TATSUNO EUROPE a.s.

FUEL DISPENSERS

TATSUNO EUROPE

Installation and User Manual

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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 supplements of this manual are in the documents IN041, IN043 and IN044 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 documents IN041, IN043 and IN44 throughout the operation of the device
- Make it available to other owners and users.
- Perform updates of regulations and manuals (www.tatsuno-europe.com)

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.

Document revisions

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Revision 10 / 3. 1. 2022	Added dispensers OCEAN EURO	Milan Berka
Revision 11 / 1. 8. 2022	Added dispensers OCEAN HERO	Milan Berka
Revision 11 / 24. 8. 2022	Added 3.4.1 – Product labels installing	Milan Berka
Revision 12 / 9. 11. 2022	Added using of 12 buttons keyboard for enter operator/manager mode of dispenser – see 5.3.13	Milan Berka
Revision 13 / 24. 2. 2023	Added handling of the OCEAN HERO dispenser using hanging eyes – see 3.2.1	Milan Berka
Revision 14 / 19. 5. 2023	Modified pictures of the HERO dispensers (Narrow version)	Milan Berka
Revision 15 / 31. 5. 2023	AdBlue dispenser commissioning - see 5.2.1	Milan Berka
Revision 16 / 24. 8. 2023	Added new dispensers series SHARK ISLAND 1700 and SHARK ISLAND 2000	Milan Berka
Revision 17 / 25. 9. 2024	Added article 3.4.2 Drip pan installation and 5.3.10 Air vent	Milan Berka

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. Consider all hazards, notices and notes stated in the manual. The manufacturer compiles this Installation, Service and User Manual to provide all necessary information and instructions for the full and efficient installation, use and maintenance of your TATSUNO EUROPE dispensers in OCEAN and SHARK type series. This manual was prepared by the manufacturer and forms and 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 manual and attached documents for the entire period of device operation for any potential future reference!*

1.2. PERMITTED USE

TATSUNO EUROPE dispensers, OCEAN and SHARK type series, are designed for stationary or mobile placement for the delivery of gasoline, diesel oil, biodiesel, light fuel oil, kerosene, 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 must 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 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 also contains certification documents that must be submitted by the operator on demand.

1.3. BRIEF CHARACTERISTICS OF MEDIA USED

1.1.1. 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 isooctane or aromatic hydrocarbons of toluene and benzene 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 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 Eco-diesel) is a motor fuel that is produced from classic fossil motor diesel (69%) and FAME bio-component (31%). Eco-diesel is freely mixable with standard motor diesel. Thanks to tax advantages that is related to a Europe-wide subsidy for fuels from renewable resources Eco-diesel is by approx. 2.50 to 3.00 CZK/L

cheaper than classic motor diesel.

1.1.2. LPG CHARACTERISTICS

LPG is a commercial name for a liquefied mixture of light hydrocarbons (**L**iquefied **P**etroleum **G**as), 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 m^3 of liquefied LPG (approx. 550 kg) into the air about 12.400 ÷ 83.330 m^3 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_3H_8	C_4H_{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 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.

1.1.3. 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. 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 *AdBlue® is a registered trademark of VDA. AdBlue® is also known as AUS 32 (Aqueous Urea Solution) or DEF (Diesel Exhaust Fluid).*

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. 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. 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.*

1.1.4. 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%.!***

1.1.5. CNG CHARACTERISTICS

CNG is a business name for **C**ompressed **N**atural **G**as. 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/m^3]	0.678	720-775	800-845	502-579
Min. heating value of gaseous phase [MJ/m^3] 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

1.2.1. 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 fill yin 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.
- The filters.

1.2.2. OBLIGATIONS OF EMPLOYEES

- To ensure optimum prevention of injuries, in addition to general rules for employee protection it is necessary to consider 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:

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

1.2.3. 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 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 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.***

1.2.4. PERSONAL PROTECTIVE EQUIPMENT

Protective clothing

The following clothing must always be worn 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 if 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 body 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 body 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).

1.2.5. 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 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.

1.2.6. 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 hypochlorite and calcium hypochlorite 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.

1.2.7. 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).

NOTICE ***Standard painted versions of TATSUNO EUROPE dispensers are not intended for use in high humidity, chemical and saltwater areas. For such applications TATSUNO EUROPE supplies options using stainless steel materials.***

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. 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
12	Electronic counter	PDEX	TE	-	TCM141/07-4491	all types of dispensers
13	Electronic counter	PDEX5	TE	-	ZR141/18-0175	all types of dispensers
14	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	Pulse generator, magnetic	EK-1129	TATSUNO	FTZÚ16ATEX0132X	TCM141/07-4493	part of the meter 2. Ex d design
7	Electronic counter	PDEX	TE	-	TCM141/07-4493	all types of dispensers
8	Electronic counter	PDEX5	TE	-	ZR141/18-0175	all types of dispensers
9	Electronic counter	TBELTx	TE	-	TCM141/07-4493	all types of dispensers
10	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 sigh 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.

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

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

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	SHARK BMP5xx.Sx /LPG	Liquefied propane-butane (LPG)	FTZÚ 03 ATEX 0025	TCM 141/07-4493
4	OCEAN BMP4xxx.Oxx /LPG	Liquefied propane-butane (LPG)	FTZÚ 10 ATEX 0064X	TCM 141/07-4493
5	SHARK BMP5xx.Sx /AdB	AdBlue®	FTZÚ 21 ATEX 0048X	TCM 141/07-4492
6	SHARK BMP5xx.Sx /AdB&Die	Combined Diesel + AdBlue®	FTZÚ 03 ATEX 0022	TCM 141/07-4491 (4492)
7	OCEAN BMP4xxx.Oxx /AdB	AdBlue®	FTZÚ 21 ATEX 0048X	TCM 141/07-4492
8	OCEAN BMP4xxx.Oxx /WSE	Windshield washer fluid (WSE)	A565-18 (FTZÚ)	TCM 141/13-5085
9	OCEAN BMP4xxx.Oxx /CNG	Compressed natural gas (CNG)	A484-16 (FTZÚ)	R139/2014-B-CZ1-2018.01*
10	OCEAN BMP4xxx.Oxx+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 type tests the OIML CERTIFICATE ISSUED UNDER SCHEME B No. R139/2014-B-CZ1-2018.01 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 – EN 13617-1, EN 14678-1, EN IEC 60079-0, EN ISO 80079-36, 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) or 99999(5) **		
Maximum amount to pay (number of digits)	999999(6) or 9999999(7) **		
Maximum volume (number of digits)	999999(6) or 1999999(6.5) **		
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]	-20 to +40 (standard dispenser version); -40 to +55 (special dispenser version)		
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), 1.02 (dbd2FFA4)
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*

***Data transmission of the entire contents of the display with the number of digits 7/6.5/5 is only possible using the extended communication protocol (8/8/6)*

****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) or 99999(5) *			
Maximum amount to pay (number of digits)	999999(6) or 9999999(7) *			
Maximum volume (number of digits)	999999(6) or 1999999(6.5) *			
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 +40			
Ambient temperature range [°C]	-20 to +40			
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	PDEX5
Program version (W&M check sum)	1.01 (8CA4)	1.03 (20260)	1.01 (4092)	1.01 (4573), 1.02 (dbd2FFA4)
Calculator powering	230V ± 10%; 50Hz; max. 300VA			
Electro-magnetic valves	Proportional or two-state; + 24VDC / max.1A			

**Data transmission of the entire contents of the display with the number of digits 7/6.5/5 is only possible using the extended communication protocol (8/8/6)*

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) or 99999(5) ***		
Maximum amount to pay (number of digits)	999999(6) or 9999999(7) ***		
Maximum volume (number of digits)	999999(6) or 1999999(6.5) ***		
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]	0 to +40		
Ambient temperature range [°C]	-20 to +40 (standard dispenser version); -20 to +50 (enhanced dispenser version) 0 to +40°C (version without 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), 1.02 (dbd2FFA4)
Calculator powering	230V ± 10%; 50Hz; max. 300VA		
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*

**** Data transmission of the entire contents of the display with the number of digits 7/6.5/5 is only possible using the extended communication protocol (8/8/6)*

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) or 99999(5) *		
Maximum amount to pay (number of digits)	999999(6) or 9999999(7) *		
Maximum volume (number of digits)	999999(6) or 1999999(6.5) *		
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]	-20 to +40 (standard dispenser version); -20 to +50 (special dispenser version)		
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), 1.02 (dbd2FFA4)
Calculator powering	230V ± 10%; 50Hz; max. 300VA		
Electro-magnetic valves	Proportional or two-state; + 24VDC / max.1A		

** Data transmission of the entire contents of the display with the number of digits 7/6.5/5 is only possible using the extended communication protocol (8/8/6)*

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) or 99999(5) *	
Maximum amount to pay (number of digits)	999999(6) or 9999999(7) *	
Maximum quantity (number of digits)	999999(6) or 1999999(6.5) *	
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	M2	
Electromagnetic class	E1	
Humidity	Condensing	
Location	Open	
Measured unit	Mass [kg]	
Electronic counter	TBELTM	
Program version (W&M check sum)	1.01 (4092), 1.02 (24AD)	
Calculator powering	230V ± 10%; 50Hz; max. 300VA	
Electro-magnetic valves	Two-state; +24VDC/max.1A	

* *Data transmission of the entire contents of the display with the number of digits 7/6.5/5 is only possible using the extended communication protocol (8/8/6)*

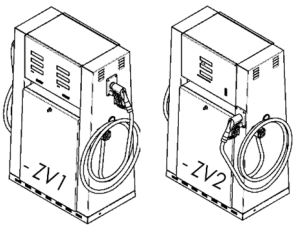
2.4. DISPENSER MODEL IDENTIFICATION

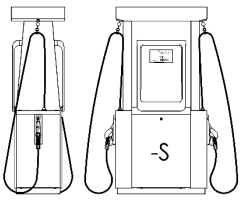
The basic design of the TATSUNO EUROPE dispenser business branding is:

1	2	3	4	5	6	7		1	2	3	4	5	6	7		
BMP	4 0	4	8	. O W	D	/H/VR2	+	MOD	4 0	1	2	. O W	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	---------->	**Device type**
	BMP	Dispenser. Standalone dispenser.
	MOD	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 TOWER versions.
2	---------->	**Series of dispensers**
	5	**SHARK.** Simple single-product to two-product dispensers of the SHARK JUNIOR and SHARK ECONOMY series.
	40	**OCEAN.** Single to five-product dispensers of the OCEAN EURO, OCEAN SMART, OCEAN TOWER 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	---------->	**Dispenser design.**
	S	SHARK JUNIOR dispensers. Single-product, one- to two-hose dispensers with a height of 1400 mm.
	SX	SHARK ECONOMY dispensers. Two-product, one- to two-hose dispensers with a height of 1400 mm.
	SI	SHARK ISLAND dispensers. Two-product, one- to four-hose dispensers with a height of 1700 or 2100 mm.
	OE*	OCEAN EURO dispensers. Multi-product, one- to ten-hose dispensers with a height of 1900 mm.
	OT*	OCEAN TALL dispensers. Multi-product, one- to ten-hose dispensers with a height of 2300 mm.
	OS	OCEAN SMART dispensers. Single-product, one- to four-hose dispensers with a height of 1900 mm.
	OW	OCEAN TOWER dispensers. Multi-product, one- to ten-hose dispensers with a height of 1900 mm.
	OH	OCEAN HERO dispensers. Multi-product, one- to eight-hose dispensers with a height of 2200 mm.
6	---------->	**Dispenser orientation**
	D	Double-sided dispenser.
	L	Single-sided dispenser – left.
	R	Single-sided dispenser – right.
7	---------->	**Specifying abbreviation**
	- without -	The dispenser or module for pumping liquid fuels (gasoline, diesel, ...).
	/LPG	The LPG (liquefied propane-butane) dispenser or module.
	/AdB	AdBlue® (AUS32 reducing agent) dispenser or module
	/WSE	Dispenser or module for WSE (windshield washer fluid dispensing).
	/AdB&Die	Dispenser with combined delivery of AdBlue and liquid fuel (diesel).
	/CNG	CNG (compressed natural gas) dispenser or module.
	/NoEx	The dispenser must be positioned out of reach of the fuel dispensers
	/NoHeat	The AdBlue dispenser/module is not equipped with heating
	-ZV1	The dispenser where the hose exits from the rear cover and the nozzle is also located on the rear cover, see figure.
	-ZV2	The dispenser where the hose exits from the rear cover and the nozzle is located on the front of the dispenser
	/H	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.
	/UH	Ultra-high performance of one delivery hose (120 to 150L/min). For two hoses in the dispenser, the /UH/UH is used.
	/VRx	The number of exhausted products in the fuel dispenser where x = 1, 2, 3, 4 or 5.
	/S3	Pressure dispenser. The dispenser does not contain a pump. The submersible pump is located in the tank.
	/MAS	A dispenser with one output for a satellite stand. If two satellite outlets are in the dispensers, /MAS/MAS is used.
	/SAT	A dispenser with a satellite delivery hose. If two satellite hoses are used in the dispenser, /SAT/SAT is used.
	/LON; /TAT	Data communication IFSF-LON; data communication TATSUNO SUNNY (RS485)
	/CUBE; /FIN; /WAVE	Design variants of the dispenser created by adding decorative elements to the base version of the dispenser (OCEAN dispensers only).
	-HS; -HR	A spring hose holder (SHARK); hose reel (OCEAN)
	-SC	Simultaneous delivery of hoses on a two-hose dispenser.
	-NC	Non-simultaneous delivery of hoses on a two-hose dispenser.
	-2C	Simultaneous delivery of two delivery hoses on one side of the multi-product dispenser.
	-4C	Simultaneous pumping of four delivery hoses on a double-sided multi-product dispenser.
	-S	Nozzle position on side of dispenser (OCEAN HERO)
	-1700, -2100	Two version of ISLAND dispensers SHARK ISLAND (height in v mm)





Notes: ** Serial production of the OCEAN EURO and OCEAN TALL series dispensers was terminated in October 2020.*

2.4.1. DISPENSER PARTS MARKING CONVENTIONS

Figure 1 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 (SHARK ECONOMY, OCEAN HERO), the location of the nameplate which is always closest to product No. 1 and nozzle No. 1R (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.

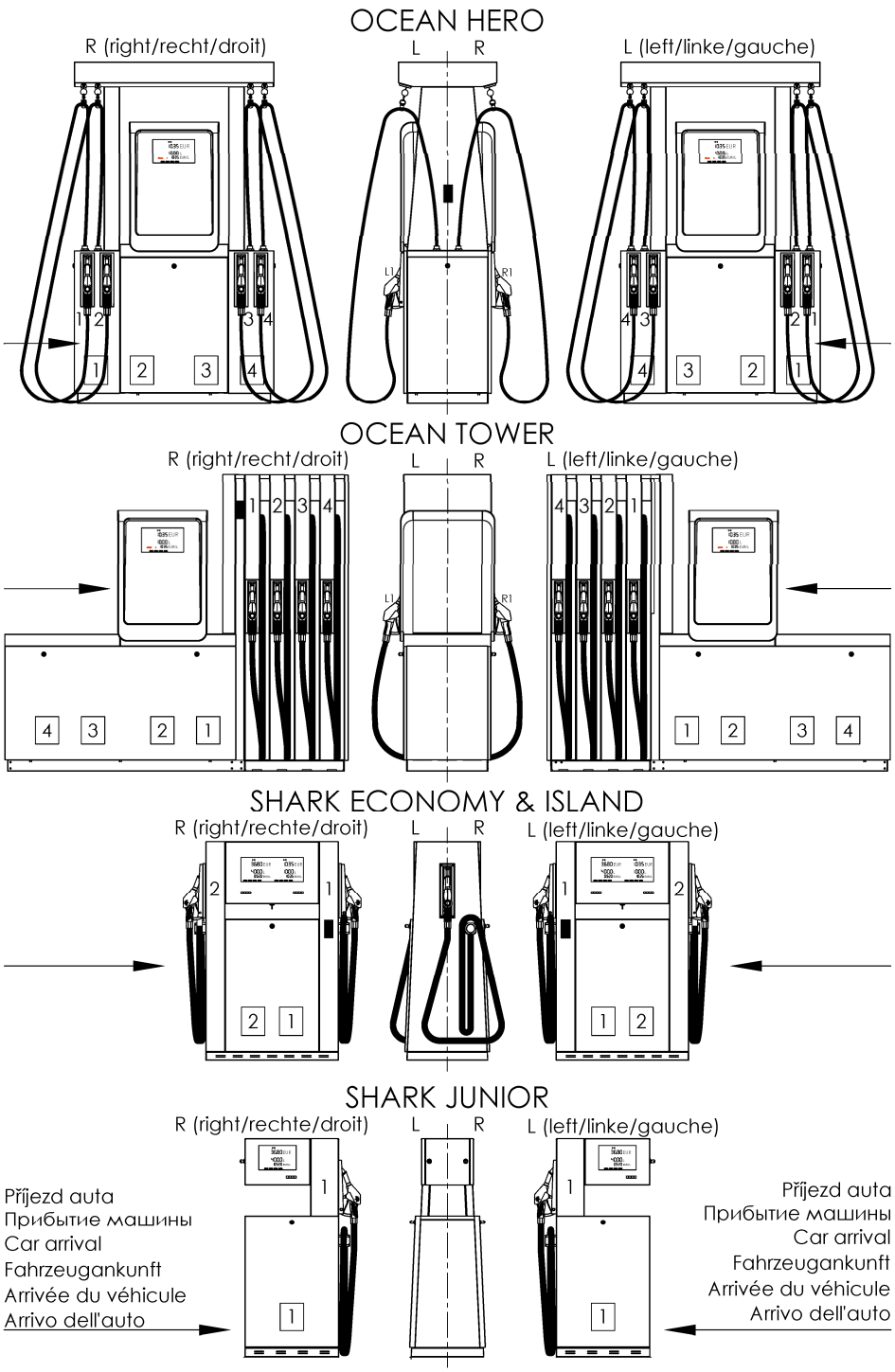


Figure 1 - Dispenser marking system with the recommended arrival direction

2.5. STANDARD MODELS OF DISPENSERS

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

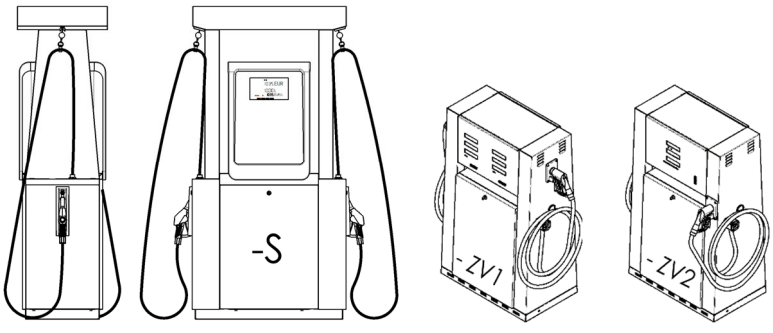
- depending on the type of pumped / delivered medium
  - **dispensers with one type of media**
  - **multi-media dispensers - combined dispensers**

  Note: The most common types of combined dispensers are diesel + AdBlue®; gasoline + CNG; gasoline, diesel + LPG, etc.
- 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.
- 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).
- 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)
- by the number of fuel products
  - by the type the dispenser can deliver **from one to five different fuel products.**
- by to 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.
- 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)



- by pumping / filling performance of the fuel dispenser
  - **with standard pumping performance**
  - **dispensers with increased pumping performance** (marking /H)
  - **dispensers with high pumping performance** (marking /UH)

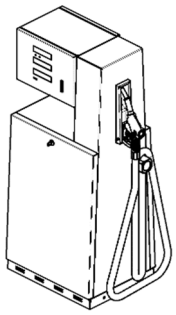
  Note: The pumping performance means maximum achievable fuel flow through the delivery nozzle. It is expressed in litres per minute or in kilograms per minute (CNG). The actual pumping/filling performance depends on the actual conditions at the fuel station - on the quality and length of the suction piping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

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).

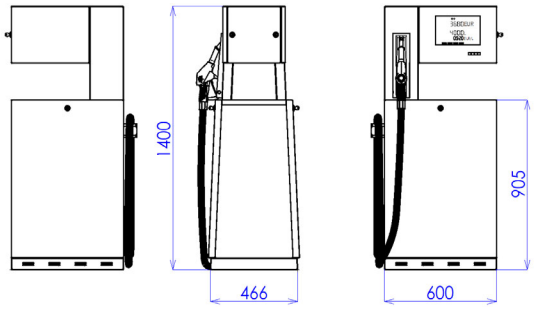
List of standard SHARK JUNIOR models:



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

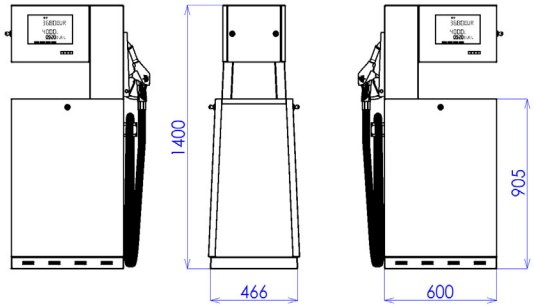
Notes: Special models (see chap. 2.4) can also be produced in a pressure version without pumps (/S3) where the submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. Dispensers can be equipped with a vapour recovery system (/VR) of the 2nd level and 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).

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/

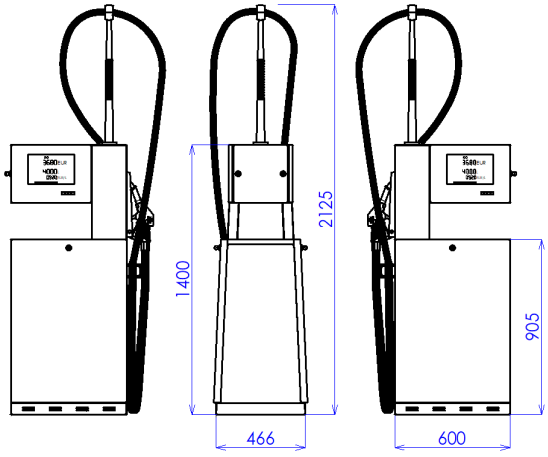


BMP511.SL-ZV2; BMP511.SL/H-ZV2; BMP521.SL/UH-ZV2

Figure 2- Standard SHARK JUNIOR dispenser models with a nozzle positioned at the front



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



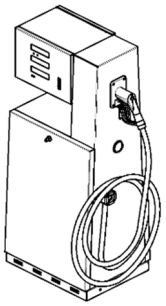
BMP511.SD-HS; BMP511.SD/H-HS; BMP521.SD/UH-HS

Figure 3 - 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.

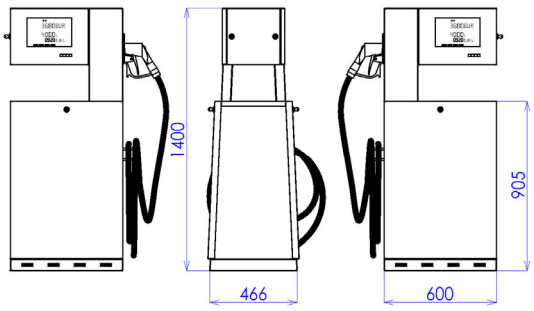
List of standard SHARK JUNIOR LPG models:



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).

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/



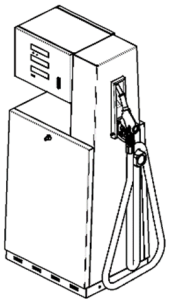
BMP511.SD /LPG

Figure 4 – Standard model SHARK JUNIOR LPG

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:

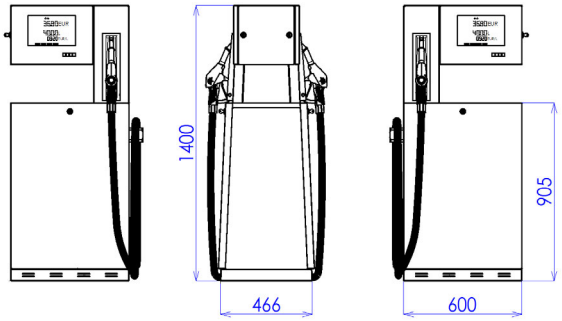


Dispenser model	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Number of products** *(number of pumps or inputs)*	**Number of meters** *(number of measuring systems)*	**Number of delivery nozzles** *(number of delivery hoses)*	**Number of displays**	**Pumping performance** *(L/min)*
BMP511.SL(R)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

Notes: 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 necessary to equip the dispenser at the customer's request by heating the hose, nozzle boot and the hydraulic part of the dispenser. For dispensers with heated hoses, it is also recommended to use spring hose hinges (abbreviation "HS") to avoid hose contact with the ground and hence reduce heating efficiency. The maximum pumping performance Q_{max} = 40 L/min is mainly dependent on the submersible pump used in the storage tank and the dispensing hose type. It can be reduced by means of an electromagnetic proportional valve located in the dispenser to the selected lower value. For pumping into passenger cars, it is recommended to use a maximum flow rate in the range of Q_{max} = 5 to 7 L / min. for smoother pumping into a small tank in the vehicle.

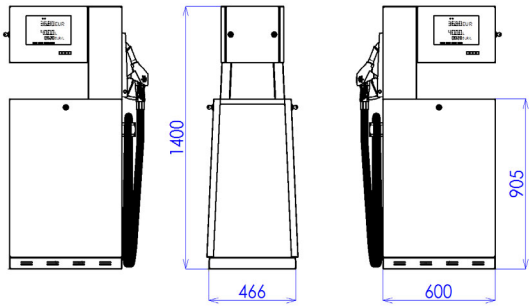
AdBlue® dispensers marked /NoEx are not designed for installation near fuel dispensers. The dispensers marked /Ex can be installed in zone 2 (according to EN 60079-10-1) generated by other fuel (petrol, diesel) or LPG equipment.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/

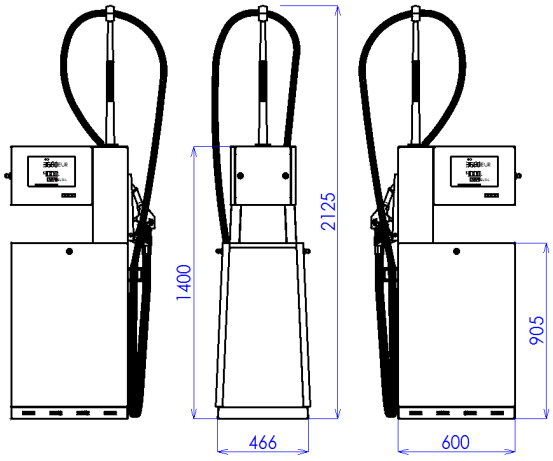


BMP512.SD/AdB-ZV2

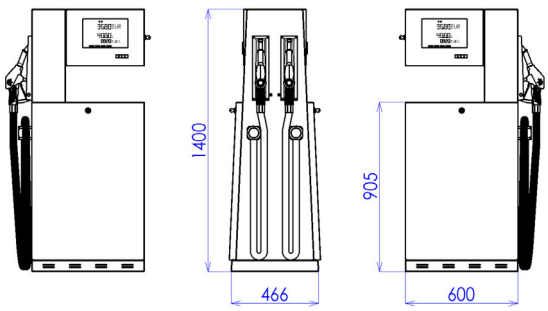
Figure 5 - Standard SHARK JUNIOR ADBLUE® dispenser models with nozzles positioned at the front (-ZV2)



BMP511.SD /AdB



BMP511.SD/AdB-HS



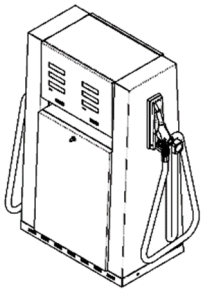
BMP512.SD/AdB

Picture 6 - 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).

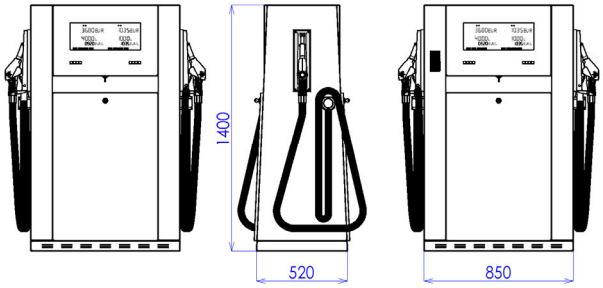
List of standard SHARK ECONOMY models:



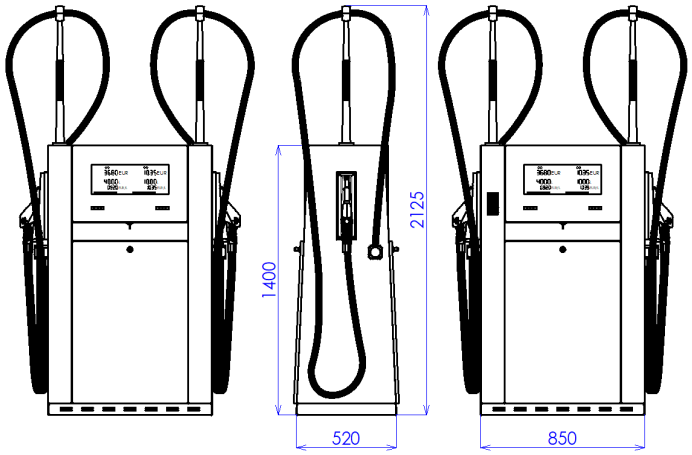
Dispenser model	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of products** *(number of pumps or inputs)*	**Number of meters** *(number of measuring systems)*	**Number of delivery nozzles** *(number of delivery hoses)*	**Number of displays**	**Pumping performance** *(L/min)*
BMP522.SXL	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).

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

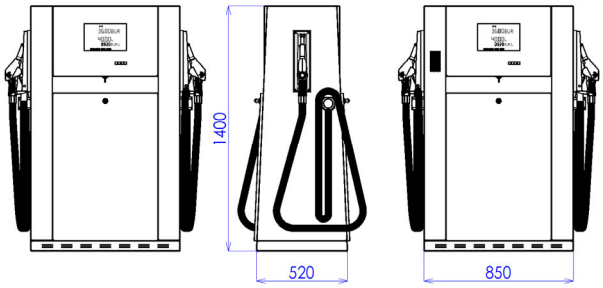


BMP522.SXD; BMP522.SXD/H; BMP522.SXD/UH; BMP522.SXD/UH/H

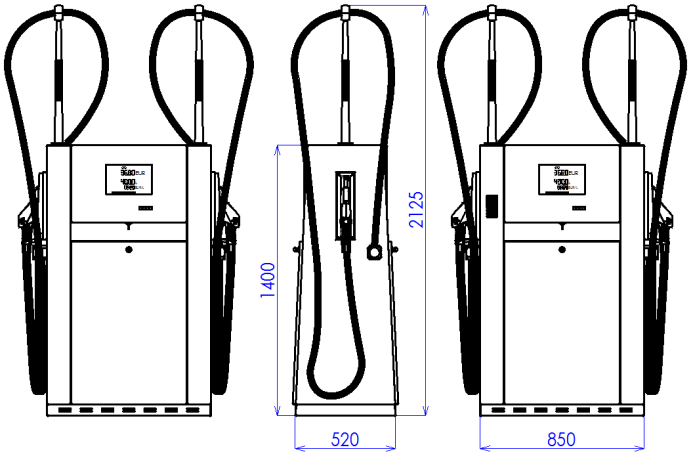


BMP522.SXD-HS; BMP522.SXD/H-HS; BMP522.SXD/UH-HS; BMP522.SXD/UH/H-HS

Figure 7 - Standard models of SHARK ECONOMY dispensers (two simultaneous deliveries)



BMP522.SXD-NC; BMP522.SXD/H-NCBMP522.SXD/UH; BMP522.SXD/UH/H-NC

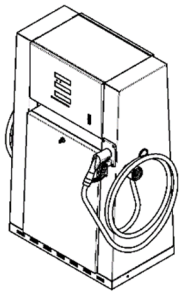


BMP522.SXD-NC-HS; BMP522.SXD/H-NC-HS; BMP522.SXD/UH-NC-HS; BMP522.SXD/UH/H-NC-HS

Figure 8 – Standard SHARK ECONOMY models (no simultaneous deliveries -NC)

2.5.5. SHARK ECONOMY LPG DISPENSERS

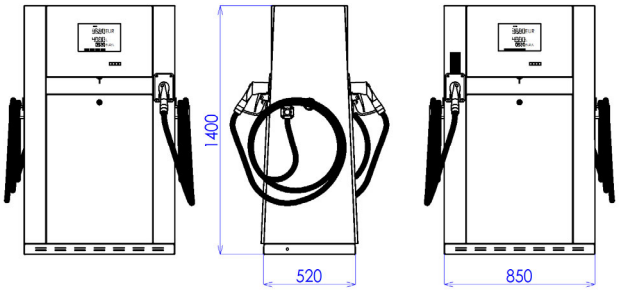
SHARK ECONOMY LPG dispensers are produced only in a pressure version, i.e., without a pump, in a single-sided left (L) or double-sided (D) version with one or two free-hanging delivery hoses for LPG (liquefied propane butane) delivery. The delivery nozzles may be located on the front (-ZV2) or on the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

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



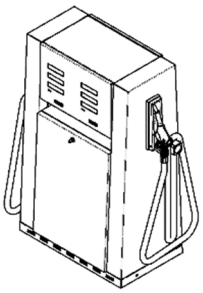
BMP522.SXD /LPG-ZV2

Figure 9 – Standard SHARK ECONOMY LPG models

2.5.6. SHARK ECONOMY ADBLUE® DISPENSERS

SHARK ECONOMY ADBLUE® dispensers are standardly manufactured in a pressure version, single-sided left (L) or double-sided (D) version with 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 ECONOMY ADBLUE® models:



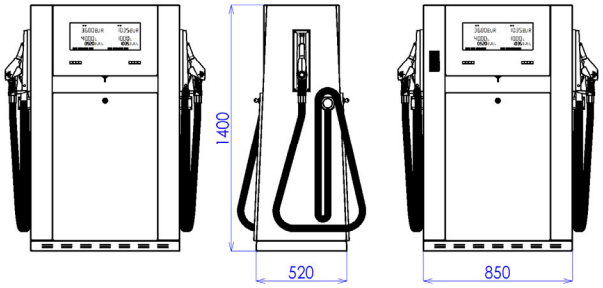
Dispenser model	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of products** *(number of pumps or inputs)*	**Number of meters** *(number of measuring systems)*	**Number of delivery nozzles** *(number of delivery hoses)*	**Number of displays**	**Pumping performance** *(L/min)*
BMP512.SXL /AdB	1	1	2	2	2	40/10
BMP512.SXL /AdB-NC	1	1	1	2	1	40/10
BMP512.SXD /AdB	2	1	2	2	4 (2+2)	40/10
BMP512.SXD /AdB-NC	2	1	1	2	2 (1+1)	40/10

Note: SHARK ECONOMY 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 necessary to equip the dispenser at the customer's request by heating the hose, nozzle boot and the hydraulic part of the dispenser. For dispensers with heated hoses, it is also recommended to use spring hose hinges (abbreviation "HS") to avoid hose contact with the ground and hence reduce heating efficiency.

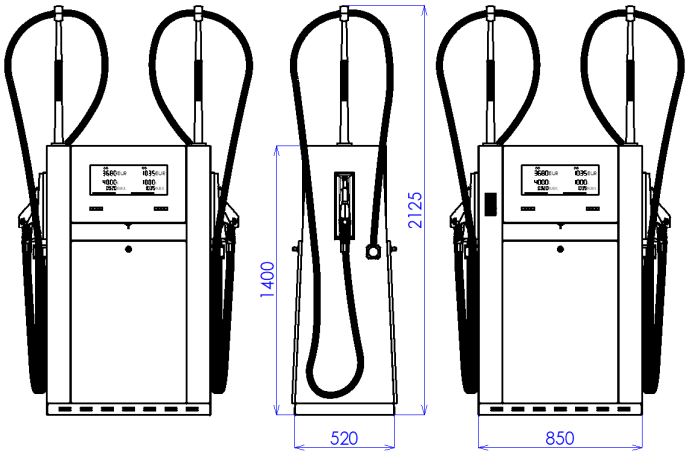
The maximum pumping performance Q_{max} = 40 L/min is mainly dependent on the submersible pump used in the storage tank and the dispensing hose type. It can be reduced by means of an electromagnetic proportional valve located in the dispenser to the selected lower value. For pumping into passenger cars, it is recommended to use a maximum flow rate in the range of Q_{max} = 5 to 7 L / min. for smoother pumping into a small tank in the vehicle.

AdBlue® dispensers marked /NoEx are not designed for installation near fuel dispensers. The dispensers marked /Ex can be installed in zone 2 (according to EN 60079-10-1) generated by other fuel (petrol, diesel) or LPG equipment.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

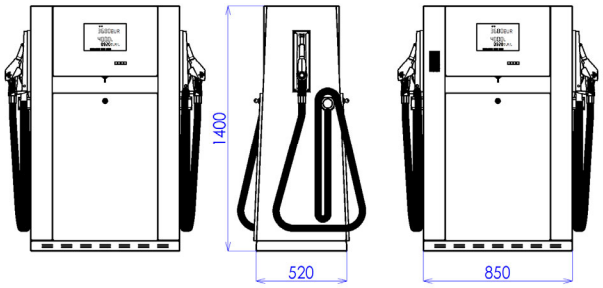


BMP512.SXD/AdB

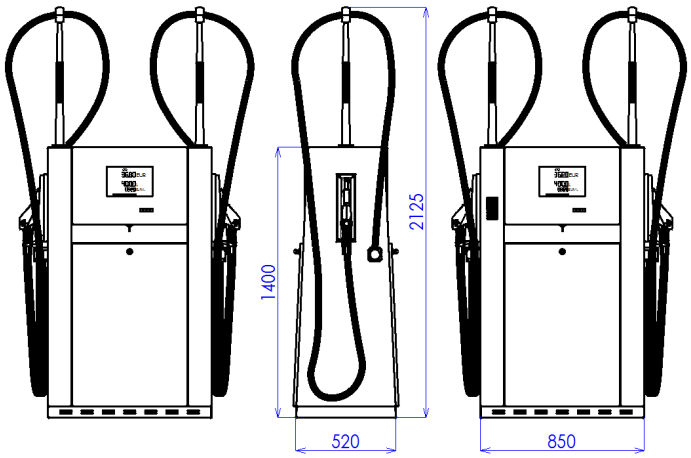


BMP512.SXD/AdB-HS

Figure 10 - Standard SHARK ECONOMY ADBLUE® models (two simultaneous deliveries)



BMP512.SXD/AdB-NC



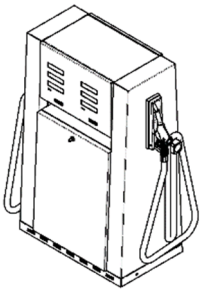
BMP512.SXD/AdB-NC-HS

Figure 11 - Standard SHARK ECONOMY ADBLUE® models (non-simultaneous deliveries „-NC“)

2.5.7. COMBINED SHARK ECONOMY DISPENSERS FOR DIESEL AND ADBLUE® DELIVERY

Combined SHARK ECONOMY dispensers serve for the delivery of fuel liquids (diesel, biodiesel…) and AdBlue® reduction agent (32.5% urea solution: AUS32). Dispensers are manufactured in a single-sided left (L) or double-sided (D) design with two delivery hoses free hanging or hung by a spring hinge (HS). Maximum delivery flow rate of the liquid fuel is 40 or 80 L/min, maximum pumping performance of the AdBlue® delivery hoses is 40 L/min for trucks or 10 L/min for passenger cars. The part of dispenser intended for delivery of liquid fuel is performed in suction version with pump, the part of AdBlue® in pressure version (without pump).

List of standard COMBINED SHARK ECONOMY models:



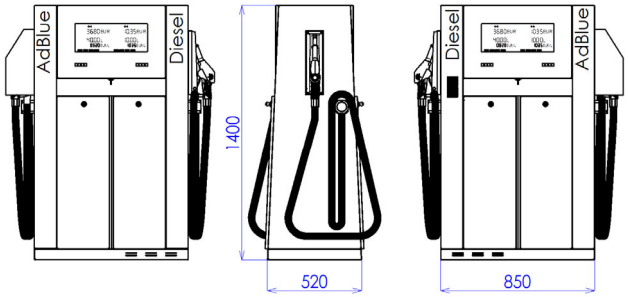
Dispenser model	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of products** *(number of pumps or inputs)*	**Number of meters** *(number of measuring systems)*	**Number of delivery nozzles** *(number of delivery hoses)*	**Number of displays**	**Pumping performance** *(L/min)*
BMP522.SXL /AdB&Die	1	2	2	2	2	40 + 40/10
BMP522.SXL /H/AdB&Die	1	2	2	2	2	80 + 40/10
BMP522.SXD /AdB&Die	2	2	2	2	4 (2+2)	40 + 40/10
BMP522.SXD /H/AdB&Die	2	2	2	2	4 (2+2)	80 + 40/10

Notes: COMBINED SHARK ECONOMY dispensers are not standardly equipped with heating. For the installation of dispensers in an environment where the temperature drops below -5 °C, it is necessary to equip the AdBlue® module of dispenser by heating. For dispensers with heated hoses, it is also recommended to use spring hose hinges (abbreviation "HS") to avoid hose contact with the ground and hence reduce heating efficiency.

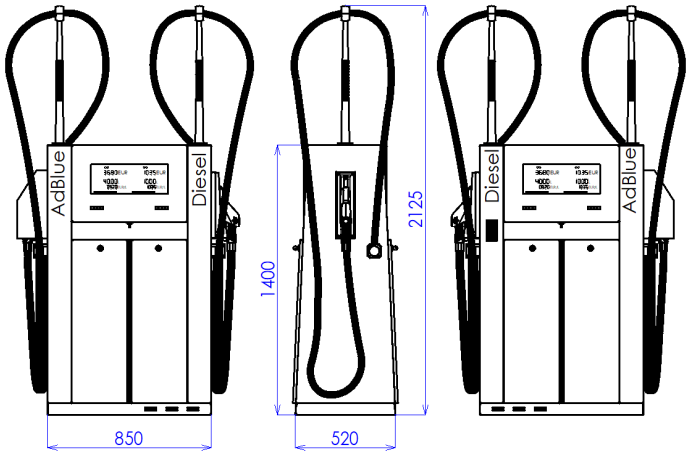
The maximum pumping performance of AdBlue® hose Q_{max} = 40 L/min is mainly dependent on the submersible pump used in the storage tank and the dispensing hose type. It can be reduced by means of an electromagnetic proportional valve located in the dispenser to the selected lower value. For pumping into passenger cars, it is recommended to use a maximum flow rate in the range of Q_{max} = 5 to 7 L / min. for smoother pumping into a small tank in the vehicle.

Liquid fuel module can also be produced in a pressure version without pumps (/S3) where the submersible pump is in the storage tank and pushes the fuel into the dispenser via a pressure line. The standard performance ranges from 35 to 50 L/min, increased performance from 70 to 90 L/min.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



BMP522.SXD /AdB&Die



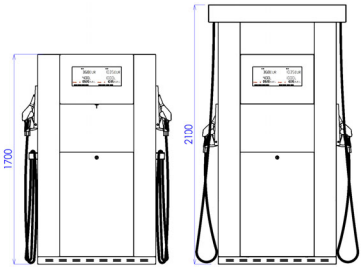
BMP522.SXD/AdB&Die-HS

Figure 12 - Standard COMBI SHARK ECONOMY models

2.5.8. SHARK ISLAND DISPENSERS

SHARK ISLAND dispensers exist in two design modifications – with a height of 1700 mm and with a height of 2100 mm and a portal connecting the two columns. Dispensers are produced as standard in a suction version with pumps, in a single-sided left (L) or double-sided (D) version with one or two hoses for dispensing liquid fuels (gasoline, diesel, E85...) and finished dispensing nozzles located on the side of the dispenser (variants - S) or one to four hoses placed from the forehead (LANE oriented). Hoses can be free-hanging or suspended using a spring-loaded hinge (HS, only 1700 mm modification).

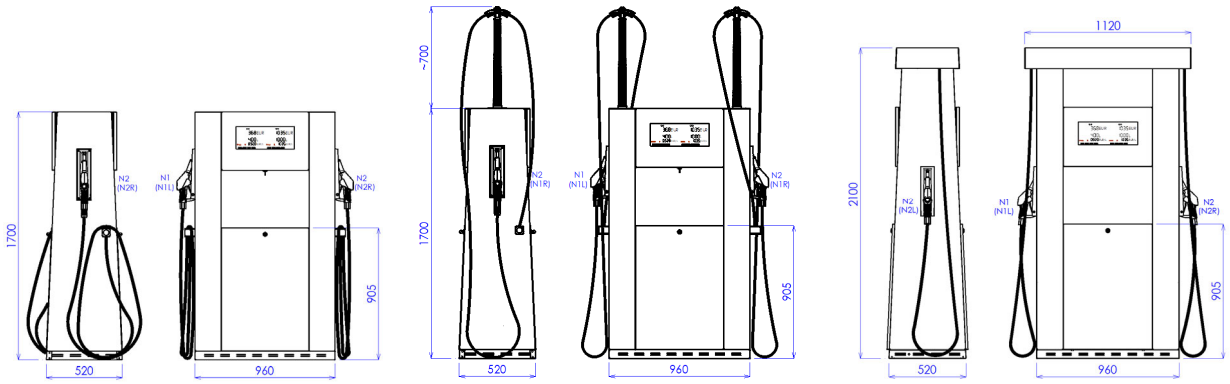
List of standard SHARK ISLAND models:



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)*
BMP2011.SIL -1700 (-2100)	1	1	1	1	1	40
BMP2011.SIL -S -1700 (-2100)	1	1	1	1	1	40
BMP2012.SID -1700 (-2100)	2	1	2	2	2	40+40
BMP2012.SID -S -1700 (-2100)	2	1	2	2	2	40+40
BMP2022.SID -1700 (-2100)	2	2	2	2	2	40+40
BMP2022.SID -S -1700 (-2100)	2	2	2	2	4	40+40
BMP2022.SIL – NC -1700 (-2100)	1	2	2	2	1	40+40
BMP2022.SIL -S – NC -1700 (-2100)	1	2	2	2	1	40+40
BMP2021.SIL /UH -1700 (-2100)	1	2	2	1	1	130
BMP2021.SID /UH -S -1700 (-2100)	2	2	2	1	2	130
BMP2022.SID /UH/H -1700 (-2100)	2	2	3	3	2	130+80
BMP2022.SID /UH/H -S -1700 (-2100)	2	2	3	3	4	130+80
BMP2024.SID -1700 (-2100)	1	2	4	4	2	40+40+40+40

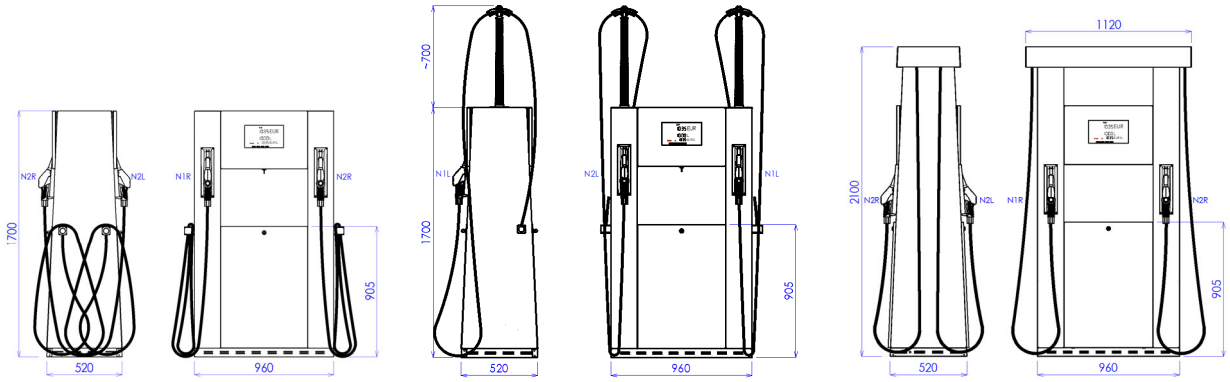
Notes: Special models (see chap. 2.4) can also be produced in a pressure version without pumps (/ S3) where the submersible pump is located in the storage tank and pushes the fuel into the dispenser via a pressure line. According to the number of gasoline products, dispensers can be equipped with a vapour 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).

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



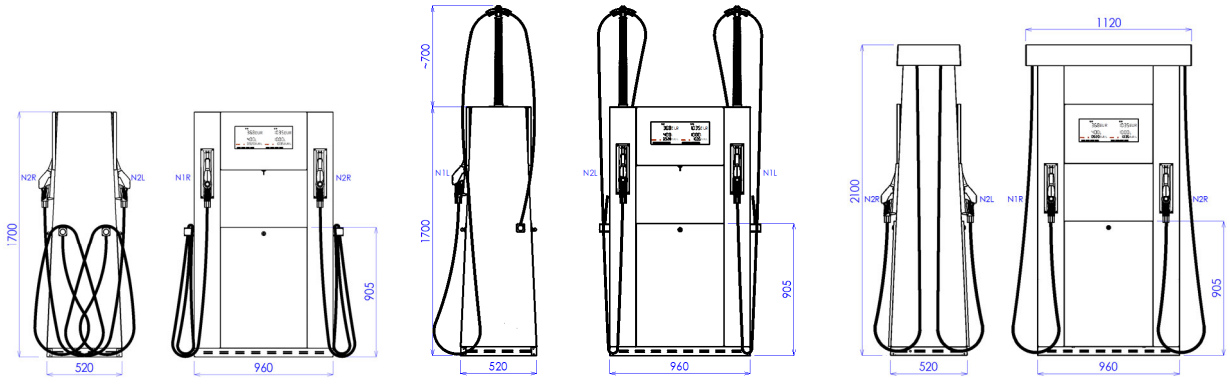
BMP2022.SID-S-1700 BMP2022.SID-S-1700-HS BMP2022.SID-S-2100

Figure 13 - Standard models of SHARK ISLAND dispensers – hoses from side (-S)



BMP2022.SID-1700 BMP2022.SIL-1700-HS BMP2022.SID-2100

Figure 14 – Standard SHARK ISLAND models – hoses from front



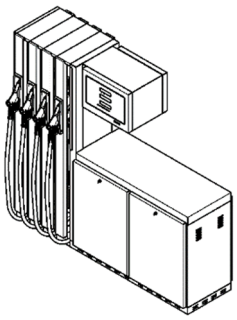
BMP2022.SID-1700-4C BMP2022.SIL-1700-2C-HS BMP2022.SID-2100-4C

Figure 15 – Special SHARK ISLAND models – 2 simultaneous deliveries per one side

2.5.9. 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.

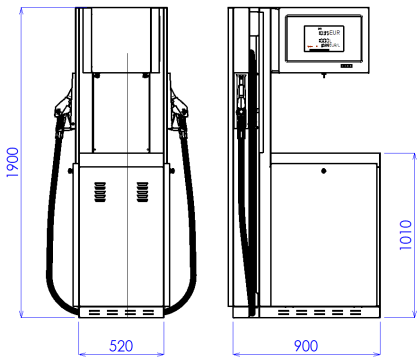
List of standard OCEAN EURO models:



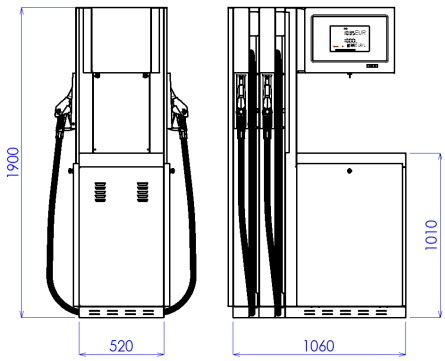
Dispenser model	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Total number of products** *(i.e. number of pumps or inputs)*	**Number of meters** *(i.e. number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(i.e. number 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.

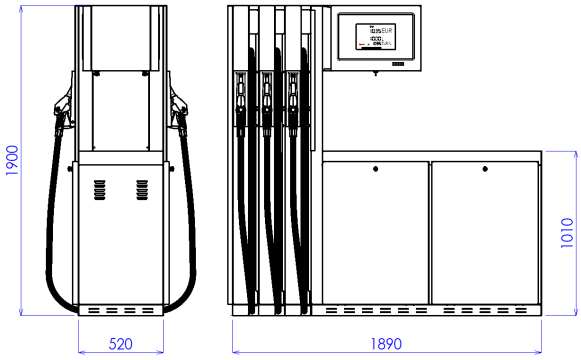
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



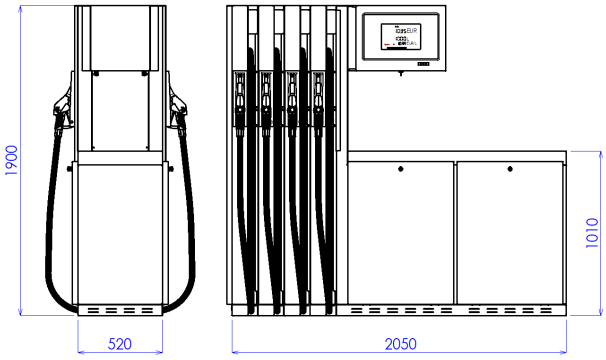
BMP4012.OED



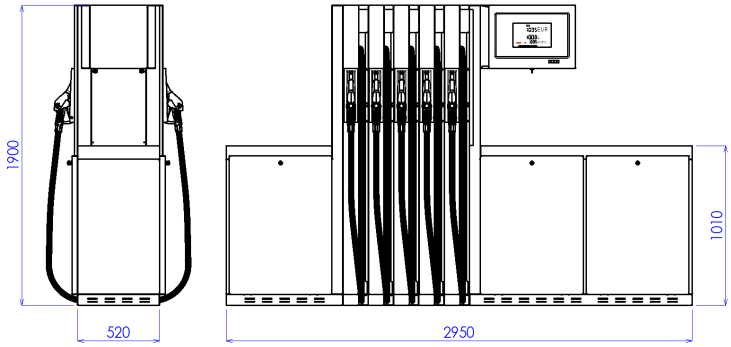
BMP4024.OED



BMP4036.OED

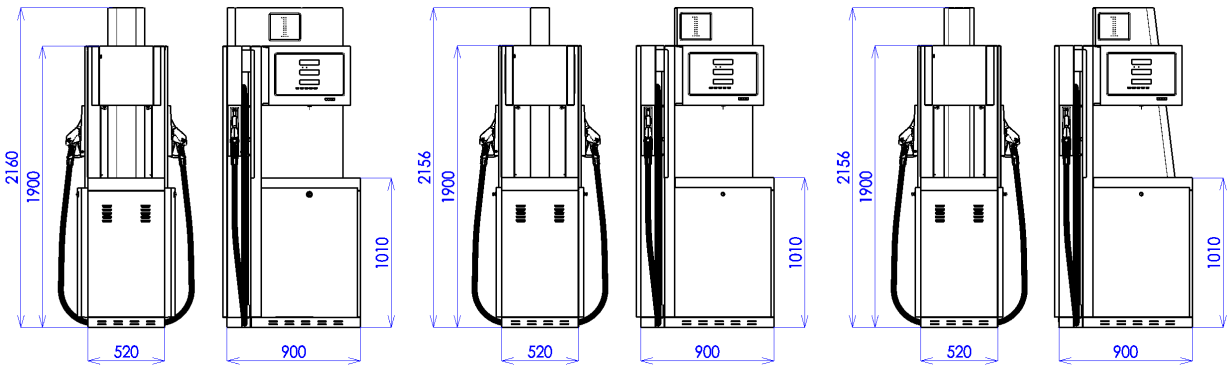


BMP4048.OED



BMP40510.OED

Figure 16 - Overview of standard OCEAN EURO models in basic design



Design variant WAVE
(BMP4012.OED/WAVE)

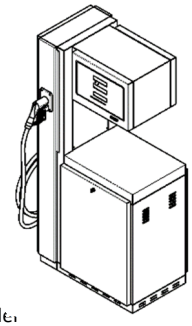
Design variant CUBE
(BMP4012.OED/CUBE)

Design variant FIN
(BMP4012.OED/FIN)

Figure 17 - Design variants of OCEAN EURO dispensers

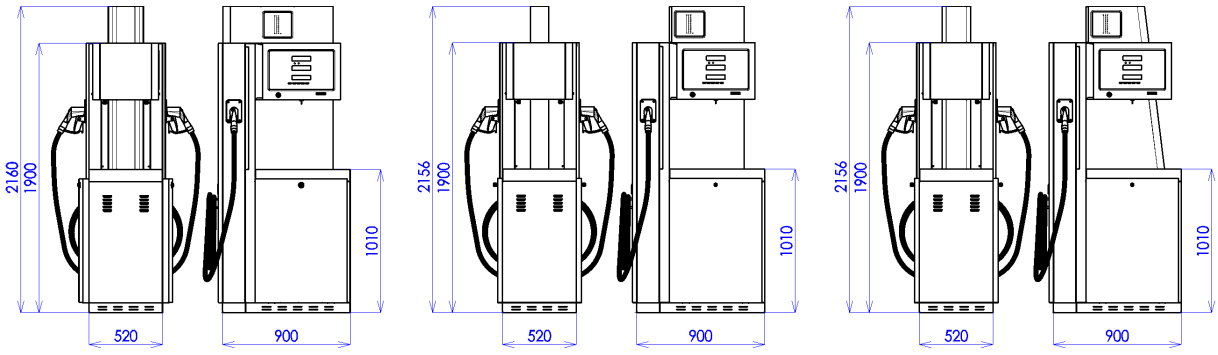
2.5.10. OCEAN EURO LPG DISPENSERS

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
BMP4011.OEL(R) /LPG-HR	1	1	1	1	1	1x50
BMP4012.OED /LPG	2	1	2	2	2	2x35
BMP4012.OED /LPG-HR	2	1	2	2	2	2x35
BMP4022.OED /LPG	2	2	2	2	2	2x50
BMP4022.OED /LPG-HR	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). Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

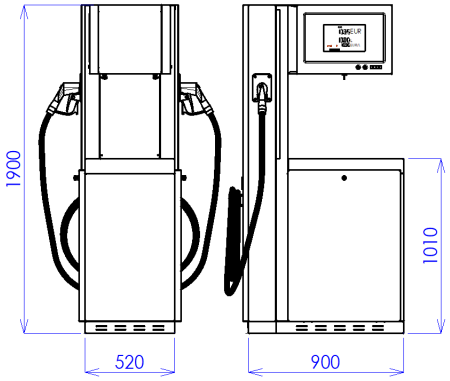


Design variant í WAVE *(BMP4012.OED/LPG/WAVE)*

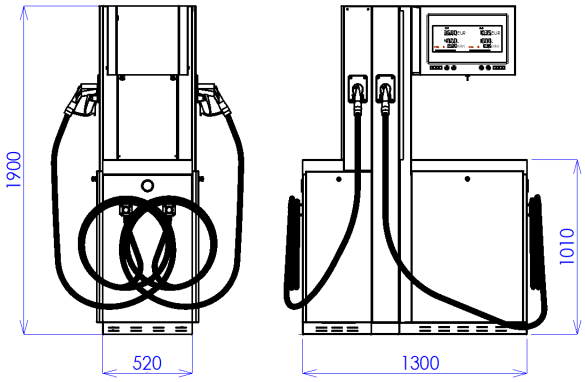
Design variant CUBE *(BMP4012.OED/LPG/CUBE)*

Design variant FIN *(BMP4012.OED/LPG/FIN)*

Figure 18 - Design variants of OCEAN EURO LPG dispensers

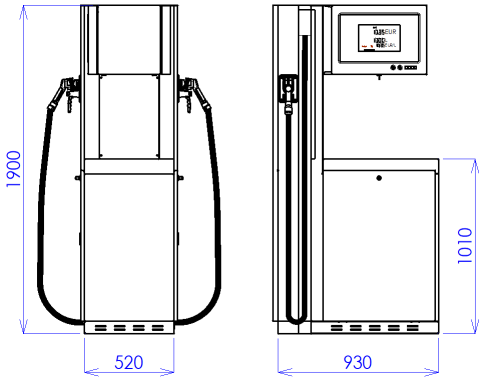


BMP4012.OED/LPG; BMP4022.OED/LPG



BMP4034.OED/LPG-4C

Figure 19 - Overview of standard OCEAN EURO LPG models without hose reels



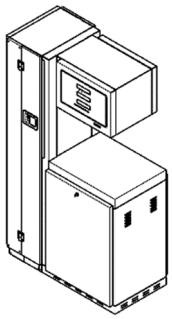
BMP4012.OED/LPG-HR
BMP4022.OED/LPG-HR

Figure 20 - Overview of standard OCEAN EURO LPG models with delivery hose reels

2.5.11. 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.

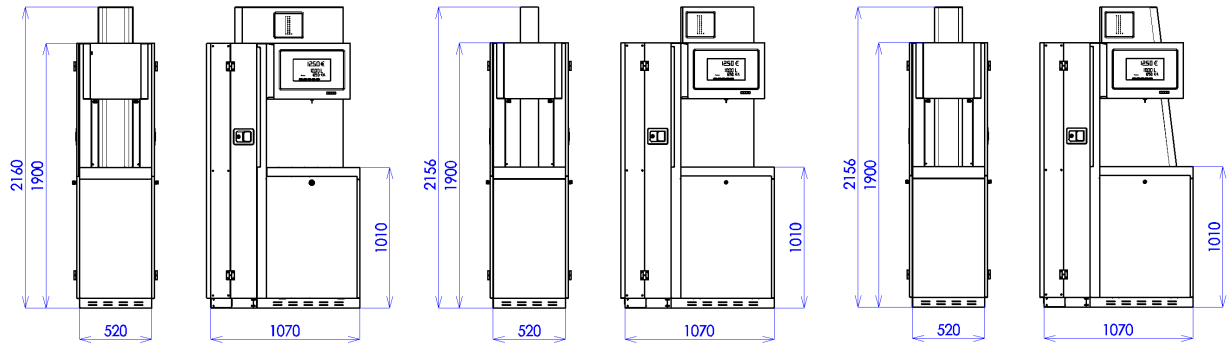
List of standard OCEAN EURO ADBLUE® models:



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 picture on next page.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

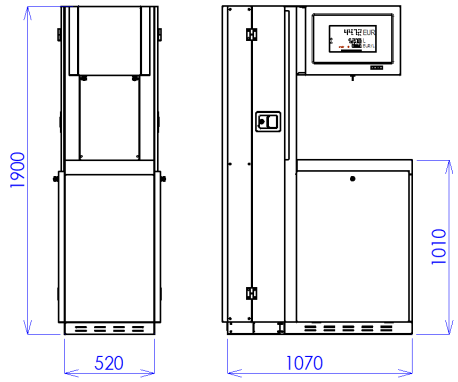


WAVE version (BMP4012.OED/AdB/WAVE)

CUBE version (BMP4012.OED/AdB/CUBE)

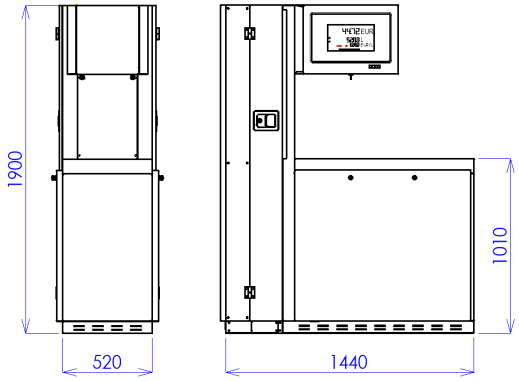
FIN version (BMP4012.OED/AdB/FIN)

Figure 21 - Design variants of OCEAN EURO ADBLUE® dispensers



BMP4012.OED/AdB

Figure 22 - Overview of standard OCEAN EURO ADBLUE® dispensers



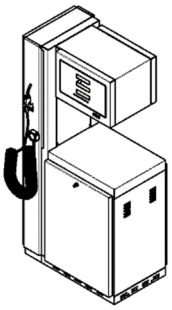
BMP4012.OED/AdB/T250

Figure 23 - Model of OCEAN EURO ADBLUE® dispenser with 250L storage tank and pump

2.5.12. 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.

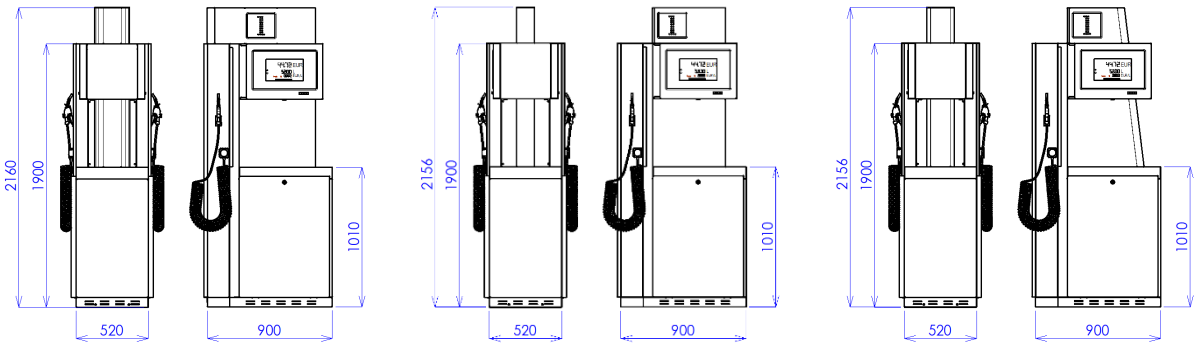
List of standard OCEAN EURO WSE models:



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 picture below.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

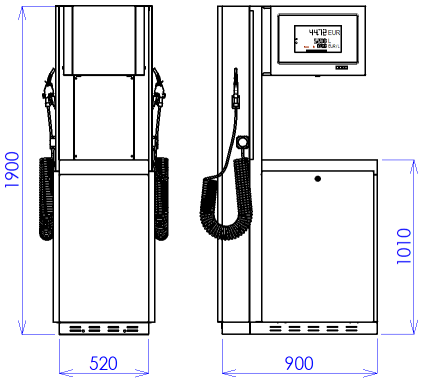


WAVE version (BMP4012.OED/WSE/WAVE)

CUBE version (BMP4012.OED/WSE/CUBE)

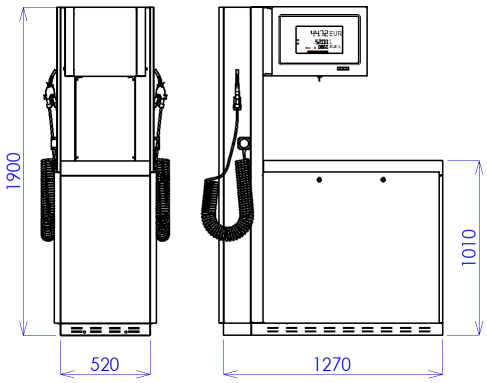
FIN version (BMP4012.OED/WSE/FIN)

Figure 24 - Design variants of OCEAN EURO WSE dispensers



BMP4012.OED/WSE

Figure 25 - Overview of standard OCEAN EURO WSE dispensers



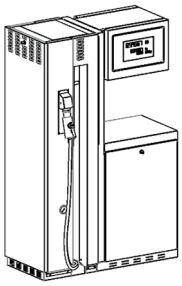
BMP4012.OED/AdB/T250

Figure 26 - Model of OCEAN EURO ADBLUE® dispenser with 250L storage tank and pump

2.5.13. OCEAN EURO CNG DISPENSERS

Dispensers for filling cars with compressed natural gas of the OCEAN EURO CNG series are standardly produced in single-sided left (L), single-sided right (R) or double-sided (D) versions with one to four free-hanging pressure filling hoses. The maximum filling capacity is 30 kg / min. with NGV1 filling nozzle for passenger cars or 70 kg / min. with NGV2 filling nozzle for filling trucks.

List of standard models of OCEAN EURO CNG dispensers:

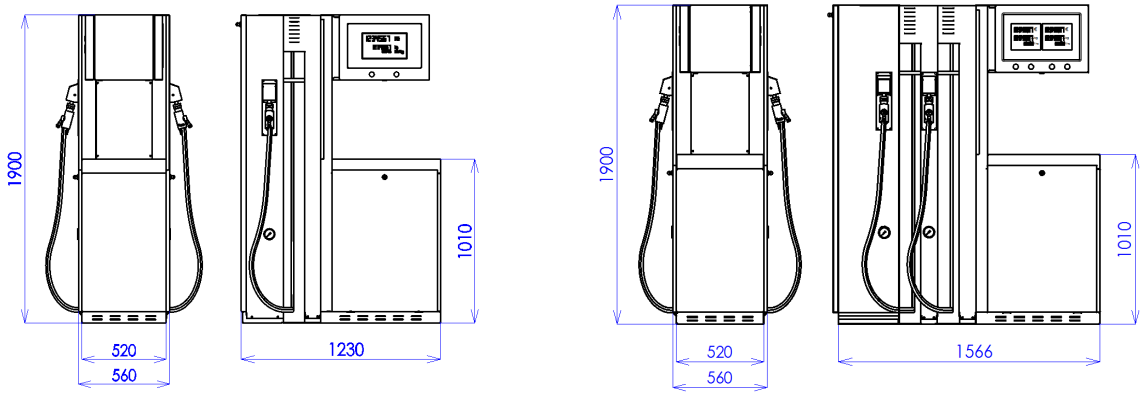


Model of dispenser	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of pressure inputs**	**Number of meters** *(number of measuring systems)*	**Number of filling hoses**	**Number of main displays** *(number of simultaneous deliveries)*	**Filling performance** *[kg/min]*
BMP40x1.OEL(R) /CNG	1	x	1	1	1	1x30
BMP40x1.OEL(R) /CNG/H	1	x	1	1	1	1x70
BMP40x2.OED /CNG	2	x	2	2	2	2x30
BMP40x2.OED /CNG/H	2	x	2	2	2	1x30+1x70
BMP40x2.OED /CNG/H/H	2	x	2	2	2	2x70
BMP40x2.OEL(R) /CNG/H	1	x	1	2	1	1x30 + 1x70
BMP40x4.OED /CNG/H/H	2	x	2	4	2	2x30 + 2x70
BMP40x4.OED /CNG-4C/HE	2	x	4	4	4	4 x 30

Notes: x… is the number of CNG inputs (CNG pressure tanks) x = 1, 2 or 3 depending on the station technology.

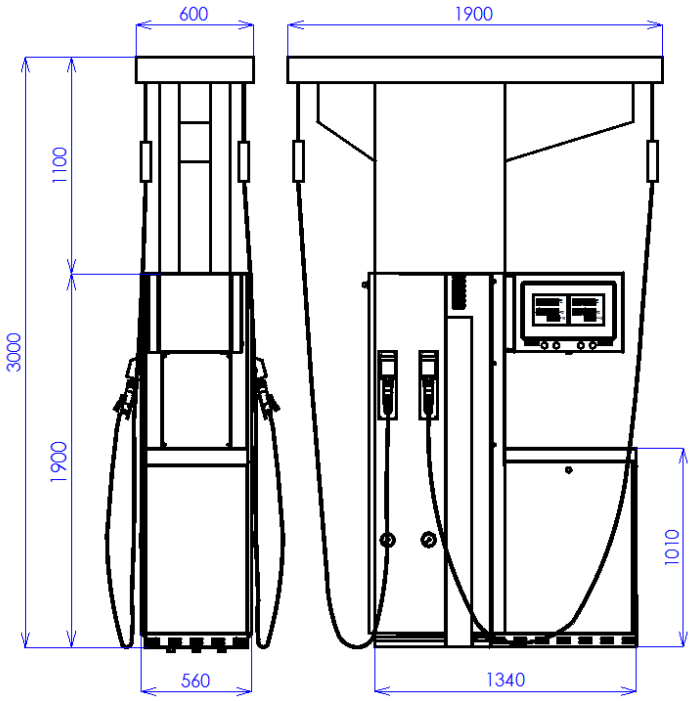
The filling capacity depends on the real conditions at the filling station - quality and length of piping, working pressure, volume and number of pressure tanks, compressor, length, and cross-section of filling piping in the vehicle, etc. The standard filling capacity is 30 kg/min. The filling capacity can be increased to 70 kg/min (/H). In the case of the /H /H marking, there are two filling hoses with a capacity of 70 kg/min in the dispenser.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/



BMP40x2.OED /CNG *BMP40x4.OWD /CNG*

Figure 27 – Overview of standard OCEAN EURO CNG dispensers



BMP40x4.OED /CNG-4C/HE

Figure 28 – Model of OCEAN EURO CNG dispenser with hose extender (HE = hose extender)

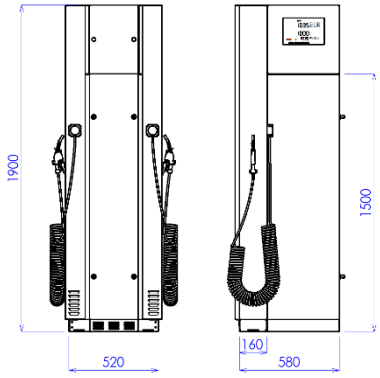
2.5.14. OCEAN SMART WSE DISPENSERS

OCEAN SMART 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.

List of standard OCEAN SMART WSE models:

 Model of dispenser	**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.OSL(R) /WSE	1	1	1	1	1	20
BMP4012.OSD /WSE	2	1	2	2	2	20

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/



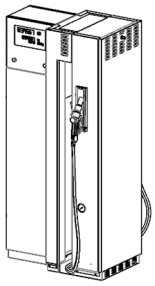
BMP4012.OED/WSE

Picture 29 - Standard model of OCEAN SMART WSE dispenser

2.5.15. OCEAN SMART CNG DISPENSERS

Dispensers for filling cars with compressed natural gas of the OCEAN SMART CNG series are standardly produced in single-sided left (L), single-sided right (R) or double-sided (D) versions with one to four free-hanging pressure filling hoses. The maximum filling capacity is 30 kg/min. with NGV1 filling nozzle for passenger cars or 70 kg/min. with NGV2 filling nozzle for filling trucks.

List of standard OCEAN SMART CNG stand models:

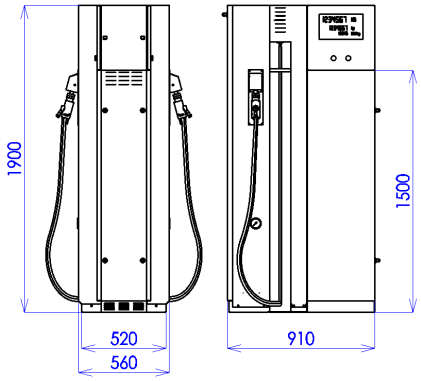


Model of dispenser	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of pressure inputs**	**Number of meters** *(number of measuring systems)*	**Number of filling hoses**	**Number of main displays** *(number of simultaneous deliveries)*	**Filling performance** *[kg/min]*
BMP40x1.OSL(R) /CNG	1	x	1	1	1	1x30
BMP40x1.OSL(R) /CNG/H	1	x	1	1	1	1x70
BMP40x2.OSD /CNG	2	x	2	2	2	2x30
BMP40x2.OSD /CNG/H	2	x	2	2	2	1x30+1x70
BMP40x2.OSD /CNG/H/H	2	x	2	2	2	2x70
BMP40x2.OSL(R) /CNG/H	1	x	1	2	1	1x30 + 1x70
BMP40x4.OSD /CNG/H/H	2	x	2	4	2	2x30 + 2x70

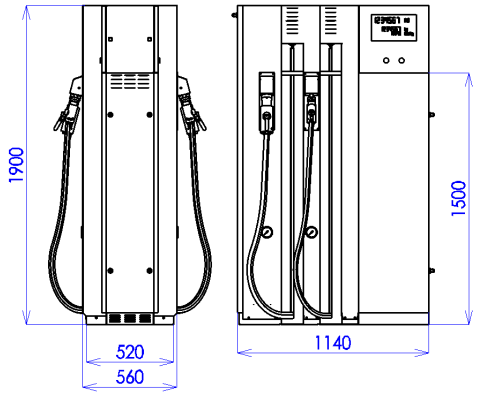
Notes: x… is the number of CNG inputs (CNG pressure tanks) x = 1, 2 or 3 depending on the station technology.

The filling capacity depends on the real conditions at the filling station - quality and length of piping, working pressure, volume and number of pressure tanks, compressor, length, and cross-section of filling piping in the vehicle, etc. The standard filling capacity is 30 kg/min. The filling hose output can be increased to 70 kg/min (/H). In the case of the /H /H marking, there are two filling hoses with a capacity of 70 kg/min in the dispenser.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/



BMP40x2.OSD /CNG, BMP40x2.OSD /CNG/H, BMP40x2.OSD /CNG/H/H



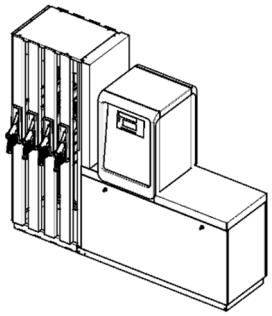
BMP40x4.OSD /CNG, BMP40x4.OSD /CNG/H, BMP40x4.OSD /CNG/H/H

Figure 30 – Overview of standard OCEAN SMART CNG models

2.5.16. OCEAN TOWER DISPENSERS

Multi-product OCEAN TOWER 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 dispensers are equipped with hose retractor system.

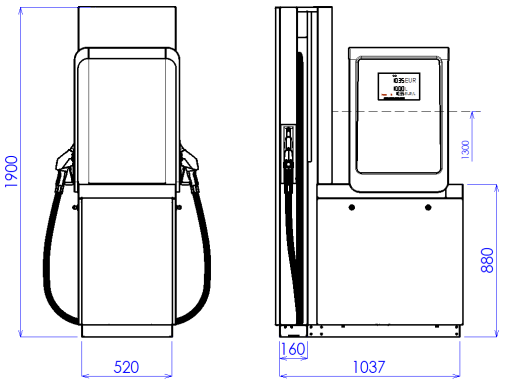
List of standard OCEAN TOWER models:



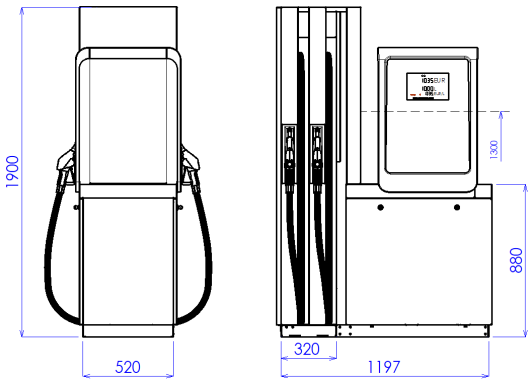
Dispenser model	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Total number of products** *(i.e., number of pumps or inputs)*	**Number of meters** *(i.e., number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(i.e., number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

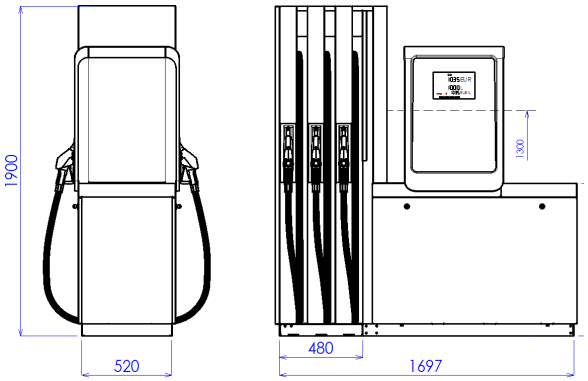
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



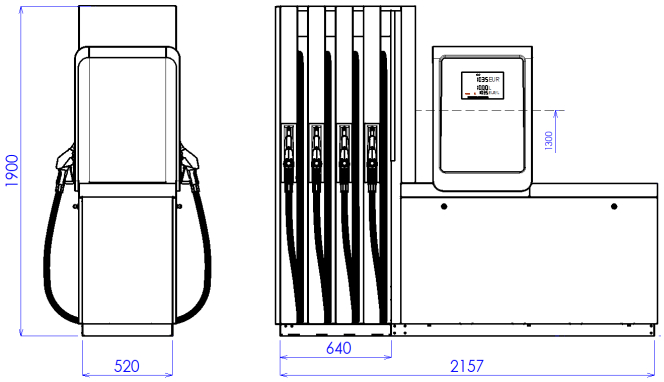
BMP4012.OWD



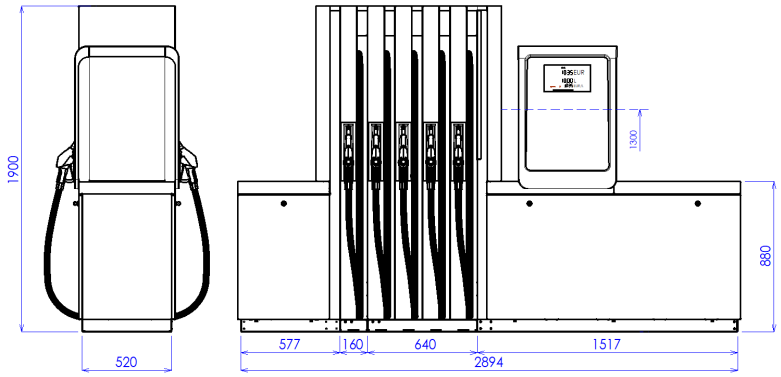
BMP4024.OWD



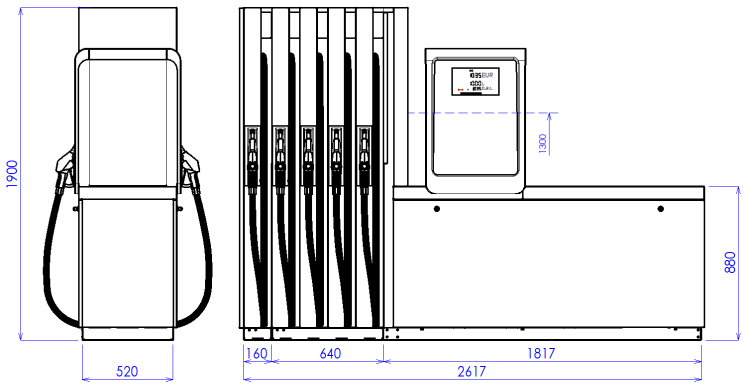
BMP4036.OWD



BMP4048.OWD



BMP40510.OWD (modular version)



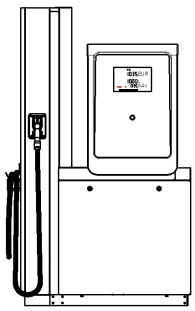
BMP40510.OWD (in-line version, 2021)

Figure 31 - Overview of standard OCEAN TOWER models

2.5.17. OCEAN TOWER LPG DISPENSERS

OCEAN TOWER LPG dispensers are produced only in the remote (pressure) version, i.e. without pump, in one-sided left (L), one-sided right (R) or double-sided (D) version with one to four dispensing hoses for dispensing LPG (liquefied propane-butane). The dispensing hoses are freely hung or equipped with a reel (see models marked "-HR") and are terminated by dispensing nozzles located from the front of the dispenser.

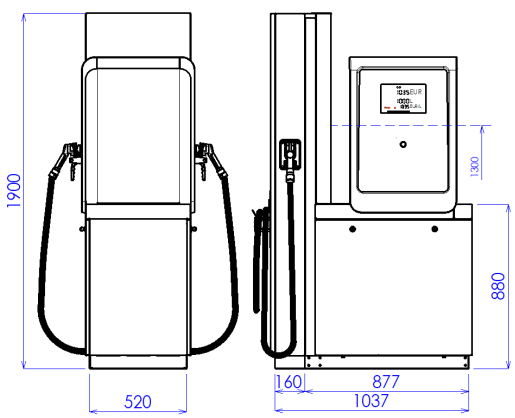
List of standard OCEAN TOWER LPG dispenser models:



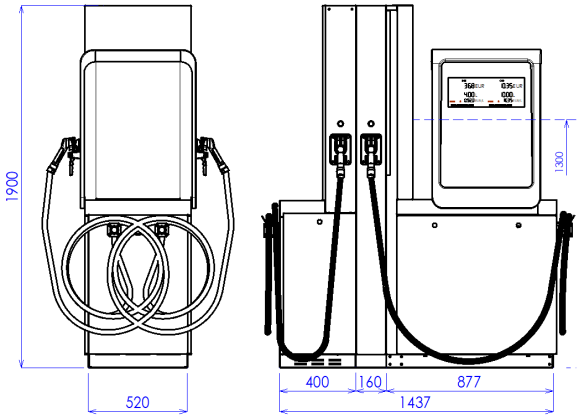
Model stojanu	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of pressure inputs**	**Number of meters** *(number of measuring systems)*	**Number of filling hoses**	**Number of main displays** *(number of simultaneous deliveries)*	**Filling performance** *[kg/min]*
BMP4011.OWL(R) /LPG	1	1	1	1	1	1x50
BMP4011.OWL(R) /LPG-HR	1	1	1	1	1	1x50
BMP4012.OWD /LPG	2	1	2	2	2	2x35
BMP4012.OWD /LPG-HR	2	1	2	2	2	2x35
BMP4022.OWD /LPG	2	2	2	2	2	2x50
BMP4022.OWD /LPG-HR	2	2	2	2	2	2x50
BMP4022.OWL(R) /LPG-2C	1	2	2	2	2	2x50
BMP4022.OWL(R) /LPG-2C-HR	1	2	2	2	2	2x50
BMP4034.OWD /LPG-4C	2	3	4	4	4	2x50 + 2x35
BMP4034.OWD /LPG-4C-HR	2	3	4	4	4	2x50 + 2x35

Notes: The filling performance depends on the conditions at the station (distance from the LPG pump, LPG pump pressure..., etc.). The standard filling capacity for models with one inlet, one hose (11) and two inlets, two hoses (22) is 50 L/min. For models with one inlet, two hoses (12), the output capacity is 35 L/min. Please note that exceeding the maximum operating pressure of 18 bar (0.18MPa) may result in higher filling capacity but also insufficient separation of the gaseous phase from the LPG fuel. As standard, LPG dispensers are equipped with DISH nozzle (nozzle connector) most used in Europe. At the customer's request, the dispenser can be equipped with ACME nozzle (Belgium, Germany, Ireland and Austria), BAYO or EURO (Spain, Portugal).

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

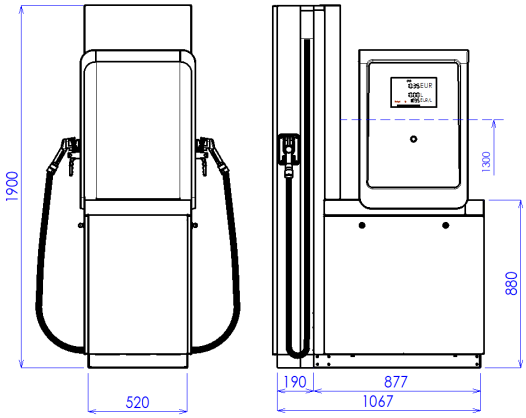


BMP4012.OWD/LPG
BMP4022.OWD/LPG
(two independent deliveries)

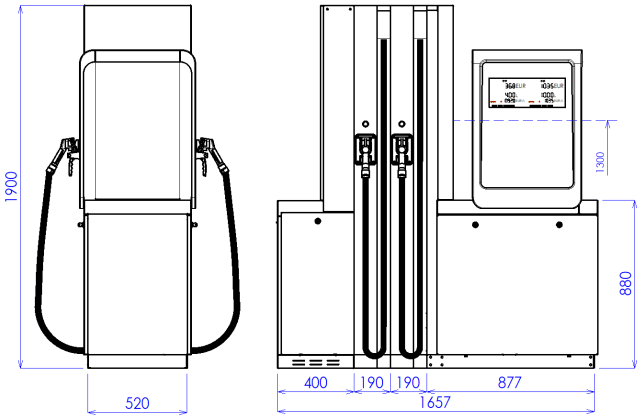


BMP4034.OWD/LPG-4C
(four independent deliveries)

Figure 32 – Overview of standard OCEAN TOWER LPG dispensers with free hanging hoses

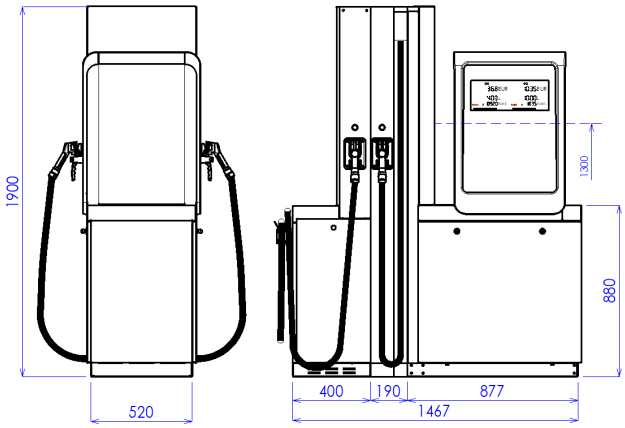


BMP4012.OWD/LPG-HR
BMP4022.OWD/LPG-HR
(two independent deliveries)



BMP4034.OWD/LPG-HR-4C
(four independent deliveries)

Figure 33 - Overview of standard OCEAN TOWER LPG dispensers with hose reels (-HR)



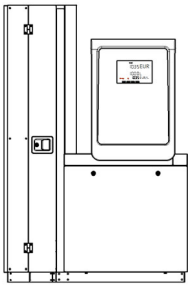
BMP4034.OWD/LPG-HR-4C (IT)
(four independent deliveries)

Picture 34 – Special model of the dispenser OCEAN TOWER LPG with two hose retractors and two free hanging hoses (for long distance nozzle reach)

2.5.18. OCEAN TOWER ADBLUE® DISPENSERS

OCEAN TOWER ADBLUE® dispensers are standardly produced in a remote (pressure) version, i.e. without pump, in one-sided left (L), one-sided right (R) or double-sided (D) version with one or two dispensing hoses for dispensing AdBlue® reducing agent (32.5% urea solution; AUS32). The hoses are wound in a dispenser. The maximum filling capacity is 40 L/min for trucks or 10L/min for personal cars.

List of standard OCEAN TOWER ADBLUE® models:

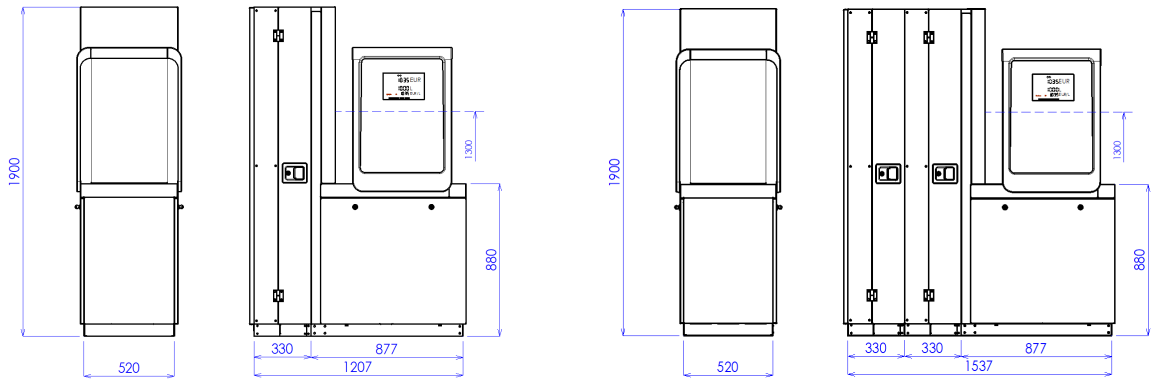


Model of dispenser	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of pressure inputs**	**Number of meters** *(number of measuring systems)*	**Number of filling hoses**	**Number of main displays** *(number of simultaneous deliveries)*	**Filling performance** *[kg/min]*
BMP4011.OWL(R) /AdB	1	1	1	1	1	40/10
BMP4012.OWD /AdB	2	1	2	2	2	40/10
BMP4022.OWL(R) /AdB	1	2	2	2	1	40/10
BMP4024.OWD /AdB	2	2	4	4	2	40/10

Notes: OCEAN TOWER ADBLUE® dispensers are equipped as standard with heating, which keeps the temperature of the hydraulic part at +10°C, see Figure 35. Dispensers without heating are designed for areas where the ambient temperature does not fall below -5 ° C all year round, see Figure 36. The dispenser can be supplemented with a pump and a storage tank for 250 L of medium.

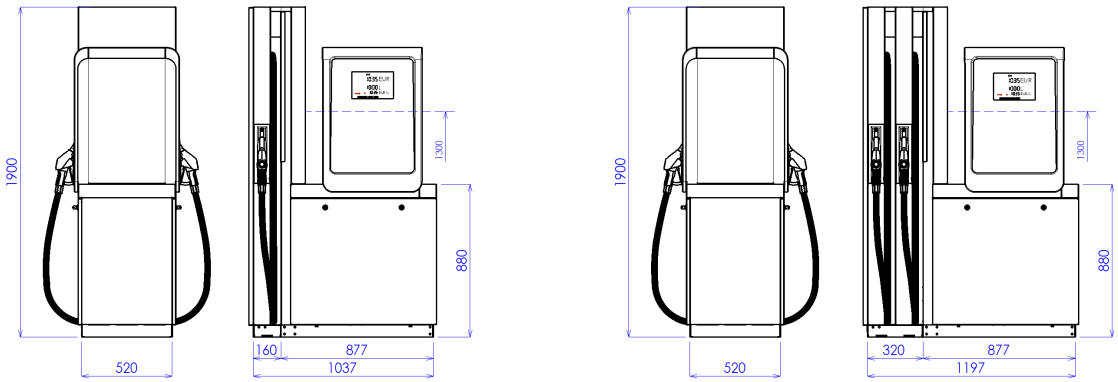
OCEAN TOWER ADBLUE® marked /Ex dispensers can be installed in zone 2 (according to EN 60079-10-1) generated by other fuel or LPG equipment

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



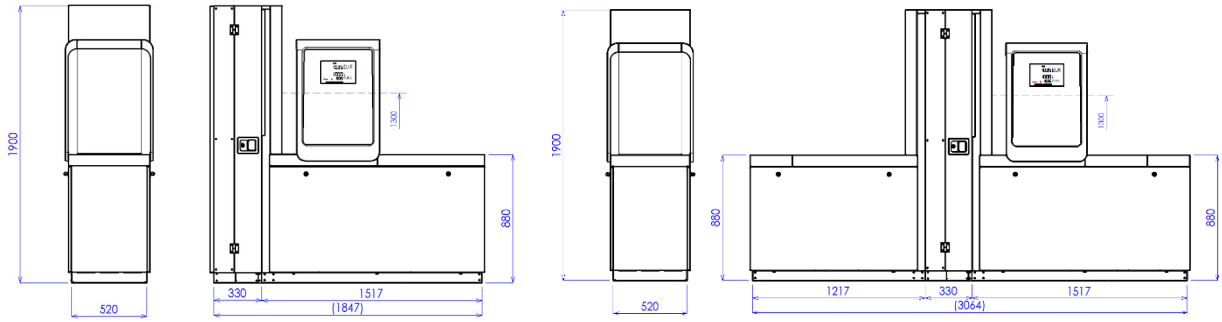
BMP4012.OWD/AdB *BMP4024.OWD/AdB*

Figure 35 – OCEAN TOWER ADBLUE® standard model with internal heating



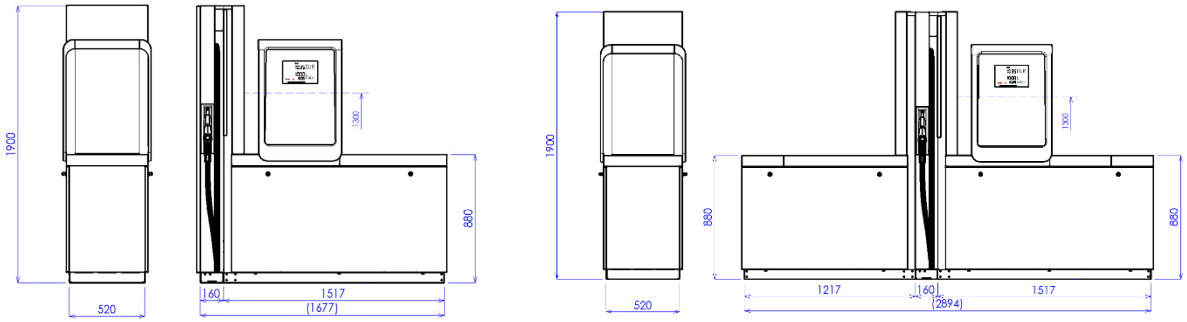
BMP4024.OWD/AdB/NoHeat *BMP4024.OWD/AdB/NoHeat*

Figure 36 - OCEAN TOWER ADBLUE® dispenser model without internal heating



BMP4012.OWD/AdB/T250 *BMP4024.OWD/AdB/T500*

Picture 37 - OCEAN TOWER ADBLUE® dispenser model with internal heating and storage tank 250L or 500L



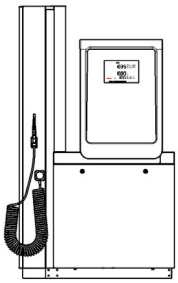
BMP4012.OWD/AdB/T250/NoHeat *BMP4024.OWD/AdB/T500/NoHeat*

Picture 38 - OCEAN TOWER ADBLUE® dispenser model without internal heating and storage tank 250L or 500L

2.5.19. OCEAN TOWER WSE DISPENSERS

OCEAN TOWER WSE dispensers are standardly produced in a remote (pressure) version, i.e. without pump, in one-sided left (L), one-sided right (R) or double-sided (D) version with one or two spiral dispensing hoses for dispensing windscreen washer liquid (abbreviation WSE - water + detergent/soap + ethanol). The maximum filling capacity of the dispensing hoses is 20 L/min.

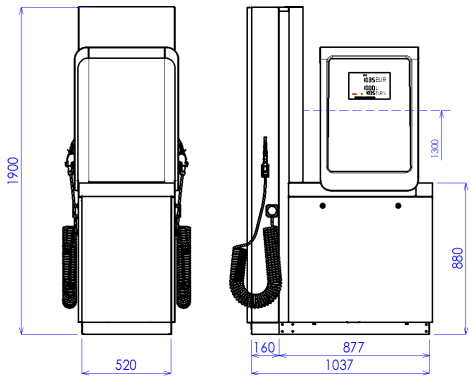
List of standard OCEAN TOWER WSE stand models:



Model of dispenser	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of pressure inputs**	**Number of meters** *(number of measuring systems)*	**Number of filling hoses**	**Number of main displays** *(number of simultaneous deliveries)*	**Filling performance** *[kg/min]*
BMP4011.OWL(R) /WSE	1	1	1	1	1	20
BMP4012.OED /WSE	2	1	2	2	2	20

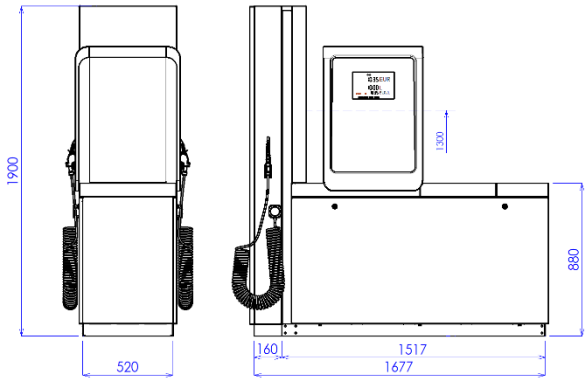
Note: The standard OCEAN TOWER WSE dispenser can be equipped with a suction pump and storage 250L storage tank.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

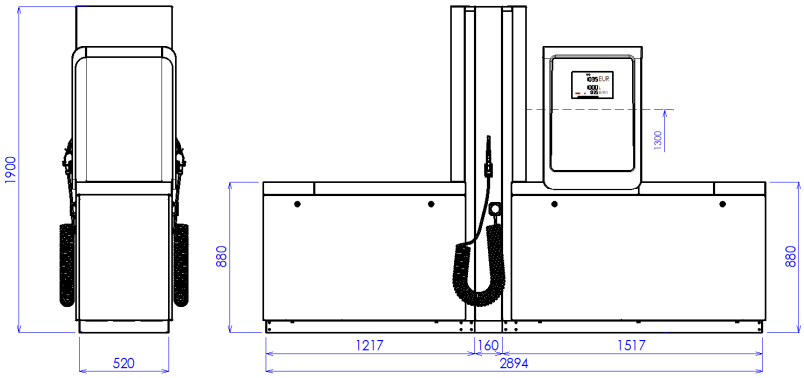


BMP4012.OED/WSE

Figure 39 - OCEAN TOWER WSE standard model



BMP4012.OWD/AdB/T250



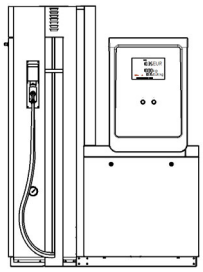
BMP4024.OWD/AdB/T500

Picture 40 – OCEAN TOWER WSE special models of dispenser with suction pump and storage tank 250L or 500L

2.5.20. OCEAN TOWER CNG DISPENSERS

The OCEAN TOWER CNG series dispensers for filling cars with compressed natural gas are standardly produced in single-sided left (L), single-sided right (R) or double-sided (D) versions with one to four free-hanging pressure filling hoses. The maximum filling capacity is 30 kg/min. with NGV1 filling nozzle for passenger cars or 70 kg/min. with NGV2 filling nozzle for filling trucks & buses.

List of standard OCEAN TOWER CNG stand models:

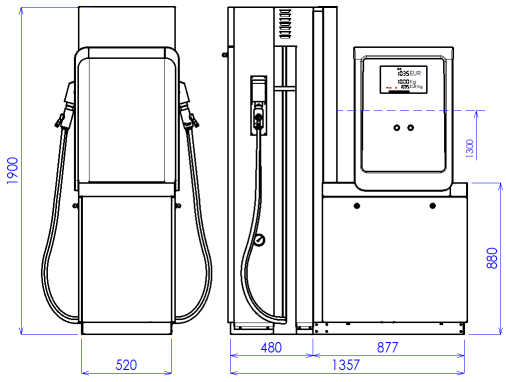


Model of dispenser	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Number of pressure inputs** *(number of pressure tanks)*	**Number of meters** *(number of measuring systems)*	**Number of filling hoses**	**Number of main displays** *(number of simultaneous deliveries)*	**Filling performance** *[kg/min]*
BMP40x1.OWL(R) /CNG	1	x	1	1	1	1x30
BMP40x1.OWL(R) /CNG/H	1	x	1	1	1	1x70
BMP40x2.OWD /CNG	2	x	2	2	2	2x30
BMP40x2.OWD /CNG/H	2	x	2	2	2	1x30+1x70
BMP40x2.OWD /CNG/H/H	2	x	2	2	2	2x70
BMP40x2.OWL(R) /CNG/H	1	x	1	2	1	1x30 + 1x70
BMP40x4.OWD /CNG/H/H	2	x	2	4	2	2x30 + 2x70
BMP40x4.OWD /CNG4C-HE	2	x	4	4	4	4x30

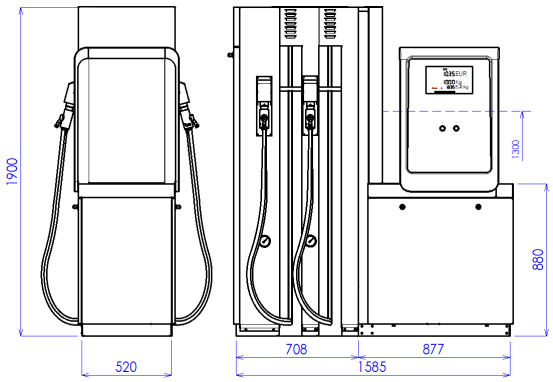
Notes: x… is the number of CNG inputs (CNG pressure tanks) x = 1, 2 or 3 depending on the station technology.

The filling capacity depends on the real conditions at the filling station - quality and length of piping, working pressure, volume and number of pressure tanks, compressor, length, and cross-section of filling piping in the vehicle, etc. The standard filling capacity of the hose is 30 kg/min. The filling hose output can be increased to 70 kg/min (/ H). In the case of the /H /H marking, there are two filling hoses with a capacity of 70 kg/min in the dispenser.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

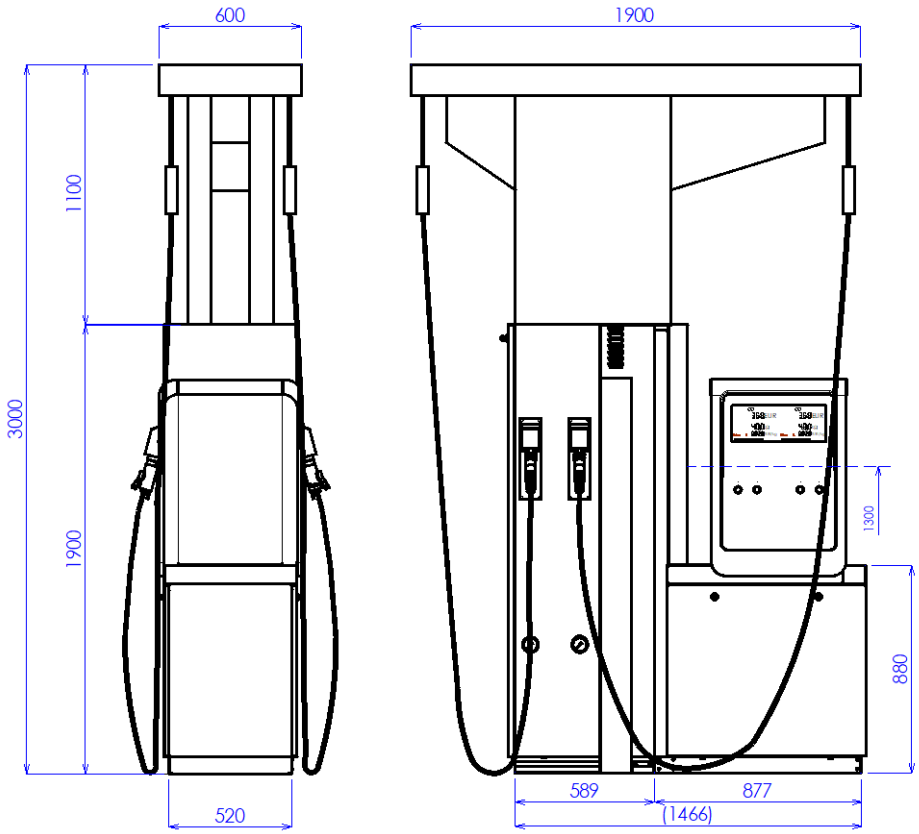


BMP40x2.OWD /CNG



BMP40x4.OWD /CNG

Picture 41 – OCEAN TOWER CNG standard models



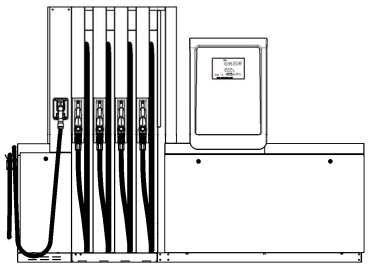
BMP4024.OWD /CNG-4C--HE

Picture 42 – OCEAN TOWER CNG dispenser with four independent dispensing hoses NGV1 and hose extender (-HE)

2.5.21. COMBINED OCEAN TOWER DISPENSERS WITH LPG MODULE

OCEAN TOWER combined dispensers with an LPG module consist of a basic dispenser for liquid fuels of the OCEAN TOWER series and an additional LPG dispensing module. Combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one to eight fuel dispensing hoses wound in the dispenser and one or two free-hanging LPG dispensing hoses or LPG hoses with hose reel (-HR).

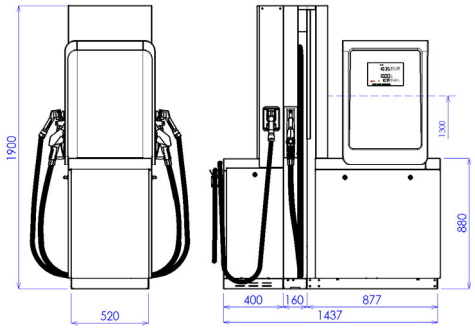
List of combined dispenser models:



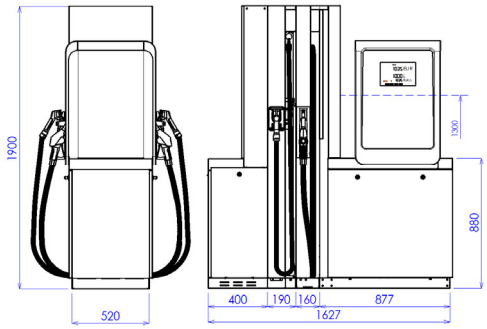
Combined fuel dispenser	+ LPG dispensing module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main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

Notes: Standard output of fuel hoses (petrol, diesel…) is 40L/min., Standard output of LPG hoses for single-sided design is 50 L/min., for double-sided design 35 L/min. Models marked -2C and -4C can simultaneously fill LPG and one of the liquid fuels (petrol, diesel…). The output of diesel hoses can be increased to 80 L/min (/ H) or 120-150 L / min (/ UH).

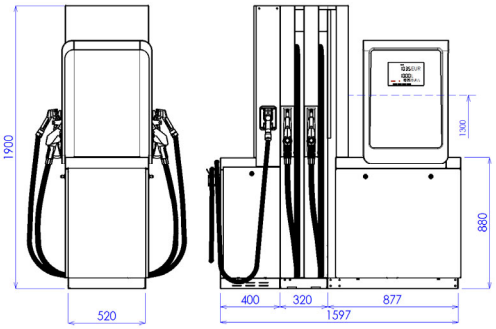
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



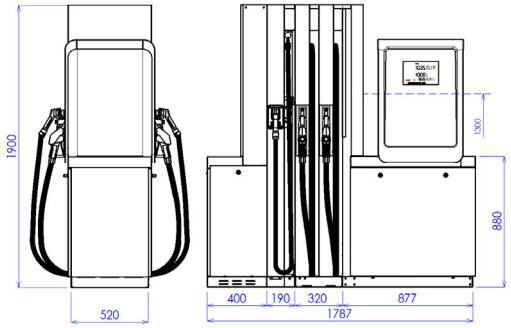
BMP4012.OWD+MOD4012.OWD/LPG



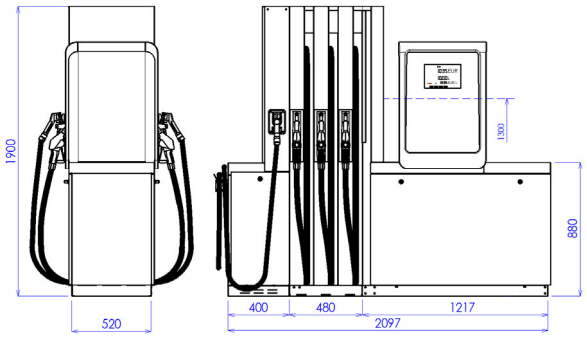
BMP4012.OWD+MOD4012.OWD/LPG-HR



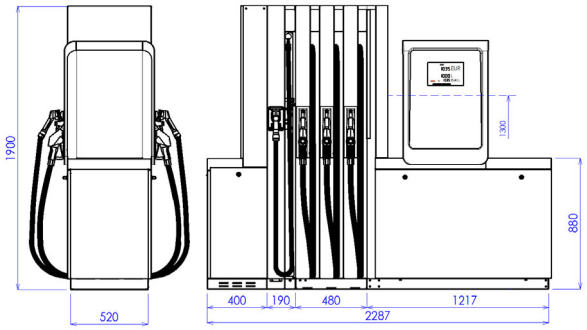
BMP4024.OWD+MOD4012.OWD/LPG



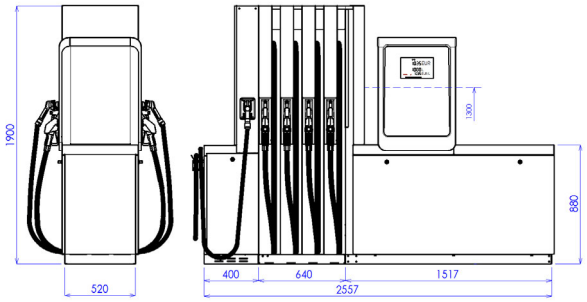
BMP4024.OWD+MOD4012.OWD/LPG-HR



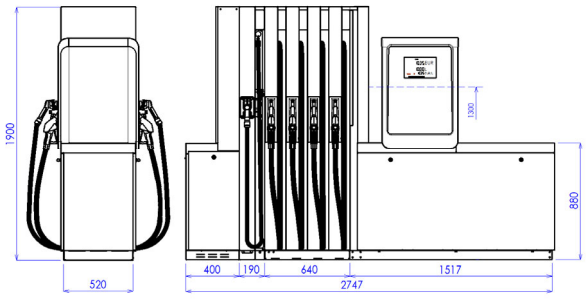
BMP4036.OWD+MOD4012.OWD/LPG



BMP4036.OWD+MOD4012.OWD/LPG-HR



BMP4048.OWD+MOD4012.OWD/LