1
SDA 1111.E-S	2	1	1	1	1
SDA 1222.E-S /1L	1	1	2	2	2
SDA 1222.E-S	2	1	2	2	2
SDA 2222.E-S /1L	1	2	2	2	2
SDA 2222.E-S	2	2	2	2	2
<hr/>					
SDF 4222.E-S /UH/UH/1L	1	4	4	4	2
SDF 4222.E-S /UH/UH	2	4	4	4	2



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Total number of products (i.e. number of pumps or inputs)	Number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
SDF 4222.E /UH/UH	2	4	4	4	2
SDC 2222.E-S /UH/H/1L	1	2	2	2	2
SDC 2222.E-S /UH/H	2	2	2	2	2
SDC 2222.E /UH/UH	2	2	2	2	2
SDC 2111.E-S /UH/1L	1	2	1	1	2
SDC 2111.E-S /UH	2	2	1	1	1
SDC 2111.E /UH/1L	1	2	1	1	1

Notes: The pumping performance is strongly dependent on the conditions at the station (distance from the tank, suction height, pipe inner diameter... etc.). The standard pumping performance is within the range of 35 to 50 L/min. For special models (see chapter 2.4), the performance of the diesel hoses can be increased to a high performance of 70 to 90 L/min (/H). Special models can simultaneously deliver two or three liquid fuels on one side of the dispenser. Dispensers can also be produced in a pressure version without pumps (SSD, SSA, SSF SSC) where the central submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. According to the number of gasoline products, dispensers can be equipped with a vapour recovery system (/VR, /VR2, /VR3...) of the 2nd level and optionally with an electronic system that monitors the correct function and efficiency of the recovery system. For each dispenser model it is possible to provide one or two hoses for diesel delivery. This allows one delivery (one transaction) from two hoses at a time. The dispenser with an output for the satellite hose is supplemented with /MAS abbreviation and the dispenser with a satellite hose with /SAT abbreviation.

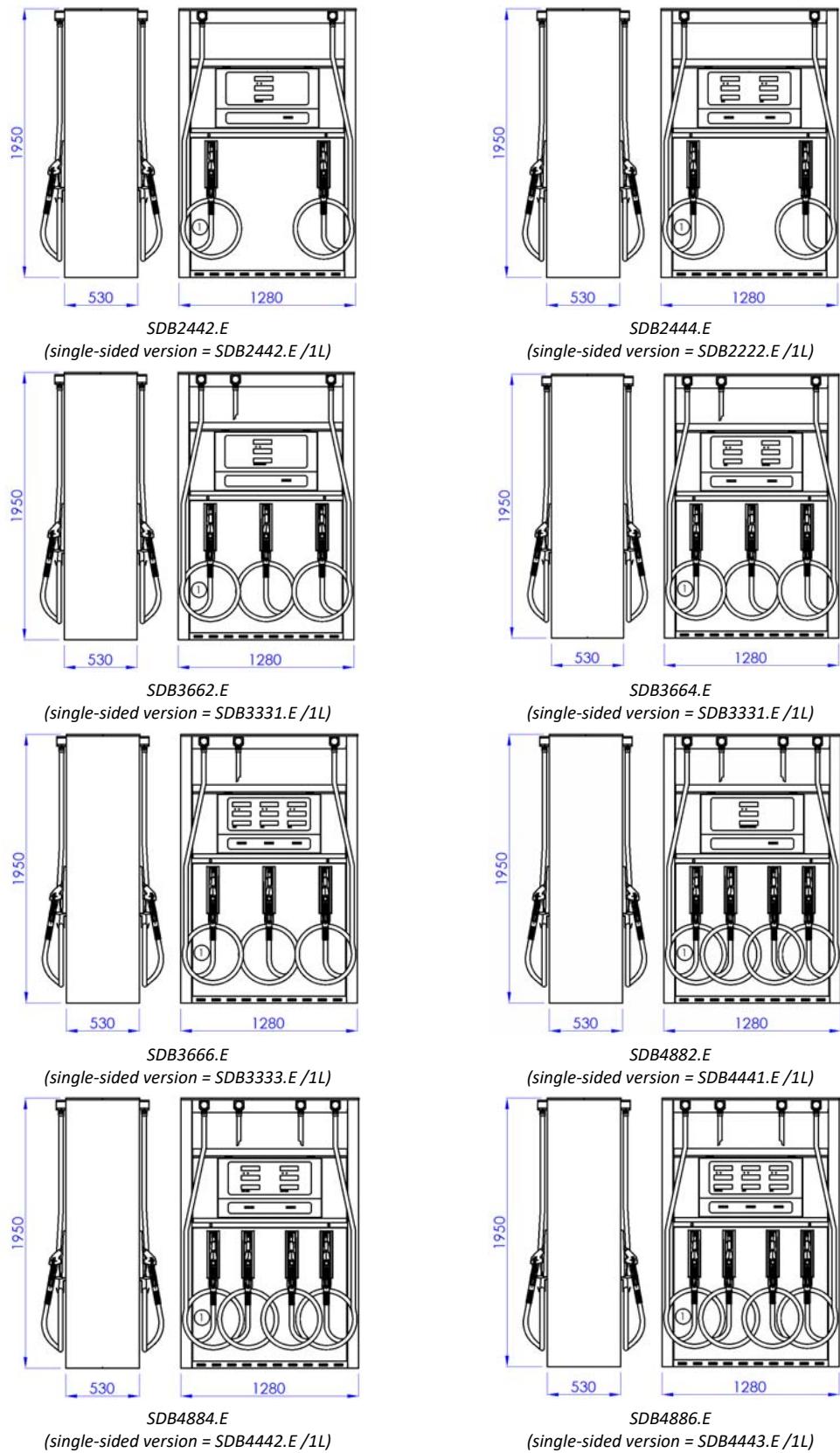


Figure 12 - Overview of standard SUNNY-XE EURO models in a wide design with front-mounted nozzles

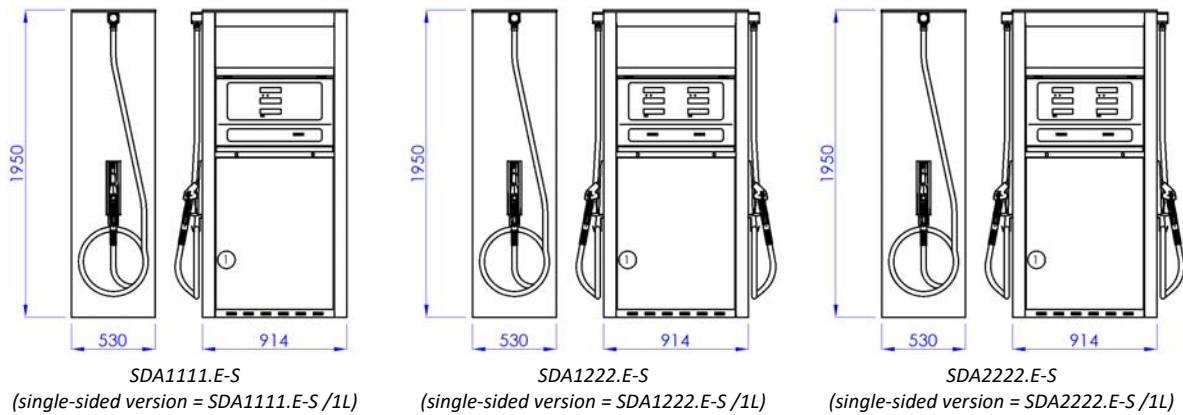


Figure 13 - Overview of standard SUNNY-XE EURO models in a narrow design with side-mounted nozzles

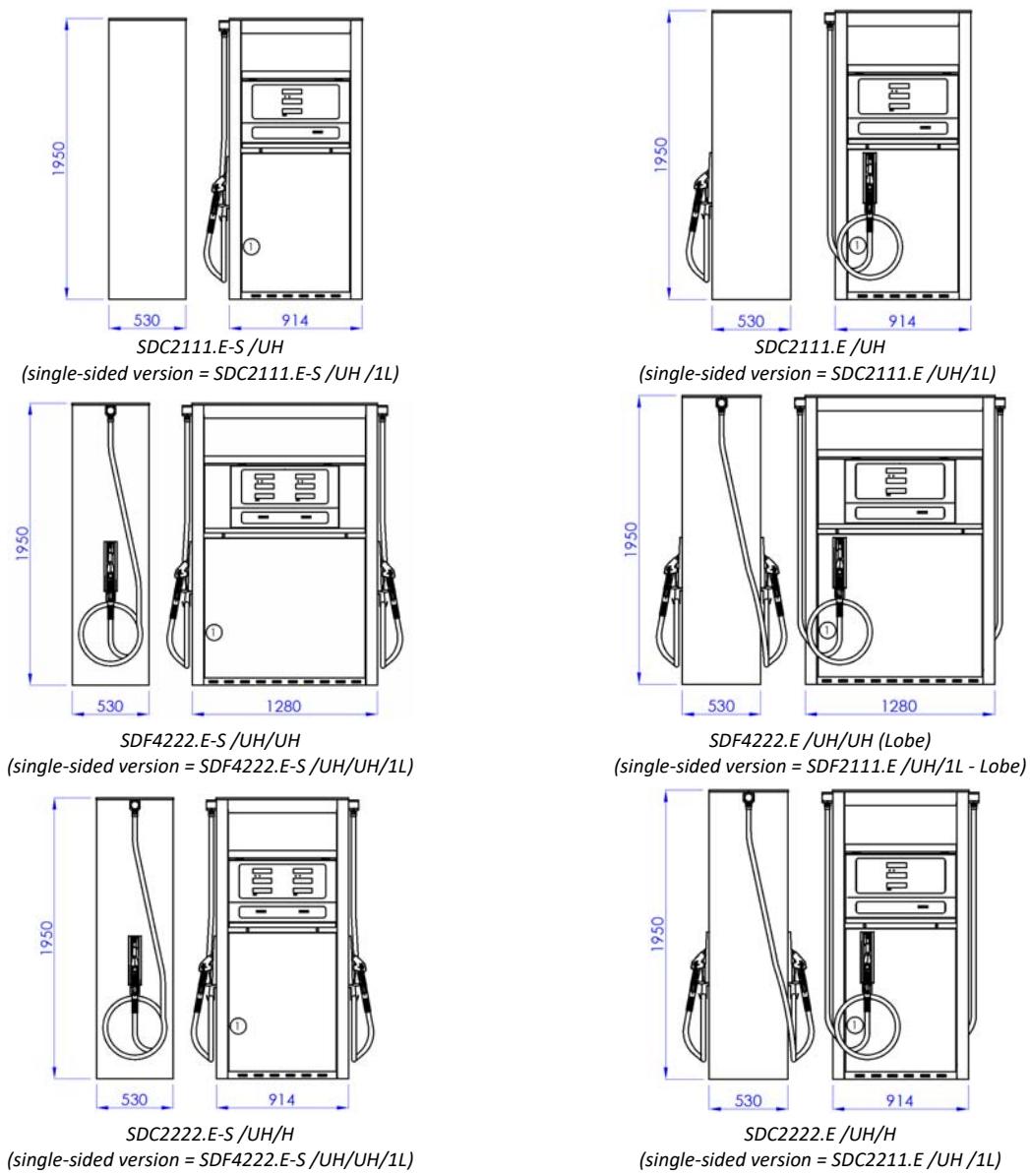
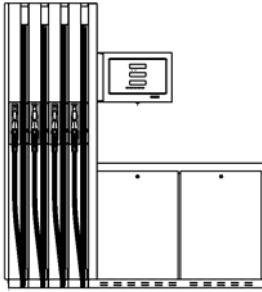


Figure 14 - Models of SUNNY-XE EURO dispensers for diesel delivery

2.5.7. OCEAN TALL DISPENSERS

Multi-product OCEAN TALL dispensers are standardly manufactured in a suction version in a single-sided left (L), single-sided right (R) or double-sided (D) design with one to ten delivery hoses for liquid fuel (gasoline, diesel, E85 ...) located on the front of the dispenser. Hoses are free-hanging on the dispenser. The design of dispensers can be basic or in CUBE or FIN variants.

List of standard OCEAN TALL models:



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Total number of products (i.e. number of pumps or inputs)	Number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
BMP4011.OTL(R)	1	1	1	1	1
BMP4012.OTD	2	1	2	2	2
BMP4022.OTL(R)	1	2	2	2	1
BMP4024.OTD	2	2	4	4	2
BMP4033.OTL(R)	1	3	3	3	1
BMP4036.OTD	2	3	6	6	2
BMP4044.OTL(R)	1	4	4	4	1
BMP4048.OTD	2	4	8	8	2
BMP4055.OTL(R)	1	5	5	5	1
BMP40510.OTD	2	5	10	10	2

Notes: The pumping performance is strongly dependent on the conditions at the station (distance from the tank, suction height, pipe inner diameter... etc.). The standard pumping performance is within the range of 35 to 50 L/min. For special models (see chapter 2.4), the performance of the diesel hoses can be increased to a high performance of 70 to 90 L/min (/H) or ultra-high performance from 120 to 150 L/min (/UH). When using a special meter (LOBE), the pumping performance can be increased up to 170 L/min and in a pressure version up to 200 L/min, depending on the submersible pump power. Special models marked -2C and -4C can simultaneously deliver two liquid fuels on one side of the dispenser. Dispensers can also be produced in a pressure version without pumps (/S3) where the central submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. According to the number of gasoline products, dispensers can be equipped with a vapour recovery system (/VR, /VR2, /VR3...) of the 2nd level and optionally with an electronic system that monitors the correct function and efficiency of the recovery system. Delivery nozzles are standardly placed on the front of the dispenser. In the case of a single-product diesel model, it is also possible to have a version with a side-mounted nozzle (-ZV1). For each dispenser model it is possible to provide one or two hoses for diesel delivery. This allows one delivery (one transaction) from two hoses at a time. The dispenser with an output for the satellite hose is supplemented with /MAS abbreviation and the dispenser with a satellite hose with /SAT abbreviation.

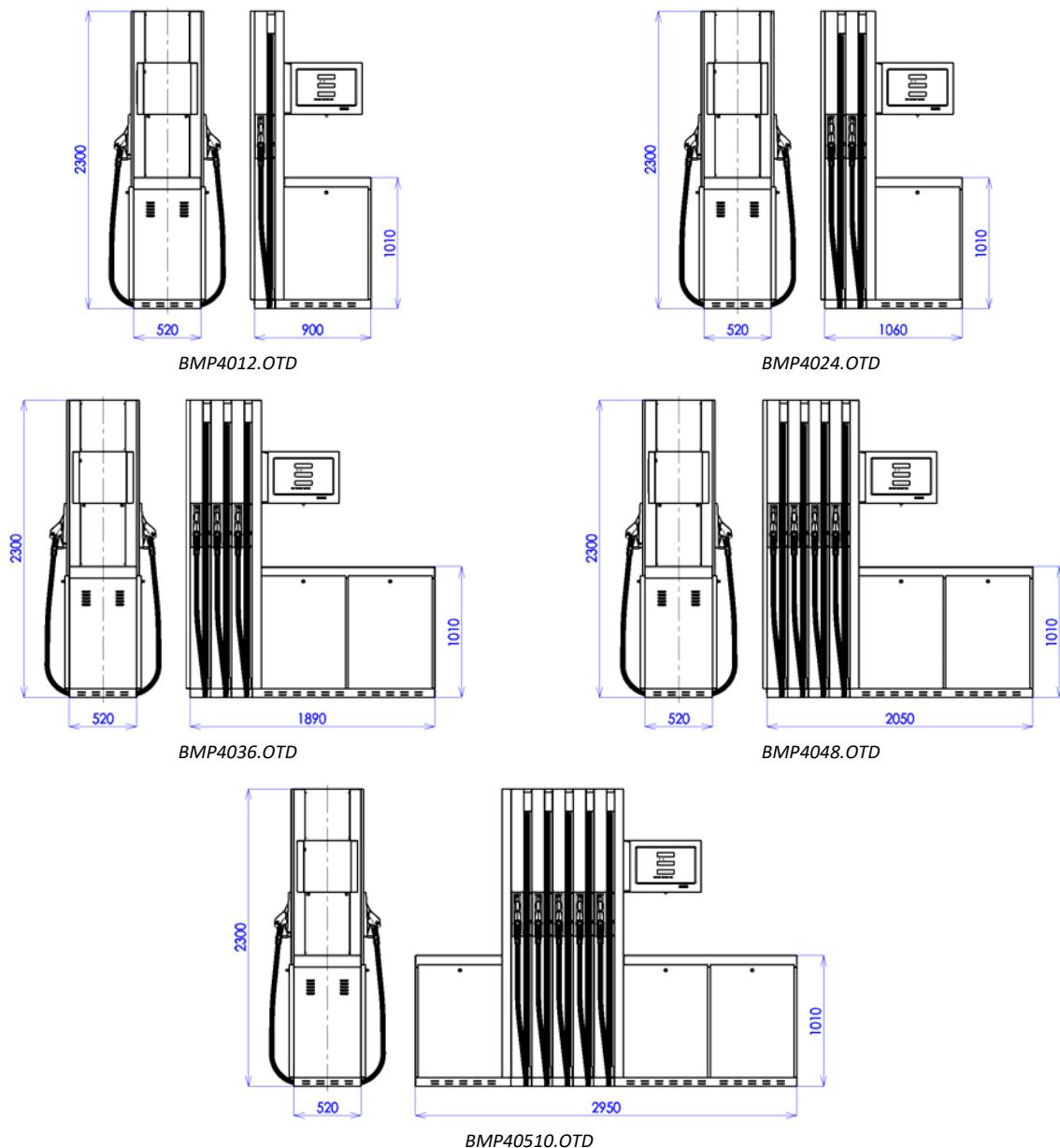


Figure 15 - Overview of standard OCEAN TALL models in basic design

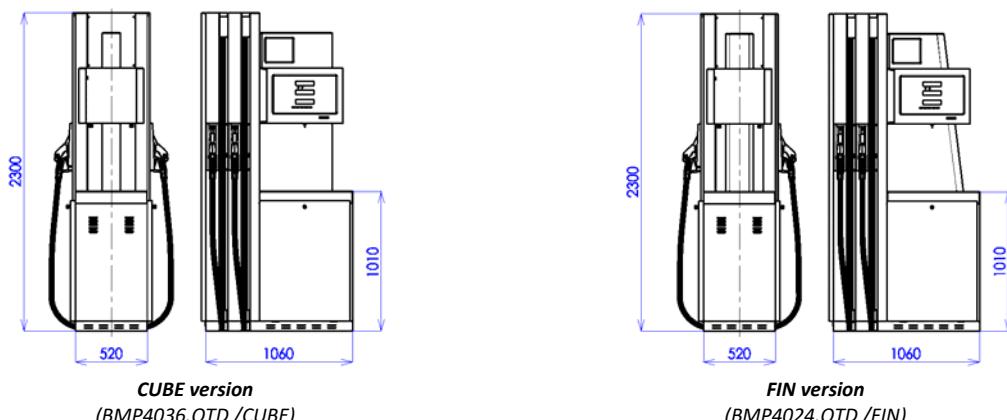
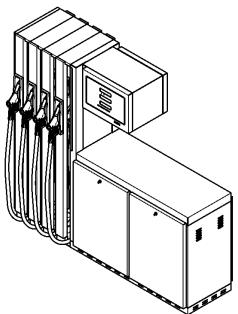


Figure 16 - Design variants of OCEAN TALL dispensers

2.5.8. OCEAN EURO DISPENSERS

Multi-product OCEAN EURO dispensers are standardly manufactured in a suction version in a single-sided left (L), single-sided right (R) or double-sided (D) design with one to ten delivery hoses for liquid fuel (gasoline, diesel, E85 ...) located on the front of the dispenser. The hoses are wound on a reel in the dispenser. The design of dispensers can be basic or one of the specific variants CUBE, FIN or WAVE.

List of standard OCEAN EURO models:



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Total number of products (i.e. number of pumps or inputs)	Number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
BMP4011.OEL(R)	1	1	1	1	1
BMP4012.OED	2	1	2	2	2
BMP4022.OEL(R)	1	2	2	2	1
BMP4024.OED	2	2	4	4	2
BMP4033.OEL(R)	1	3	3	3	1
BMP4036.OED	2	3	6	6	2
BMP4044.OEL(R)	1	4	4	4	1
BMP4048.OED	2	4	8	8	2
BMP4055.OEL(R)	1	5	5	5	1
BMP40510.OED	2	5	10	10	2

Notes: The pumping performance is strongly dependent on the conditions at the station (distance from the tank, suction height, pipe inner diameter... etc.). The standard pumping performance is within the range of 35 to 50 L/min. For special models (see chapter 2.4), the performance of the diesel hoses can be increased to a high performance of 70 to 90 L/min (/H) or ultra-high performance from 120 to 150 L/min (/UH). When using a special meter (LOBE), the pumping performance can be increased up to 170 L/min and in a pressure version up to 200 L/min, depending on the submersible pump power. Special models marked -2C and -4C can simultaneously deliver two liquid fuels on one side of the dispenser. Dispensers can also be produced in a pressure version without pumps (/S3) where the central submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. According to the number of gasoline products, dispensers can be equipped with a vapour recovery system (/VR, /VR2, /VR3...) of the 2nd level and optionally with an electronic system that monitors the correct function and efficiency of the recovery system. Delivery nozzles are standardly placed on the front of the dispenser. In the case of a single-product diesel model, it is also possible to have a version with a side-mounted nozzle (-ZV1). For each dispenser model it is possible to provide one or two hoses for diesel delivery. This allows one delivery (one transaction) from two hoses at a time. The dispenser with an output for the satellite hose is supplemented with /MAS abbreviation and the dispenser with a satellite hose with /SAT abbreviation.

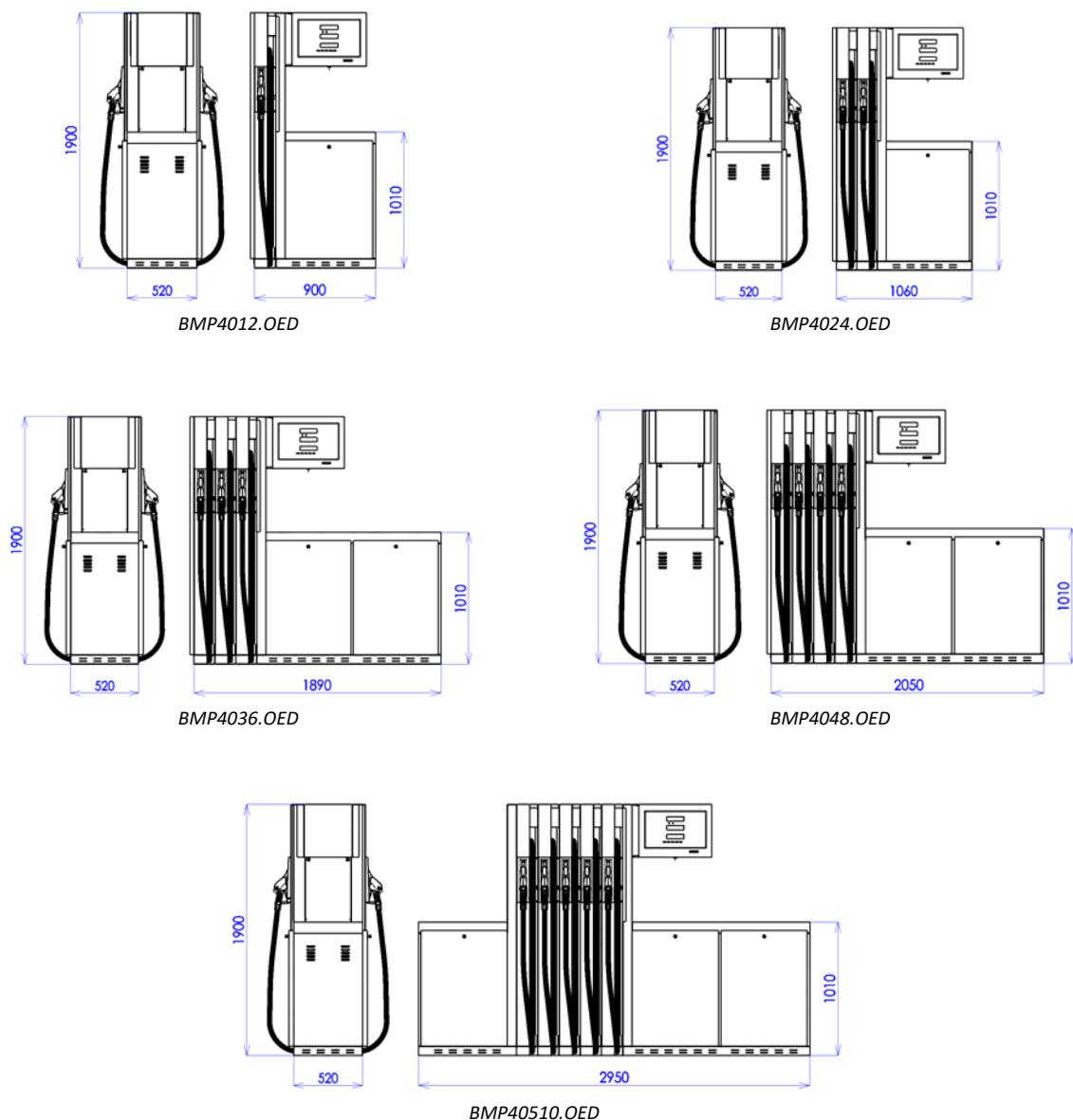


Figure 17 - Overview of standard OCEAN EURO models in basic design

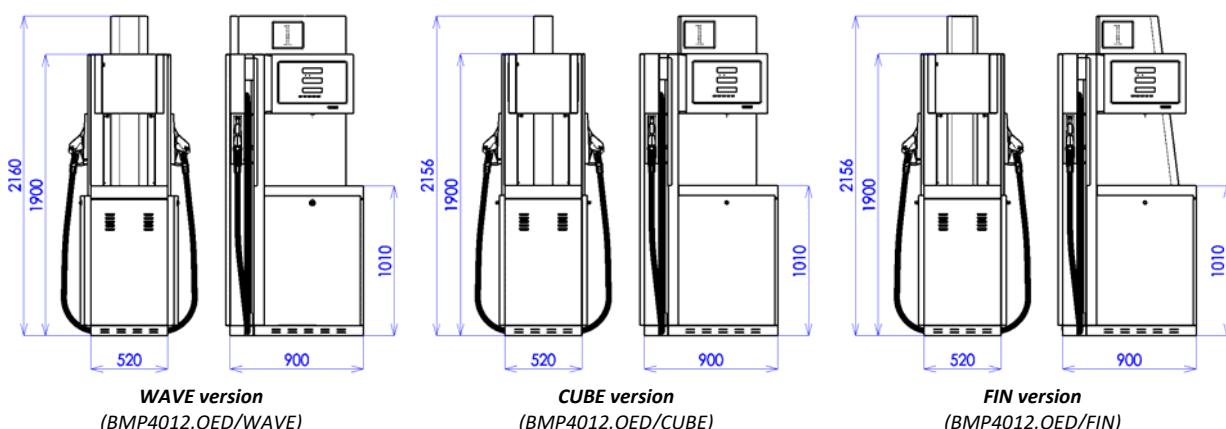
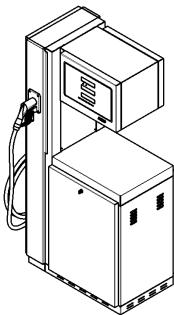


Figure 18 - Design variants of OCEAN EURO dispensers

2.5.9. OCEAN EURO LPG DISPENSERS

OCEAN EURO LPG dispensers are produced only in a pressure version, i.e. without a pump, in a single-sided left (L), single-sided right (R) or double-sided (D) version with one to four delivery hoses for LPG (liquefied propane butane) delivery. Delivery hoses are free-hanging or fitted with a reel (-HR) and are terminated by front-mounted delivery nozzles. The design of dispensers can be basic or one of the specific variants CUBE, FIN or WAVE.

List of standard OCEAN EURO LPG models:



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Number of pressure inputs	Number of meters (number of measuring systems)	Number of delivery hoses	Number of main displays (number of simultaneous deliveries)	Filling performance [L/min]
BMP4011.OEL(R) /LPG	1	1	1	1	1	1x50
BMP4012.OED /LPG	2	1	2	2	2	2x35
BMP4022.OED /LPG	2	2	2	2	2	2x50
BMP4022.OEL(R) /LPG-2C	1	2	2	2	2	2x50
BMP4034.OED /LPG-4C	2	3	4	4	4	2x50 + 2x35

Notes: The pumping performance depends on the conditions at the station (pump distance, pump pressure ... etc). Standard pumping performance for models with one inlet, one hose (11) and two inlets, two hoses (22) is 50 L/min. For models with one input, two hoses (12) the performance is 35 L/min. Note that when exceeding the maximum operating pressure of 18 bar (0.18 MPa), higher pumping performance may also occur but also a lack of separation of the gaseous phase from the LPG fuel. By default, LPG dispensers are equipped with DISH standard connector most widely used in Europe. At customer's request, the dispensers can be equipped with ACME standard nozzles (Belgium, Germany, Ireland and Austria), BAYO, or EURO nozzles (Spain, Portugal).

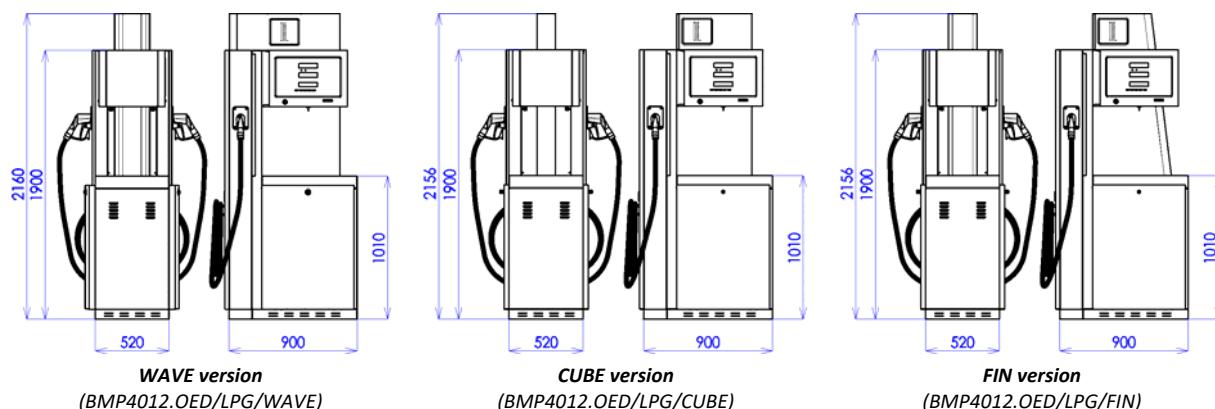


Figure 19 - Design variants of OCEAN EURO LPG dispensers

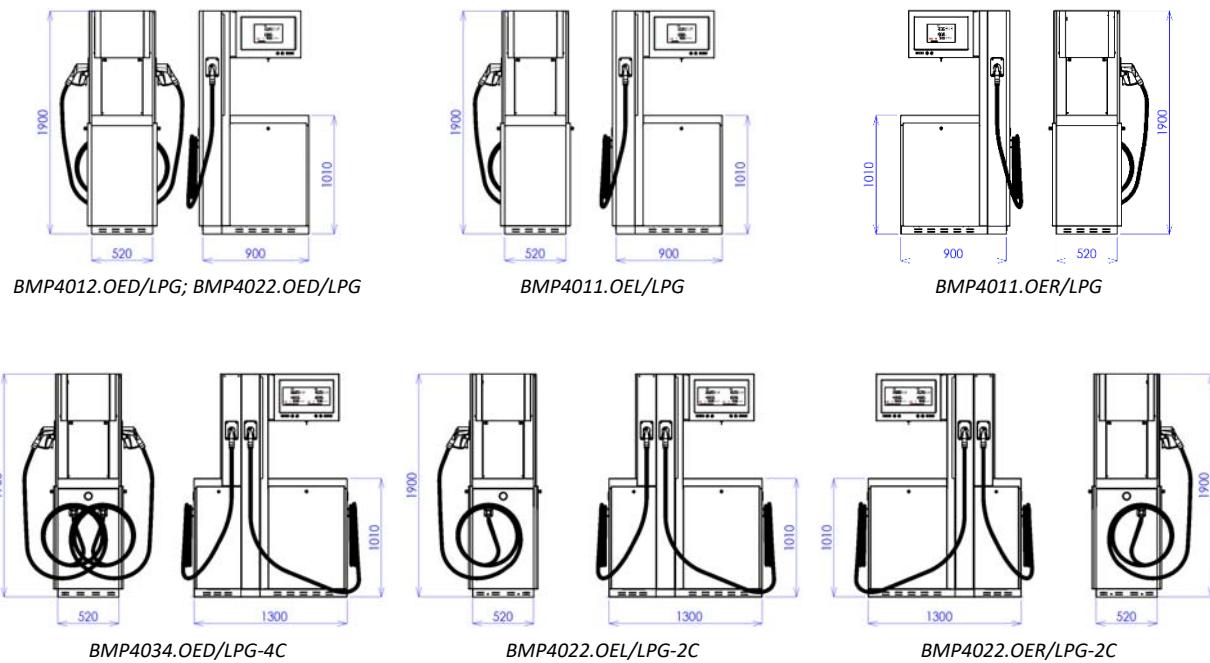


Figure 20 - Overview of standard OCEAN EURO LPG models without hose reels

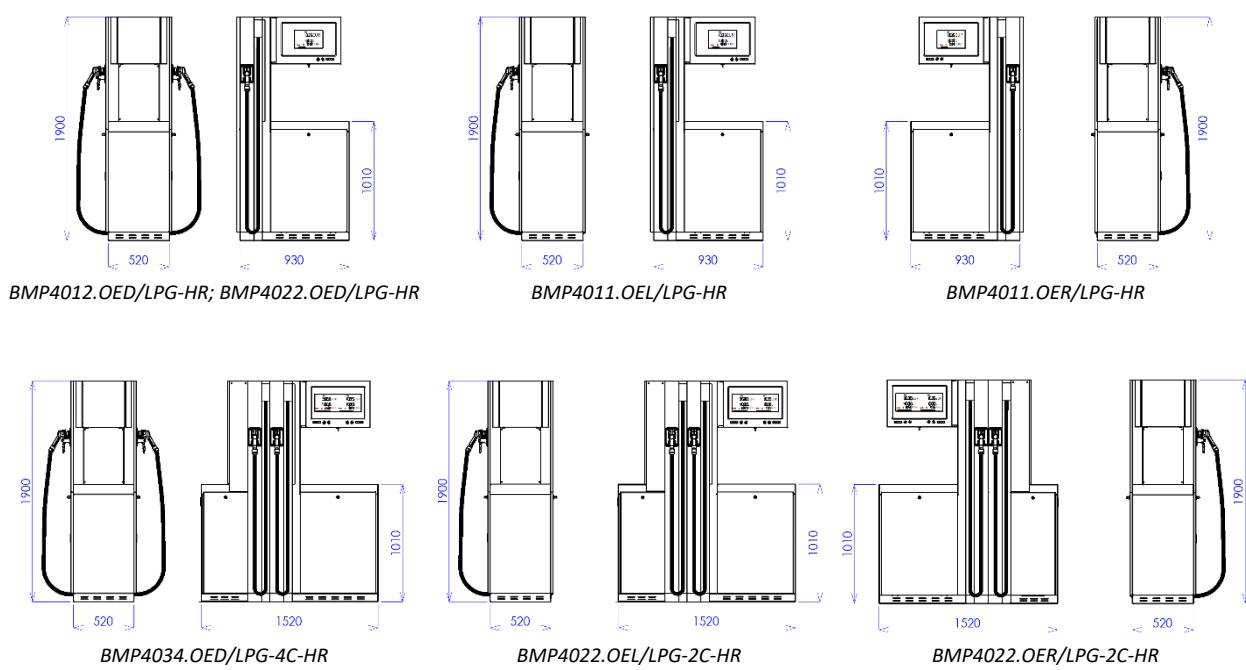
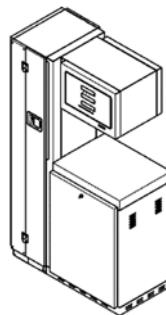


Figure 21 - Overview of standard OCEAN EURO LPG models with delivery hose reels

2.5.10. OCEAN EURO ADBLUE® DISPENSERS

OCEAN EURO ADBLUE® dispensers are standardly manufactured in a pressure version, single-sided left (L), single-sided right (R) or double-sided (D) version with one or two delivery hoses for the delivery of AdBlue® reduction agent (32.5% urea solution; AUS32). The hoses are wound in the dispenser. The maximum pumping performance of the delivery hoses is 40 L/min for trucks or 10 L/min for passenger cars. The design of dispensers can be basic or one of the specific variants CUBE, FIN or WAVE.

List of standard OCEAN EURO ADBLUE® models:



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Number of pressure inputs	Number of meters (number of measuring systems)	Number of delivery hoses	Number of main displays (number of simultaneous deliveries)	Filling performance [L/min]
BMP4011.OEL /AdB	1	1	1	1	1	40/10
BMP4011.OER /AdB	1	1	1	1	1	40/10
BMP4012.OED /AdB	2	1	2	2	2	40/10

Note: OCEAN EURO ADBLUE® dispensers are standardly equipped with heating which keeps the temperature of the hydraulic part at + 10 °C. The dispenser can be supplemented with a pump and a storage tank for 250 L of the medium – see Figure 24.

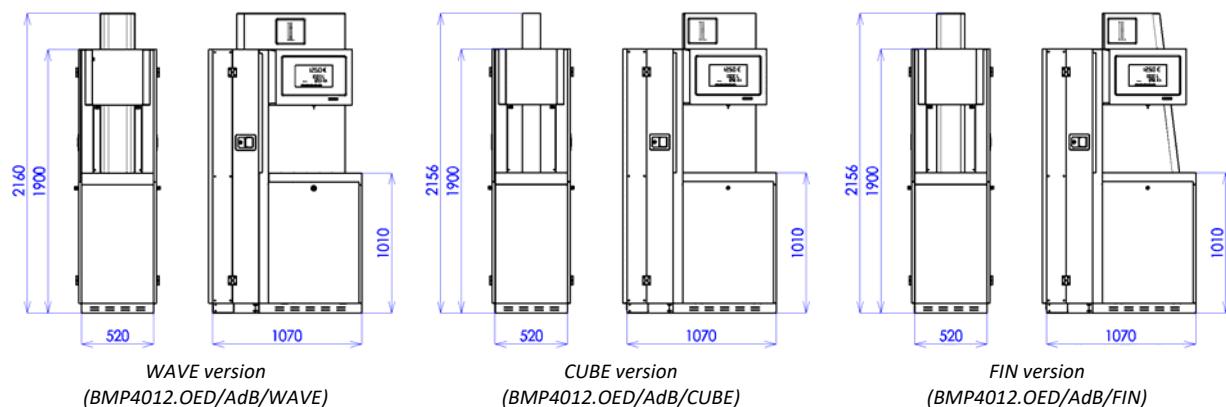


Figure 22 - Design variants of OCEAN EURO ADBLUE® dispensers

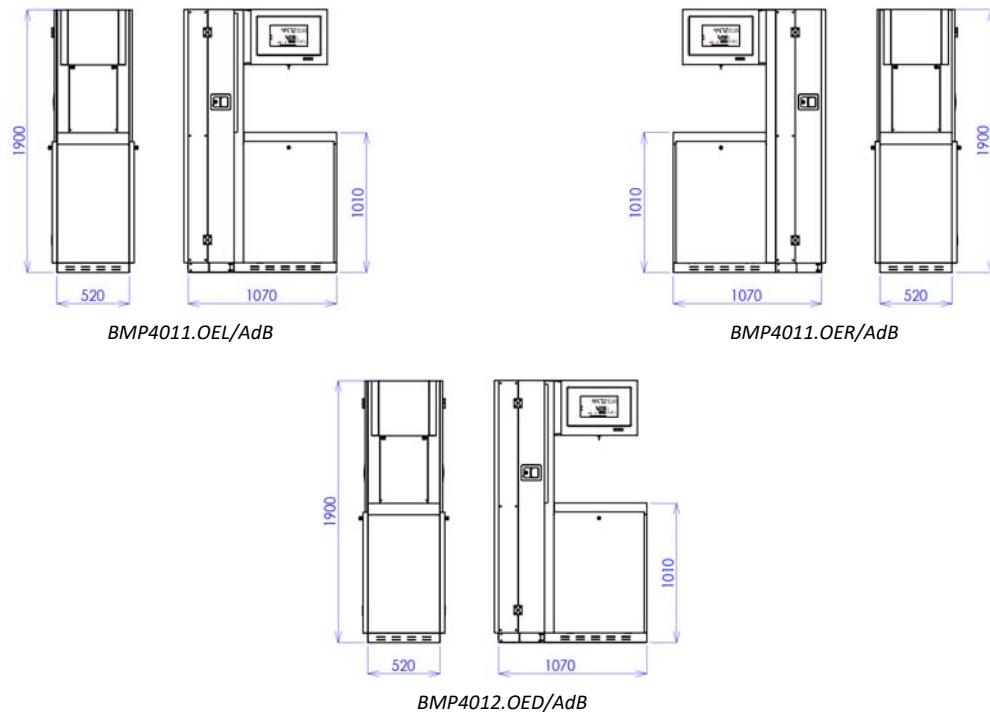


Figure 23 - Overview of standard OCEAN EURO ADBLUE® dispensers

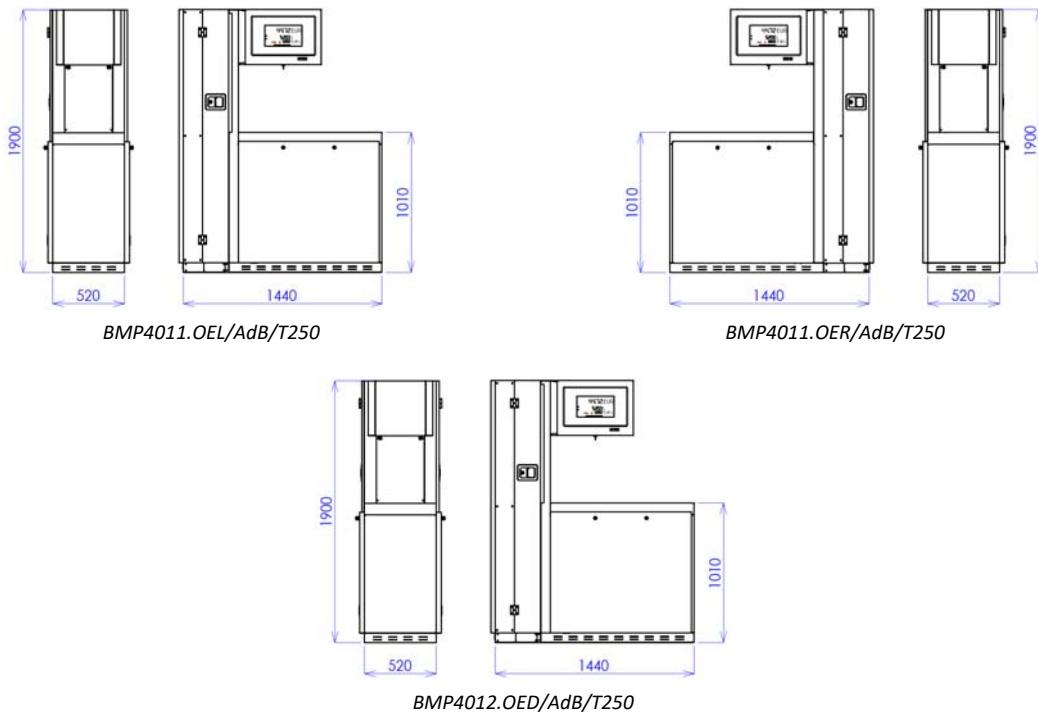
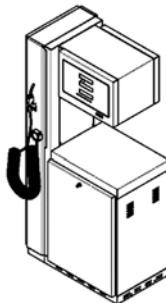


Figure 24 - Overview of OCEAN EURO ADBLUE® dispensers with 250L storage tank and pump

2.5.11. OCEAN EURO WSE DISPENSERS

OCEAN EURO WSE dispensers are standardly manufactured in a pressure version, single-sided left (L), single-sided right (R) or double-sided (D) version with one or two spiral delivery hoses for the delivery of windshield washer fluid (WSE - water + detergent + ethanol). Maximum pumping performance of delivery hoses is 20 L/min. The design of dispensers can be basic or one of the specific variants CUBE, FIN or WAVE.

List of standard OCEAN EURO WSE models:



Dispenser model	Access to dispenser (1-single-sided, 2-double-sided)	Number of pressure inputs	Number of meters (number of measuring systems)	Number of delivery hoses	Number of main displays (number of simultaneous deliveries)	Filling performance [L/min]
BMP4011.OEL /WSE	1	1	1	1	1	20
BMP4011.OER /WSE	1	1	1	1	1	20
BMP4012.OED /WSE	2	1	2	2	2	20

Note: The standard OCEAN EURO WSE dispenser can be supplemented with a pump and a 250L storage tank, see Figure 24.

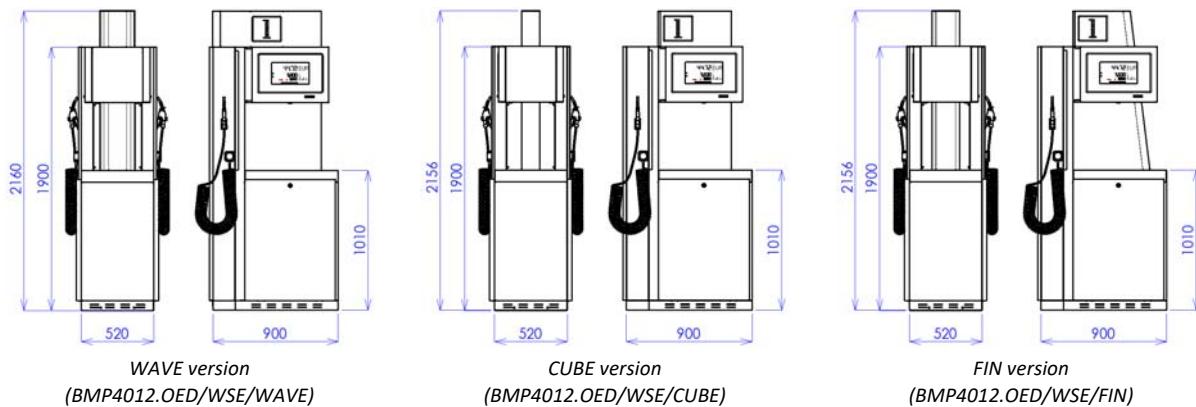


Figure 25 - Design variants of OCEAN EURO WSE dispensers

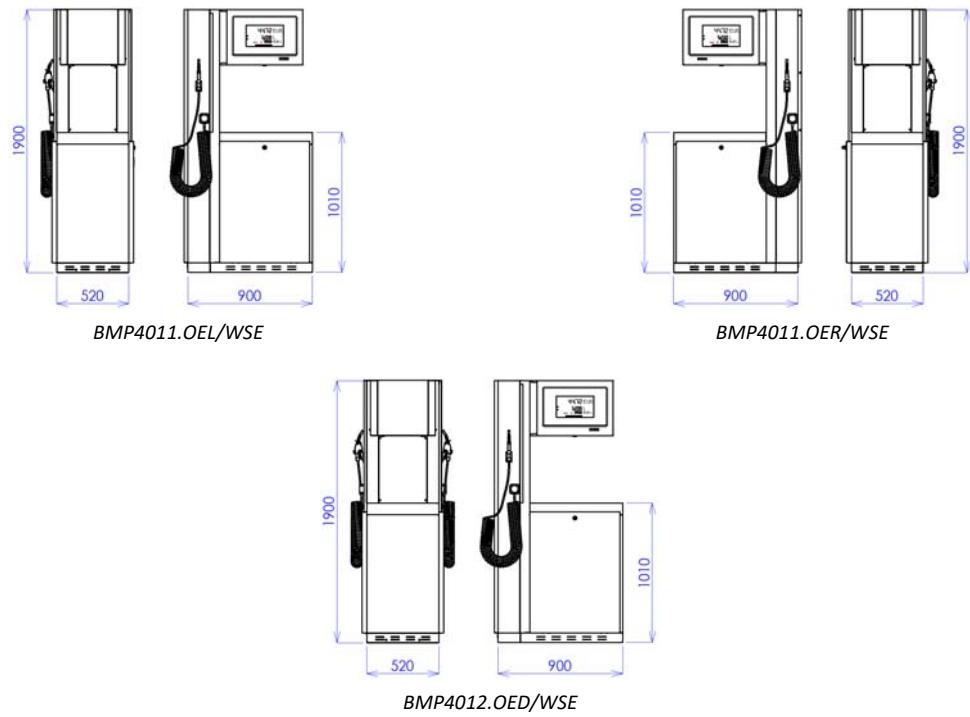


Figure 26 - Overview of standard OCEAN EURO WSE dispensers

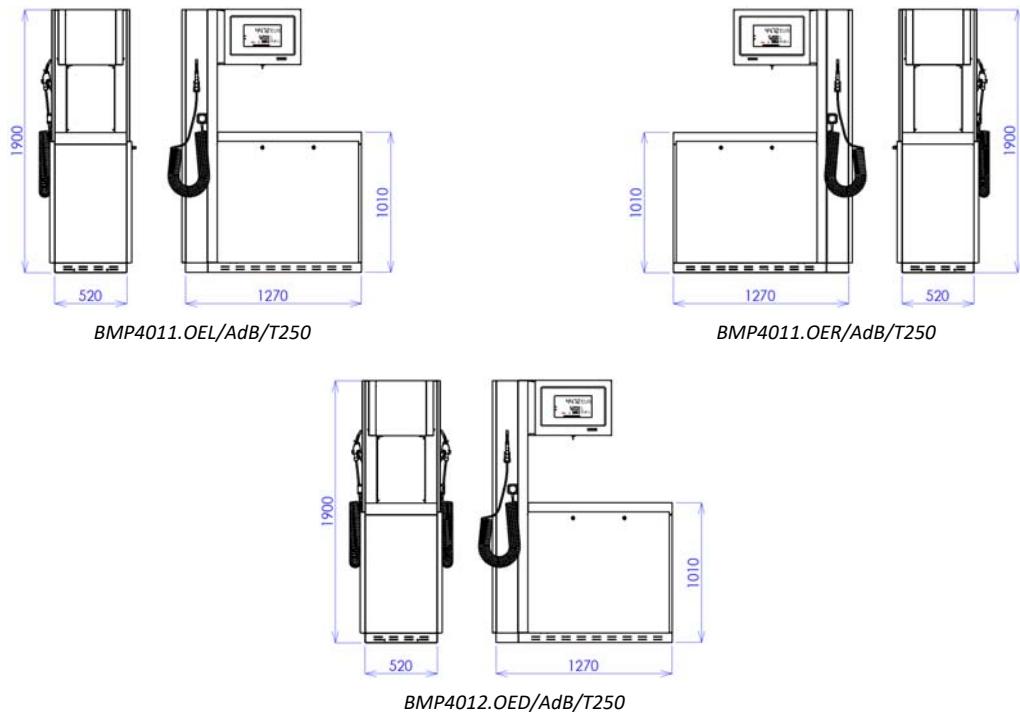
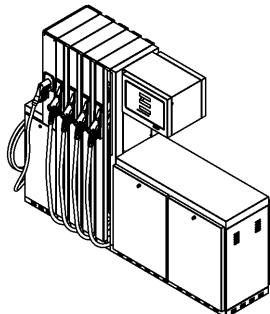


Figure 27 - Overview of OCEAN EURO ADBLUE® dispensers with 250L storage tank and pump

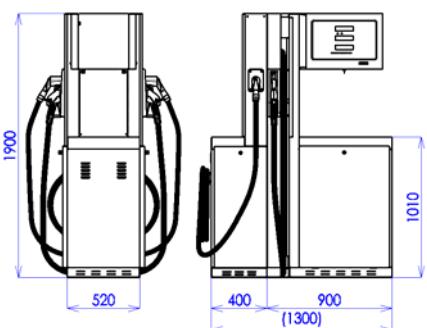
2.5.12. COMBINED OCEAN EURO DISPENSERS WITH LPG MODULE

Combined OCEAN EURO dispensers with LPG module (OCEAN EURO COMBI LPG) consist of the OCEAN EURO basic liquid fuel dispenser and the additional LPG dispensing module. The combined dispensers are made in a single-sided left (L), single-sided right (R) and double-sided version with one to eight delivery hoses for fuel delivery wound inside the dispenser with hose reels and one or two free-hanging delivery hoses for LPG delivery, or LPG hoses with a reel (-HR). The design of all dispensers can be basic or in CUBE, WAVE or FIN variants. List of standard OCEAN EURO COMBI LPG models:

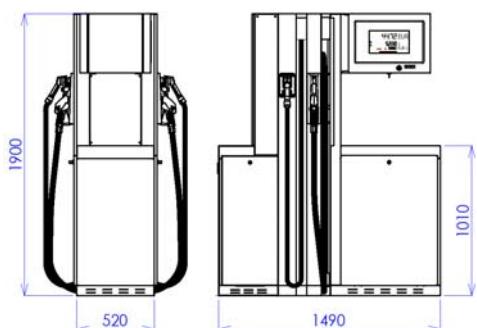


Fuel combined dispensers	+ LPG dispensing module	Access to dispenser (2-double-sided, 1-single-sided)	Total number of products (i.e. number of pumps or inputs)	Number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
BMP4011.OEL(R)	+ MOD4011.OEL(R)/LPG	1	2	2	1+1	1
BMP4011.OEL(R)-2C	+ MOD4011.OEL(R)/LPG	1	2	2	1+1	2
BMP4012.OED	+ MOD4012.OED /LPG	2	2	4	2+2	2
BMP4012.OED -4C	+ MOD4012.OED /LPG	2	2	4	2+2	4
BMP4022.OEL(R)	+ MOD4011.OEL(R) /LPG	1	3	3	1+1	1
BMP4022.OEL(R) -2C	+ MOD4011.OEL(R) /LPG	1	3	3	2+1	2
BMP4024.OED	+ MOD4012.OED /LPG	2	3	6	4+2	2
BMP4024.OED -4C	+ MOD4012.OED /LPG	2	3	6	4+2	4
BMP4033.OEL(R)	+ MOD4011.OEL(R) /LPG	1	4	4	3+1	1
BMP4033.OEL(R) -2C	+ MOD4011.OEL(R) /LPG	1	4	4	3+1	2
BMP4036.OED	+ MOD4012.OED /LPG	2	4	8	6+2	2
BMP4036.OED -4C	+ MOD4012.OED /LPG	2	4	8	6+2	4
BMP4044.OEL(R)	+ MOD4011.OEL(R) /LPG	1	5	5	4+1	1
BMP4044.OEL(R) -2C	+ MOD4011.OEL(R) /LPG	1	5	5	4+1	2
BMP4048.OED	+ MOD4012.OED /LPG	2	5	10	8+2	2
BMP4048.OED -4C	+ MOD4012.OED /LPG	2	5	10	8+2	4

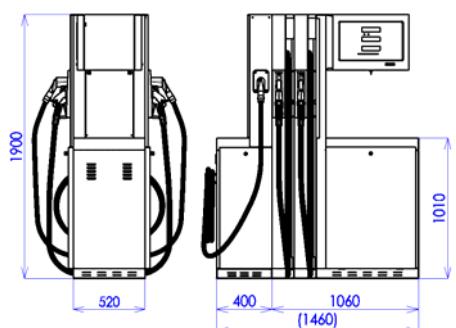
Note: Standard performance of fuel hoses (gasoline, diesel ...) 40 L/min., standard output of LPG hoses at a single-sided version 50 L/min, for a double-sided version 35 L/min. The models marked -2C and -4C can simultaneously deliver LPG and one of the liquid fuels (gasoline, diesel ...). The output of the diesel hoses can be increased to 80 L/min (/H) or 120-150 L/min (/UH).



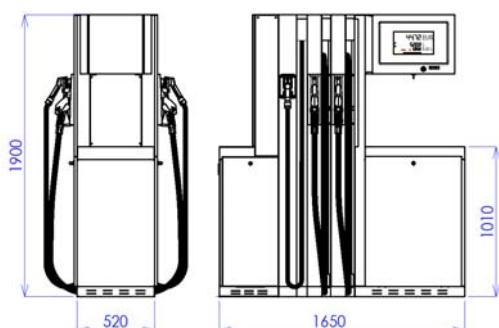
BMP4012.OED+MOD4012.OED/LPG



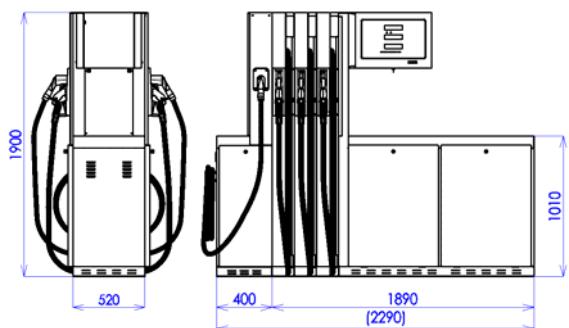
BMP4012.OED+MOD4012.OED/LPG-HR



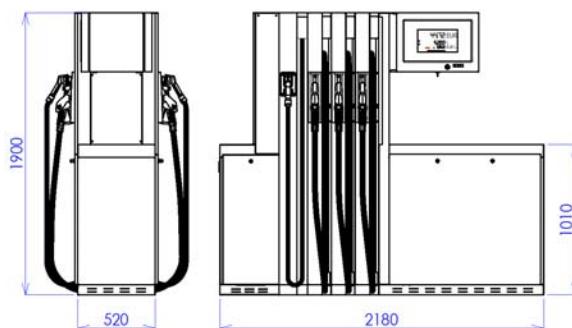
BMP4024.OED+MOD4012.OED/LPG



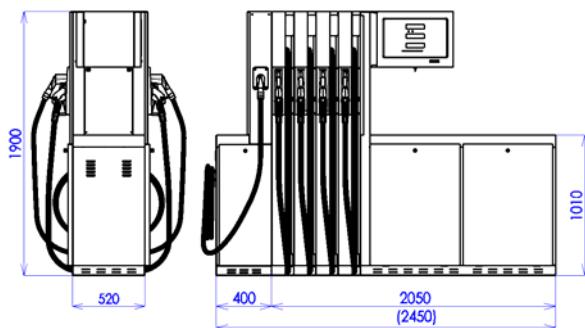
BMP4024.OED+MOD4012.OED/LPG-HR



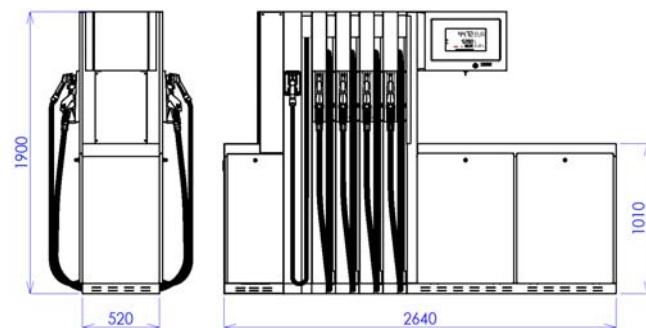
BMP4036.OED+MOD4012.OED/LPG



BMP4036.OED+MOD4012.OED/LPG-HR



BMP4048.OED+MOD4012.OED/LPG

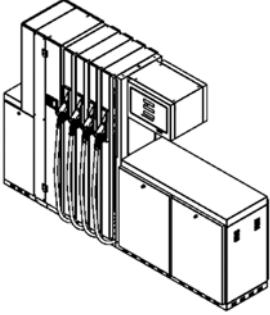


BMP4048.OED+MOD4012.OED/LPG-HR

Figure 28 - Overview of standard OCEAN EURO COMBI LPG dispensers in a basic design without LPG hose reels and with LPH hose reels (/HR)

2.5.13. COMBINED OCEAN EURO DISPENSERS WITH ADBLUE® MODULE

Combined OCEAN EURO dispensers with AdBlue® module (OCEAN EURO COMBI ADB) consist of the OCEAN EURO basic liquid fuel dispenser and the additional AdBlue® dispensing module. The combined dispensers are made in a single-sided left (L), single-sided right (R) and double-sided version with one to eight delivery hoses for fuel delivery wound inside the dispenser with hose reels and one or two delivery hoses for AdBlue® delivery wound in a heated additional module. The design of all dispensers can be basic or in CUBE, WAVE or FIN variants. List of standard OCEAN EURO COMBI ADB models:



Fuel combined dispensers	+ ADB dispensing module	Access to dispenser (2-double-sided, 1-single-sided)	Total number of products (i.e. number of pumps or inputs)	Number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
BMP4011.OEL(R)	+ MOD4011.OEL(R)/AdB	1	2	2	1+1	1
BMP4011.OEL(R)-2C	+ MOD4011.OEL(R)/AdB	1	2	2	1+1	2
BMP4012.OED	+ MOD4012.OED /AdB	2	2	4	2+2	2
BMP4012.OED -4C	+ MOD4012.OED /AdB	2	2	4	2+2	4
BMP4022.OEL(R)	+ MOD4011.OEL(R) /AdB	1	3	3	1+1	1
BMP4022.OEL(R) -2C	+ MOD4011.OEL(R) /AdB	1	3	3	2+1	2
BMP4024.OED	+ MOD4012.OED /AdB	2	3	6	4+2	2
BMP4024.OED -4C	+ MOD4012.OED /AdB	2	3	6	4+2	4
BMP4033.OEL(R)	+ MOD4011.OEL(R) /AdB	1	4	4	3+1	1
BMP4033.OEL(R) -2C	+ MOD4011.OEL(R) /AdB	1	4	4	3+1	2
BMP4036.OED	+ MOD4012.OED /AdB	2	4	8	6+2	2
BMP4036.OED -4C	+ MOD4012.OED /AdB	2	4	8	6+2	4
BMP4044.OEL(R)	+ MOD4011.OEL(R) /AdB	1	5	5	4+1	1
BMP4044.OEL(R) -2C	+ MOD4011.OEL(R) /AdB	1	5	5	4+1	2
BMP4048.OED	+ MOD4012.OED /AdB	2	5	10	8+2	2
BMP4048.OED -4C	+ MOD4012.OED /AdB	2	5	10	8+2	4

Note: The standard performance of fuel hoses (gasoline, diesel ...) 40 L/min., standard AdBlue hose performance is 40 L/min for trucks or 10 L/min. for pumping into passenger cars. The models marked -2C and -4C can simultaneously deliver AdBlue® and one of the liquid fuels (gasoline, diesel ...). The output of the diesel hoses can be increased to 80 L/min (/H) or 120 to 150 L/min (/UH).

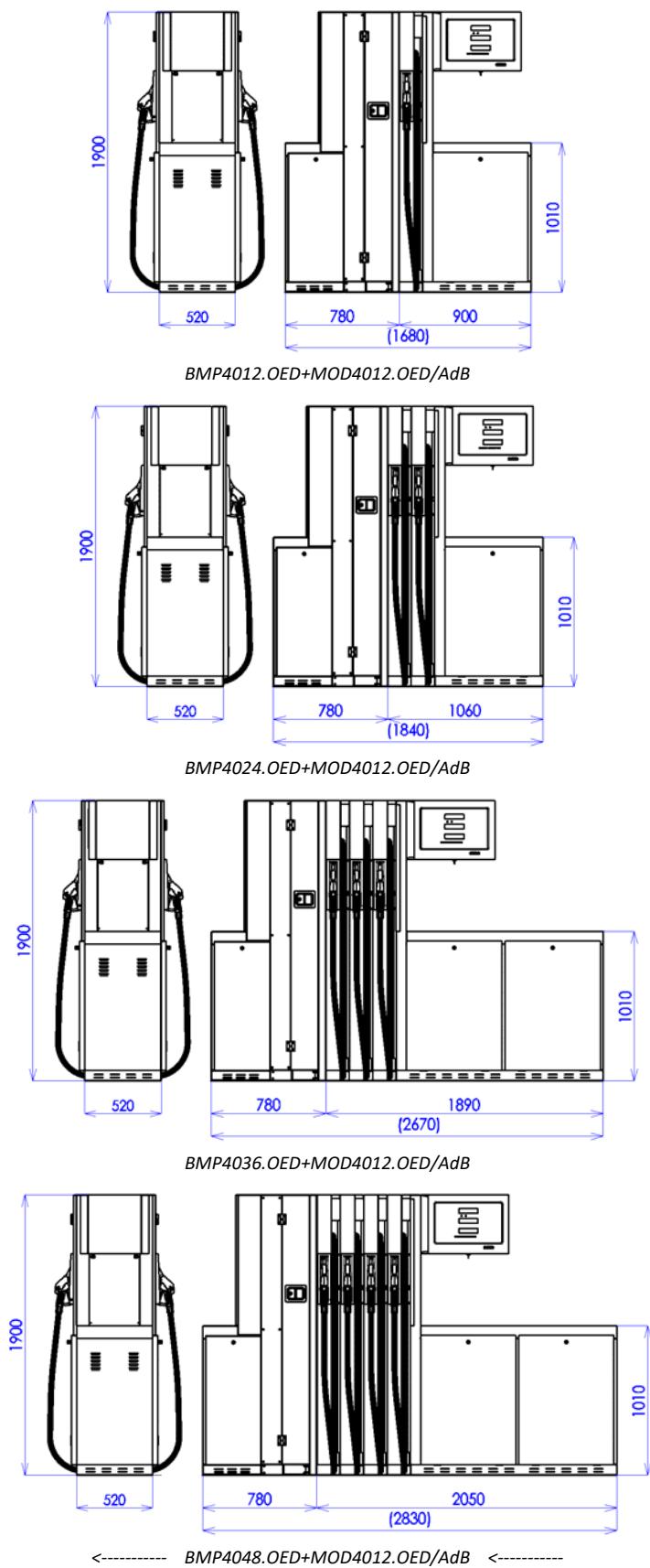
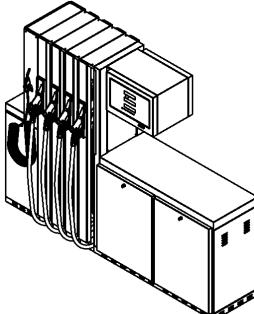


Figure 29 - Overview of standard OCEAN EURO COMBI ADB models in basic design

2.5.14. COMBINED OCEAN EURO DISPENSERS WITH WSE MODULE

Combined OCEAN EURO dispensers with WSE module (OCEAN EURO COMBI WSE) consist of the OCEAN EURO basic liquid fuel dispenser and the additional windshield washer fluid (WSE) dispensing module. The combined dispensers are made in a single-sided left (L), single-sided right (R) and double-sided version with one to eight delivery hoses for fuel delivery wound inside the dispenser with hose reels and one or two free-hanging spiral delivery hoses for WSE delivery. The design of all dispensers can be basic or in CUBE, WAVE or FIN variants. List of standard OCEAN EURO COMBI WSE models:



Fuel combined dispensers	+ WSE dispensing module	Access to dispenser (2-double-sided, 1-single-sided)	Total number of products (i.e. number of pumps or inputs)	Total number of meters (number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (number of simultaneous deliveries)
BMP4011.OEL(R)	+ MOD4011.OEL(R)/WSE	1	2	2	1+1	1
BMP4011.OEL(R)-2C	+ MOD4011.OEL(R)/WSE	1	2	2	1+1	2
BMP4012.OED	+ MOD4012.OED /WSE	2	2	4	2+2	2
BMP4012.OED -4C	+ MOD4012.OED /WSE	2	2	4	2+2	4
BMP4022.OEL(R)	+ MOD4011.OEL(R) /WSE	1	3	3	1+1	1
BMP4022.OEL(R) -2C	+ MOD4011.OEL(R) /WSE	1	3	3	2+1	2
BMP4024.OED	+ MOD4012.OED /WSE	2	3	6	4+2	2
BMP4024.OED -4C	+ MOD4012.OED /WSE	2	3	6	4+2	4
BMP4033.OEL(R)	+ MOD4011.OEL(R) /WSE	1	4	4	3+1	1
BMP4033.OEL(R) -2C	+ MOD4011.OEL(R) /WSE	1	4	4	3+1	2
BMP4036.OED	+ MOD4012.OED /WSE	2	4	8	6+2	2
BMP4036.OED -4C	+ MOD4012.OED /WSE	2	4	8	6+2	4
BMP4044.OEL(R)	+ MOD4011.OEL(R) /WSE	1	5	5	4+1	1
BMP4044.OEL(R) -2C	+ MOD4011.OEL(R) /WSE	1	5	5	4+1	2
BMP4048.OED	+ MOD4012.OED /WSE	2	5	10	8+2	2
BMP4048.OED -4C	+ MOD4012.OED /WSE	2	5	10	8+2	4

Note: The standard performance of fuel hoses (gasoline, diesel ...) is 40 L/min., standard WSE hose performance is 20 L/min for trucks or 10 L/min for pumping into passenger cars. The models marked -2C and -4C can simultaneously deliver windshield washer fluid and one of the liquid fuels (gasoline, diesel ...). The output of the diesel hoses can be increased to 80 L/min (/H) or 120 to 150 L/min (/UH).

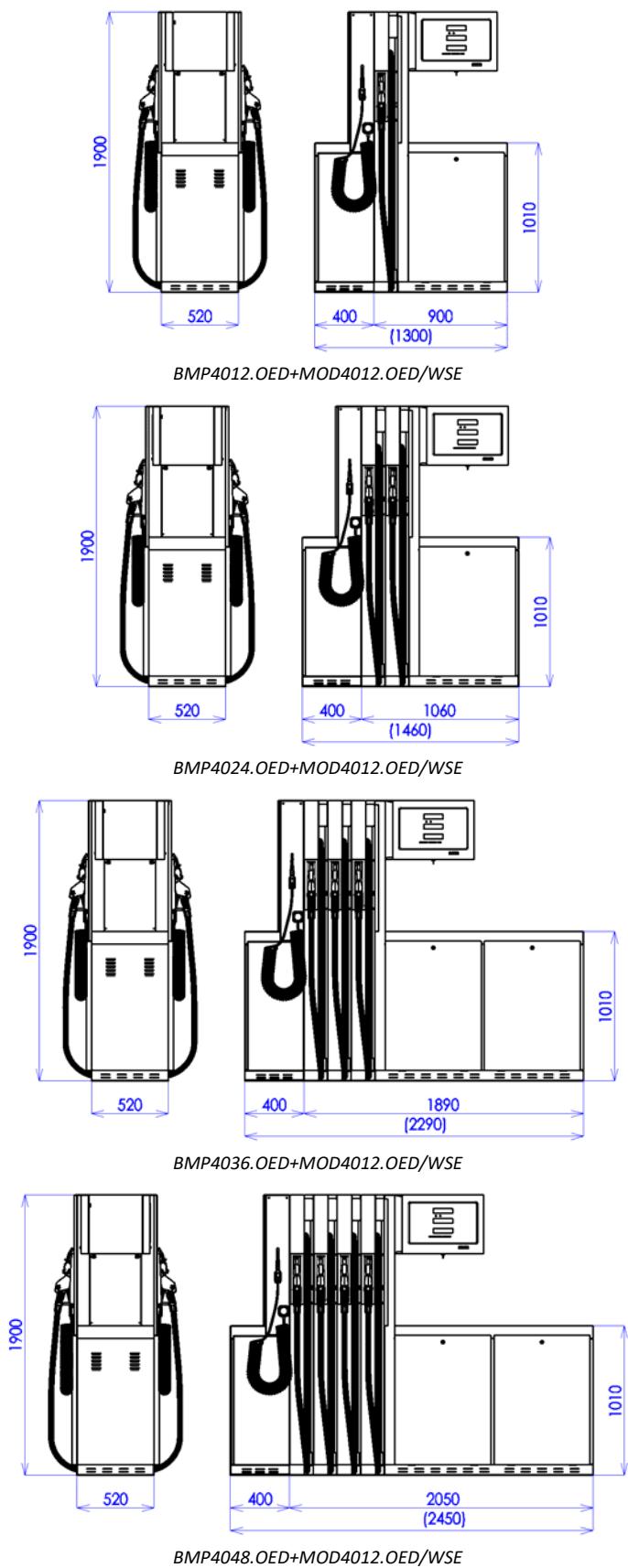
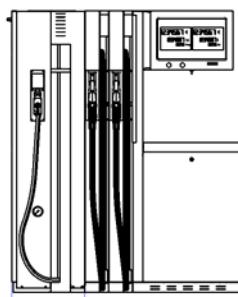


Figure 30 - Overview of standard OCEAN EURO COMBI WSE models in basic design

2.5.15. COMBINED OCEAN EURO DISPENSERS WITH CNG MODULE

Combined OCEAN EURO dispensers with CNG module (OCEAN EURO COMBI CNG) consist of the OCEAN EURO basic liquid fuel dispenser and the additional compressed natural gas (CNG) dispensing module. The combined dispensers are made in a single-sided left (L), single-sided right (R) and double-sided version with one to eight delivery hoses for fuel delivery wound inside the dispenser with hose reels and one or two free-hanging delivery hoses for CNG delivery. The design of all dispensers can be basic or in CUBE, WAVE or FIN variants. List of standard OCEAN EURO COMBI CNG models:



Fuel combined dispensers	+ CNG dispensing module	Access to dispenser (2-double-sided, 1-single-sided)	Total number of products (i.e. number of pumps or inputs)	Total number of meters (i.e. number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (i.e. number of simultaneous deliveries)
BMP4011.OEL(R)	+ MOD40x1.OEL(R)/CNG	1	2	2	1+1	1
BMP4011.OEL(R)-2C	+ MOD40x1.OEL(R)/CNG	1	2	2	1+1	2
BMP4012.OED	+ MOD40x2.OED /CNG	2	2	4	2+2	2
BMP4012.OED -4C	+ MOD40x2.OED /CNG	2	2	4	2+2	4
BMP4022.OEL(R)	+ MOD40x1.OEL(R) /CNG	1	3	3	1+1	1
BMP4022.OEL(R) -2C	+ MOD40x1.OEL(R) /CNG	1	3	3	2+1	2
BMP4024.OED	+ MOD40x2.OED /CNG	2	3	6	4+2	2
BMP4024.OED -4C	+ MOD40x2.OED /CNG	2	3	6	4+2	4
BMP4033.OEL(R)	+ MOD40x1.OEL(R) /CNG	1	4	4	3+1	1
BMP4033.OEL(R) -2C	+ MOD40x1.OEL(R) /CNG	1	4	4	3+1	2
BMP4036.OED	+ MOD40x2.OED /CNG	2	4	8	6+2	2
BMP4036.OED -4C	+ MOD40x2.OED /CNG	2	4	8	6+2	4
BMP4044.OEL(R)	+ MOD40x1.OEL(R) /CNG	1	5	5	4+1	1
BMP4044.OEL(R) -2C	+ MOD40x1.OEL(R) /CNG	1	5	5	4+1	2
BMP4048.OED	+ MOD40x2.OED /CNG	2	5	10	8+2	2
BMP4048.OED -4C	+ MOD40x2.OED /CNG	2	5	10	8+2	4

Note: Standard pumping performance of fuel hoses (gasoline, diesel ...) is 40 L/min, standard filling performance of the compressed natural gas delivery hoses is 30 kg/min. The models marked -2C and -4C can simultaneously deliver CNG and one of the liquid fuels (gasoline, diesel ...). The output of the diesel hoses can be increased to 80 L/min (/H) or 120 to 150 L/min (/UH).

x ... is the number of CNG inputs (CNG pressure tanks) x = 1,2 or 3

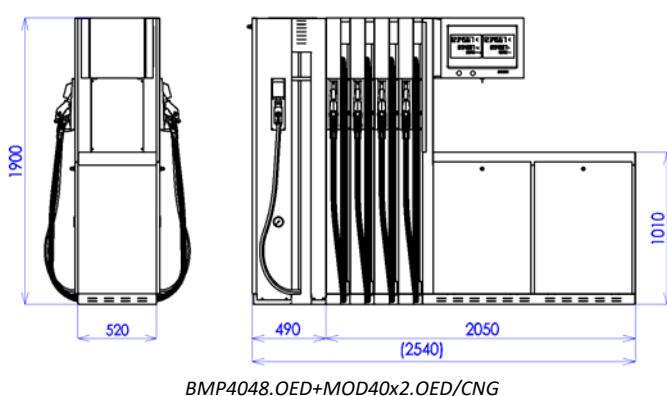
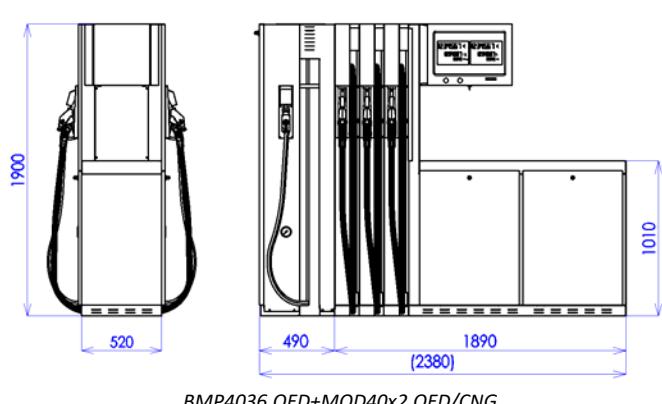
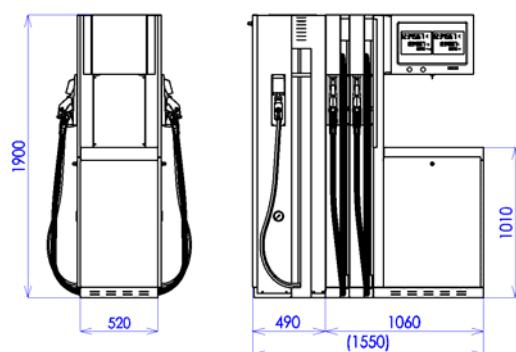
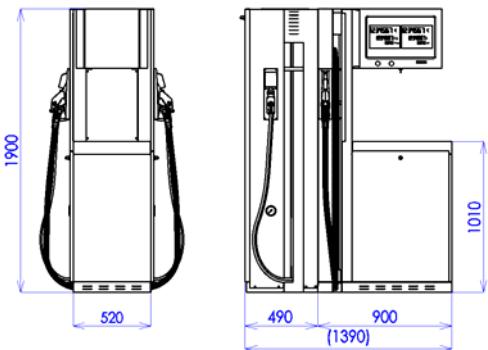
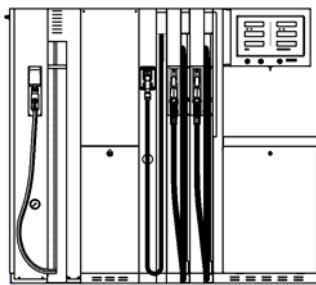


Figure 31 - Overview of standard OCEAN EURO COMBI CNG dispensers in a basic design, x=1, 2, 3 is a number of CNG inputs

2.5.16. COMBINED OCEAN EURO DISPENSERS WITH LPG AND CNG MODULES

Combined OCEAN EURO dispensers with additional LPG and CNG modules (OCEAN EURO COMBI LPG+CNG) consist of the OCEAN EURO basic liquid fuel dispenser and additional liquefied propane butane (LPG) and compressed natural gas (CNG) dispensing modules. The combined dispensers are made in a single-sided left (L), single-sided right (R) and double-sided version with one to eight delivery hoses for fuel delivery wound inside the dispenser with hose reels, one or two wound LPG delivery hoses and one or two free-hanging delivery hoses for CNG delivery. The design of all dispensers can be basic or in CUBE, WAVE or FIN variants. List of standard OCEAN EURO COMBI LPG+CNG models:



Fuel combined dispensers	+ LPG module	+ CNG module	Access to dispenser (2-double-sided, 1-single-sided)	Total number of products (number of pumps or inputs)	Total number of meters (number of measuring systems)	Number of delivery hoses (dispenser hose + module hose)	Number of main displays (number of simultaneous deliveries)
BMP4011.OEL(R)	+ MOD4011.OEL(R)/LPG	+ MOD40x1.OEL(R)/CNG	1	3	3	1+1+1	1
BMP4011.OEL(R)-2C	+ MOD4011.OEL(R)/LPG	+ MOD40x1.OEL(R)/CNG	1	3	3	1+1+1	2
BMP4012.OED	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	3	6	2+2+2	2
BMP4012.OED -4C	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	3	6	2+2+2	4
BMP4022.OEL(R)	+ MOD4011.OEL(R) /LPG	+ MOD40x1.OEL(R) /CNG	1	4	4	1+1+1	1
BMP4022.OEL(R) -2C	+ MOD4011.OEL(R) /LPG	+ MOD40x1.OEL(R) /CNG	1	4	4	2+1+1	2
BMP4024.OED	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	4	8	4+2+2	2
BMP4024.OED -4C	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	4	8	4+2+2	4
BMP4033.OEL(R)	+ MOD4011.OEL(R) /LPG	+ MOD40x1.OEL(R) /CNG	1	5	5	3+1+1	1
BMP4033.OEL(R) -2C	+ MOD4011.OEL(R) /LPG	+ MOD40x1.OEL(R) /CNG	1	5	5	3+1+1	2
BMP4036.OED	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	5	10	6+2+2	2
BMP4036.OED -4C	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	5	10	6+2+2	4
BMP4044.OEL(R)	+ MOD4011.OEL(R) /LPG	+ MOD40x1.OEL(R) /CNG	1	6	6	4+1+1	1
BMP4044.OEL(R) -2C	+ MOD4011.OEL(R) /LPG	+ MOD40x1.OEL(R) /CNG	1	6	6	4+1+1	2
BMP4048.OED	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	6	12	8+2+2	2
BMP4048.OED -4C	+ MOD4012.OED /LPG	+ MOD40x2.OED /CNG	2	6	12	8+2+2	4

Note: The standard pumping performance of the fuel hoses (gasoline, diesel ...) is 40 L/min, standard pumping performance of LPG hoses is 50 L/min for single-sided dispensers and 35 L/min for double-sided dispensers, standard filling capacity of CNG delivery hoses is 30 kg/min. The models marked -2C and -4C can simultaneously fill the CNG and deliver one of the liquid fuels (gasoline, diesel ...). The performance of the diesel hoses can be increased to 80 L/min (H) or 120 to 150 L/min.

x ... is the number of CNG inputs (CNG pressure tanks) x = 1,2 or 3

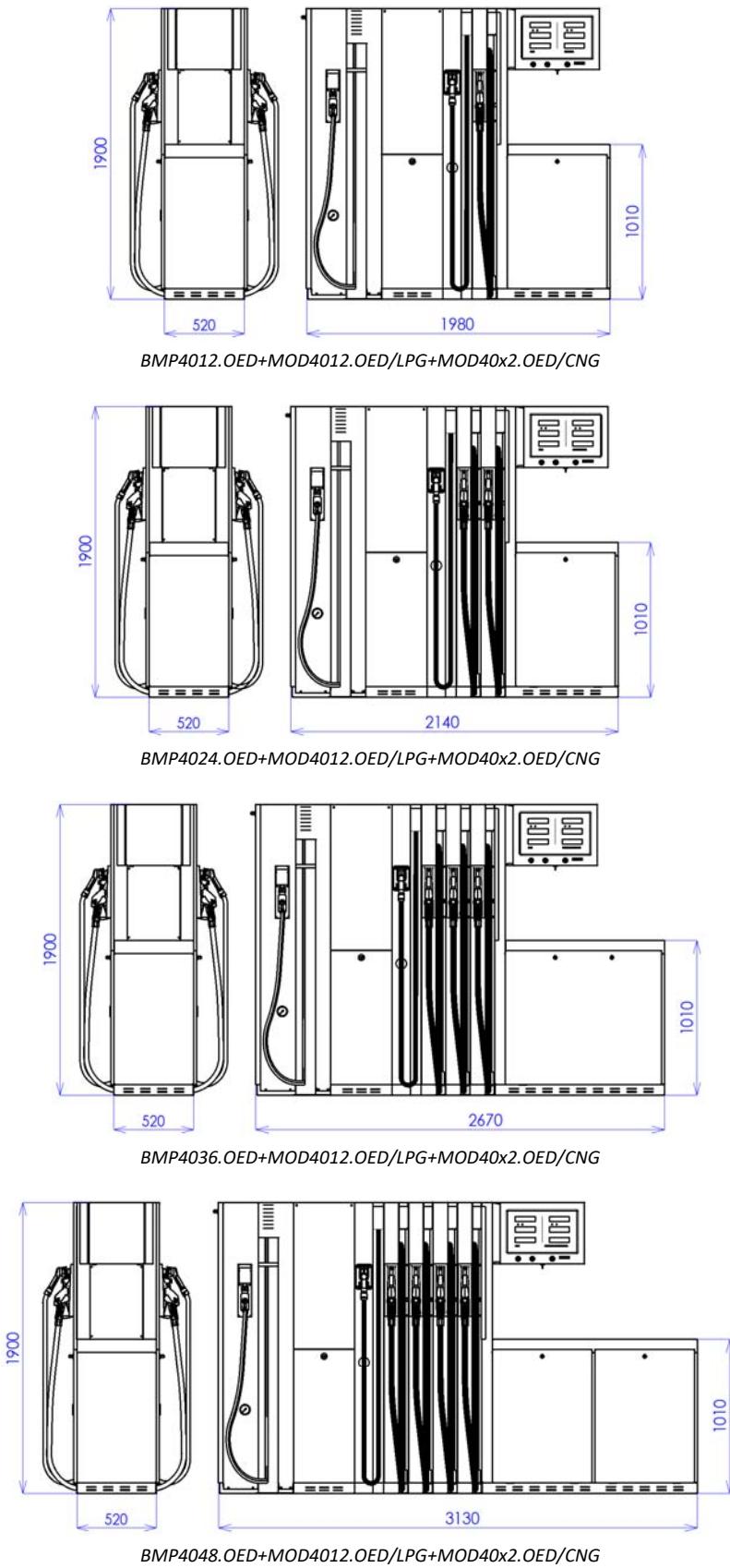
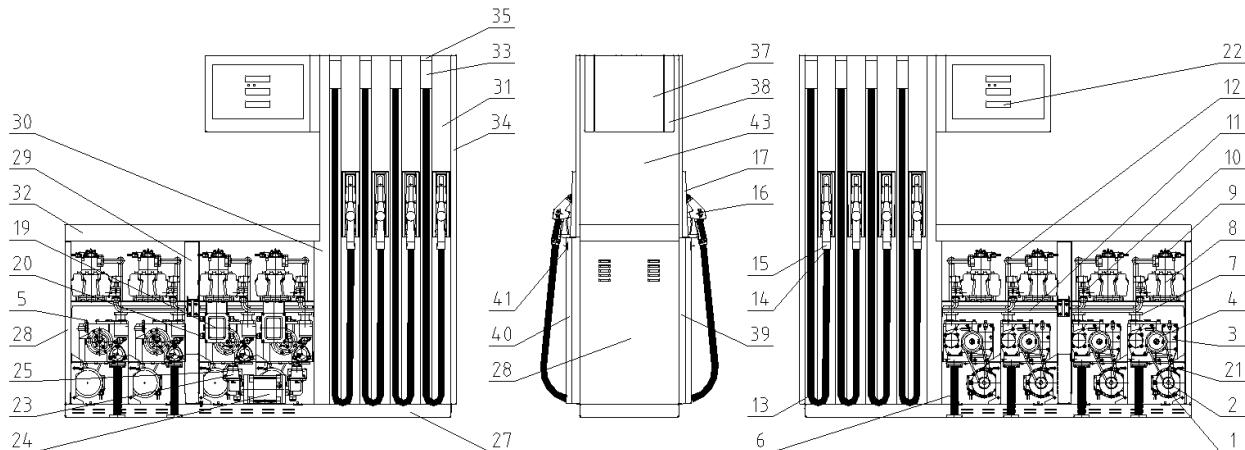


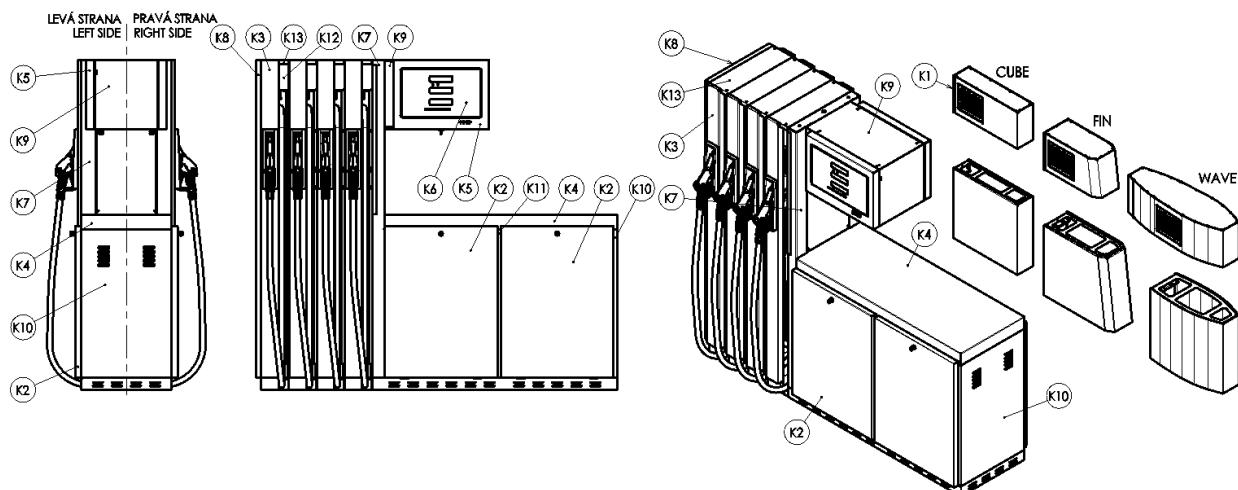
Figure 32 - Overview of standard OCEAN EURO COMBI LPG+CNG dispensers in a basic design, x=1, 2, 3 is a number of CNG inputs

2.6. TERMINOLOGY OF BASIC PARTS OF THE DISPENSER

2.6.1. GASOLINE, (BIO)DIESEL AND ETHANOL (E85) DISPENSER/MODULE



Picture 33 - Basic parts of the OCEAN dispenser



Picture 34 - Covers of the OCEAN dispenser

Position	Device	Position	Device	Position	Device
1	Pump motor	19	Distribution box	38	Mask + display mask sheet
2	Motor pulley	20	Cable bushing – IP66/ IP67	39	Right door
3	Pumping monoblock	21	V-belt (anti-static)	40	Left door
4	Pump pulley	22	Electronic counter	41	Barrier lock
5	Air separation sensor	23	Recovery vacuum pump	-	-
6	Connecting piece - bellows	24	Vacuum pump motor	K1	Decorative elements
7	Exhaust coupling	25	Vapour flow sensor	K2	Door
8	Meter	27	Dispenser foundation	K3	Hose retractor column
9	Pulser – pulse generator	28	Column front	K4	Hydraulics roof
10	Electro-magnetic valve	29	Central column	K5	Display mask
11	Fuel pipeline	30	Inner column	K6	Display mask sheet metal
12	Thermal sensor Pt100	31	Retractor column	K7	Inner column
13	Delivery hoses	32	Hydraulics roof	K8	Rear lid
14	Breakaway coupling	33	Column roof	K9	Counter case
15	Cylindrical sight hole	34	Rear lid	K10	Column front
16	Delivery nozzles	35	Roof lid	K11	Central column
17	Nozzle cover	36	Retractor holder	K12	Column roof
(18)	Magn. sensor of the nozzle position	37	Counter case	K13	Roof lid

2.6.2. LIQUEFIED PROPANE-BUTANE (LPG) DISPENSER/MODULE

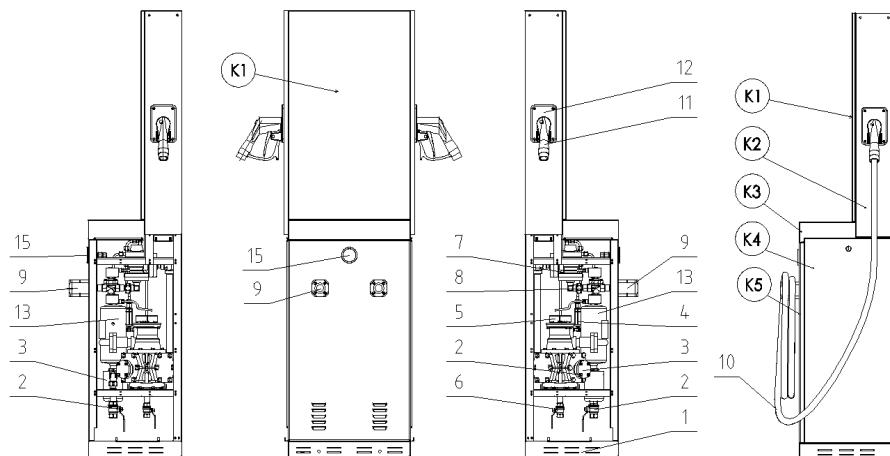


Figure 35 - Basic parts of the LPG dispensing module and its cover

Position	Device	Position	Device	Position	Device
1	Dispensing module foundation	8	Electro-magnetic valve	15	Manometer
2	Input ball valve (fluid)	9	Sight hole	-	-
3	Piston meter LPG	10	Delivery hoses	K1	Column lid LPG rear
4	Overpressure valve	11	Delivery nozzles	K2	Column lid LPG
5	Pulser – pulse generator	12	Nozzle cover	K3	LPG module roof
6	Output ball valve (gas)	13	Gaseous phase separator	K4	LPG module door
7	Differential valve	14	Filter	K5	Front column LPG

2.6.3. REDUCTION AGENT AUS 32 (ADBLUE®) DISPENSER/MODULE

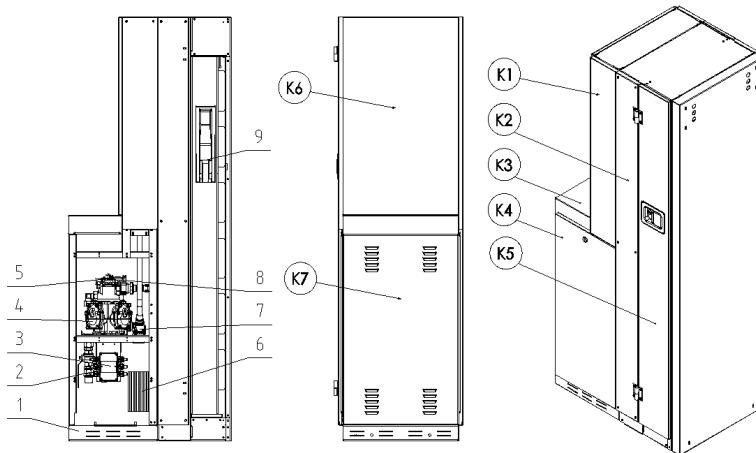


Figure 36 - Basic parts of the AdBlue® dispensing module and its cover

Position	Device	Position	Device	Position	Device
1	Dispensing module foundation	7	Electro-magnetic valve	K3	Hydraulics roof
2	Input ball valve	8	Filter	K4	Module hydraulics door
3	Heating distribution box	9	Nozzle cover	K5	AdBlue® hose door
4	AdBlue® piston meter	-	-	K6	Column lid rear combi
5	Pulser – pulse generator	K1	Column lid	K7	Front column combi
6	Heating element (ATEX)	K2	AdBlue® cover, front	-	-

2.6.4. WINDSHIELD WASHER FLUID (WSE) DISPENSER/MODULE

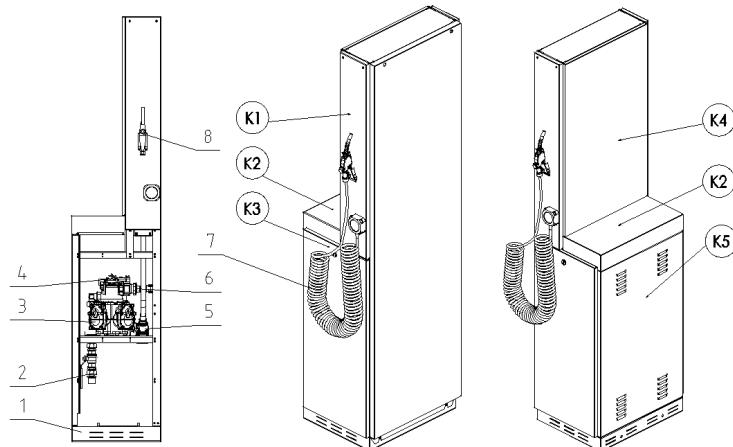


Figure 37 - Basic parts of the WSE dispensing module and its cover

Position	Device	Position	Device	Position	Device
1	Dispensing module foundation	6	Filter	K1	Column lid
2	Input ball valve	7	Spiral delivery hose	K2	Hydraulics roof
3	AdBlue® piston meter	8	Delivery nozzles	K3	Module hydraulics door
4	Pulser – pulse generator	-	-	K4	Column lid rear combi
5	Electro-magnetic valve	-	-	K5	Front column combi

2.6.5. COMPRESSED NATURAL GAS (CNG) DISPENSER/MODULE

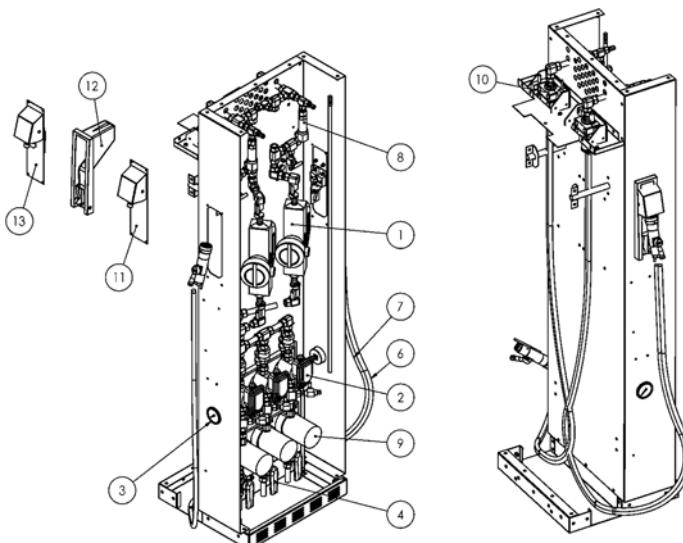


Figure 38 - Basic parts of the WSE dispensing module and its cover

Position	Device	Position	Device	Position	Device
1	CNG mass meter	6	CNG hose, filling	11	Nozzle cover, stainless, without a switch
2	CNG electromagnetic valve	7	CNG hose, ventilating	12	Nozzle cover, plastic, with a switch
3	Manometer 400 bar	8	Pressure sensor	13	Nozzle cover, stainless with a switch
4	Input ball valve	9	CNG filter		
5	CNG nozzle (filling end)	10	Breakaway coupling		

2.7. NAMEPLATES

Each dispenser is equipped with one, see Figure 39, or in the case of a combined dispenser, with several nameplates for individual fuels, see Figure 42. If the number of delivery hoses is higher than two then the dispenser is supplemented with the so-called orientation label, see Figure 41, where it is schematically indicated what kind of fuel is pumped and with what hose. All data on the dispenser in terms of metrology and safety according to WELMEC 10.5 and European standards for equipment located in potentially explosive areas (EN 13617-1, EN 14678-1, EN 60079-0 and EN 13463-1) is contained in the nameplate. At the same time, the orientation label serves to metrology inspection for sticking the safety metrology labels stating the execution of measuring system verification.

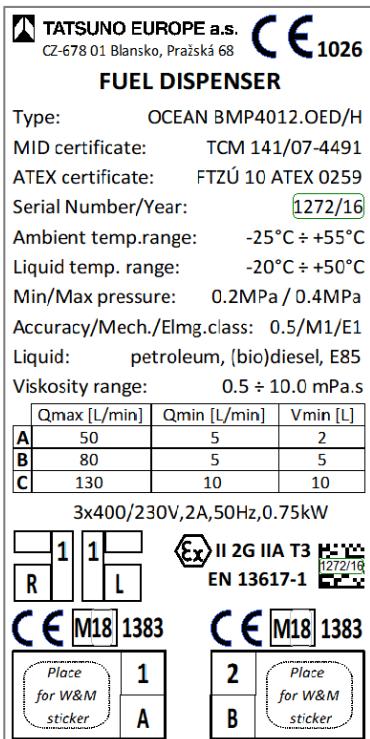


Figure 39 - Nameplate of a two-hose gasoline/diesel dispenser

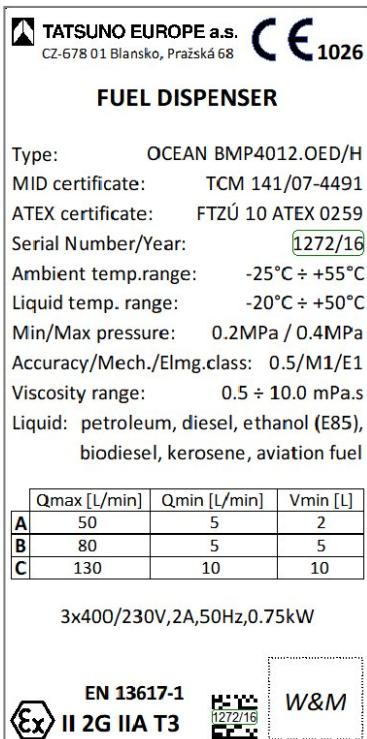


Figure 40 - Nameplate of the multi-hose gasoline/diesel combined

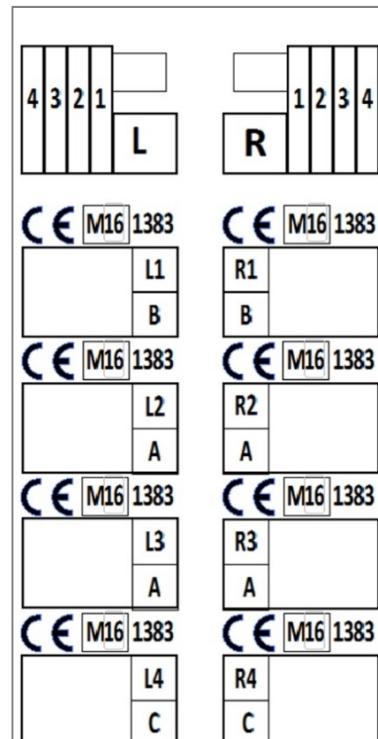


Figure 41 - Orientation label for multiple hose dispensers

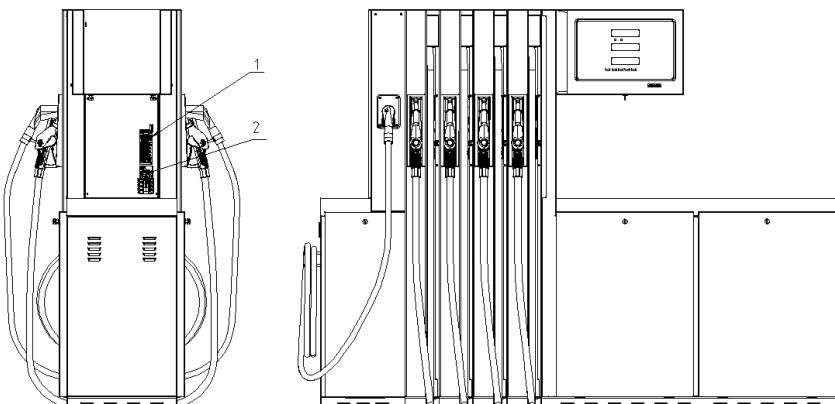


Figure 42 - Nameplate location on the combined dispenser
(1- nameplate gasoline/diesel, 2 - orientation label, 3 - LPG nameplate)

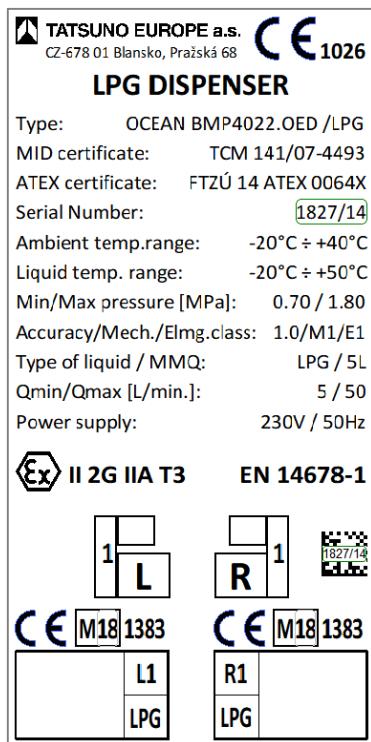


Figure 43 - Nameplate of two-hose LPG dispenser

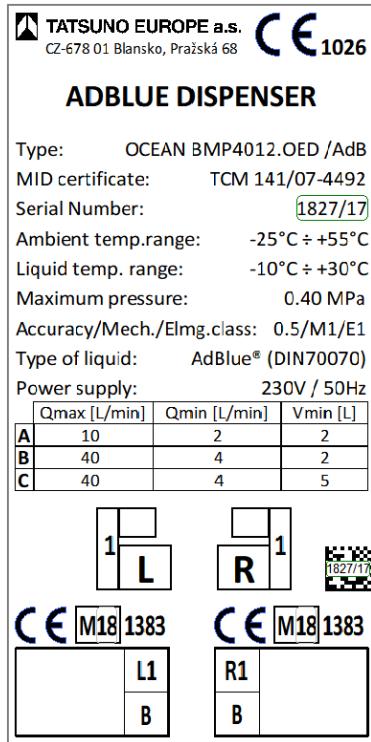


Figure 44 - Nameplate of two-hose AdBlue® dispenser

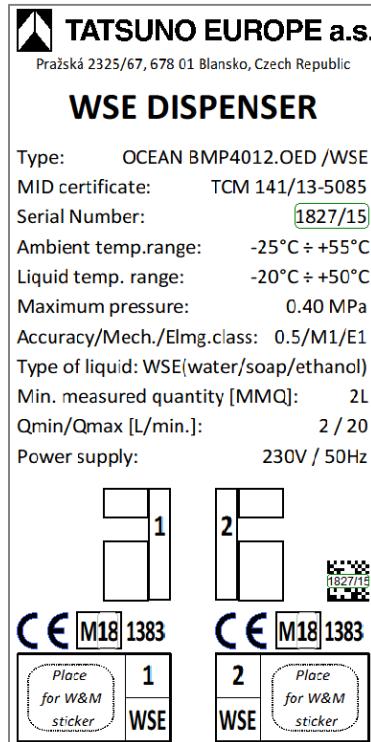


Figure 45 - Nameplate of two-hose WSE dispenser

Table 13 - Label information on the dispenser and module

TATSUNO EUROPE a.s.	Name and address of dispenser manufacturer
	Dispenser labelling means that it is designed, manufactured and labelled in accordance with European Commission directives. The dispenser is subject to a type examination certification in accordance with Directive 2014/32/EU - MID which was carried out by a notified body No. 1383 - ČMI Brno
	Dispenser labelling means that it is designed, manufactured and labelled in accordance with European Commission directives. The dispenser is subject to the type-examination certification in accordance with Directive 2014/34/EU - ATEX which has been carried out by a notified body No. 1026 - FTZÚ Ostrava Radvanice
LIQUID FUEL DISPENSER	Device identification
Type of	Marking of the dispenser type (see section 2.4)
MID certificate	Number of the metrology EU certificate approving the meter type – ČMI
ATEX certificate	Number of the EU certificate of type examination (ATEX certificate) – FTZÚ
Serial number	Serial number of the dispenser (seq. number / year of production)
Fluid/medium temperature range	Range of delivered liquid, medium or gas temperature for which the dispenser was designed and approved
Ambient temperature range	Range of ambient temperature for which the dispenser was designed and approved
Pressure min/max	Minimum and maximum working pressure
Accuracy class/mech./elm.	Accuracy class / Mechanical class / Electromagnetic class
diesel, gasoline, LPG, AdBlue...	Type of liquid, medium or gas for which the dispenser was designed and approved
Q _{max}	Maximum pumping / filling flow rate in L/min or kg/min
Q _{min}	Minimum pumping / filling flow rate in L/min or kg/min
MMQ	Minimum consumption in L or kg
	Identification of the protection of a non-explosive electrical device: II 2 – device for environment with an explosion hazard other than subsurface mines, probability of explosive atmosphere occurrence – zone 1 G – explosive atmosphere is formed by gases, vapours or mists IIA – gas group – the least dangerous T3 – maximum temperature of an electrical device that could cause ignition of the ambient atmosphere (200°C)
EN 13617-1; EN 14678-1	Number of the European standard under which the dispenser was approved
motor power supply	3x400/230V; 2A; 50Hz; 0,75kW

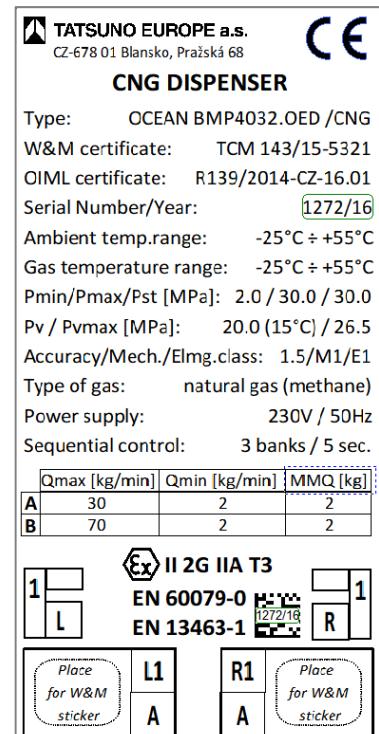


Figure 46 - Nameplate of two-hose CNG dispenser

3. INSTALLATION

3.1. INSTRUCTIONS FOR OCCUPATIONAL SAFETY



CAUTION

- ⚠ The installation of this appliance must be carried out by qualified personnel according to the relevant standards, rules and regulations and local restrictions and according to these instructions.
- ⚠ It is forbidden to smoke or use open fire in the immediate vicinity of the dispenser.
- ⚠ Always follow the measures for handling of gasoline, diesel, LPG, AdBlue®, WSE and CNG
- ⚠ Observe all leaks in the dispenser. If any leakage of fuel, media or gas occurs due to any untightness, disconnect the supply voltage and contact a service organization.
- ⚠ The electrical installation must be carried out by qualified specialists.
- ⚠ Ensure that a properly functioning fire extinguisher is available.
- ⚠ When handling of the appliance, use suitable protective equipment.

3.2. RECEIPT, TRANSPORT, UNPACKING

The customer shall contractually ensure the method of dispenser shipping. If the transport is ensured by TATSUNO EUROPE, a.s., it shall transport the product to an agreed place. The manufacturer has sufficient knowledge about the method of handling and transport. If the transport is ensured by the customer in another way, the manufacturer shall ensure professional loading. However, the manufacturer is not responsible for the method of transport. It is generally stated that the dispenser must be transported properly packed, always attached to the frame. The dispenser must be secured on the means of transport against damage (covers, paint), shifting and overturning. All handling and transport shall be totally performed in a vertical position. The dispenser must not be laid on covers.

WARNING Only fork lift trucks may be used during handling. In case of use of other handling equipment TATSUNO EUROPE, a.s. is not responsible for damage suffered.

Packaging of dispensers is performed differently, according to the destination.

NOTICE

- ⚠ In case of packing the dispenser into a bubble wrap the maximum storage period under shelter is 3 months, 1 month in case of outdoor storage.
- ⚠ In case of packing the dispenser into cardboard packaging the maximum storage period under shelter is 6 months.

3.3. DISPENSER LOCATION

3.3.1. GENERAL

The manufacturer recommends placing dispensers on safety islands of fuel stations in such a way that the direction of arrival of the vehicles to the dispenser corresponds to the orientation of the arrow, see Figure 3. The same figure shows the numbering of the dispenser products.

CAUTION->LPG *LPG dispensers/modules are standardly equipped with a breakaway coupling located between the deliver hose and the dispenser. It breaks and interrupts the flow of LPG at both ends if a force greater than 200 N and less than 500 N is applied to it. However, for proper operation of the breakaway coupling, it is necessary to follow the recommended direction of arrival of the vehicles to the dispenser and position an LPG hose towards the exit from the fuel station!*

NOTICE *Dangerous zones are determined according to ČSN EN 60079-10 in the vicinity of the dispenser. Dispensers must not be located in a dangerous zone. Electronic counters used in these dispensers are in an unprotected design. They are located in the space without explosion hazard and separated from other spaces by a divider of 1 type according to ČSN EN 13617-1.*

The space for dispenser installation must be structurally secured so that the possibility of dispenser damage by an incoming car and following medium leakage into atmosphere is avoided as best as possible. Therefore, it is suggested to:

- Secure the access to the refilling position in straight direction
- Install the dispenser onto an elevated refuge with the following parameters
 - refuge elevation above the surrounding road at least 150 mm
 - refuge width at least 1,500 mm / refuge length at least 4,000 mm
- In case of dispenser installation directly onto the surface without a refuge it is necessary to secure the dispenser against collision with a vehicle by using a tube guard with the following parameters:
 - guard width at least 1,500 mm (refuge width) / length 2,000 mm
 - height of the upper edge of the tube above the road at least 450 mm

Example of the dispenser location at the fuel station – see Figure 48.

If there is any fixed obstacle (column, wall, etc.) nearby the dispenser, the minimum separation distance of the dispenser from such obstacles must be observed due to safe operation and maintenance – see Figure 47.

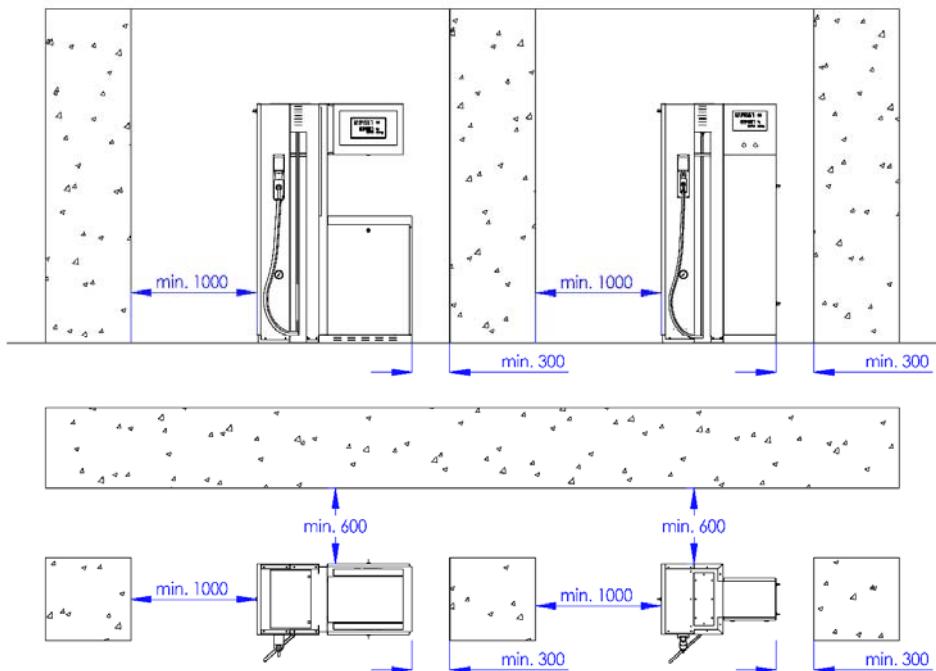


Figure 47 – Minimum separation distance of the dispenser from a fixed obstacle

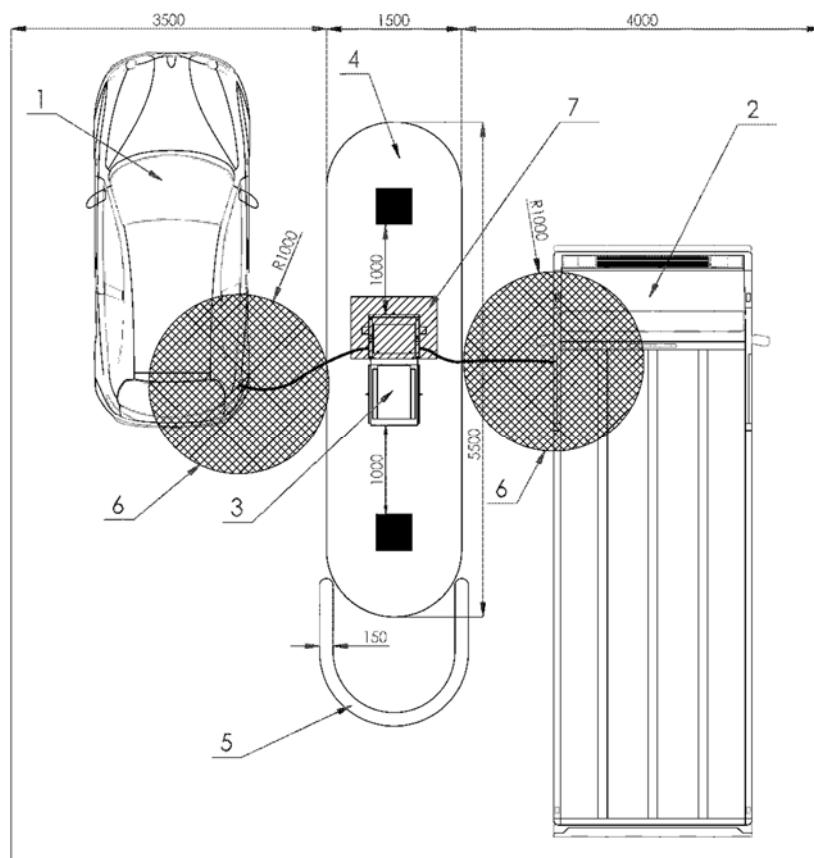


Figure 48 – Example of the CNG dispenser location at the fuel station

(1-refilling position for passenger cars, 2- refilling position for trucks and buses, 3-dispenser CNG dispenser,
4-dispenser refuge, 5-tube guard, 6-projection of the dangerous zone border (zone 1) of the filling end piece during delivery,
7- projection of the dangerous zone border (zone 2) of the CNG dispenser)

3.3.2. ORIENTATION OF A SINGLE-SIDED DISPENSER

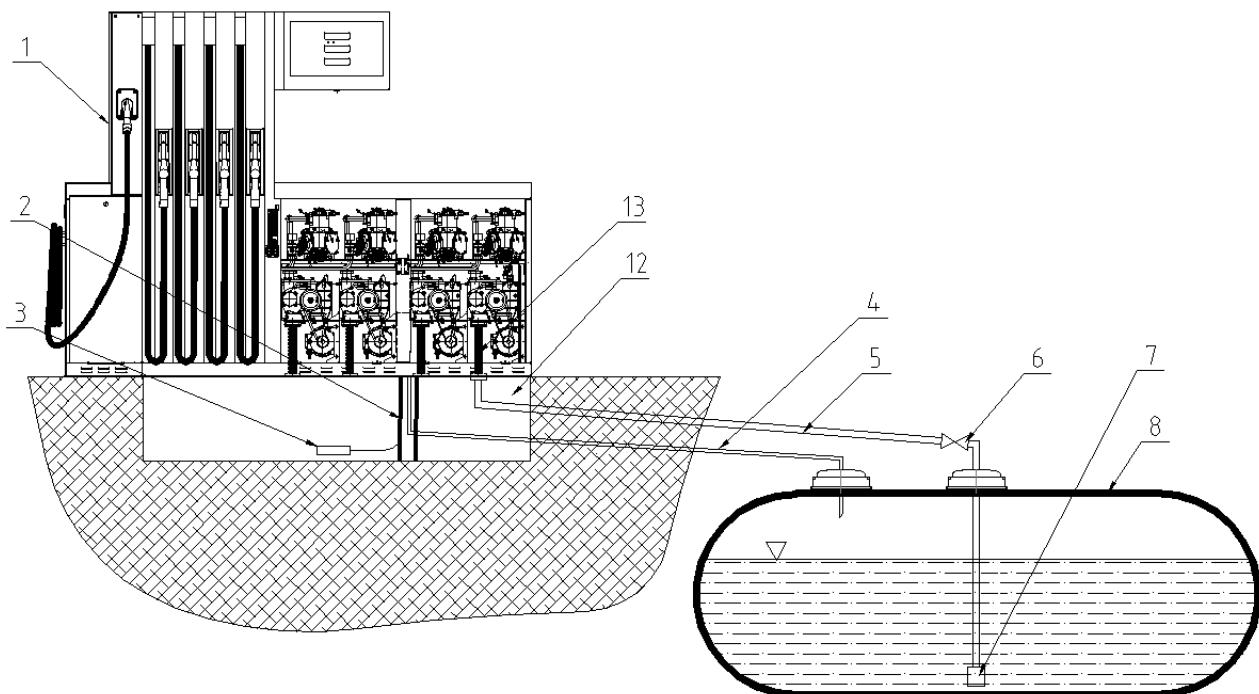
Single-sided dispenser stands are labelled "L" and "R" ("L" left/left-sided and "R" right/right-sided) after the dispenser type designation, e.g. BMP4011.OEL, see section 2.4. Dispenser orientation is determined by a view of the dispenser from the vehicle arrival direction, see Figure 3.

3.3.3. DISPENSER DISTANCE FROM A TANK–FUEL TANK

The manufacturer recommends that the maximum distance of dispensers from storage tanks (gasoline, diesel, LPG, WSE and AdBlue®) should be **50 meters** and the suction height up to **5.5 meters**. Under other conditions, the suction capacity of dispensers equipped with pumps may be impaired, resulting in a reduction in pumping performance (rated flow) or an increase in the noise level of the dispenser. All technological requirements for the fuel station must be solved in a professionally designed and approved fuel station project consulted with the dispenser manufacturer.

3.3.4. LIQUID FUEL TANK TYPE

Dispensers for pumping liquid fuels and technical liquids (diesel, gasoline, AdBlue, WSE...) can be connected to both underground and overground storage tanks.

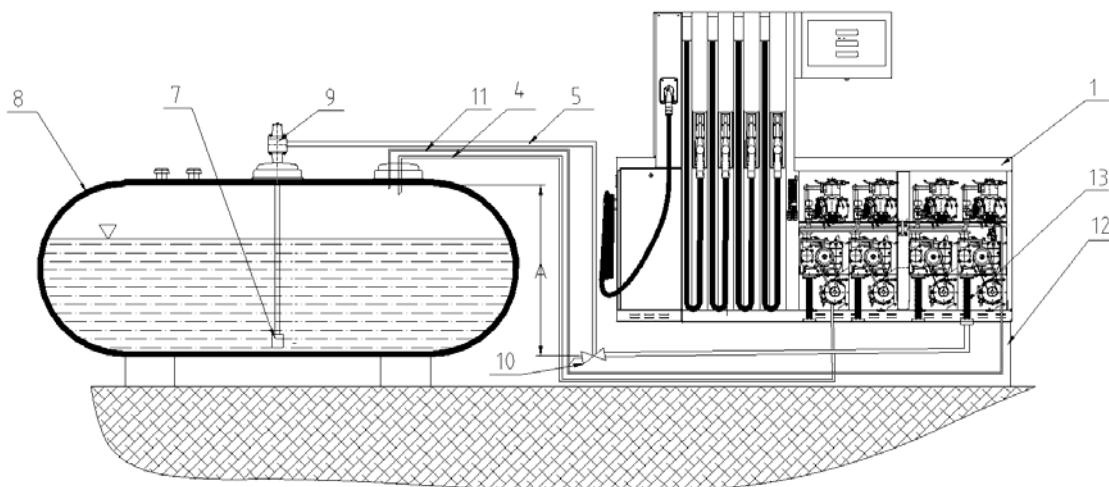


Picture 49—Example of connection of the dispenser with suction pumps to an underground tank

Legend: 1-dispenser, 2-power supply cables and data line, 3-fluid sensor located at the bottom of the drain pan, 4-pipe for return drainage of vapours (recovery), 5-suction fuel pipeline, 6-backflow valve, 7-suction basket (without a backflow valve), 8-underground fuel tank, 12-drip EKO tray with a dispenser base frame, 13-connecting element (bellows) with a flange.

CAUTION B&D If the dispenser is connected to an **underground storage tank**, it is necessary to include a **backflow valve** in the suction pipeline to ensure that if the dispenser is stationary and does not pump, the fuel column will not be spontaneously interrupted and the air will not be sucked in after pumping starts. **A separate check valve must not be installed if a suction basket has been already equipped with a check valve (see Picture 49)**

CAUTION B&D If the dispenser is connected to an overground storage tank, it is necessary for the safety reasons to include a **pressure relief (check) valve** in the suction pipeline which prevents the product from escaping from the tank by gravity during a malfunction. The valve also serves to release overpressure in the suction pipeline back into the storage tank. We recommend the **OPW 199ASV (Anti-Siphon Valve)** valve. The valve type must be selected according to the difference between the maximum fuel level in the storage tank and the lowest point of the fuel line, see Picture 50 – height A. At the lowest point of the pipeline, a **shut-off and drain valve** should be installed which should be closed by the fuel station operator whenever the dispenser is not in operation. **In the absence of these valves, uncontrolled leakage of fuel can occur in the event of any leak in the piping system!** (see Picture 50).



Picture 50 – Example of connection of the dispenser with suction pumps to the overground storage tank

Legend: 1-dispenser, 4-pipe for return drainage of vapours (recovery), 5-suction fuel line, 7-suction basket (without a check valve), 8-overground fuel tank, 9-pressure relief check valve (OPW 199ASW), 10-drain and shut-off valve, 11-return pipe from the separator of the dispenser pump, 12-drip EKO tray with a dispenser base frame, 13-connecting element (bellows) with a flange.

NOTICE Overground storage tank. The pumping monoblock of dispensers is designed with a permanently open air separator into the venting chamber formed by the space in the monoblock body and the monoblock lid space. A hole with an integrated DN6 connection for connecting the air exhaust pipe is located in the top of the lid. To prevent overfilling of the pumping monoblock venting chamber and leakage of the medium into the dispenser interior and then into its surroundings in case of leakage or blockage of the check valve when the dispenser is out of operation, **it is necessary to connect the outlet of the pumping monoblock separator to the storage tank.** This connection can be made using a pipe Ø 10 x 1 (DN8) connected to the DN8 pipe connection. The pipe connection is screwed through the seal in the M12x1.5 hole in the top of the monoblock lid. The pipe outlet must be inserted into the storage tank lid using the DN8 corner connection.

3.3.5. DESIGN OF PIPELINES

The dispenser manufacturer recommends conducting piping in a standard way where a separate pipeline runs from each pump in the dispenser to a relevant fuel tank.

NOTE There is also a so-called backbone piping system where several dispensers (pumps) are connected to one supply pipeline from the storage tank. The dispenser manufacturer does not recommend this backbone piping system due to possible instability of the fuel suction from storage tanks. In the event that the designer decides for

*the backbone piping system, the dispenser manufacturer requires to include **disk valves** in the suction pipeline which will functionally separate the dispensers from one another.*

3.3.6. DISPENSER LOCATION BASED ON EXTERNAL INFLUENCES

CAUTION Dangerous zones are determined according to EN 60079-10-1 in the vicinity of the dispenser. **TATSUNO EUROPE dispensers must not be located in potentially explosive areas**, i.e. hazardous areas 1, 2 or 3 defined by EN 60079-10-1. An electronic counter used in dispensers is located in the counter case which is IP54-protected. There is an explosion-free space within the counter case, separated from other hazardous areas by a Type 1 divider in accordance with EN 13617-1.

3.3.7. PRESSURE SYSTEM

TATSUNO EUROPE dispensers can be connected not only to the system with conventional suction where the fuel is sucked in by pumps located in dispensers, but also to the **pressure system** where the fuel is “pushed” into the dispenser directly from storage tanks where submersible (diesel, gasoline, AdBlue, WSE) or external (LPG) pumps are located.

The advantage of the pressure system is a very quiet operation of dispensers, the disadvantage is high demands on the quality and tightness of the fuel line. In the case of a pressure system, the dispenser is not equipped with a pumping monoblock. The inlet pipeline is connected via a breakaway valve located under the dispenser and is firmly connected to its base frame. From there, the liquid flows into a filter and is distributed through gauges and control valves into delivery hoses and nozzles.

CAUTION According to the European standard EN 13617-1, the dispenser connected to the pressure system must be equipped with a breakaway valve that closes the pressure supply in the event of the dispenser being pulled down! The breakaway valve is not a part of the standard delivery of the dispenser. The dispenser manufacturer recommends using the OPW 10BF valve. The fuel inlet to the dispenser is made by a pipe with a compression nut with a G1" internal thread. The position of the inlet pipeline is shown in Appendix 1 where the recommended connection to the pressure pipeline is also indicated.

CAUTION It is necessary to ensure that the maximum allowed pressure of 0.35 MPa is not exceeded at the fuel inlet to the dispenser.

The base plans of dispensers in a pressure design are shown in Appendix 1.

3.3.8. SATELLITE TO THE DISPENSER

All dispensers of the OCEAN series can be equipped with a so-called satellite. This is an additional delivery point – a column with a delivery hose and a delivery nozzle which is placed on the other side of the safety island. In particular, the satellite can be used to fill trucks where it is possible to fill with delivery hoses of the main dispenser and satellite into both side tanks of the truck at the same time. The satellite column has no control electronics and hydraulics and is completely dependent on the main dispenser. The satellite image, foundation plan and foundation frame are shown in Appendix 1.

3.4. MECHANICAL ATTACHMENT OF THE DISPENSER

Dispensers are attached to special foundation frames by using anchor bolt supplied with the dispenser. The foundation frame of the dispenser is not a part of dispenser standard equipment but it may be ordered separately. The foundation frame is concreted into the safety island, then the front and rear covers of the dispenser are removed, the dispenser is placed onto the foundation frame and attached by anchor bolts.

CAUTION *Where required by local regulations, for the sake of safety and environmental protection, a drip tray is installed under the dispenser. It prevents the leakage of fuel or technical liquid into soil due to possible leakage of the hydraulic system. The leaked liquid appears at a defined location outside the dispenser where the operator quickly identifies it and ensures a repair of the leakage of the hydraulic system.*

Then the dispenser is connected to the suction pipeline with a bellows (suction piece) that is included in the dispenser delivery. Appendix 1 shows the foundation frames and foundation plans of all types of dispensers with the indicated position of the suction pipeline and the pipeline for extracting gasoline vapour from dispensers. The vapour recovery pipeline is connected to the G 1" lid of the pipeline.

NOTE *The G 1" lid is included in the dispenser delivery. The suction line must be terminated by the G1" internal thread.*

CAUTION->LPG *LPG extrusion from the dispenser and pipeline, e.g. while removing the dispenser, is carried out with nitrogen or inert gas. Extrusion by air or oxygen is prohibited!*

NOTICE->LPG *According to EN 14678-1: 2013, clause 4.5.1.2, the liquid phase entry into the LPG dispenser/module and the gas phase output from the LPG dispenser/module must be protected by a device (shear valve or break point) to ensure that the flow of liquid LPG or LPG vapour into atmosphere is prevented in case of pipeline rupture. The shear valve or break point must be firmly attached to the frame of the dispenser and to the ground. Shear valves are not a part of the standard delivery of the dispenser!*

In the case of the CNG dispenser/module, the inlet pipeline of the outer diameter ø12 mm (standard delivery) or ø16 mm (higher delivery /H) is inserted to the interconnecting threaded joint with a screw ring located under the ball shut-off valve on the dispenser and then the threaded joint is tightened. **The inlet pipeline must be fitted with shut-off valves before its entrance to the shaft space under the dispenser for potential disassembly of the dispenser.**

CAUTION->CNG *Joint design must ensure perfect tightness up to the pressure of 400 bar.*

CAUTION->CNG *The inlet pipeline of the dispenser must be secured by overpressure protection (overpressure valve, etc.) against pressure higher than the permissible maximum operating pressure.*

3.5. ELECTRICAL CONNECTION OF THE DISPENSER

For electrical connection of TATSUNO EUROPE dispensers, it is necessary to perform protection against touch voltage according to ČSN 33 2000-4-41 "Low voltage electrical installation – Part 4-41: Protective measures to ensure safety – Protection against electrical shock", issued: January 2018, which is in compliance with an international standard HD 60364-4-41:2017, and applicable electrical cables must be then routed to each dispenser.

It is necessary that all dispensers at the fuel station are interconnected by a grounding wire and connected to the grounding system. As a grounding wire you can use a yellow-green cable with a section of at least **4 mm²** or a special grounding strap. The grounding wire must be connected to a central grounding terminal of the dispenser located on the foundation (bolt M10) marked with a mark for grounding.

CAUTION Only cables complying with the requirements of European standard EN 13617-1:2012 may be used as supply cables. The essential properties of these cables include resistance to oils, gasoline and gasoline vapour (according to HD21 13S1). Examples of electrical wiring are given in IN041 – Connection plans.

NOTE For easy installation (cable termination in a distribution box), it is necessary that the ends of all cables entering the dispenser are of a sufficient length – each end at least **3 m** above ground.

In terms of used voltage and function the cables may be divided into power (supply) and signal cables.

Power cables:

- supply of pump and vacuum pump electric motors located in the dispenser
- supply of counters, switching circuits and heating
- switching of pumps located outside the dispenser (pressure version of the dispenser/module)

Signal cables:

- communication line
- additional service and safety lines (STOP signal, pulse outputs, motor blocking, level gauges, etc.)

3.5.1. SUPPLY OF PUMP AND VACUUM PUMP ELECTRIC MOTORS IN THE DISPENSER

The supply of pump electric motors and vacuum pump electric motors for all types of dispensers is carried out with the help of a 4-wire H05VV5-F 4x1.5 cable (see Table 14) which is fed from the main switchboard in the booth to each dispenser to the power supply box, see document IN041 - Connection plans. The cable is connected to the fuses and the switch in the switchboard. Switching of individual pump motors and vacuum pump motors is performed via contactors inside the dispenser.

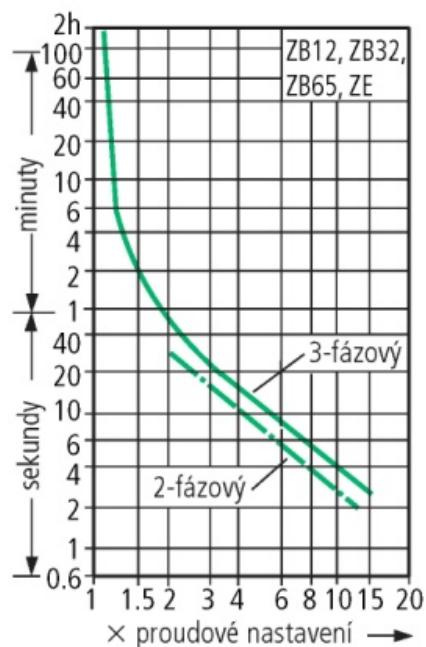
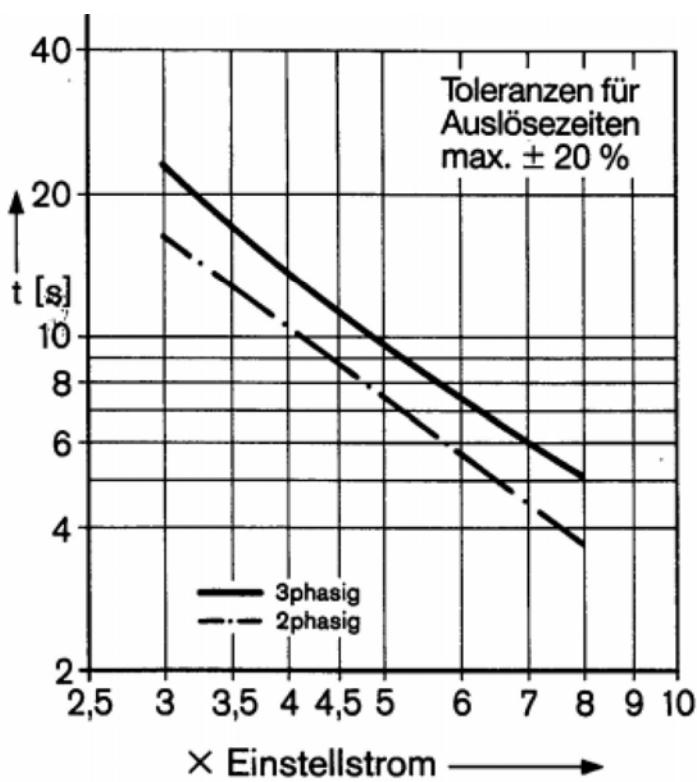
All TATSUNO EUROPE dispensers for gasoline and diesel delivery in a suction version are equipped with contactors and each motor is protected by thermal jet protection in the dispenser. Pump motors and vacuum pump motors switching is performed so that at any moment a maximum of two pump motors and possibly two vacuum pump motors are connected to the power supply cable.

Table 14 – Identification of wires in the power supply cable for the pump and vacuum pump electric motors

Identification of wires in the H05VV5-F 4x1.5 cable		
identification	colour	description
L1	black 1	phase 1
L2	black 2	phase 2
L3	black 3	phase 3
PE	yellow-green	protection wire

NOTICE We recommend using a special motor circuit-breaker, type **PKZM 0-10** by Moeller Klöckner to terminate the 3x400V power cable in the switchboard. This circuit breaker serves as a switch and includes both short-circuit and thermal fuse. After installation into the door of the switchboard, this circuit breaker can be supplemented with a control head (IP65) with an extended shaft, type RH-PKZO.

NOTE The **DIL EEM-10** and **DIL EM-10-GI** motor contactors with thermal current protection, type **ZE-2.4** and **ZE-0.6**, by Moeller Klöckner or **PKZM 0-0.4** motor circuit-breakers from the same manufacturer are used for switching the pump and vacuum pump motors in the dispensers. Figure 13 shows the access characteristics of the used current protection, type **ZE**.



Picture 51 – Access characteristics of the motor current protection, type **ZE**

Parameters of electric motors

Table 15 shows the basic parameters of two basic types of electric motors used in TATSUNO EUROPE dispensers.

Table 15 – Parameters of electric motors

Pump electric motor	Vacuum pump electric motor
V80 TL 4P (RAEL)	J2071B2H2305FZ
asynchronous motor	asynchronous motor
230/400V; 50Hz	230/400V; 50Hz
current 2.2 A	current 1.45 A
power supply 0.75 kW	power supply 0.55 kW
1410 rpm	2840 rpm
Ia/In = 4.4	Ia/In = 4.9
IP 55	IP 54
T3	T3 ($t_E = 10$ sec)
$\cos \phi = 0.8$	$\cos \phi = 0.78$
Ex II 2G Ex db IIB T3 Gb	Ex II 2G Ex e IIC T3 Gb
EPT 16 ATEX 2476X	EUM1 12 ATEX 0744

NOTICE When the electric motor is connected, check the correct direction of rotation! The correct direction of rotation is indicated by the arrow marked on the pump pulley, see Figure 52.

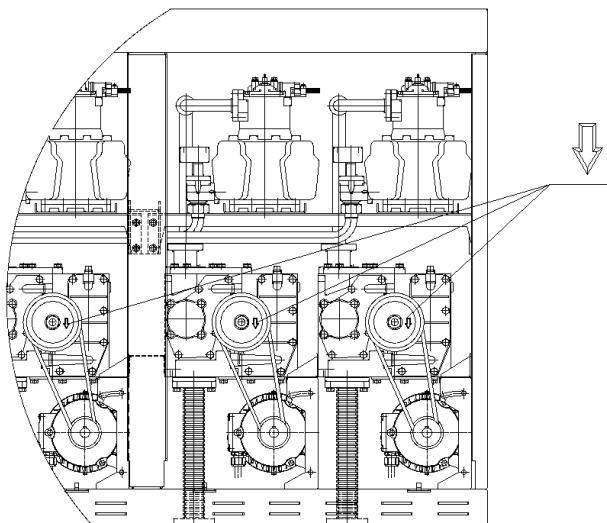


Figure 52 – Check of the pump motor direction of rotation (arrow)

3.5.2. POWER SUPPLY OF ELECTRONIC COUNTER, SWITCHING ELEMENTS AND HEATING

Counter and switching circuits are supplied via a **3-wire power cable H05VV5-F 3x1,5** (see Table 16), or if the dispenser is equipped with heating (e.g. AdBlue® dispensers) via a **5-wire power cable H05VV5F 5x1.5** (Table 17). The power cable is always brought from the main switchboard in the booth to the first hydraulic module of the dispenser into the distribution power supply box. From the distribution box, the

power supply is led to the dispenser electronic head where it provides a stabilized supply of the electronic counter, switching elements and possibly additional heating elements.

Table 16 – Identification of wires in the power supply cable for the counter and switching elements

Identification of wires in the H05VV5-F 3x1.5 cable		
identification	colour	description
L	black	phase
N	blue	neutral wire
PE	yellow-green	protection wire

Table 17 – Identification of wires in the power supply cable for the counter, switching elements and heating

Identification of wires in the H05VV5-F 5X1.5 cable		
identification	colour	description
Ls	black	phase
Ns	blue	neutral wire
Lt	brown	heating phase
Nt	blue	neutral wire
PE	yellow-green	protection wire

From the dispenser the power supply for the counter is led to the main switchboard where it is connected to through the 230V/6A circuit breaker to a common bus for all dispensers. From this point the power supply for all dispensers is led to the stabilized backup power source which will supply the dispenser counter for 3-5 minutes in case of power failure.

SUGGESTION In order to ensure trouble-free operation of dispensers, the dispenser manufacturer recommends backing up the stabilized power supply of the dispenser by a UPS (Uninterruptible Power Supply). Very frequent phenomena in the electricity network are power failures, strong interference or voltage fluctuations in voltage peaks (especially in winter season). All such phenomena may be eliminated by using a correct backup UPS. There are basically two types of backup power supply sources for dispensers: **UPS of a line-interactive type** and **UPS of an on-line type**. For fuel stations connected to a stable electricity network (without voltage fluctuations and interference) UPS of a line-interactive type is sufficient. In other cases, it is necessary to use UPS of an on-line type. Interference and fluctuations or power failures may cause frequent blocking of dispensers, communication errors between a computer and dispenser, computer failures (data loss), etc.

3.5.3. SWITCHING OF PUMPS LOCATED OUTSIDE THE DISPENSER

Switching of pumps located outside the dispenser (submersible pumps, LPG, WSE, AdBlue...) is carried out at the dispenser via the **3-wire power cable H05VV5F 3x1,5** / (see Table 18) or via the **7-wire H05VV5 power cable F 7x1,0** (Table 19) depending on how many external pumps need to be switched. The switching power cable is always brought from the main switchboard in the booth to the first hydraulic module of the dispenser into the distribution power supply box. From the distribution box, the power supply is led into the dispenser electronic head where it is connected to power relays enabling the switching of LPG, WSE, AdBlue® pumps or submersible fuel pumps for gasoline and diesel in the pressure system.

Table 18 – Designation of wires in the pump module switching cable (suction version of the dispenser)

Identification of wires in the H05VV5-F 3x1.5 cable		
identification	colour	description
SC	black 2	common wire
S1	black 1	switching phase
PE	yellow-green	protection wire

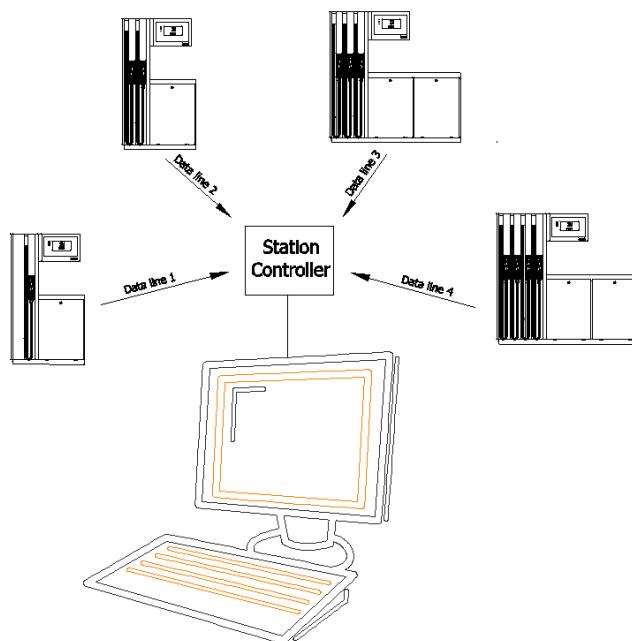
Table 19 – Designation of wires in the dispenser and module pump switching cable (pressure version of the dispenser)

Identification of wires in the H05VV5-F 7X1.0 cable		
identification	colour	description
SC	black 6	common wire
S5	black 5	switching phase 5
S4	black 4	switching phase 4
S3	black 3	switching phase 3
S2	black 2	switching phase 2
S1	black 1	switching phase 1
PE	yellow-green	protection wire

NOTE Relays in the dispenser are used for switching pump motor contactors. The switching voltage on relay contacts must not exceed **250 V** and the switching current must not exceed the value of **1 A**.

3.5.4. DATA (COMMUNICATION) LINE

The data line is used for controlling the dispenser and remote data transfer from the dispenser in a so-called automatic mode of the dispenser. The dispenser is controlled with a single-purpose bracket, station regulator or directly by a computer located in the fuel station booth. If the dispenser works in a manual mode it is not necessary to install this data line.

**Figure 53 – Radial data line from dispensers**

In order to install the data line, it is necessary to route the 4-wire shielded **H05VVC4V5-K 5x0.5** communication cable (see Table 20) to each dispenser at the fuel station. The data cable must be routed radially from the station control (booth, control panel) to the first module of each dispenser into the communication distribution box. From the communication distribution box, the data line is led to the dispenser electronic head of the dispenser and connected to the counter.

Table 20 – Identification of wires in the data line

Identification of wires in the H05VVC4V5-K 5G0.5 cable		
identification	colour	description
SH	shield	shield
-	black5	reserve
-	black4	reserve
-	black3	reserve
B	black2	data B
A	black1	data A

NOTICE For the communication line, we recommend using a **5-wire shielded communication cable with a minimum wire cross-section of 0.5 mm²**. The jacket of the cable must be self-extinguishing and resistant to gasoline vapour. For this purpose, the manufacturer recommends using H05VVC4V5-K harmonized cables.

The TATSUNO EUROPE dispensers are standardly equipped with a PDE data line which is the RS485 line with the PDE communication protocol. However, it is possible on customer's demand to add a data converter to the dispenser counter which will convert the PDE data line to a line of another type and communication protocol, e.g. PUMA LAN, ER4, IFSF-LON, TATSUNO Party Line, etc. This also changes the meaning of wires in the data cable. Identification of wires for the most used types of data lines is described below, see Table 21.

Table 21 – Identification of wires for different types of data lines

Identification of wires in the H05VVC4V5-K 5x0.5 cable for different types of data lines							
wire colour	PDE	Easy Call	PUMA LAN	PUMA LAN + probes	ER4	DART	ACTL
shield	ST	ST	ST	ST	ST	ST	ST
black 5	reserve	reserve	unused	LL1	reserve	reserve	reserve
black 4	reserve	reserve	0V	LL0	ZB	reserve	Rx-
black 3	reserve	0V	AM	GND	YB	reserve	Rx+
black 2	B	D(+)	RX	RX	ZA	B	Tx-
black 1	A	D(-)	TX	TX	YA	A	Tx+

NOTE For some type of data line a 2-wire or 3-wire cable would be sufficient - see Table 21. Since the data line type may change during operation depending on the used control system, **we recommend using a 5-wire cable**.

3.5.5. SERVICE LINES

Service lines serve for special purposes. These lines are not necessary for the immediate dispenser operation but they are also used in cases when it is necessary to remotely control some of the dispenser functions or lead some signals out of the dispenser. Always consult the engineers of TATSUNO EUROPE,

a.s. about the necessity to install service lines. For service lines we recommend using multi-wire shielded H05VVC4V5-K cables (0.5 mm²).

3.5.6. SECURITY LINE (STOP BUTTON)

The security line serves to output the signal from the STOP button located in the dispenser to the station switchboard security circuits. The security line must be especially installed in LPG and CNG dispensers/modules that operate in an unattended mode. Pressing the STOP button on the dispenser activates the security circuits that disconnect the dispenser from the power supply and at the same time the safety valves on the supply line close.

In order to install the security line it is necessary to route the **3-wire power cable H05VV5-F 3x1.5** (see Table 22) to each dispenser at the fuel station. The security line cable is always brought from the main switchboard in the booth to the first module of the dispenser into the distribution box. From the distribution box, the cable is routed to the dispenser electronic head where it is connected to the STOP button.

Table 22 – Identification of wires in the security line

Identification of wires in the H05VV5-F 3x1.5 cable		
identification	colour	description
ST	black2	STOP signal
ST	black1	STOP signal
PE	yellow-green	protection wire

3.5.7. REGULATION OF VALVES IN PRESSURE SECTIONS OUTSIDE DISPENSER (CNG MODULE)

If the valves from high-pressure sections are located at the CNG fuel station outside the dispenser in the area of pressure reservoirs and compressor then their switching is performed by a **5-wire H05VV5-F 5G1.5 cable** (see Table 14). The cable from valves regulation is routed from the main switchboard in the booth to the supply distribution box of the dispenser. The H05VV5-F 5G1.5 cable is routed from the distribution box to the counter case to the outputs that ensure the valves regulation.

Table 23 – Identification of wires in the cable for regulating the valves in CNG pressure sections

Identification of wires in the H05VV5-F 5x1.5 cable		
identification	colour	description
V1	black 1	valve 1 regulation
V2	black 2	valve 2 regulation
V3	black 3	valve 3 regulation
VC	black 4	common wire for valves
PE	yellow-green	protection wire

CAUTION In order to regulate external valves the dispenser outlets are used that use the voltage of 24V DC with maximum current-carrying capacity of 0.8 A for switching. Always consult the dispenser manufacturer for the use of another control voltage and current.

3.5.8. COLLECTIVE SIGNAL OF THE DISPENSER DEFECT – “COLLECTIVE ALARM” (CNG)

For leading the collective signal of the CNG dispenser/module defect a **2-wire H05VV5-F 2X0.5 cable** is used (see Table 24) which is routed from the main switchboard in the booth to the communication distribution box of the dispenser. The H05VV5-F 2x0.5 cable is routed from the distribution box to the counter case to relay contacts. Relay contacts shall close in each CNG dispenser defect and open after the defect is removed.

Table 24 – Identification of wires in the line of a collective signal of the dispenser defect

Identification of wires in the H05VV5-F 2X0.5 cable		
identification	colour	description
ER	black1	ERR signal
ER	black2	ERR signal

CAUTION *The max. load of the relay contacts for the dispenser defect indication is 250 V and 2 A. Always consult the dispenser manufacturer for the use of another control voltage and current.*

Note: In case of the CNG dispenser/module defect the delivery is interrupted and the display shows the defect code which corresponds to the defect type – e.g. broken hose, leak in the vehicle storage tank, meter failure, etc. At the same time, the relay of a collective dispenser defect is activated/switched on which informs the control centre of the fuel station about the dispenser defect. The relay automatically deactivates/switches off after the defect is removed.

3.5.9. CABLE CHARACTERISTICS

For installations it is necessary to use cables resistant to common chemicals, oils and with sufficient thermal and mechanical resistance. These conditions are, for example, met by harmonized cables H05VV5-F and H05VVC4V5-K. The main characteristics of the cables are given in Table 25.

Table 25 – Cable characteristics

Cable type	Function	Number of wires	D _{Anom} [mm]
H05VV5-F 4x1.5	motor power supply	4	8.2 – 10.2
H05VV5-F 7x1.0	pump switching	7	9.5 – 11.8
H05VV5-F 3x1.5	counter power supply, module pump switching, security line	3	7.4 – 9.4
H05VV5-F 5x1.5	power supply for the counter with heating	5	9.1 – 11.4
H05VVC4V5-K 5x0.5	data line	5	10.1
H05VV5-F 2X0.5	collective signal of the dispenser defect	2	5.9
H05VV5-F 5G1.5	control of pressure section valves	5	9.1 – 11.4

Legend: D_{Anom} - cable outer diameter

NOTICE *Cable bushings M20 x 1.5 and M25 x 1.5 in an explosion-proof design with protection Ex II 2G Ex e II and IP65 are used in the dispenser distribution boxes. These bushings have a cable diameter range (D_{anom}) of **7.0 mm to 13.0 mm (M20) and 11.0 mm to 17.0 mm (M25)**. It is forbidden to use cables that have a diameter outside of the permitted bushing range!*

NOTICE->LPG *Each LPG dispenser must be secured with an electrical device equipped with the STOP function according to category 0 or 1 in EN 60204-1. The fuel station attendant must be familiar with the device function.*

NOTICE *Pulse overvoltage may occur in any line due to the strike of lightning up to the distance of several kilometres or due to any industrial activity. The size of pulses formed by lightning induction is sufficient to a total damage of electrical equipment. For these reasons the overvoltage protection is used which diverts energy of the overvoltage pulse to the grounding wire, thus protecting the device. The dispenser manufacturer recommends protecting the main switchboard (or the secondary switchboard) supplying the dispensers, electronic devices (computer, payment terminal, etc.) and data lines by overvoltage protection and lightning arresters. The manufacturer is not responsible for damage caused by insufficient protection of cable connections!*

NOTICE *For trouble-free operation of dispensers, it is necessary to consistently separate signal cables from power supply cables. When power cables are in the vicinity of signal cables, the interference and undesirable parasitic phenomena occur that can cause problems with controlling the dispensers or even destruction of electronic devices placed in dispensers and in the booth. Therefore, any intersection or joint routing (in one harness) of signal and power cables must be avoided. This can be solved so that power and signal cables have their own "channels" (storage, metal pipes). The manufacturer is not responsible for damage caused by improperly performed cable connections!*

4. DISPENSER SETTING AND BASIC FUNCTIONS

Dispenser setting is performed by the set of setting parameters via which it is possible to control functional parameters of the dispenser, totally change the mode and behaviour of the dispenser in different situations. Depending on the type of an electronic counter installed the parameter values can be viewed and changed using the remote IR (infrared) controller, the service keypad, or the preset keypad buttons located on the dispenser.

4.1. PDEX COUNTER

The PDEX electronic counter is set using the remote controller by the dispenser manufacturer.

Table 26 describes the basic parameters of all electronic counters used in TATSUNO EUROPE dispensers.

Table 26 - Types of TATSUNO EUROPE electronic counters

Counter type	PDEX	TBELTX	TBELTM	PDEX5
Year/month of first installation	06/2008	06/2010	01/2016	5/2018
Use	all types of dispensers	all types of dispensers without temperature compensation and without the "Slave" display	dispensers with a mass meter (CNG and LPG)	all types of dispensers
OIML verification	R117	R117	R117, R139	R117
MID Evaluation certificate	no	no	yes	yes
Software Validation (WELMEC 7.2)	yes	yes	yes	yes
Method of parameter setting	Remote controller PDERT-XS, service PDERT-XO, manager	External keyboard or preset keypad	Remote controller PDERT-XS, service PDERT-XO, manager	Remote controller PDERT-XS, service PDERT-XO, manager
View program version + CRC	after powering on or in parameter P05-1 (version) P05-2 (CRC)	after powering on or in parameter P51 (CRC) P53 (version)	after powering on or in parameter P05-1 (version) P05-2 (CRC)	after powering on or in parameter M0-P05-1 (version) M0-P05-2 (CRC)
Protection of metrological parameters	by a password + switch	by a switch	by a password + switch	by a password + switch
Communication protocol type	PDE (RS485)	PDE (RS485)	PDE (RS485)	PDE (RS485)

The method of setting the dispenser differs depending on the counter used in the dispenser head. The following section describes the basic functions and settings for all counters.

4.2. PDEX COUNTER

The PDEX electronic counter is set using the remote controller. The yellow service remote controller PDERT-5S is intended for service engineers authorized by the dispenser manufacturer. This remote controller allows to perform complete settings of all dispenser parameters. The silver remote controller PDERT-5O is intended for fuel station managers and this remote controller allows them to perform:

- reading non-resettable electronic litre totalizers of all delivery hoses
- reading and resetting daily electronic litre and financial totalizers of all hoses
- setting of unit prices of products (in manual operation)
- reading and setting of operating parameters of the dispenser

The setting mode may be called up at the dispenser by a below stated procedure only in the condition when the dispenser is at rest - i.e. in the condition of "finished delivery", all nozzles hung, all sales finished. There are two access modes:

- ▶ The **operator mode** is designed for the operators of the fuel station. It only allows you to read the values of the electronic totalizers and values of the basic parameters of the dispensers. It does not allow you to reset or change the parameter values.
- ▶ The **manager mode** is designed for the manager of the fuel station. It allows you to read the values of the electronic totalizers and set the basic operating parameters of the dispenser. The access to the Manager mode is protected by password.

4.1.1. DESCRIPTION OF PDERT-5O REMOTE CONTROLLER

The keyboard of the PDERT-5O remote manager's controller is described on Figure 55. While using the remote controller it is necessary to move the remote controller closer to the distance of approx. 1 meter from the centre of the dispenser display, see Figure 54.

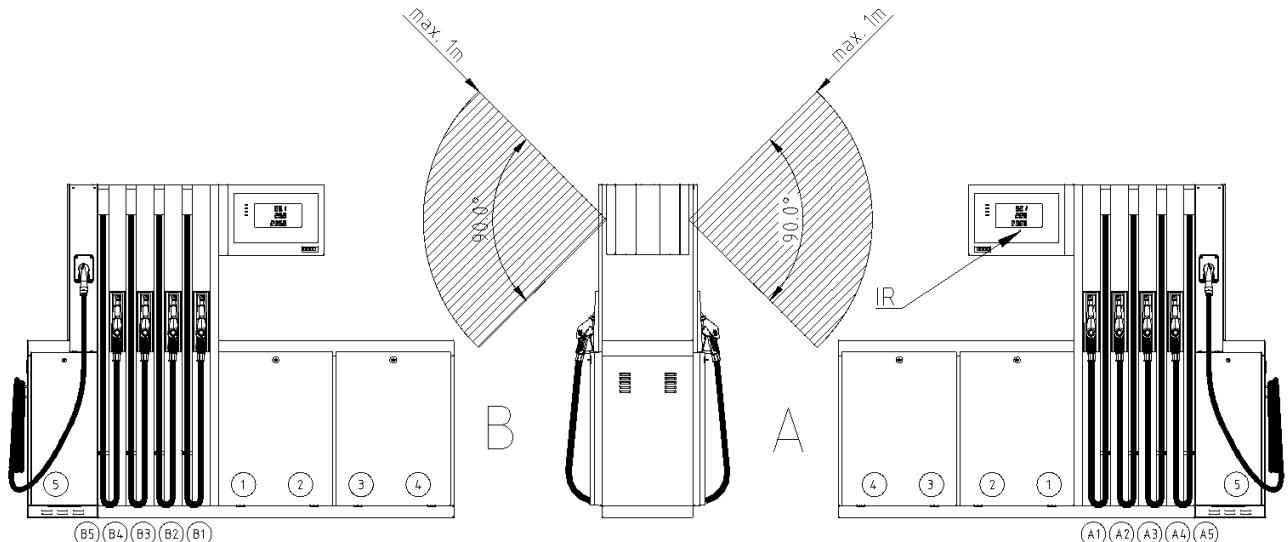


Figure 54 – Range of operation of the remote controller and marking of hoses and dispenser products

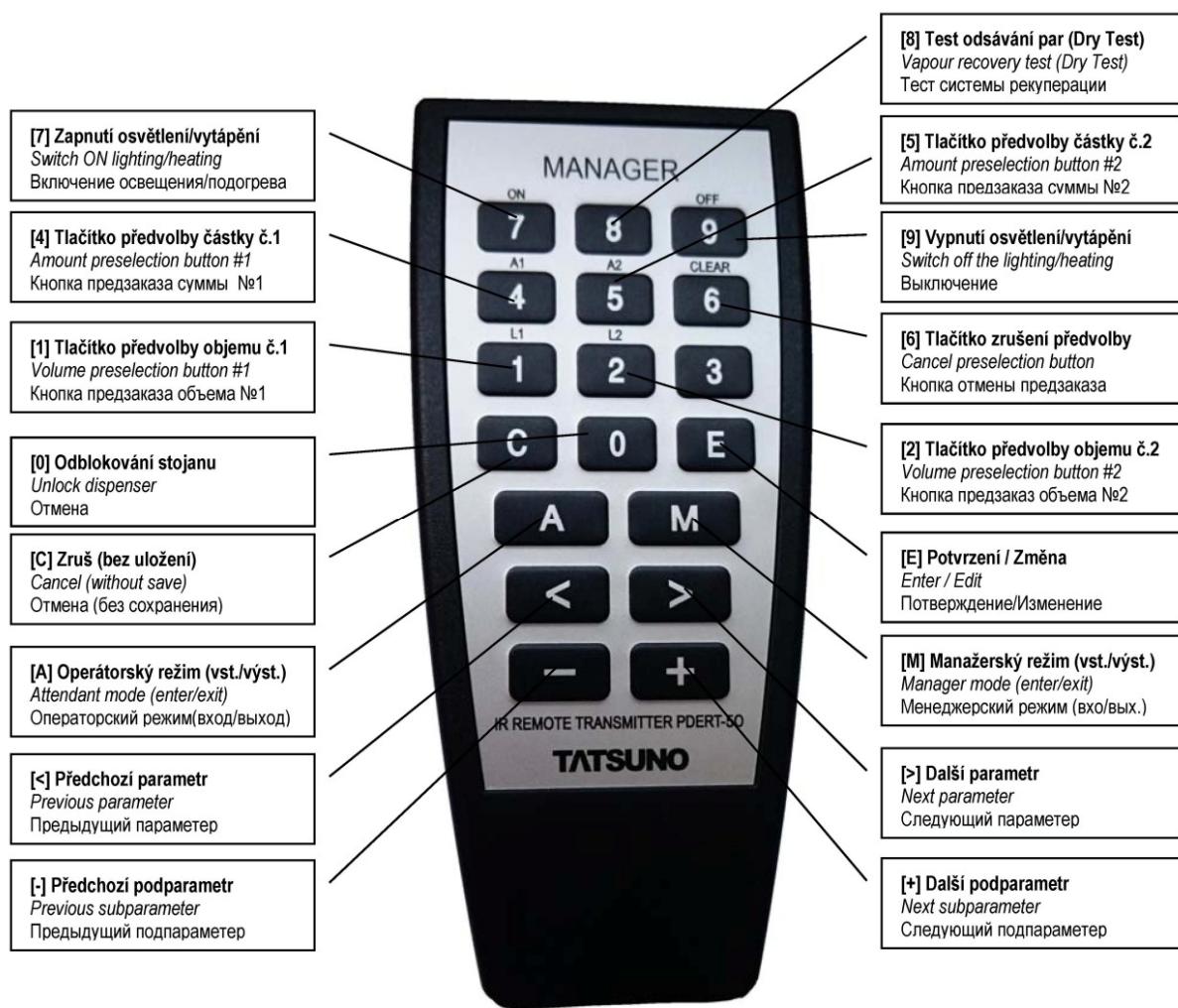


Figure 55 – Description of keys of the PDERT-50 remote controller PDERT-50

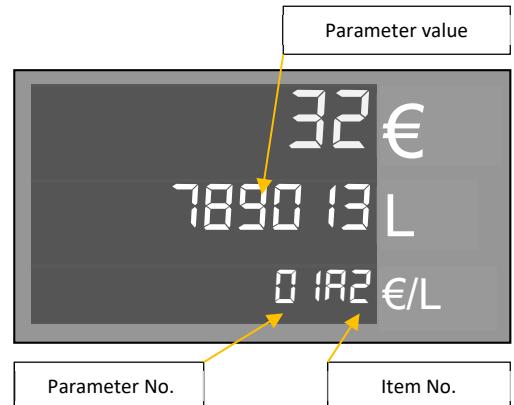
The manager mode is started by pressing the <M> button, the operator mode by the <A> button. The set and read values are displayed on the display. During the reading of the electronic totalizers, the convention of marking the parts of the dispenser applies which is described in Figure 54. In addition to setting and reading parameter values of the electronic counter of the dispenser, the remote controller can also be used for the following operating functions:

- ▣ **Pre-selection of the delivered amount/volume.** Keys <A1>, <A2>, <L1>, <L2> and <CLEAR> can be used just like the preset keypad to set the volume/amount pre-selection on the dispenser.
- ▣ **Unlocking the dispenser after delivery.** If the dispenser is in the manual mode with the blocking after delivery, you can unlock the dispenser with the <0> key, or only one side with the <C> key.
- ▣ **Unlocking the dispenser after an error.** When the dispenser is in the manual mode and an error occurs on the dispenser, the error status can be cancelled by pressing the <0> key or by lifting and hanging the nozzle.
- ▣ **Exhaust vacuum pump test (so-called "Dry Test").** If the dispenser is at rest and all delivery nozzles have been hung, pressing the <8> key can test the vacuum pump function. The exhaust vacuum pump is started for the time defined by parameter 11. Lifting the nozzle stops the vacuum pump test.

4.1.2. DISPLAYING DATA IN THE SETTING MODE

All data is displayed on the dispenser display in setting modes. While controlling using the remote controller the data is displayed on the display of that side where the setting mode was called up from by the remote controller. Individual parameters are shown as follows on the display:

No. of parameter: 01
 Item No.: 2 (dispensing hose order)
 Auxiliary code: A (dispenser side)
 Parameter value: 32789013 (volume in centilitres)



4.1.3. OPERATOR MODE PDEX

The operator mode of the PDEX counter is started by pointing the manager's remote controller on the dispenser display from the distance of approx. 1 m from the dispenser display centre and by pressing the <A> button. **All delivery nozzles on the dispenser must be hung in advance and the sale on the dispenser must be finished (paid).** After calling up the Attendant mode the value of the first parameter is displayed. Parameters and their items may be switched by using the <>> and <+> keys (see Figure 55). The operator mode allows to view **but not change** the values of all parameters listed below, see Table 27.

Table 27 - List of parameters of the operator access mode of the PDEX counter

Parameter	Description
01	Non-resettable volume totalizers
02	Daily volume and financial totalizers (resettable)
03	Product unit prices (in manual mode)
04	Current time and date
05	Program version and check sums
06	Error message history
07	Latest delivery history

Individual parameters will be described further. The operator mode is finished by pressing <R> or <A> keys. The mode is finished automatically if no remote controller button is pressed for 60 seconds.

4.1.4. MANAGER MODE OF THE PDEX

The manager mode is started by pointing the manager's remote controller at the dispenser display from the distance of approx. 1 m from the dispenser display centre and by pressing the <M> button. **All delivery nozzles on the dispenser must be hung in advance and the sale on the dispenser must be finished (paid).** After calling up the manager mode the dispenser display shows a prompt for entering the 4-digit access password: Due to keeping the password confidential the digits entered are shown as dashes. The following default access password is set in the factory: "1111".



Example: Gradually press <M><1><1><1><1> and <ENT> keys.

NOTE If the fuel station manager forgets the valid access password then he/she must contact the authorized service staff who can set a new one.

After entering the valid access password the display shows the value of the first parameter 01. Now it is possible to browse parameters by using the <>> key or by entering the **number of searched parameter** and confirm with the <ENT> key to go directly to the desired parameter. The Manager mode allows to view and change the values of parameters listed below, see



Table 28.

Table 28 - List of parameters of the manager mode of the PDEX counter

Parameter	Description
01	Non-resettable volume totalizers
02	Daily volume and financial totalizers (resettable)
03	Product unit prices (in manual mode)
04	Current time and date
05	Program version and check sums
06	Error message history
07	Latest delivery history
08	Access password for the Manager mode
09	Maintenance history
10, 11	- unoccupied -
12	Dispenser control mode
13	Defects statistics
14	Current operating temperature
15	Resetting daily totalizers
16	Operating control number
17	Intensity of the display backlight
18	Text messages
19	Display segment error

The manager mode is finished by pressing <R> or <A> keys. The mode is also finished automatically if no remote controller button is pressed for 60 seconds.

4.1.5. NON-RESETTABLE VOLUME TOTALIZERS (CODE 01)

Electronic totalizers for all delivery hoses (nozzles) are saved in the memory of the electronic counter. These totalizers are **non-resettable** and state what total volume was delivered by individual delivery hoses.

Table 29 - Description of values of P01 parameter

Parameter	Meaning
011A	volume of fuel pumped by hose 1 on side A in centilitres (x 0.01L)
012A	volume of fuel pumped by hose 2 on side A in centilitres (x 0.01L)
...	...
015A	volume of fuel pumped by hose 5 on side A in centilitres (x 0.01L)
011B	volume of fuel pumped by hose 1 on side B in centilitres (x 0.01L)
012B	volume of fuel pumped by hose 2 on side B in centilitres (x 0.01L)

Parameter	Meaning
...	...
015B	volume of fuel pumped by hose 5 on side B in centilitres (x 0.01L)

NOTE Number of totalizers of delivery hoses shown in the P01 parameter is conditioned by the configuration of the dispenser. The identification system of delivery hoses and products is described in Figure 54.

4.1.6. DAILY TOTALIZERS (CODE 02)

Electronic daily totalizers for all delivery hoses (nozzles) are saved in the memory of the electronic counter. **These totalizers may be reset at any time by using the P15 parameter** (see description below). They indicate what total volume and total amount of money has been delivered from each delivery hose since it was last reset.

Table 30 - Description of values of P02 parameter

Parameter	Meaning
02L1 (A)	volume of fuel pumped by hose 1 on side A in centilitres (x 0.01L)
02C1 (A)	the amount delivered by the hose 2 on side A in the unit of currency
...	...
02L5 (A)	volume of fuel pumped by hose 1 on side A in centilitres (x 0.01L)
02C5 (A)	the amount delivered by the hose 2 on side A in the unit of currency
02L1 (B)	volume of fuel pumped by hose 1 on side A in centilitres (x 0.01L)
02C1 (B)	the amount delivered by the hose 2 on side A in the unit of currency
...	...
02L5 (B)	volume of fuel pumped by hose 1 on side A in centilitres (x 0.01L)
02C5 (B)	the amount delivered by the hose 2 on side A in the unit of currency

NOTE Number of totalizers of delivery hoses shown in the P02 parameter is conditioned by the configuration of the dispenser. The identification system of delivery hoses and products is described in Figure 54.

4.1.7. FUEL PRODUCT UNIT PRICES (CODE 03)

This feature allows you to view and set current unit prices (i.e. one litre of fuel) of all fuel products. These fuel unit prices are set on the display at the first lift of the delivery nozzle and reset of the display if the dispenser works in the **manual mode**. Setting is made by pressing the <Ent> key and entering the price in the **CCCC** format and confirming by the <Ent> key. The decimal point is not entered. E.g. price 1.03 €/L is entered as number 0103, price 34.15 CZK/L as number 3415, etc.

Table 31 - Description of values of P03 parameter

Parameter	Meaning	Factory setting
03 1	fuel product unit price 1	0,00 €/L
03 2	fuel product unit price 2	0,00 €/L
03 3	fuel product unit price 3	0,00 €/L
03 4	fuel product unit price 4	0,00 €/L
03 5	fuel product unit price 5	0,00 €/L

NOTE Number of fuel products shown in the 03 parameter is conditioned by the configuration of the dispenser. The identification system of delivery hoses and products is described in Figure 54. If you change the unit price, such change will be reflected after a subsequent lift of the delivery nozzle.

NOTICE Values set in the P03 parameter are valid **only in the dispenser manual mode**. If the dispenser is connected to the central control system of the fuel station, then the fuel unit price is set directly by the control system before each delivery. In such case the values of the P03 parameter are non-functional.

NOTICE The dispenser does **not enable deliveries with a zero value of the unit price**. In such case, after lifting the delivery nozzle the dispenser display shows the error message E30 and the delivery does not start.

4.1.8. CURRENT TIME AND DATE (CODE 04)

This function allows to show and set current time and date. The first line of the display shows time in the "HHMMSS" format (hours, minutes, seconds), the second line shows the date in the "DDMMYY" format (day, month, year) - example 15:35:11 24.12.2016. Setting is made by pressing the <Ent> key and entering the time/date in the correct format and confirming by the <Ent> key.

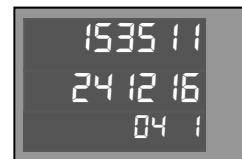


Table 32 - Description and setting of values of P04 parameter

Parameter	Meaning	Factory setting
04 1	Date setting, DDMMYY format (e.g. 241211 = 24. 12. 2016)	1.1.2001
04 2	Time setting, HHMMSS format (e.g. 153511 = 15:35:11)	0:00:00

NOTE The time and date information is used during their displaying on a graphical proportional display and in P06 and P07 parameters for recording time of defect occurrence and time of delivery finish.

NOTICE 72 hours after disconnecting the electrical power supply of the dispenser the internal clock will be reset. Time and date values will switch to factory setting and must be set again!

4.1.9. DISPLAYING THE PROGRAM VERSION AND CHECK SUMS (CODE 05)

This function shows the number of the program version of the dispenser counter and different check sums. These values are intended for metrology authorities and authorized service engineers.

Table 33 - Description of values of P05 parameter

Parameter	Meaning
05 1	Program version + release (e.g. 1.03 + 7)
05 2	Check sum W&M (20260)
05 3	Program check sum (e.g. 52359)
05 4	P20-P99 parameter memory check sum (e.g. 34567)
05 5	Check sum of the device for the main unit of temperature compensation (e.g. 47644)
05 6	Check sum of the temperature compensation auxiliary unit (e.g. 47644)
05 7	Time and date of program creation (e.g. 19.07.2011, 07:56:17)

4.1.10. HISTORY OF ERROR MESSAGES (CODE 06)

This function is intended to show history of last 10 error codes of defects that occurred in the dispenser. The table of error messages is shown in section 6.2.1. After switching to parameter P06, the display shows the code of the last fault message on the dispenser A side (e.g. 41 - E41 hose pulse generator fault 1A, see Table of error messages in chapter 6.2.1). After pressing the <ENT> key the display shows time and date of fault origin. After pressing the <+> key the display shows the code of the last error message on the dispenser B side. Also see Table 34.

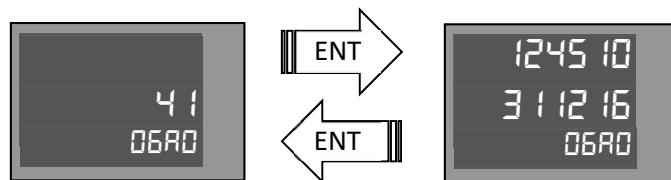


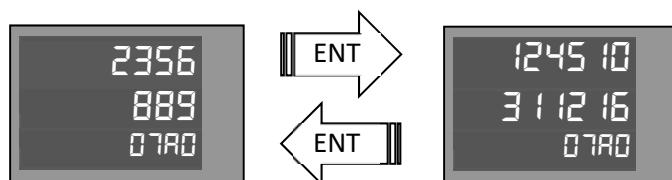
Table 34 - History of error messages P06

Parameter	Meaning
06A0	code of the last dispenser error on side A
06B0	code of the last dispenser error on side B
...	...
06A9	code of the tenth last dispenser error on side A
06B9	code of the tenth last dispenser error on side B

NOTE If two errors of the same type with the same error code occur in sequence, only the latest one will be stored in the counter memory.

4.1.11. HISTORY OF LAST DELIVERIES (CODE 07)

This function is intended to show history of last 10 deliveries on each side of the dispenser. This parameter has the following arrangement of data on the display:



After switching to parameter P07, the display shows the last delivery code on the A side of the rack (e.g. 310 €/10 L). The price per litre alternates on the display with the parameter number. After pressing the <ENT> key the display shows time and date of delivery finish. After pressing the <+> key the display shows the code of the last error message on the dispenser B side. Also see Table 35 .

Table 35 – History of last deliveries P07

Parameter	Meaning
07A0	last dispenser delivery on side A
07B0	last dispenser delivery on side B
...	...
07A9	the tenth last dispenser delivery on side A
07B9	the tenth last dispenser delivery on side B

NOTE If the storage tank intended for delivery history is empty, i.e. if there is no delivery stored in history, "-----" appears on the display.

4.1.12. ACCESS PASSWORD FOR THE MANAGER MODE (CODE 08)

This function allows to show and change the access password for the Manager mode.

The default access password “1111” is set in the factory.

4.1.13. HISTORY OF MAINTENANCE (CODE 09)

This function allows to show codes of the last 10 service remote controllers used to set the counter parameters.

4.1.14. VAPOUR EXTRACTION SYSTEM TEST (CODE 11)

The function allows you to set the duration of the vapour extraction system test in seconds. The test can be started by pressing the <8> key on the remote controller while all delivery nozzles are hung on the dispenser. Lifting the nozzle finishes the test prematurely.

Table 36 - Description and setting of values of P11 parameter

Parameter	Meaning
11 = 0	Vapour extraction system test in non-functional.
11 = 1.2...999	Test duration after pressing <8> in seconds

The factory default setting for the parameter value is 120.

4.1.15. OPERATING MODE OF THE DISPENSER (CODE 12)

This function defines the type of the operating mode of the dispenser.

Table 37 - Operating mode of the dispenser P12

Parameter	Meaning
12 = 0	Automatic mode with remote control
12 = 3	Manual mode

The parameter value may be 0 and 3.

- If the parameter value **P12 equals 0** then the dispenser works in solely automatic mode, i.e. connected to the control computer via a data line. The dispenser is completely controlled by a remote control unit (PC, control counter, ...) – dispenser release for delivery, dispenser blocking, setting the fuel price and maximum amount/volume for each delivery, etc. Shortly after interrupting communication between the computer and the dispenser the display shows the error message E18. After communication recovery the E18 message disappears.
- If the parameter value **P12 equals 3** then the dispenser works in solely manual mode. The dispenser is completely independent – not controlled remotely. The data line is blocked. Fuel unit prices are controlled by the P03 parameter. If no special manual mode with blocking after delivery or a mode with RELEASE signal control is set, the delivery starts immediately after lifting the delivery nozzle and resetting the display.

4.1.16. DEFECT STATISTICS (CODE 13)

This function is intended for showing statistics of defects occurred on the dispenser from the moment of initialization or resetting the counter. This parameter has different arrangement of data on the display. The first line of the display shows the dispenser error code - 01 to 59, the second line shows frequency of defect occurrence from dispenser commissioning or from resetting the statistics by the service engineer. You can browse the defect statistics by using <+> or <-> keys.



The table of all defect codes is shown in section 6.2.1.

4.1.17. CURRENT OPERATING TEMPERATURE (CODE 14)

This function shows current operating temperature measured by the heat sensor located on the processor board of the counter, possibly a current temperature of heat sensors Pt100 located in the dispenser hydraulics, if installed. This parameter has the following display layout - the first line of the display shows the temperature on the processor board in decimal degrees of Celsius (26.8 °C), the second line shows the temperature of the fuel product No. 1 in the hydraulic system of the dispenser in tenths of degrees of Celsius (14.6 °C).

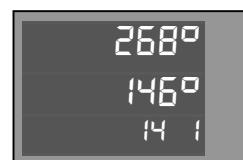


Table 38 - Current operating temperature P14

Parameter	Meaning
14 1	The temperature around the counter processor and the fuel temperature of product No. 1
14 2	The temperature around the counter processor and the fuel temperature of product No. 2
14 3	The temperature around the counter processor and the fuel temperature of product No. 3
14 4	The temperature around the counter processor and the fuel temperature of product No. 4
14 5	The temperature around the counter processor and the fuel temperature of product No. 5

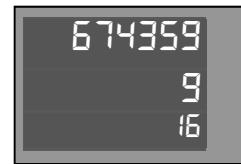
NOTE Number of fuel products shown in the P14 parameter is conditioned by the configuration of the dispenser. The identification system of delivery hoses and products is described in Figure 54.

4.1.18. RESETTING DAILY TOTALIZERS (CODE 15)

This function is intended for resetting all daily totalizers of delivery hoses/nozzles. After setting the parameter to 1 and confirming (<ENT> + <1> + <ENT>) all totalizers that are a part of the P02 parameter will be **reset**.

4.1.19. OPERATING CONTROL NUMBER (CODE 16)

This function is used to display a 6-digit operating control number and to enter the operating code if the dispenser is blocked or is running within the trial period. This parameter has the following arrangement of data on the display: The first line of the display shows the numeric code (operating control number) required to remotely unlock the dispenser. The second row shows the number of days of trial operation after which the dispenser will be blocked. If the first line of the display is blank and the second line shows 0, then the dispenser is in the standard operating mode.



4.1.20. DISPLAY BACKLIGHT INTENSITY (CODE 17)

The function allows you to set the intensity of the LED backlight of the PDEDCU graphical proportional display and the PDEDIL V6 display. For other display types, the parameter is non-functional.

Table 39 - Display backlight intensity P17

Parameter	Meaning
17 = 0	Display backlight is not regulated
17 = 1-100	PWM value of display backlight.

The factory default setting for the parameter value is 70.

4.1.21. GRAPHIC DISPLAY TEXT MESSAGES (CODE 18)

If the dispenser is equipped with a PDECPU graphic proportional display, then the feature allows you to set the length of the text messages duration that will appear on the display. Text messages can be divided into two groups:

- display descriptions
- advertising messages

Parameters reserved for display descriptions can be 0 and 1. At a parameter value 0, the description on the display is not displayed. It is displayed with parameter 1. Parameters reserved for advertising texts may be 0, 1, 2 to 9. If the value of parameter is 0, the advertising message is not displayed on the display, if the value of parameter is 1, 2, 3 to 9 the display shows the advertising message for 1, 2, 3 to 9 seconds (according to the parameter value). The advertising messages appear on the display in the order of 1, 2 ... to 9 only in the period when the dispenser is in the idle state after payment. They will stop showing immediately after lifting up the delivery nozzle and starting the delivery. A list of all usable parameters and their significance is in the table below.

Table 40 - Text messages of graphical display P17

Parameter	Meaning	Factory setting
18 6	Amount display description	0 - do not show
18 7	Volume display description	0 - do not show
18 8	Price display description	0 - do not show
18 11	Advertising message No. 1	0 - do not show
18 12	Advertising message No. 2	0 - do not show
18 13	Advertising message No. 3	0 - do not show
18 14	Advertising message No. 4	0 - do not show

Parameter	Meaning	Factory setting
18 15	Advertising message No. 5	0 - do not show
18 16	Advertising message No. 6	0 - do not show
18 17	Advertising message No. 7	0 - do not show
18 18	Advertising message No. 8	0 - do not show
18 19	Advertising message No. 9	0 - do not show
18 20	Description in amount pre-selection	0 - do not show
18 21	Description in volume pre-selection	0 - do not show

NOTE Parameter 18 only works for the PDEDCU graphical proportional display. For other display types, the parameter is non-functional.

4.1.22. DISPLAY OF THE DISPLAY SEGMENT ERROR (CODE 19)

The function allows you to turn on/off display of a display segment error (Er1) by the processor.

Table 41 - Display of the display error P17

Parameter	Meaning
19 = 0	The display segment error will not be displayed
19 = 1	The display segment error will be displayed

The factory default setting for the parameter value is 1.

4.3. TBELTM COUNTER

The TBELTM electronic counter in the same way as the PDEX counter, see chapter 4.2, by remote controllers PDERT-5S (service) and PDERT-5O (manager), which can be used to:

- ▶ read non-resettable electronic quantity totalizers of all delivery hoses
- ▶ read and reset daily electronic quantity and financial totalizers of all hoses
- ▶ setting of unit prices of products (in manual operation)
- ▶ reading and setting of operating parameters of the dispenser

The operator and manager mode of the TBELTM counter is almost the same as in the PDEX counter (chapter 4.2). The difference is only in a few parameters - see below.

Table 42 - List of parameters of the operator access mode of the TBELTM counter

Parameter	Description
01	Non-resettable amount totalizers
02	Daily quantity and financial totalizers (resettable)
03	Product unit prices (in manual mode)
04	Current time and date
05	Program version and check sums
06	Error message history
07	Latest delivery history

Table 43 - List of parameters of the manager mode of the TBELTM counter

Parameter	Description
01	Non-resettable volume totalizers
02	Daily volume and financial totalizers (resettable)
03	Product unit prices (in manual mode)
04	Current time and date
05	Program version and check sums
06	Error message history
07	Latest delivery history
08	Access password for the Manager mode
09	Maintenance history
10	Serial numbers of peripheral units
11	- unoccupied -
12	Dispenser control mode
13	Defects statistics
14	Current operating temperature
15	Resetting daily totalizers
16	- unoccupied -
17	- unoccupied -
18	- unoccupied -
19	- unoccupied -

Differences of the TBELTM counter parameters from the PDEX counter:

- ▣ Parameter P04 - Current time and date - Internal clock power is backed up for 5 days
- ▣ Parameter P06 - History of error messages - 100 error codes are backed up.
- ▣ Parameter P07 - History of deliveries - stores up to 50 deliveries
- ▣ Parameter P10 - Serial numbers of peripheral units - new parameter, see 4.2.1

4.2.1. DISPLAYING PERIPHERAL UNIT SERIAL NUMBERS (CODE 10)

This feature allows you to view serial numbers of peripheral units that are stored in the counter memory.

Table 44 - Display of serial numbers of peripheral units P10

Parameter	Unit	E code
10-1	Processor unit	
10-2	Main displaying unit (Master display)	E80
10-3	Auxiliary displaying unit (Slave display)	E81
10-4	Totalizer unit	E82
10-5	Temperature measuring unit (PDEINP)	E83
10-6	Mass meter	E84

NOTE Serial numbers of peripheral units are checked before each delivery and re compared to numbers stored in the counter memory. In discrepancy, delivery is not allowed and the fault code will appear on the display (see column E in the table). Changing serial numbers is only possible in a service mode by the authorized employee after previous metrological seal damage.

4.4. PDEX5 COUNTER

The PDEX5 electronic counter is set in the same way as the PDEX counter, see chapter 4.2, by remote controllers PDERT-5S (service) and PDERT-5O (manager), which can be used to:

- ▶ read non-resettable electronic quantity totalizers of all delivery hoses
- ▶ read and reset daily electronic quantity and financial totalizers of all hoses
- ▶ setting of unit prices of products (in manual operation)
- ▶ reading and setting of operating parameters of the dispenser

The operator and manager mode of the PDEX5 counter is almost the same as in the PDEX counter (chapter 4.2). The difference is only in the numbers of the individual parameters. Table 45 a Table 46 describe the lists of operator and manager parameters of the PDEX5 counter. The last column in the table indicates the corresponding parameter of the PDEX counter, see 4.2.

Table 45 - List of parameters of the operator access mode of the PDEX5 counter

Parameter	Description	(PDEX)
00	Non-resettable amount totalizers	(P01)
01	Resettable (daily) quantity totalizers	(P02)
02	Resettable (daily) amount totalizers	(P02)

Table 46 - List of parameters of the manager mode of the PDEX5 counter

Parameter	Description	(PDEX)
00	Non-resettable amount totalizers	(P01)
01	Resettable (daily) quantity totalizers	(P02)
02	Resettable (daily) amount totalizers	(P02)
03	Product unit prices in a manual mode	(P03)
04	Current time and date	(P04)
05	Program version and check sums	(P05)
06, 07	- not used -	
08	Access password for the Manager mode	(P08)
09	- not used -	
10	Serial numbers of peripheral units	-
11	Vapour exhaust test duration	(P11)
12	Dispenser control mode	
13	- not used -	
14	Current product temperature	(P14)
15	Resetting daily totalizers	(P15)
16-19	- not used -	
20	Error message history	(P06)
21	Statistics of dispensing site A failures	(P13)
22	Statistics of dispensing site B failures	(P13)
23	Statistics of dispensing site C failures	(P13)
24	Statistics of dispensing site D failures	(P13)
25	History of delivery operations in the dispensing site A	(P07)
26	History of delivery operations in the dispensing site B	(P07)
27	History of delivery operations in the dispensing site C	(P07)
28	History of delivery operations in the dispensing site D	(P07)
29	Maintenance history	(P09)

Differences of the PDEX5 counter parameters from the PDEX counter:

- ▶ Parameter P04 - Current time and date - Internal clock power is backed up for 5 days
- ▶ Parameter P20 - History of error messages - 100 error codes are backed up on each side of the dispenser.
- ▶ P21, P22, P23, P24 parameter – Statistics of errors – is individually for each dispensing site
- ▶ P25, P26, P27, P28 parameter – Delivery history – 100 deliveries for each dispensing site
- ▶ Parameter P10 - Serial numbers of peripheral units - new parameter, see 4.3.1

4.3.1. DISPLAYING PERIPHERAL UNIT SERIAL NUMBERS (CODE 10)

This feature allows you to view serial numbers of peripheral units that are stored in the counter memory. The column E code contains error codes that appear on the display if the serial number of the unit does not match the number stored in the counter memory.

Table 47 - Display of serial numbers of peripheral units P10

Parameter	Unit	E code
10-1	Processor unit	
10-2	PDEINP1 temperature correction main unit (temperature sensors 1 to 4)	E83-1
10-3	PDEINP2 temperature correction auxiliary unit (temperature sensors 5 to 8)	E83-2
10-4	Mass meter A	E84-1
10-5	Mass meter B	E84-2
10-6	Dispensing site A main (master) displaying unit (display)	E80-1
10-7	Dispensing site A auxiliary (slave) displaying unit (display)	E80-2
10-8	Dispensing site A electromechanical totalizer main unit	E82-1
10-9	Dispensing site A electromechanical totalizer auxiliary unit	E82-2
10-10	Dispensing site B main (master) displaying unit (display)	E80-1
10-11	Dispensing site B auxiliary (slave) displaying unit (display)	E80-2
10-12	Dispensing site B electromechanical totalizer main unit	E82-1
10-13	Dispensing site B electromechanical totalizer auxiliary unit	E82-2
10-14	Dispensing site C main (master) displaying unit (display)	E80-1
10-15	Dispensing site C auxiliary (slave) displaying unit (display)	E80-2
10-16	Dispensing site C electromechanical totalizer main unit	E82-1
10-17	Dispensing site C electromechanical totalizer auxiliary unit	E82-2
10-18	Dispensing site D main (master) displaying unit (display)	E80-1
10-19	Dispensing site D auxiliary (slave) displaying unit (display)	E80-2
10-20	Dispensing site D electromechanical totalizer main unit	E82-1
10-21	Dispensing site D electromechanical totalizer auxiliary unit	E82-2

NOTE Serial numbers of peripheral units are checked before each delivery and re compared to numbers stored in the counter memory. In discrepancy, delivery is not allowed and the fault code will appear on the display (see column E in the table). Changing serial numbers is only possible in a service mode by the authorized employee after previous metrological seal damage.

4.5. TBELTx COUNTER

The TBELTx electronic counter is set using the 4-button keyboard or the preset keyboard if installed on the dispenser. Using the keyboard, you can:

- ▶ set unit prices of fuel products (in manual operation)
- ▶ read non-resettable electronic litre totalizers of all delivery hoses
- ▶ change the dispenser working mode

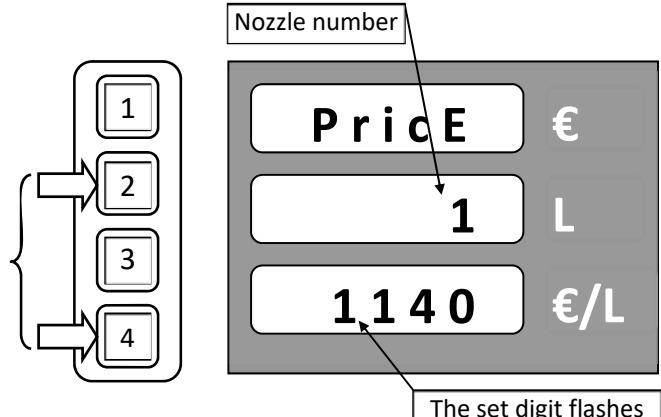
4.4.1. SETTING THE FUEL UNIT PRICE

If the dispenser operates in the manual mode, then the product unit prices saved in the calculator memory where a single fuel unit price is assigned to each pump are used for calculation of the sum for dispensed fuel. Changes of the fuel price on the display will take effect after the next time the nozzle is taken out. A zero price value for all fuel products is set at the factory. It is necessary to set a non-zero price, or dispensing will not commence and the error message E30 – "zero price" will appear. If the dispenser works in the automatic mode, the fuel unit prices sent from the control computer at each dispensing authorization is used to calculate the total dispensed sum. Prices saved in the parameter P03 are non-functional.

How to set the fuel price in a manual mode

The price change can only be made between powering on the counter and the first delivery on the dispenser.

- ▶ Turn the counter power supply off and on.
- ▶ Press and hold the button 2 simultaneously with button 4 for at least 3 seconds.
- ▶ The middle line shows the number of the set nozzle (product), the unit price is shown on the lower line. The price is set by individual locations. The set digit flashes.
- ▶ Use the button 1 to change the value of the flashing location.
- ▶ By button 2 you can move between different orders.
- ▶ Use the button 3 to change the number of the nozzle for which the price is being set.
- ▶ To quit the price setting, press the button 4.

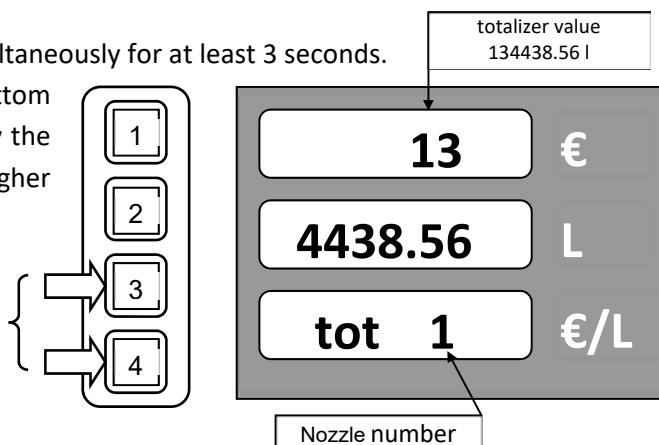


4.4.2. READING ELECTRONIC TOTALIZERS

The TBELTx counter is equipped with electronic volume totalizers for each delivery hose / nozzle. The value of these totalizers can be determined using the preset keyboard or by the command on the communication line. Totalizer reset can be done using the P18 configuration parameter. Totalizer reset can only be done if the SW1-1 switch is set to OFF.

How to read the electronic totalizers:

- ▶ You can only display the value of the totalizers on the counter display if all the nozzles are hung and the previous delivery is paid.
- ▶ Press and hold the buttons 3 and 4 simultaneously for at least 3 seconds.
- ▶ The nozzle number appears on the bottom line. The upper and middle lines display the totalizer value (the upper line shows higher orders).
- ▶ Use the 1(+) and 2(-) buttons to change the nozzle number.
- ▶ To end the display of the totalizer, press the button 4 (Cancel).

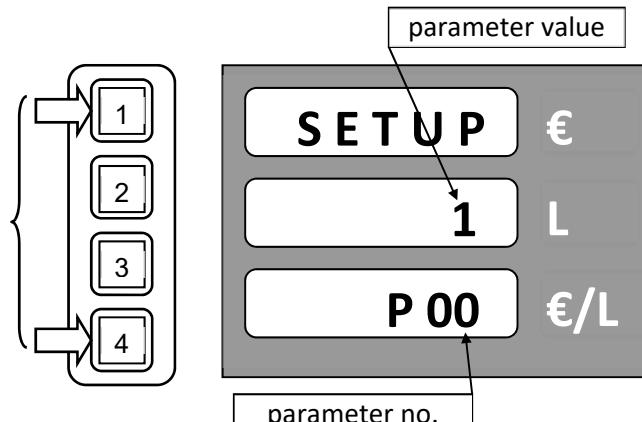


4.4.3. CHANGE OF THE WORKING MODE

Changing the dispenser working mode must be performed when the dispenser is disconnected from the control system (e.g. in the event of a malfunction of the control system) when the dispenser is to be operated manually or vice versa when the dispenser is in a manual mode and must be connected to the control system.

How to change the working mode:

- ▶ Turn the power supply of the dispenser counter off and on.
- ▶ During the counter test (zero countdown), press and hold buttons 1 and 4 simultaneously until the letter "P" flashes on the lower line indicating the entry to the setting mode.
- ▶ When the counter test is completed, the parameter number P00 appears on the bottom line.
- ▶ The value of that parameter is displayed on the middle line.
- ▶ Opening the parameter for editing is made by pressing the button 3 (Enter).
- ▶ When the parameter is opened, its value flashes.
- ▶ Change the parameter value with buttons 1 and 2 to 0 – for automatic mode or 1 – for manual mode.
- ▶ To store the parameter value, press the button 3 (Enter).
- ▶ The parameter setting mode is ended by pressing the button 4 for at least 2 seconds (Cancel).



5. OPERATION

5.1. INSTRUCTIONS FOR SAFE OPERATION

Dispensers are complex devices that have to secure a whole range of difficult functions. Therefore, cleaning of the storage tanks, piping systems and inspection of the pumped medium cleanliness must be carried out before commissioning. An inspection of wiring and a check of connection correctness must be performed before commissioning in order to prevent any electric shock injuries and to ensure safety against explosion.



Smoking forbidden



**Open flame use
forbidden**



Use of mobile phones forbidden

NOTICE->LPG For LPG dispensers/modules, a pressure test of the LPG dispenser must be performed with a pipeline system by pressure of 2.5 MPa, including a review, before commissioning.

NOTICE->ADBLUE AdBlue® dispensers/modules must be pressurized at 0.35 MPa before commissioning the AdBlue® dispenser together with the piping system in order to perform a pressure test.

WARNING Dispensers are hygienically harmless for the customer and operator. It is advisable to protect your hands, for example, with eco-friendly gloves during normal maintenance and during deliveries. In case of skin contact, wash the affected area as soon as possible with soap and water. In case of eye contact, etc., seek medical attention. During deliveries, avoid inhalation of vapours of the pumped medium.

CAUTION

- ⚠ It is forbidden to smoke and use open fire in the immediate vicinity of the dispenser.
- ⚠ The smoking ban applies also to passengers inside the vehicle.
- ⚠ It is forbidden to use mobile phones in the immediate vicinity of the dispenser.
- ⚠ It is forbidden to pump into the vehicle tank while the engine is running.

CAUTION->LPG

- ⚠ Technical and technological devices must correspond to approved conditions together with regulations for safe operation and maintenance as well as solutions of emergencies. The device must be fitted with carbon-dioxide extinguishers according to the fire-safety solution.
- ⚠ The LPG fuel station may only be operated by demonstrably trained persons.
- ⚠ The "STOP button" is placed at the dispenser (for emergency situations). The procedure in case of fire or emergency is precisely defined in local operating rules and regulations – the attendant must be demonstrably trained with regard to this.
- ⚠ The "STOP line" must be located at least 5 meters from the dispenser.
- ⚠ LPG containers, piping and dispenser must be earthed, the grounding point for the pumping tank must be established and marked.

- ⚠ When pumping LPG or pumping out or removing from tanks, it is necessary to proceed according to the regulations issued, in accordance with specific conditions the entry and operation in the designated area of the fuel station must be avoided.
- ⚠ It is necessary to follow the prescribed procedure for the sale and delivery of LPG. In any danger, immediately disable this device. During the LPG delivery, the LPG station operator must also be present, the delivery must not be carried out in the event of the risk of atmospheric discharges in storms.
- ⚠ It is necessary to observe defined terms to perform regular checks and inspections of all installed technical devices. Do not allow persons without appropriate professional qualification to tamper the installed technology including the gas devices.

CAUTION->ADBLUE

- ⚠ Technical and technological tools must meet approved requirements which consist of instructions for safe operation and maintenance and instructions for solving any emergency situation. Snow extinguishers must be available in the vicinity of AdBlue® dispensers in accordance with the safety guidelines.
- ⚠ Sale and delivery of AdBlue® must comply with prescribed rules; in case of danger, stop the operation of the dispenser immediately.
- ⚠ It is necessary to keep the dates of regular inspections and checks of the entire AdBlue® dispenser; persons without appropriate competencies, skills and qualifications must not handle the installed technology.
- ⚠ Regular maintenance and service must be carried out by a solely authorized service company.
- ⚠ The operator is responsible for keeping the AdBlue® dispenser in its original and safe condition; any defect or unusual phenomenon must be immediately reported to a service company; in case of danger or delayed intervention the dispenser must be shut down.

CAUTION

- ⚠ The attendant must not perform any repairs of the device and change setting of safety fittings. Regular maintenance and service may only be performed by an authorized service company.
- ⚠ The attendant must keep the device in proper and safe order, immediately inform the service organization about the defect of abnormality during operation and immediately decommission the device in case of danger of default.

NOTICE The LPG dispenser must be secured with an electrical device equipped with the STOP function according to category 0 or 1 in EN 60204-1. The fuel station attendant must be familiar with the device function.

CAUTION-CNG

- ⚠ Technical and technological devices must correspond to approved conditions together with regulations for safe operation and maintenance as well as solutions of emergencies. The device must be fitted with carbon-dioxide extinguishers according to the fire-safety solution.
- ⚠ The CNG fuel station may only be operated by demonstrably trained persons.
- ⚠ The dispenser is equipped with the "STOP button" for emergencies. The procedure in case of fire or emergency is precisely defined in local operating rules and regulations – the attendant must be demonstrably trained with regard to this.
- ⚠ It is necessary to observe defined terms to perform regular checks and inspections of all installed technical devices. Do not allow persons without appropriate professional qualification to tamper the installed technology including the gas devices.

CAUTION-CNG

- ⚠ *The attendant must not perform any repairs of the device and change setting of safety fittings. Regular maintenance and service may only be performed by an authorized service company.*
- ⚠ *The attendant must keep the device in proper and safe order, immediately inform the service organization about the defect of abnormality during operation and immediately decommission the device in case of danger of default.*

CAUTION-CNG

- ⚠ *It is forbidden to smoke and use open fire in the immediate vicinity of the dispenser.*
- ⚠ *The smoking ban applies also to passengers inside the vehicle.*
- ⚠ *It is forbidden to use mobile phones in the immediate vicinity of the dispenser.*

NOTICE-CNG *Each CNG dispenser must be secured with an electrical device equipped with the STOP function according to category 0 or 1 in EN 60204-1. The fuel station attendant must be familiar with the device function.*

5.2. DISPENSER COMMISSIONING

Switching on and off of fuel dispensers is carried out in the main switchboard of the fuel station where the power supply of the dispensers is provided. Each dispenser has two power points in the main switchboard:

- The power supply of pump electric motors and suction vacuum pumps if included in the dispenser
- Power supply of the dispenser electronic counter, switching and heating circuits

Both of these power points are secured by the appropriate circuit breakers that enable the dispenser to be switched on and off.

RECOMMENDATION *We recommend that you turn on the dispenser as follows:*

- ⚠ *Turn on the backup UPS located in the booth (the green LED on the UPS turns on)*
- ⚠ *Switching on the 230 V circuit breaker for stabilized power supply of the electronic counter of the dispenser (all segments of the display are automatically tested and the last delivered values are displayed on the display)*
- ⚠ *Switching on the 3x400 V the power supply circuit breaker for electric motors of pumps and vacuum pumps (if installed).*

During each counter powering on, the following processes are carried out:

- **displaying units (displays) test.** The display backlight turns on and then all segments (digit "8") are displayed for approx. 1 second.
- **time delay when the counter is turned on.** The time needed to start the multimedia display. During the time delay, the display shows the side of the counter where the display is connected (A = DISA or B = DISB) and the time in seconds remaining to the activation of the electronic counter of the dispenser. The length of the time delay can be set by the counter parameter, standardly without delay.
- **processor unit test.** A ten-second test that controls all functions and the processor unit memory. During the test the displays show the counter side where the display is connected (A = DISA or B = DISB), the metrological control sum of the program (20260) and the version of the counter program (1.03).
- **temperature test around the processor and the SW1 switch position display.** The value of the measured temperature in tenths of degrees is displayed on the display. If the measured temperature is $T < -15^{\circ}\text{C}$, then the display heating (if enabled) is started. The display shows the position of SW1-1, SW1-2, SW1-3 and SW1-4 switches (1 = ON, 0-OFF). If the switch SW1-1 is in position 1, the setting of selected metrology parameters cannot be performed on the counter.
- **setting of the calculator state before turning it off.** The information that was on the display before the last counter turnoff is displayed. If the calculator was working in the manual mode, dispensing can commence immediately after lifting the nozzle. If the calculator was working in the automatic mode, it waits until communication with the control computer is established and - if necessary - until the transaction is finished (paid), in case it was not finished regularly before turning off.

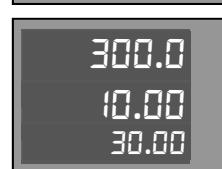
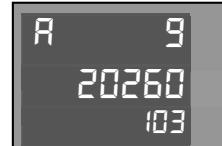
Now the dispenser is ready for fuel delivery.

5.3. DISPENSER OPERATION

NOTICE *The operator is responsible for the operation of the fuel station and it is his duty to monitor the delivery of fuel and, in the event that the customer performs unauthorized operations at the self-service dispensers, he must instruct the customer about proper handling. The operator is also obliged to mark the risk area of the fuel station with warning symbols (smoking ban, ban on open fire, direction of arrival to the dispenser, etc.). The fuel station operating instructions must be freely accessible to the customer for any information on basic obligations.*

5.3.1. FUEL (PETROL, DIESEL ...) AND TECHNICAL LIQUIDS (WSE, ADBLUE®) DELIVERY

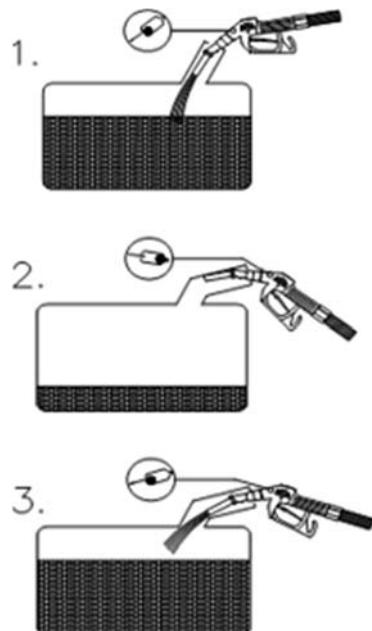
Starting the dispenser is carried out by lifting the delivery nozzle from the nozzle cover which simultaneously automatically resets the electronic counter data. Then the pump electric motor is started and the fuel can be delivered. The delivering speed is controlled by the delivery nozzle. Ending the delivery is performed by closing



the delivery nozzle (by releasing the control lever) and its subsequent hanging in the nozzle cover which shuts down the pump electric motor. The quantity delivered remains unchanged until the delivery nozzle is lifted again or until the payment.

Fuel delivery. The fluid measured by the meter is delivered into the delivery hose and the delivery nozzle bolted to the end of the hose. Self-service fuel stations use delivery stop-nozzles with a safety shutter. Using the control lever, the flow rate can be controlled until it stops. In the basic version, the delivery nozzle is supplied with a lever lock. At customer's request, a delivery nozzle is provided without a lock where the lever must still be pressed during delivery. When releasing the lever or dropping the delivery stop-nozzle out of the tank opening, the fuel flow stops. The stop function occurs when the tank is full after the sensor has detected the fluid level, the flow stops even when the control lever is depressed. The safety function works, for example, when the delivery nozzle is not properly handled, i.e. the discharge attachment is higher than 15 degrees from the horizontal plane upwards, the flow stops even when the control lever is depressed. After the stop function and the safety function it is necessary to release the control lever to automatically return to the basic position.

Table 48 - Delivery nozzle positions during delivery



Correct position of the delivery nozzle during delivery

The delivery nozzle is almost vertical, the ball does not prevent the passage of air and the fuel flows.

Incorrect delivery nozzle position

The delivery nozzle is diverted from the horizontal position, the ball prevents the passage of air and the fuel does not run

In various designs of fuel tank inlet ports, it is necessary to find the optimal position of the delivery nozzle when the fuel still flows. Flow shut-off may also occur when the fuel flow from the delivery nozzle hits the wall of the tank neck. In that case, it is also necessary to find the optimal position.

5.3.2. LPG DELIVERY

Before the delivery starts, the dispenser attendant checks whether the storage tank in a vehicle has a homologation mark, the vehicle engine and all electrical devices are turned off. Then he/she visually inspects the condition or wear of the filling neck that could be the reason for leaks. If he/she finds serious deficiencies, he/she is entitled to refuse storage tank filling. In case of gas leak or danger the attendant shall finish the delivery.

LPG delivery into motor vehicles with attendants

The operation of the dispenser is ensured by the employee of the fuel station who lifts the delivery nozzle from the dispenser and connects it to the storage tank of the vehicle which must be secured against moving. After pressing the control button (START button) located on the counter case, the reset of the electronic counter is

performed and the pump electric motor located at the storage tank starts. Delivery can be terminated at any time by releasing the control button. When refilling the "full" tank, after reaching the 80% fill level the tank filler neck is closed and the safety control (electronic counter) terminates the delivery within 10 seconds regardless of the control button. Delivery data remains recorded on the counter display. Dispensers equipped with an electronic pre-selection allow pre-selection of the exact quantity required which is determined by volume or amount. These stands are equipped with a two-stage solenoid valve.

NOTICE Pursuant to EN 14678-1:2013, article 4.5.8, LPG dispensers designed for self-service operation must be equipped with a "**dead man button**" (START button) to ensure that the delivery process can only be started and maintained by pressing this button. **Release of this button shall immediately stop the flow of LPG.**

NOTE According to EN 14678-1:2013, article 4.5.1.1, LPG dispensers must be equipped with a breakaway or shear coupling located between the delivery nozzle and the dispenser. This breakaway coupling disconnects the flow rate at both ends in case of emergency. LPG dispensers are standardly equipped with a breakaway coupling which breaks if a force greater than 200N and less than 500N is applied to it.

OBLIGATIONS OF LPG DISPENSER/MODULE ATTENDANT

- ⚠ *Observe operating rules and regulations and operating instructions of gas devices.*
- ⚠ *Keep the operated devices in a safe and proper condition.*
- ⚠ *Immediately inform the operator about each defect, failure or abnormality during operation.*
- ⚠ *Immediately decommission the device in case of gas leak or danger.*
- ⚠ *Keep tidiness and cleanliness and ensure that no unauthorized persons are nearby the device.*
- ⚠ *Inform the operator about circumstances that impede the device operation for the attendant.*
- ⚠ *Properly write records to the log book about the shift start and finish, inspections, repairs and audits.*
- ⚠ *The dispenser and reservoir attendant must not perform any repairs or change the device and safety fittings setting on his/her own.*
- ⚠ *Regularly check the condition of delivery hoses, their correct position in the dispenser. Protect them from damage, especially when the dispenser is not equipped with a winch and the hose is lying on the ground.*

Unattended LPG delivery into motor vehicles

In the case of unattended delivery, the customer him/herself lifts the delivery nozzle from the dispenser and connects it to the tank of the vehicle. After pressing the control button (START button) located on the counter case, the reset of the electronic counter is performed and the pump electric motor located at the storage tank starts. Delivery can be terminated at any time by releasing the control button or by pressing the STOP button (safety STOP button). When refilling the "full" tank, after reaching the 80% fill level the tank filler neck is closed and the safety control (electronic counter) terminates the delivery within 10 seconds regardless of the control button. Upon completion, the customer is obliged to hang the delivery nozzle back into the dispenser, into the delivery nozzle holder. Only after the nozzle has been properly hung up, the transaction is terminated and the registration of the delivery by the control system is completed.

NOTE->LPG In the unattended mode, the start of delivery only occurs after lifting the nozzle and pressing the START button. Delivery termination only occurs after releasing the "START" button and returning the delivery nozzle. In the attended mode, commencing / terminating delivery occurs after pressing / releasing the START button.

NOTE->LPG LPG dispensers for unattended fuel stations must be, in addition to the START button, also equipped with a safety STOP button and the delivery nozzle position sensor – see EN 14678-1, art. 4.5.6 "**Unattended fuel stations must be equipped with a device to ensure that the fuel filler is properly positioned back after the fuel delivery is completed**".

Safety at work with the LPG dispenser/module

The operator is responsible for the fuel station operation and is obliged to entrust its operation only to trained employees having relevant authorization. The attendant shall competently perform filling the LPG storage tanks of refilled vehicles, checks the conditions of the dispenser and other devices in regular intervals as well as the operation of the entire device, and keeps operating records. The smoking ban and ban on using open fire within a radius of 10 m must be located in a visible place nearby the dispenser. There must be also a notice on switching off the engine, max. filling level of 80% and securing the vehicle against spontaneous setting in motion.

In terms of construction, dispensers and all their components which could be the source of initiation of the explosion are approved by the state authorized institution, State Testing Office No. 210 FTZÚ Ostrava Radvanice that issues the relevant certificates. Environmental safety is documented by the approval of ČIŽP No. 90/00/895/01/TOM. After detecting possible gas leak the detector sensors may be located in the dispenser area. However, these sensors are not included in the basic offer. In terms of hygiene, the given device is harmless for attendants and operators. While performing operation and maintenance it is advisable to protect your hands by wearing gloves.

5.3.3. CNG DELIVERY TO MOTOR VEHICLES

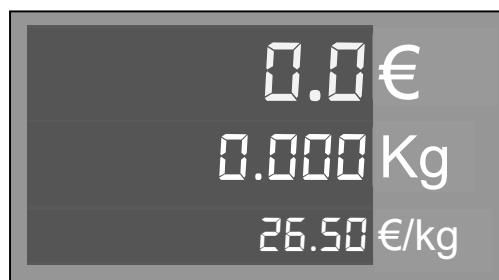
Delivery start

Before the delivery starts, the dispenser attendant checks whether the storage tank in a vehicle has a homologation mark, the vehicle engine and all electrical devices are turned off. Then he/she visually inspects the condition or wear of the filling neck/connector that could be the reason for leaks. If he/she finds serious deficiencies, he/she is entitled to refuse storage tank filling. In case of gas leak or danger the attendant shall finish the delivery.

The operation of the dispenser itself is ensured by the employee of the fuel station who lifts the delivery nozzle from the dispenser and connects it to the storage tank of the vehicle which must be secured against moving. Immediately after the nozzle is lifted the display test is performed – displaying all segments – and then it is reset and the product unit price is displayed.



After pressing the START button located on the counter case the electromagnetic valve opens at the inlet of the first pressure section and the pressure storage tank of the vehicle is filled with compressed natural gas. At the moment when the delivery speed decreases under the defined limit, the electronic counter automatically switches delivery to the second section and then potentially to the third pressure section – depending on the dispenser and fuel station configuration.



NOTE Some dispensers, especially non-public - company dispensers, are not fitted with the sensors of delivery nozzle lifting. At such dispensers the display test is performed after pressing the START button.

Delivery termination

The delivery may be terminated for various causes. Possible causes of delivery termination and corresponding messages shown on the display are mentioned in Table 49.

Table 49 - Causes for delivery termination

Event	Indication on display
1. Pressing the STOP button by the customer/attendant during the delivery	STOP
2. Attaining the pre-set sum, quantity or limit values of the dispenser	STOP
3. STOP command received from the superior system (payment terminal)	STOP
4. Gas flow rate drop under the value set on the dispenser (e.g. < 2kg/min)	FULL
5. Attaining the maximum possible mass calculated by temperature compensation	FULL
6. Detection of an error event.	Exx

The most frequent delivery termination is during filling the full storage tank when the gas flow rate drops under the set value (4) at dispensers without temperature compensation and delivery termination by attaining the maximum possible gas mass calculated by temperature compensation (5). In both cases delivery termination is signalled by the "FULL" message on the product unit price display.



Delivery is finished by hanging the delivery nozzle to the dispenser.

NOTE Delivery with temperature compensation is performed so that the dispenser shall verify the situation in the vehicle storage tank by a small amount of gas at the beginning of delivery and calculates the maximum gas mass which it is able to deliver under given ambient temperature. After attaining the maximum mass, it finishes the delivery and shows the "FULL" message. According to technical rules of TPG 304 02 art. 4.5.4 the limit values in the Czech Republic for calculating maximum gas mass in the vehicle are as follows:

- a) maximum gas pressure converted to 15 °C – 20.0 MPa
- b) attain maximum overpressure in a vehicle 26.5 MPa
- c) attaining maximum gas temperature in a vehicle 82 °C

NOTE According to ISO/DIS 16923, par. 7.5 CNG dispensers must be equipped with a breakaway coupling located between the delivery nozzle and the dispenser. This breakaway coupling disconnects the gas flow rate at both ends in case of emergency. The force that causes breaking the coupling must be higher than 220N and lower than 600N. OCEAN CNG dispensers are standardly equipped with a breakaway coupling with a magnetic sensor of breaking. After breaking the hose the delivery is immediately terminated (magnetic valves are closed) and the display shows the error message E67.

RESPONSIBILITIES OF CNG DISPENSER ATTENDANTS

- Observe operating rules and regulations and operating instructions of gas devices.
- Keep the operated devices in a safe and proper condition.
- Immediately inform the operator about each defect, failure or abnormality during operation.
- Immediately decommission the device in case of gas leak or danger.
- Keep tidiness and cleanliness and ensure that no unauthorized persons are nearby the device.
- Inform the operator about circumstances that impede the device operation for the attendant.
- Properly write records to the log book about the shift start and finish, inspections, repairs and audits.
- The dispenser and reservoir attendant must not perform any repairs or change the device and safety fittings setting on his/her own.
- Regularly check the condition of delivery hoses, their correct position in the dispenser and protect them from damage.

EQUIPMENT OF ATTENDANTS

- soap (foaming) solution + brush for detecting leaks
- leather gloves
- the fuel station booth must contain a first-aid kit, log book, writing materials, operating and safety regulations, fittings diagram and extinguisher

Occupational safety while working with the CNG dispensing module

The operator is responsible for the fuel station operation and is obliged to entrust its operation only to trained employees having relevant authorization. The attendant shall competently perform filling the CNG storage tanks of refilled vehicles, checks the conditions of the dispenser and other devices in regular intervals as well as the operation of the entire device, and keeps operating records. The smoking ban and ban on using open fire within a radius of 10 m must be located a visible place nearby the dispenser. There must be also a notice on switching off the engine and securing the vehicle against spontaneous setting in motion.

In terms of structure, all dispenser components that could be sources of explosion initiation are approved according to the European standard ATEX. After detecting possible gas leak the detector sensors may be located in the dispenser area. However, these sensors are not included in the basic offer. In terms of

hygiene, the given device is harmless for attendants and operators. While performing operation and maintenance it is advisable to protect your hands by wearing gloves and wear safety goggles.

5.4.1. ELECTROMECHANICAL TOTALIZERS

On demand, TATSUNO EUROPE dispensers are equipped with electromechanical totalizers for monitoring the total amount of fuel flown through each delivery hose. Totalizers are located on the dispenser display. Each delivery hose or nozzle has one seven-digit electromechanical totalizer that shows the **number of complete litres (kilograms for CNG) delivered through the appropriate delivery hose**. For multiple product dispensers, the electromechanical totalizers on the display are ordered from top to bottom or from left to right and are marked with delivery hose numbers.

NOTE On display A, the electromechanical totalizers are numbered 1, 2, 3, 4. The numbers of the totalizers correspond to the delivery hoses 1A, 2A, 3A and 4A. On the display B, the electromechanical totalizers are also numbered 1, 2, 3, 4. The numbers of totalizers correspond to the delivery hoses 1B, 2B, 3B and 4B.

5.4.2. GASOLINE VAPOUR RECOVERY

TATSUNO EUROPE dispensers for gasoline or gasoline/ethanol mixture (max. E85) can be (on customer demand) equipped with a gasoline vapour recovery system where fuel vapours, except for diesel and biodiesel, are extracted from the delivery nozzle outlet point through the coaxial delivery hose, the vacuum pump located in the dispenser via a return pipe into the fuel storage tank. In the case of vapour recovery at a single-product dispenser, the vacuum pump is driven directly by the dispenser pump electric motor. For multi-product dispensers, each side of the dispenser has its own vacuum pump powered by an electric motor. The recovery function and the amount of exhausted vapours are regulated according to the fuel flow. This means that if the fuel is not delivered into the tank, the vapour recovery is switched off and if the fuel is delivered, then the vapour volume must be equal to the volume of fuel pumped. According to European Directive 2009/126/EC art. 4 par. 2, the vapour/gasoline ratio must be equal to or greater than 0.95 but less than or equal to 1.05. The actual operation of the vapour recovery system is indicated on the display of the dispenser depending on the type of display used either by the display segment or by the green LED or by the two-arrow pictogram lit.

A malfunctioning vapour recovery system or faulty system may be signalled:

-  an unlit LED or display segment
-  non-illuminated pictogram with white arrows 
-  lit pictogram with red arrows and an exclamation mark 
-  the error message E54, E55 or E56 on the display, see the article 6.2.1

The **operation of the vapour recovery system** can be automatically monitored by a control unit coupled to a vapour flow sensor located on the return pipe in the dispenser, e.g. VAPORIX (FAFNIR) or Vareco Plus (TST). The vapour monitoring system compares the amount of aspirated vapours with the amount of protected fuel at each delivery and stores the data in the control unit. If the vapour/gasoline ratio is not within the specified limits (95% to 105%), it sends a signal to the counter of the dispenser which, if the defect is not removed within 72 hours, does not allow gasoline to be delivered from the dispenser. According to European Directive 2009/126/EC Art. 5, the vapour recovery system must be officially inspected at least once a year. If the dispenser

is equipped with monitoring of the vapour recovery system, the official examination is necessary at least every three years.

Conditions of operation of fuel stations (Decree 355/2002 Coll. - Annex 12)

"All gasoline dispensers must be fitted with a clear inscription warning the customers of the need to fully insert the delivery nozzle into the filler neck of the motor vehicle tank."

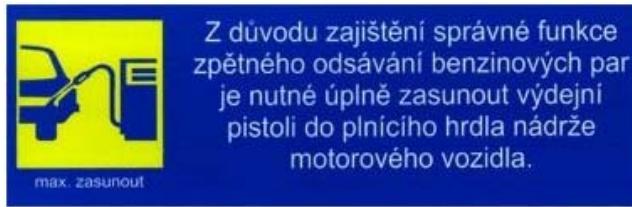


Figure 56 – Example of the vapour recovery label according to Decree 355/2002 Coll.

Conditions of operation of fuel stations (Decree 355/2002 Coll. - Annex 12)

"Checking the functionality of the vapour recovery system for vapour backflow at the dispensers is performed by the fuel station operator at regular intervals, at least once per shift. In the case of dispensers equipped with an optical signalling of the vacuum pump function, this function is checked by the operation of the warning light when the petrol is delivered."

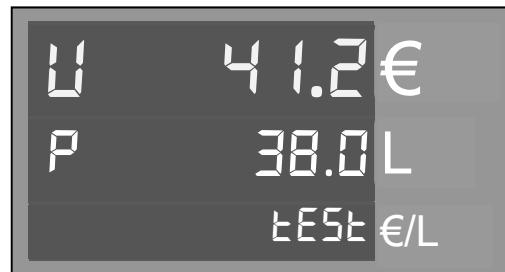
NOTICE In case of suspicion of malfunctioning of the recovery or detection of malfunctioning of the signalling, the operator is obliged to notify this fact immediately to the service organization to carry out the inspection and to remedy the defect.

5.4.3. VAPOUR RECOVERY SYSTEM TEST

The PDEX dispenser counter allows you to perform a **simple test of the vapour recovery system** of a dispenser according to EN 16321-2:2013 article 5.4. and a simple functional test without delivering fuel or shutting down the dispenser communication with the cash desk. The whole test is performed in the idle mode of the dispenser – i.e. the tested part of the dispenser (side A or B) with hung nozzles and in the delivered and paid state. The advantage of the test is that it can be terminated at any time by simply lifting up the delivery nozzle with an immediate transition to the standard delivery mode – for example, if the customer comes to the station during the test, he/she can lift the nozzle and deliver immediately. On the other untested part of the dispenser a standard fuel delivery can take place.

Procedure for dry vapour recovery measuring method, so-called "dry test method", with simulation of fuel flow according to EN 16321-2:2013 Article 5.4:

1. All pistols on the tested part of the dispenser are hung and the dispensing point has completed and paid delivery (delivery transaction). Lift up the nozzle that we want to measure and quickly replace it with a replacement nozzle or magnet in order to



avoid zeroing and starting the delivery and the dispenser remain idle.

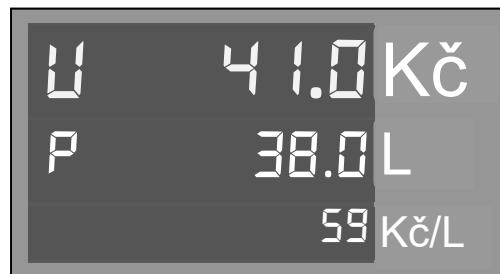
Pull the UMAX2 vapour recovery adapter onto the lifted nozzle and connect it to a gas meter equipped with a controller that shows the instantaneous vapour flow through the gas meter, see Picture 57. Hang the delivery nozzle by the outlet adapter downwards to open the internal ON/OFF vapour recovery valve.

Press <8> on the manager or service remote controller. The display shows screen (1):

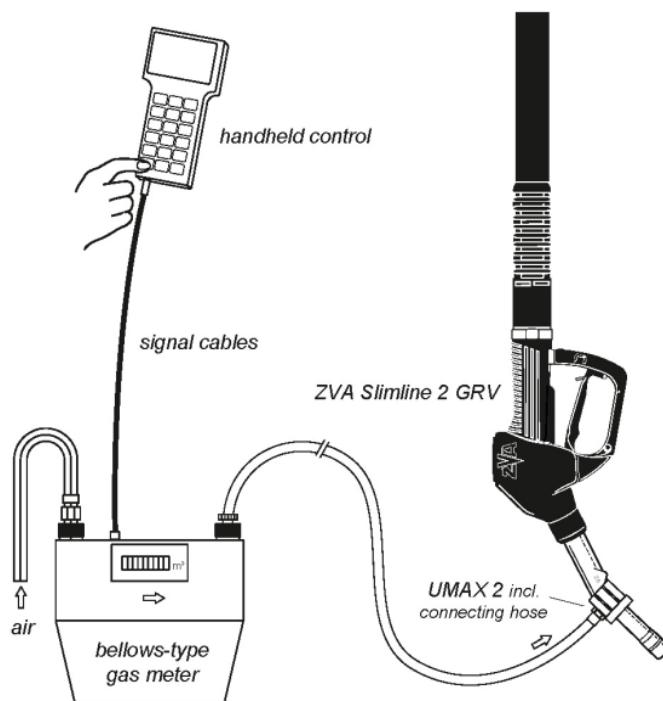
- **on the LITERS line:** P + value of simulated fuel flow $\bar{Q}_K = 38 \text{ l/min}$. According to the European standard EN 16321-2:2013, article 5.4, the test is performed with a simulated fuel flow $\bar{Q}_K = 38 \text{ l/min}$.

- **on the PRICE line:** V + required air flow through the recovery system $\bar{Q}_a = \bar{Q}_K \cdot k$ (e.g. $41.0 \text{ l/min} = 38.0 \text{ l/min} \times 1.08$). The value of the correction coefficient "k" is stored in parameter P77.

- **on the €/litre line:** text TEST.



NOTE If you wish to set any other fuel simulated value, then carry out a change of the value of $\pm 0.5 \text{ l/min}$ using the <+> and <-> keys or of the value of $\pm 5.0 \text{ l/min}$ using the <>> and <<> keys. In the PRICE line, the required airflow rate will automatically be calculated by the recovery system \bar{Q}_a .



Picture 57 - Connecting the delivery nozzle with an adapter and gas meter

2. Press the <E> button. The pump runs for the time set in parameter P11 (factory setting = 60 seconds). At the same time, the corresponding proportional valve (VRA or VRB) opens to a value corresponding to the simulated fuel flow \bar{Q}_K . Air starts to flow through the recovery system, the average flow value will be displayed by the display on the measuring gas meter. On the €/LITRE line, the set time will count down to 0. Before the end of the test period, the measured flow rate must be read \bar{Q}_a .
3. After the test time, the test is completed, i.e. the vacuum pump is shut off and the proportional valve closes. You can start the new test again by pressing the <E> button. Testing termination is performed by lifting up any delivery nozzle.

Test evaluation:

According to the European standard EN 16321-2:2013, article 5.4.2 the equation applies:

$$R = \frac{\bar{Q}_a}{k \cdot \bar{Q}_K}$$

where

R ... is the vapour/fuel ratio;

\bar{Q}_a ... is the calculated air flow during the measurement (mean value) in litres per minute;

\bar{Q}_K ... is the simulated fuel flow rate in litres per minute;

k ... is the correction factor stated in the certificate (according to EN 16321-1:2013).

The vapour recovery system operates correctly if the ratio of recovered vapour and fuel R ranges between 0.95 and 1.05. Consequently, **the value of the required vapour flow rate displayed on the display on the PRICE line must be equal or differ by less than ± 5% from the air flow value displayed on the gas meter's controller.**

NOTES

- ⚠ It is necessary for the vacuum pump to be heated to operational temperature during the test. For that reason, it is necessary to carry out one "blank" test before the measured test.
- ⚠ If only a gas meter without a controller is available for testing. It is possible to read the value of the gas meter before and after the test. It is possible to obtain vapour flow from the difference in values.
- ⚠ In order to comply with all conditions of EN 16321-2:2013 standard, it is necessary to ensure ambient temperature during test within the range from +5 °C to +25 °C and the gas meter for measuring must be calibrated within the operational range from 10 l/min to 60 l/min with precision of at least 2 %.

Procedure for simple testing of vapour recovery system functionality:

1. All pistols on the tested part of the dispenser are hung and the dispensing point has completed and paid delivery (delivery transaction). Lift up the nozzle for which we want to verify the recovery function and quickly replace it with a replacement nozzle or magnet in order to avoid zeroing and starting the delivery and the dispenser remain idle.
Put the adapter (whistle) on the lifted delivery nozzle (Quick Tester GR92), see Fig. 58. Then hang the delivery nozzle by the outlet adapter downwards to open the internal ON/OFF vapour recovery valve.

Press <8> on the manager or service remote controller. The screen (1) appears on the display – see the previous test.

2. Press the <E> button. The pump runs for the time set in parameter P11 (factory setting = 60 seconds). At the same time, the relevant proportional valve (VRA or VRB) opens and the air flows through the delivery nozzle. On the €/LITRE line, the set time will count down to 0.
3. After the test time, the test is completed, i.e. the vacuum pump is shut off and the valve closes. You can start the new test again by pressing the <E> button. Testing termination is performed by lifting up any nozzle.

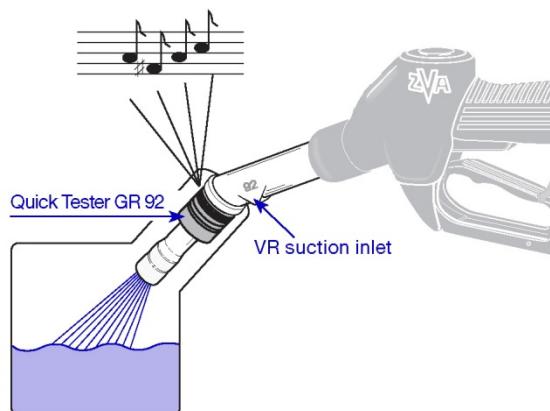


Fig. 58 - Functional recovery test with Quick Tester GR 92

Test evaluation:

The vapour recovery system works if the whistling sound is emitted from the adapter during the test, see Fig. 58 - which is proof of the air flowing through the entire recovery system.

NOTE The manufacturer of the Quick Tester GR 92 is ELAFLEX (Germany). If an adapter is not available, the functionality of the recovery system can also be verified with a plastic bag that surrounds the gun's neck and which is deformed (vacuumed) during the test.

5.4.4. TEMPERATURE VOLUME COMPENSATION (ATC).

The TATSUNO EUROPE dispensers for delivering gasoline, diesel and LPG allow conversion of the volume of dispensed fuel at a given temperature to a corrected volume corresponding to the reference temperature of 15°C. A precise calibrated temperature sensor Pt100 which measures the current temperature of dispensed fuel with the accuracy of $\pm 0.15^\circ\text{C}$ is incorporated in the dispenser hydraulic system before the flow meter. Temperature data from all temperature sensors are collected with the PDEINP unit located in the counter case and the data is transmitted to the dispenser counter. The electronic counter automatically recalculates and displays the delivered volume on the display for liquid fuels – see Table 50) or for LPG – see Table 51). Fuel density at 15 °C is set in the parameter of the dispenser counter and must be within the range <700; 1200> for gasoline and diesel and <500;600> for LPG.

The temperature sensor state, PDEINP unit state and density value are checked before each dispensing. If an error is present, dispensing is not permitted and the error message E10 (sensor), E11 (density) or E12 (PDEINP) is displayed. The actual fuel temperature measured by the temperature sensor can be displayed in parameter P14, see 4.1.17.

Liquid	ρ_0 [kg/m ³]	T = -20 °C	T = -10 °C	T = 0 °C	T = +15 °C	T = +30 °C	T = +50 °C
Natural 91 / Regular Unleaded	737	104.26	103.05	101.84	100.00	98.14	95.63
Natural 95 / Super Unleaded	749	104.15	102.98	101.79	100.00	98.19	95.74
Natural 98 / Super Plus Unleaded	752	104.13	102.96	101.78	100.00	98.20	95.77
Diesel oil	837	102.94	102.11	101.27	100.00	98.72	97.00
Biodiesel (RME)	831	102.98	102.14	101.29	100.00	98.70	96.96
Naphtha	716	104.44	103.19	101.92	100.00	98.06	95.43
Kerosene	799	103.23	102.31	101.39	100.00	98.60	96.71
Jet fuel	801	103.21	102.30	101.38	100.00	98.60	96.73
Fuel oil	846	102.90	102.08	101.25	100.00	98.74	97.05
EKOPAL / Testing fluid	742	104.21	103.02	101.82	100.00	98.16	95.68

Table 50 - Volume values for selected liquid fuels at temperature T and dispensed volume V_n = 100 L

Liquid %Propane / %Butane	ρ_0 [kg/m ³]	T = -20 °C	T = -10 °C	T = 0 °C	T = +15 °C	T = +30 °C	T = +50 °C
100% Propane	508	109.28	106.86	104.25	100.00	95.34	88.48
90% P / 10%B	515	108.99	106.63	104.10	100.00	95.52	88.95
80%P / 20%B	523	108.67	106.38	103.94	100.00	95.72	89.48
70%P / 30%B	531	108.35	106.14	103.78	100.00	95.91	89.98
60%P / 40%B	538	108.09	105.93	103.65	100.00	96.08	90.42
50%P / 50%B	546	107.79	105.70	103.50	100.00	96.26	90.90
40%P / 60%B	554	107.50	105.47	103.35	100.00	96.44	91.36
30%P / 70%B	561	107.26	105.28	103.23	100.00	96.59	91.76
20%P / 80%B	569	106.98	105.07	103.09	100.00	96.76	92.20
10%P / 90%B	577	106.72	104.86	102.96	100.00	96.92	92.63
100% Butane	585	106.46	104.66	102.83	100.00	97.08	93.05

Table 51 - Volume values for various ratios of liquefied propane and butane at temperature T and dispensed volume V_n = 100 L

5.4.5. DISPENSER OPERATING MODES

There are two basic dispenser operating modes:

- 1) manual mode
- 2) automatic (remote) mode

The **manual mode** is a status when the dispenser works independently of any remote control.

Delivery progress: The customer arrives at the dispensers and takes the delivery nozzle of the product he/she wants to deliver. The display will reset (approx. 1.5 seconds) and then the pump motor switches on and the dispenser is ready for delivery. Once the fuel has been delivered, the customer hangs up the delivery nozzle and

pays for the delivered fuel to the operator. The dispenser is immediately ready for next delivery. Since the dispenser is not controlled in any way in the manual mode, it is necessary to manually set the fuel unit price on the dispenser – see sections 4.1.7 and 4.4.1. The number of delivered litres per shift is determined by the difference between the electronic (or electromechanical) totalizers at the start and end of the shift.

The **automatic mode** is a status when the dispenser is remotely controlled by a control device (program in PC, control device, station controller, etc.). The automatic mode allows remotely control deliveries from the fuel station booth. The booth contains a control device by which the fuel station attendant releases the dispenser for delivery and collects information about the delivered fuel amount and price after the delivery is finished.

Delivery progress: The customer arrives at the dispensers and takes the delivery nozzle of the product he/she wants to deliver. The dispenser will require authorization from the control unit in the booth. The control unit sends a fuel unit price, a maximum amount/volume of delivery, and allows delivery. The display of the dispenser will reset (*approx. 2 seconds after removing the nozzle) and the pump motor switches on. Once the fuel has been delivered, the customer hangs the nozzle and pays the required amount to the booth where he receives the tax receipt (receipt) for the delivered fuel. The dispenser is immediately ready for next delivery. Since the dispenser is remotely controlled in the automatic mode, it is not necessary to manually set the fuel unit price on the dispenser. The correct unit price is automatically set by the control computer to all dispensers at the fuel station.

***Note:** *Immediately after the delivery is enabled, the dispenser display is reset. The time after removal of the nozzle after resetting the display and starting the pump may vary significantly depending on the control system used and the fuel station configuration from 2 to 5 seconds.*

Switch from the automatic to the manual mode. By default, the dispensers are connected and set as it is expected they should work at the fuel station, i.e. if the fuel station is equipped with a control system, the dispensers will be set to the automatic mode; if the fuel station is without the control system, the dispensers are set to the manual mode by default.

In case you have to switch the dispensers from automatic to manual mode - e.g. because of a crash in the control system, you have to do the following:

- ▣ **PDEX counter** It is necessary to change the value of parameter P12 from value 0 to value 3 using the IR remote controller and check the unit price setting in parameter P03, see chapter 4.1.15.
- ▣ **TBELTx counter** It is necessary to change the value of parameter P00 from value 0 to 1 by using the 4-button keyboard and to check unit price settings, see chapter 4.4.3.

NOTICE *The switch from the automatic to manual mode must be discussed with the service engineer in advance!*

5.4.6. AIR SEPARATION SENSOR VRS1.G

According to the amendment of type certificate TCM 141/07-4491 Add3 issued on 10. 5. 2010, all TATSUNO dispensers for diesel and biodiesel must be equipped with an air separation sensor VRS1.G, which is attached to the TATSUNO FP-1001 pumping monoblock's separator. If the amount of separated air is higher than the pump can handle, it activates the sensor VRS1.G and subsequently the BL1...BL4 input in the counter processor unit. The counter interrupts delivery and the display shows Error E51. The process of dispenser blocking and error display is as follows:

The pumping monoblock sucks in a critical amount of air (e.g. in case of suction piping damage). The VRS1.G sensor activates and the BL input enters the active state, then for the test time of 1 to 50 seconds (default 10 sec.) the counter performs the first test cycle, i.e. it almost closes the valve as when pumping to the pre-selection (approx. flow rate 2 to 5 L/min) and when the pump motor is running, it monitors the state of the BL input. If the BL input enters the inactive state during the T_{test} then the valve fully opens and continues pumping. If the sensor status does not change and remains active during the T_{test} time, pumping is terminated and the E51 fault is declared. The number of "successful" cycles, i.e. cycles when no E51 error occurs, during one delivery is limited to 3 by default. After exceeding the maximum number of test cycles, delivery is terminated and an E52 error occurs.

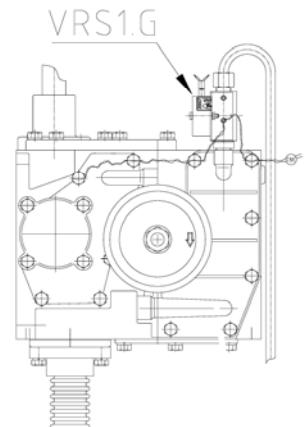


Figure59 - Pumping monoblock with air separation sensor VRS1.G

NOTICE *In the event of an E51 / E52 fault, it is necessary to check the tightness of the supply line, the tightness of the suction pipeline in the tank and the level of fuel in the tank.*

5.4.7. PRESET KEYPAD

OCEAN dispensers may be equipped with a so-called preset keypad enabling presetting the delivered sum or amount by the customer directly on the dispenser. The customer may decide before he/she starts the delivery what volume or for what sum of money he/she wants to refill the storage tank. The pre-selected value may be cancelled by pressing the <Cancel> button at the moment when the delivery has not started yet. It is then possible to set another pre-selected value or deliver in a classic way without using the pre-selection.

NOTE *In case the pre-selection keyboards are used, it is necessary that the dispensers are equipped with deceleration valves that ensure safe deceleration of fuel flow rate before the target preset value.*

a) Example of entering the pre-selection in crowns

- The customer arrives to the dispenser and wants to deliver fuel for €10.
- The customer presets the value 10 on the pre-selection keyboard (presses the <€5> button twice).
- He/she selects the product he/she wants to deliver, lifts the delivery nozzle from the dispenser and puts it in the car tank.
- The dispenser delivers exactly the amount he/she has chosen and then stops automatically.
- The customer hangs the delivery nozzle back into the dispenser and goes to pay the sum.

b) Example of presetting the litres

- The customer arrives to the dispenser and wants to refill 20 litres of fuel.

- The customer presets the value 20 by using the pre-selection keyboard (presses the <10 litres> button twice).
- He/she selects the product he/she wants to deliver, lifts the delivery nozzle from the dispenser and puts it in the car tank.
- The dispenser delivers exactly the volume he/she has chosen and then stops automatically.
- The customer hangs the delivery nozzle back into the dispenser and goes to pay the volume.

c) Example of delivery up to a full tank with pumping to a full monetary value

- The customer arrives to the dispenser and wants to deliver fuel up to a full tank.
- He/she selects the product he/she wants to deliver, lifts the delivery nozzle from the dispenser and puts it in the car tank.
- As soon as the tank is almost full, he/she switches off the nozzle and presses a button on a pre-selection keyboard with a monetary value to the multiple of which he/she wants to pump up (<10 Kč>).
- He/she turns on the nozzle and lets the dispenser pump up to a full monetary value (e.g. €12.5 or €15.5)
- The customer hangs the delivery nozzle back into the dispenser and goes to pay the sum.

d) Example of delivery up to a full tank with pumping to a rounded whole volume

- The customer arrives to the dispenser and wants to deliver fuel up to a full tank.
- He/she selects the product he/she wants to deliver, lifts the delivery nozzle from the dispenser and puts it in the car tank.
- As soon as the tank is almost full, he/she switches off the nozzle and presses once a button on the pre-selection keyboard with the value of the volume that he/she wants to deliver (for example, <1 L>).
- He/she turns on the nozzle and lets the dispenser deliver to a rounded volume (for example, 25.00 L or 128.00 L).
- The customer hangs the delivery nozzle back into the dispenser and goes to pay the sum.

5.4.8. "MAX" BUTTON FOR DELIVERY CONTROL

For gasoline and diesel dispensers, the "MAX" button on the display of the dispenser is used to control the maximum fuel flow in the delivery hose, especially when pumping diesel alternately to passenger cars ($Q_{lim} = 40 \text{ L/min}$) and trucks ($Q_{max} = 80 \text{ L/min}$). 

Functional principle:

- a) When lifting the delivery nozzle and pumping without using the "MAX" button, the fuel runs through the hose with a preset **limited flow rate** Q_{lim} which prevents frequent switching off of the nozzle due to the resulting foam, especially for diesel.
- b) If the "MAX" button is pressed before or during the delivery operation, the letter "H" or the pictogram of the truck appears on the display and the fuel with the **maximum flow** Q_{max} given by the pump used flows through the delivery hose.

The limited flow value Q_{lim} can be set for each delivery hose using the counter parameter.

5.4.9. "MIN" BUTTON FOR DELIVERY CONTROL

For fuel dispensers, the "MIN" button on the display of the dispenser is used to control the fuel flow in the delivery hose, especially when pumping fuel into small motorcycles or small containers ($Q_{\min} = 4 - 6 \text{ L/min}$).

Functional principle:

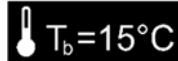
- Upon lifting up the delivery nozzle and delivering without the "MIN" button, the fuel flows through the hose with the **preset limited flow Q_{\min}** .
- If the "MIN" button is pressed before or during the delivery operation, the letter "L" or the motorcycle pictogram appears on the display and the fuel with the set **minimum flow Q_{\min}** flows through the delivery hose. 
- When the "MIN" button is pressed again, the letter "L" disappears on the display and the dispenser delivers with a higher flow rate again.

The limited flow value Q_{\lim} can be set for each delivery hose using the counter parameter.

5.4.10. DESCRIPTION OF THE PDDEDIL V6 DISPLAY



The LCD display consists of the following parts:

Display segment	Function	Note
	Amount delivered	- for P12=0 it can display the value from € 0 to 99999.9 - for P12=1 it can display the value from € 0 to 999999.9
	Volume delivered	- for P12=0 it can display the value from 0 to 9999.99 L - for P12=1 it can display the value from 0 to 99999.99 L
	Delivered fuel unit price	- for P12=0 it can display the value from 0 to 99.99 €/L - for P12=1 it can display the value from 0 to 999.99 €/L
	Minimum Measured Quantity	- the display is set by parameter P91 for each delivery hose
 $T_b = 15^\circ\text{C}$	Temperature volume compensation (ATC)	- it appears automatically during delivery if the temperature compensation function is activated for the delivered product
	High and low output signals (fuel flow)	- it appears automatically before or during delivery when the MAX button is pressed (see 5.4.8) or the MIN button is pressed (see 5.4.9).
	Function and fault indication of the vapour recovery system	- it appears when vapour recovery is activated or a vapour recovery system error has occurred (see 5.4.2)
	Dispenser status indication - released for delivery / blocked	- it appears automatically when the dispenser status changes
	Signalling of forced termination of delivery	- it appears after the STOP command has been received from the booth, after the preset number / preset amount has been reached or after the allowed time without delivery has been exceeded
	Fault signalling or maintenance required.	- it will be displayed at each fault indication together with the fault code (see 6.2.1)

5.4.11. DISPENSER OPERATION TERMINATION

RECOMMENDATION The manufacturer recommends disabling the dispenser in the following order:

- ▣ Switch off the 3x400 V the power supply circuit breaker for electric motors of pumps and vacuum pumps.
- ▣ Switch off the 230 V circuit breaker for stabilized power supply of the electronic counter of the dispenser.
- ▣ Switch off the backup UPS located in the booth by a switch located at the rear panel (the green LED on the UPS turns off).

After switching off the power supply of the electronics in the fuel station switchboard, the "OFF" message is displayed on the unit price display and the display illumination switches off. The last data is shows on the display for at least 15 minutes after the power supply disconnection. After elapsing this period and "erasing" the display the display status is saved into the counter memory and will be shown after the power supply is connected again – see the previous section.



Now the dispenser is out of order.

6. MAINTENANCE AND SERVICE

6.1. MAIN PRINCIPLES OF DISPENSER MAINTENANCE

- ▶ keep all functional units of the dispenser clean so that any potential unexpected defect may be easily identified and quickly removed
- ▶ continuously check all connections if the leakage of the fuel occurs, tighten and reinforce joints
- ▶ check and, if necessary, correct tensioning of the V-belt with the engine bracket
- ▶ check and, if necessary, tighten the screws that secure the electric motor to the bracket
- ▶ inspect the condition of the delivery nozzle and decide on repair or replacement of the delivery nozzle, if necessary, according to the type and size of the defect
- ▶ regularly check the condition of the delivery hoses. In case of mechanical damage to the delivery hose, ensure its immediate replacement.
- ▶ check the function of the door locks and the mechanism for hanging the delivery nozzle
- ▶ care for external cleanliness of the dispenser, pay special attention to counter window cleanliness
- ▶ regularly carry out sludge, water and other impurities removal by using a sludge pump from tanks (fuel tanks)

CAUTION *It is necessary to always switch off electricity and take reliable measures against its reconnection before performing all maintenance work at mechanical, hydraulic or electrical parts.*

CAUTION *Do not remove the dispenser covers during operation!*



Figure 60 - Uncovered dispenser, side B



Figure 61 - Uncovered dispenser, side A

CAUTION *The belt between the motor and the pump (e.g. suction vacuum pump) is antistatic and can not be replaced by another type!*

CAUTION *Do not open the distribution box lid if the dispenser is live!*

CAUTION->LPG

- ⚠ *Any handling and dismantling, even opening the filter cap, is conditioned by extracting the medium with nitrogen or inert gas from the hydraulic system of the dispenser!*
- ⚠ *The interventions into electrical and electronic parts may only be performed by a specialist who is responsible for device safety. The wires must be repositioned to their original position after finishing the service intervention. Proper fitting of wires must prevent contact with the movable parts of the reel module.*
- ⚠ *Caution! Tightness of hydraulic sections must be visually inspected in every service intervention and possible medium leaks must be removed.*

THE OPERATOR OF THE DISPENSER IS OBLIGED TO:

- ▣ Appoint an employee responsible for the operation and technical condition of the dispenser.
- ▣ Ensure inspections, testing, repairs and maintenance in a professional way.
- ▣ Register documents and keep records on operation.
- ▣ All activities related to attending, operation and servicing the LPG dispensing module may only be performed by employees with appropriate authorization.

PRINCIPLES OF LPG DISPENSING MODULE INSPECTIONS

Inspections of devices, reservoirs, pipeline systems and dispensers are performed on dates defined by the operating rules and regulations of the fuel station according to applicable regulations.

- ▣ Review of the LPG dispensing module hydraulic system tightness by soap solution.
- ▣ Review of the machinery.
- ▣ Review of the check and safety valve functioning.
- ▣ The inspection, calibration and official verification of the LPG dispenser is performed by the National Metrology Institute according to applicable regulations
- ▣ The inspection is preceded by cleaning the entire device from dust, removal of water and other impurities from tanks.

PRINCIPLES OF CNG DISPENSER INSPECTIONS

Inspections of devices, reservoirs, pipeline systems and dispensers are performed on dates defined by the operating rules and regulations of the fuel station according to applicable regulations.

- ▣ Review of dispenser pressure system tightness by soap solution.
- ▣ The inspection, calibration and official verification of the CNG dispenser is performed by the National Metrology Institute according to applicable regulations

The inspection is preceded by cleaning the entire device from dust, removal of water and other impurities from tanks.

6.1.1. MAINTENANCE OF DISPENSER COVERS

Covers of the dispenser (“body parts”) made of painted steel or stainless steel require regular maintenance. Pay special attention to the maintenance of such parts particularly in winter season when, due to the activity of aerosols from chloride agents created from salts used for road maintenance, the paint of unprotected body parts may be permanently damaged, or inter-crystal corrosion may appear in case of stainless steel covers.

Recommended maintenance of painted covers:

- ⚠ Wash them with warm water at least twice per month (according to the level of fouling)
- ⚠ At least once a month or after each higher surface fouling with fuels – wash them with detergent, thoroughly clean the covers from salt residues, dust and grease (according to the level of fouling) + restore the protective coating on design parts (car cosmetics).

Recommended maintenance of stainless covers:

- ⚠ Wash them with warm water at least twice per month (according to the level of fouling)
- ⚠ At least once a month or after each higher surface fouling with fuels – wash them with warm water, thoroughly clean the covers from salt residues, dust and grease (according to the level of fouling) + restore the protective coating on design parts by using a special agent for stainless sheet metal.

RECOMMENDATION

We recommend the following protective agents and detergents for stainless sheet metal:

- **ULTRAPUR – d** (producer: MMM-Group, Germany)
- **NEOBLANK spray** (producer: Chemische Fabrik GmbH, Hamburg, Germany)
- **ANTOX Surface Care 800 S** (producer: Chemetall AG, Switzerland)

NOTICE DO NOT WASH STAINLESS COVERS WITH DETERGENTS!

6.1.2. MAINTENANCE OF THE CNG DISPENSER/MODULE

The maintenance schedule for the CNG dispenser/module is described in the table below:

Table 52 - Maintenance schedule for the CNG dispenser/module (according to ISO/DIS 16923)

Maintenance activity	weekly	monthly	6 months
Inspection of filling end piece damage		X	
Inspection of hose damage	X		
Visual inspection of the breakaway coupling		X	
Tightness test of the filling end piece		X	
Tightness test of the breakaway coupling		X	
Tightness test of pipeline systems and threaded joints		X	
Conductivity test of the set of breakaway coupling-hose-end piece			X

6.1.3. METER CALIBRATION

In TATSUNO EUROPE dispensers equipped with TATSUNO flow meters, two types of meter calibration can be carried out:

- (1) Meter mechanical calibration
- (2) Meter electronic calibration

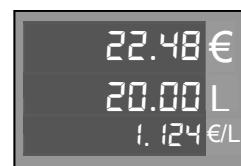
CAUTION *Meter calibration can only be performed by a person assigned to do so, i.e. a designated service technician or metrologist. When calibrating the meter, the metrology marks and seals are broken.*

The **meter mechanical calibration (1)** is performed only on piston meters of the type FM-1007, FM-1025, MP02524 (LPG), FM-1029 (LPG), FM-1022 (AdBlue + WSE) directly on the meter by turning the calibration wheel (see Figure 62) by which we can mechanically adjust the cyclic volume of the meter. If the meter is adjusted precisely, one revolution of the meter shaft corresponds precisely to 0.5 L of dispensed fuel and 50 pulses which are sent in the calculator by the pulse generator (pulser) connected to the meter shaft. By turning the calibration wheel either clockwise or counter clockwise, it is possible to correct meter accuracy within the range of $\pm 1.3\%$ in steps corresponding to a change of 0.04 %.

NOTE *The calibration wheel for fuels (FM-1025 and FM-1007) and AdBlue (FM-1022) can be turned through 17 holes in both directions. The difference of precision between two adjacent holes is $\pm 0.08\%$. The wheel can be fixed also in a position between holes, i.e. the difference of precision is $\pm 0.04\%$. The calibration wheel for LPG (FM-1029 and MP-02524) is positioned under a cover and can be turned through 17 holes in both directions. Only the position in a hole can be fixed. The difference of precision between two holes is $\pm 0.08\%$.*

The meter mechanical calibration procedure is as follows:

- 1) Precise dispensing into a calibration vessel (with capacity of e.g. 20 L, 50 L, 100 L) is carried out.
- 2) Depending on the display and the calibration tables, the calibration wheel of the meter is rotated clockwise (volume down) or counter clockwise (volume up) by the appropriate number of holes, for example, when taking up to a 20L calibration tank, the display shows 19,95L which is according to the table, see Table 53 below, out of the tolerance by -0.25 %. It is necessary to turn the calibration wheel through 3 holes clockwise, i.e. to reduce the meter chamber capacity in order to increase the number of shaft revolutions and thus also pulses.
- 3) The calibration wheel is to be fixed with a pin and a new checking metering is to be carried out.
- 4) After meter adjustment completing, the calibration wheel is fixed, and the meter provided with seals (see Figure 62, position B, C, D, E).



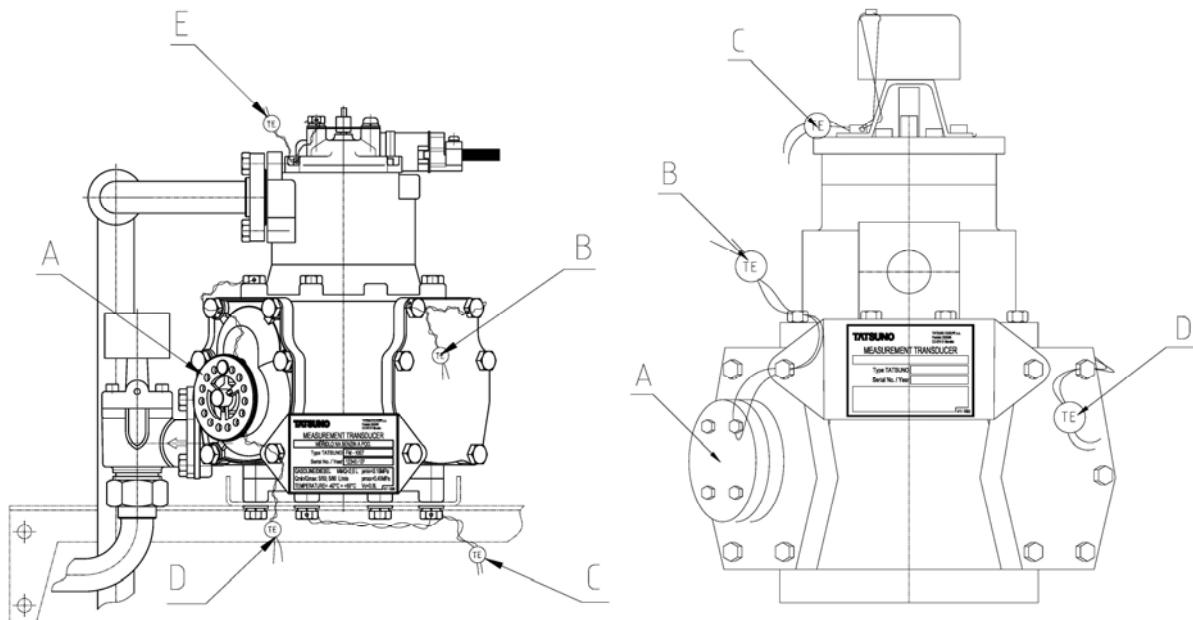
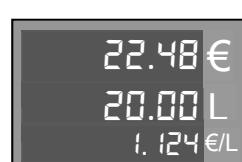
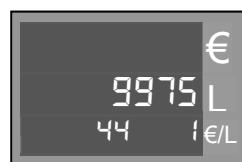
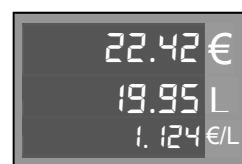


Figure 62 – Piston meters of fuel (type FM-1007, FM1025) and LPG (type MP-02524 and FM-1029), A=calibration wheel

The meter electronic calibration (2) is performed on all types of meters by changing the counter parameter, e.g. on the PDEX counter with a parameter P44. Parameter P44 value indicates the number of pulses of the pulse generator for pumping 1L of fuel. The default factory-set value is 100.00 pulses per litre. Change of the P44 parameter value can be made only after setting the SW1-1 switch to the OFF position. The SW1-1 switch is protected by a cover and seal. The meter electronic calibration procedure is as follows:

- 1) Precise dispensing into a calibration vessel (with capacity of e.g. 20 L) is carried out.
- 2) According to the data on the display, the corrected value of parameter P44 is subtracted from the calibration tables, e.g. when taking up to a 20L calibration tank, the display shows a value of 19.95L which is according to Table 53 outside the tolerance by -0.25% and the corrected value of parameter P44 is 99.75.
- 3) It is necessary to unseal the processor unit cover and to change the SW1-1 switch in the OFF position.
- 4) Then open the service mode of the counter using the PDERT-5S remote controller after service password loading and change the P44 parameter value for the corresponding delivery point and leave the service mode.
- 5) A new checking dispensing is carried out.
- 6) If everything is OK, change the SW1-1 switch in the ON position, enclose the processor unit with the cover and seal it.



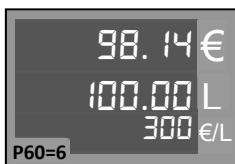
Meter calibration for the dispenser with volume temperature compensation

If volume temperature compensation is activated in the dispenser, then a special service mode (P60=6) is used for meter calibration at which both the thermally compensated fuel volume and thermally non-compensated fuel volume together with current fuel temperature is displayed on the display.

Thermally compensated volume (98.14L) →

Thermally non-compensated volume (100.00L) →

Fuel current temperature (+30.0°C) →



Data of thermally non-compensated volume on the display is used for meter calibration Mechanical or potentially electronic meter calibration is then carried out in the identical way as described in the previous section.

Fuelled volume [litres]	Fuelled volume deviation [litres]	Accuracy [%]	Corrected pulse rate (P44) [pulse/litre]
19.75	-0.25	-1.25	98.75
19.76	-0.24	-1.20	98.80
19.77	-0.23	-1.15	98.85
19.78	-0.22	-1.10	98.90
19.79	-0.21	-1.05	98.95
19.80	-0.20	-1.00	99.00
19.81	-0.19	-0.95	99.05
19.82	-0.18	-0.90	99.10
19.83	-0.17	-0.85	99.15
19.84	-0.16	-0.80	99.20
19.85	-0.15	-0.75	99.25
19.86	-0.14	-0.70	99.30
19.87	-0.13	-0.65	99.35
19.88	-0.12	-0.60	99.40
19.89	-0.11	-0.55	99.45
19.90	-0.10	-0.50	99.50
19.91	-0.09	-0.45	99.55
19.92	-0.08	-0.40	99.60
19.93	-0.07	-0.35	99.65
19.94	-0.06	-0.30	99.70
19.95	-0.05	-0.25	99.75
19.96	-0.04	-0.20	99.80
19.97	-0.03	-0.15	99.85
19.98	-0.02	-0.10	99.90
19.99	-0.01	-0.05	99.95
20.00	0.00	0.00	100.00
20.01	+0.01	+0.05	100.05
20.02	+0.02	+0.10	100.10
20.03	+0.03	+0.15	100.15
20.04	+0.04	+0.20	100.20
20.05	+0.05	+0.25	100.25
20.06	+0.06	+0.30	100.30
20.07	+0.07	+0.35	100.35
20.08	+0.08	+0.40	100.40
20.09	+0.09	+0.45	100.45
20.10	+0.10	+0.50	100.50
20.11	+0.11	+0.55	100.55
20.12	+0.12	+0.60	100.60
20.13	+0.13	+0.65	100.65
20.14	+0.14	+0.70	100.70
20.15	+0.15	+0.75	100.75
20.16	+0.16	+0.80	100.80
20.17	+0.17	+0.85	100.85
20.18	+0.18	+0.90	100.90
20.19	+0.19	+0.95	100.95
20.20	+0.20	+1.00	101.00
20.21	+0.21	+1.05	101.05
20.22	+0.22	+1.10	101.10
20.23	+0.23	+1.15	101.15
20.24	+0.24	+1.20	101.20
20.25	+0.25	+1.25	101.25

Table 53 – Calibration table for a 20L graduated vessel

6.2. TROUBLESHOOTING AND SOLVING DISPENSER DEFECTS

When you encounter a problem, first read the "**What to do if ...**" table (see Table 54) where the most frequently asked questions of the dispenser users about the problems encountered at the fuel station are described.

In the event of a dispenser defect, the electronic counter that controls the dispenser displays a fault message in the form of a numeric code. The fault codes for the individual types of electronic counters are listed in the chapter 6.2.1.

Table 54 - What to do if ...

The dispenser does not respond to the removal of the delivery nozzle and there is no fault message on the display
This means that the dispenser is without the power supply, or the delivery nozzle on the dispenser is poorly hinged, or that the dispenser is blocked by the control system.
<ul style="list-style-type: none"> ➤ Check proper hanging of all delivery nozzles ➤ Check whether pumping made on the dispenser is paid at the cash desk ➤ If the dispenser is in manual mode, try unlock the dispenser with the IR remote controller (press the "0") ➤ Turn the power supply of dispenser counter off and on. ➤ Check the power supply of dispenser, i.e. when the power is turned on the display must pass the test ➤ Check the position of the circuit-breaker for the single-phase power supply 230V of the dispenser in the main switchboard of the fuel station ➤ If the dispenser is connected to the control computer, the dispenser blocking may be coupled to a control system that does not release the dispenser for pumping or blocks the dispenser. Turn the power dispenser off and on and change the dispenser mode from automatic to manual – see chapters 4.1.15 or 4.4.3. If the stand is in a manual mode, there is a fault on the control computer side.
When the delivery nozzle is lifted, the display is reset but the pump does not start
This means that the dispenser electric motor has not been started. The cause may be the power supply circuit breaker that is located in the main switchboard or the electrical motor protection disconnected inside the dispenser.
<ul style="list-style-type: none"> ➤ Check the position of the circuit breaker of three-phase supply of the dispenser motors in the main switchboard of the fuel station
An error message " E18 " will appear on the display of the dispenser
This is a dispenser fault message that indicates that communication between the dispenser and the control unit (computer, station controller, control console, etc.) has been lost.
<ul style="list-style-type: none"> ➤ check the correct operation of the control unit (turning on the counter, turning on the data converter) ➤ check the data cable connection
At the beginning of the delivery, the customer removes the delivery nozzle and does not deliver (e.g. because of opening the fuel tank of the car). After a while the pump turns off. The display shows " STOP ".
This is a dispenser report that states that the delivery has been terminated due to interrupting the delivery for longer than 60 seconds. Hang the delivery nozzle and re-deliver.
During delivery the delivery is interrupted (e.g. changing the canisters), the pump switches off after a while. The display shows " STOP ".
This is a dispenser report that states that the delivery has been terminated due to interrupting the delivery for longer than 60 seconds. Hang the delivery nozzle and re-deliver.
After picking up the delivery nozzle an error message " E30 " appears on the display of the dispenser .
This is a fuel dispenser failure report that states that the fuel unit price is zero.
<ul style="list-style-type: none"> ➤ If the rack is operating in a manual mode without the remote control, then the unit price is incorrectly set. Set the fuel unit price, see chapter 4.1.7 and 4.4.1. ➤ If the dispenser is controlled remotely, then check the fuel unit price settings in the station controller (computer, controller). Before each delivery, the fuel price is automatically sent to the dispenser.

6.2.1. ERROR MESSAGES OF THE DISPENSER

In every defect of the dispenser equipped with the PDEX, PDEX5, TBELTM or TBELTX counter, delivery is interrupted and the display shows an error message ("E" + error code). Depending on the message type, either the whole dispenser is blocked (fatal error), or only the part where the fault appeared is blocked.

Important error messages are saved in the counter memory, where they can be shown using parameter P06 (Error history) and P13 (Error statistics).

Table 55 - Error message types

Message type	Method of dispenser blocking	Method of dispenser unblocking
LOCK (operational blocking)	Only part of the dispenser is blocked	Hanging the dispensing nozzle clears the message from the display
ALERT (alert message)	Only the faulty part of the dispenser is blocked and the error message code is saved in the history and statistics	Removing the cause of the error clears the message from the display
NFAT (non-fatal error)	Only the faulty part of the dispenser is blocked and the error message code is saved in the history and statistics	Hanging and lifting the dispensing nozzle clears the message from the display Possible to unlock the dispenser and clear the error by a remote controller, or unblocking the dispenser over the data line.
FATAL (fatal error)	Blocks entire dispenser and the error message is saved in the history and statistics	The cause of the error must be removed and the dispenser counter power source must be switched off/on.

Table 56 - Code of error messages of the dispenser equipped with the PDEX, PDEX5, TBELTM or TBELTX counter

Code of message	Type of message	Cause of error message	Removing error message
OFF	FATAL	failure of powering voltage Power failure greater than approx. 3-5 times, t > 100ms	It is necessary to turn off the dispenser counter power source for approx. 10 seconds and then turn the source back on.
STOP	LOCK	The maximum delivery interruption time is exceeded	After hanging the nozzle up, the message disappears.
E 1	NFAT	Display fault, LCD display segment failure, or electromechanical display coil failure	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E 2	FATAL	Display fault, discrepancy between the actual number of displays and the set number in parameter P31	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E 3	NFAT	Vapour exhaust system fault Fault of the exhausted vapour flow rate sensor on side A	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E 4	NFAT	Vapour exhaust system fault Fault of the exhausted vapour flow rate sensor on side B	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E 5	ALERT	Display fault, communication failure with the display or electromechanical totalizer	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.

Code of message	Type of message	Cause of error message	Removing error message
E 6	NFAT	Error of electromechanical totalizer	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E10	NFAT	Error of heat sensor	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E11	NFAT	Invalid value of fuel density	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E12	FATAL	Error of temperature compensation device The PDEINP unit is disconnected or has a wrong check sum	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E13	FATAL	Program error, metrological or program check sum error	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E16	ALERT	Credit unit error Communication failure between the counter and credit unit PDECRE	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E17	NFAT	Data line error Error of serial communication line, faulty communicated data. The controlling computer does not send the <ACK> confirmation in time	Check that two dispensers don't share the same address. Check the mechanical connection of the data line. Check the function and settings of the data converter. Check by a monitor the course of communication.
E18	ALERT	Data line error Defect of serial communication line, loss of communication.	Controlling computer not connected, or communication cable not connected correctly. Check the P76 parameter setting. Check the function of the data converter. Check by a monitor the course of communication.
E20	NFAT	Loss of power during delivery The last delivery was interrupted due to a power loss, or by a reset of the processor for interference.	Check the dispenser power supply and interference effects (power source).
E22	FATAL	Data initialization Faulty data in RAM and EEPROM, invalid check sum.	Call an authorized service centre.
E25	FATAL	Fault of electronic totalizers Electronic totalizers disturbed. The check sum of totalizers is defective	Call an authorized service centre.
E26	ALERT	TOTAL STOP button pressed	Just let go of the button.
E27	FATAL	Blocking the dispenser by the manufacturer	Enter the authorization code into parameter 16. Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E29	NFAT	Wrong password A wrong password was entered to access the manager mode.	Enter the correct manager password. If the fault persists, call an authorized service centre.
E30	LOCK	Product unit price is zero	Set the product unit price on the POS (P12=0), or in parameter P3 (P12=3).
E31	NFAT	Pulser error, pulser channel error 1 (1A)	Raise and hang up the delivery nozzle several times. Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E32	NFAT	Pulser error, pulser channel error 2 (2A)	
E33	NFAT	Pulser error, pulser channel error 3 (3A)	
E34	NFAT	Pulser error, pulser channel error 4 (4A)	

Code of message	Type of message	Cause of error message	Removing error message
E35	NFAT	Pulser error, pulser channel error 5 (1B / 5A)	
E36	NFAT	Pulser error, pulser channel error 6 (2B / 6A)	
E37	NFAT	Pulser error, pulser channel error 7 (3B / 7A)	
E38	NFAT	Pulser error, pulser channel error 8 (4B)	
E41	NFAT	Pulser error, pulser connection error 1 (1A)	Raise and hang up the delivery nozzle several times. Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E42	NFAT	Pulser error, pulser connection error 2 (2A)	
E43	NFAT	Pulser error, pulser connection error 3 (3A)	
E44	NFAT	Pulser error, pulser connection error 4 (4A)	
E45	NFAT	Pulser error, pulser connection error 5 (1B / 5A)	
E46	NFAT	Pulser error, pulser connection error 6 (2B / 6A)	
E47	NFAT	Pulser error, pulser connection error 7 (3B / 7A)	
E48	NFAT	Pulser error, pulser connection error 8 (4B)	
E51	NFAT	Pump aeration Pump aeration sensor is active	Check the fuel level in the storage tank and the supply fuel pipeline integrity. If the fault persists, call an authorized service centre.
E52	NFAT	Pump aeration The maximum number of separation tests exceeded	Check the fuel level in the storage tank and the supply fuel pipeline integrity. If the fault persists, call an authorized service centre.
E54	ALERT	Vapour recovery system efficiency is out of the permitted range. If a fault is not eliminated within 72 hours, the dispenser will be blocked (see the fault message E55).	Eliminate a fault on the vapour recovery system. Call an authorized service centre.
E55	FAT	Vapour recovery system fault The entire dispenser is blocked.	Eliminate a fault on the vapour recovery system. Unlock the VAPORIX system with a service adapter Call an authorized service centre.
E56	NFAT	Vapour recovery system fault Only the gasoline delivery nozzle is blocked.	Eliminate a fault on the vapour recovery system. Unlock the VAPORIX system with a service adapter Call an authorized service centre.

Table 57 - Code of error messages of the dispenser equipped with the TBELTM counter (dispensers/modules with a mass meter)

Code of message	Type of message	Cause of error message	Removing error message
OFF	FATAL	failure of powering voltage	It is necessary to turn off the dispenser counter power source for approx. 5 seconds and then turn the source back on.
STOP	LOCK	The STOP button was pressed, but the nozzle was not returned.	Return the nozzle, possibly press the STOP button.
E 1	NFAT	Display error – error of the LCD segment.	Display replacement necessary. Call an employee of the authorized service company.
E 5	NFAT	Display error – error of display communication.	Display connection error. Call an employee of the authorized service company.
E 6	NFAT	Error of electromechanical totalizer	The totalizer is disconnected, or does not communicate. Call an employee of the authorized service company.
E 7	NFAT	Error of electromechanical totalizer coil	Totalizer replacement necessary. Call an employee of the authorized service company.
E10	NFAT	Error of heat sensor	Pt100 heat sensor connection error. Call an employee of the authorized service company.
E12	FATAL	Error of temperature compensation device The PDEINP unit is disconnected or has a wrong check sum	Check the cable, or exchange the PDEINP unit. Call an employee of the authorized service company.
E13	FATAL	Program error – different CRC of program memory. Error message detail: 1 - Non-metrology part of program damaged 2 - Metrology part of program damaged	Carry out reprogramming of the counter or exchange the processor unit. Call an employee of the authorized service company.
E15	FATAL	Maximum fuel flow rate exceeded	Check the value of parameter P65. Call an employee of the authorized service company.
E17	NFAT	Data line error Error of serial communication line, faulty communicated data. Controlling computer does not send the confirmation <ACK> in the required time period.	Call an employee of the authorized service company.
E18	ALERT	Data line error Defect of serial communication line, loss of communication.	Controlling computer not connected, or communication cable not connected correctly. Check the function of the data converter. When the error is repeated, call an employee of the authorized service company.
E20	NFAT	Loss of power during dispensing The last dispensing was interrupted due to a power loss.	Check the dispenser power supply and interference effects (power source). When the error is repeated, call an employee of the authorized service company.
E21	NFAT	Incorrect position of switches SW1-1 & SW1-4	Call an employee of the authorized service company.
E22	FATAL	Damaged values of configuration parameters in memory FRAM Error message detail: 1 - Different CRC values of configuration parameters 2 - Value of a parameter is out of range	Call an employee of the authorized service company.

Code of message	Type of message	Cause of error message	Removing error message
E23	FATAL	Damaged values of last dispensing in FRAM Different CRC of values of the last dispensing.	Call an employee of the authorized service company.
E24	FATAL	Damaged values of decimal remains of electromechanical totalizers in FRAM Different CRC of values of latest remains of electromechanical totalizers.	Turn the calculator off and on. If the error message appears again, call an employee of the authorized service company.
E25	FATAL	Damaged values of electronic totalizers in FRAM Different CRC of values of electronic totalizers.	Turn the calculator off and on. If the error message appears again, call an employee of the authorized service company.
E26	ALERT	TOTAL STOP button pressed	Just let go of the button.
E28	NFAT	Unauthorized service controller An unauthorized service controller was used to access the service mode.	Unauthorized service controller.
E29	NFAT	Wrong password A wrong password was entered to access the service mode.	Enter the correct manager password. If you forgot the password, call an employee of the authorized service company.
E30	NFAT	Product unit price is zero	Set the non-zero product unit price on the POS (when P12=0), or in parameter P03 (when P12=3).
E60	NFAT	Pressure system not airtight	Check tightness of the pressure system. If the error repeats, call an employee of the authorized service company.
E61	NFAT	Insufficient increase of pressure during airtightness test	Check tightness of the pressure system. If the error repeats, call an employee of the authorized service company.
E64	NFAT	Insufficient increase of pressure during test dose of temperature compensation.	Check tightness of the pressure system. If the error repeats, call an employee of the authorized service company.
E66	NFAT	Disconnected or faulty pressure sensor	Check the connection of the pressure sensor. If the error repeats, call an employee of the authorized service company.
E67	FATAL	Hose broken off	Carry out repair of breakaway coupling. After cancelling the error message, it is necessary to turn the counter powering off and on. Call an employee of the authorized service company.
E70	NFAT	Meter error – no response	Check the mass meter connection and setting the meter communication parameters. Call an employee of the authorized service company.
E71	NFAT	Error in communication with meter – time to receive response expired	Check the connection of the mass meter. Check the settings on the meter's communication parameters. Call an employee of the authorized service company.
E72	NFAT	Internal meter error	Call an employee of the authorized service company.
E73	NFAT	Meter resetting error The meter failed to reset before commencing dispensing.	The error can be caused by the product flowing even before delivery commences. Check the dispenser's internal pressure pipework. If the error repeats, call an employee of the authorized service company.
E74	NFAT	Meter configuration error The meter configuration does not comply with the TBELTM counter requirements.	Call an employee of the authorized service company.

Code of message	Type of message	Cause of error message	Removing error message
E75	NFAT	Failure of setting of dispenser zero point The current value of the meter zero point does not match the value saved in the counter.	Call an employee of the authorized service company.
E76	NFAT	Damaged saved value of meter's zero point Saved CRC value of meter's zero point doesn't match.	Call an employee of the authorized service company.
E80	NFAT	Wrong serial number of main display The main display serial number is different than the saved one.	Call an employee of the authorized service company.
E81	NFAT	Wrong serial number of the slave display The secondary display serial number is different than the saved one.	Call an employee of the authorized service company.
E82	NFAT	Wrong serial number of electromechanical totalizer The electromechanical totalizer serial number is different than the saved one.	Call an employee of the authorized service company.
E83	NFAT	Wrong serial number of temperature measuring unit PDEINP The temperature measuring unit PDEINP serial number is different than the saved one.	Call an employee of the authorized service company.
E84	NFAT	Wrong serial number of mass meter The mass meter serial number is different than the saved one.	Call an employee of the authorized service company.

6.2.2. EVENT LOGGER

Each TBELTM and PDEX5 counter includes an event recording device - i.e. LOGGER. This is an external memory (SD card), which saves all important events concerning the operation of the electronic counter and the dispenser. The logging device is located on the processor board and access to the medium is protected by a cover that can be secured against unauthorized removal with a safety sticker. Logged events serve for service technicians to identify any problem and quickly detect its cause. The logger arranges information into folders by type.

The logger contains, for example, the following information:

CONFIG – all changes related to counter parameter settings and dispenser configuration settings

ERROR – log of all errors

FUELING – log of all deliveries

SERVICE – log of all accesses into service mode, service password changes etc.

SYSTEM – log of events concerning turning powering off and on, counter resets etc.

CNG - log of calculations of temperature compensation and airtightness tests.....

6.3. SERVICE OF OCEAN DISPENSERS

- service work is carried out in accordance with the operating rules at the fuel station
- before starting the service, the dispenser must be shut down, marked visibly with the "OUT OF SERVICE" sign and the driveway must be marked with the "NO ENTRY" sign
- the dispenser must be disconnected from the power supply (switch off by the main switch on the switchboard)
- the valves on the supply line must be fully closed
- during service work, vehicles must be prevented from passing within 5 meters around
- a fire extinguisher must be available to workers
- service work may only be performed by an authorized service agent

6.3.1. WARRANTY AND COMPLAINTS

The contractual warranty is determined – by default, the manufacturer provides warranty for provided devices for 2 years or 1 million litres of delivered fuels. This warranty does not cover consumables. In case of any complaints the following information must be specified:

- Serial number and name – see the type label
- Exact description of the defect and circumstances of its occurrence

The complaint shall be invalid if the safety seals are broken or the device has been tampered with. Defects and deficiencies caused by incorrect or unauthorized use or maintenance are not covered by the warranty (e.g. problems caused due to the water content and impurities in the tank and hydraulic system). During operation, it is necessary to regularly check water and impurities presence and perform cleaning if necessary.

6.3.2. ACCESSORIES

- Installation and User Manual
- Certificate on product quality and completeness
- EU Declaration of conformity
- Master card of the dispenser
- Master cards of all meters installed in the dispenser
- Pressure test protocol (dispensers with an LPG module only)
- IR controller for counter operation and setting
(may be ordered with dispensers equipped with the PDEX counter)
- Foundation frame (may be ordered)

Spare parts catalogue

This document is intended for service companies and service engineers only.

NOTES:
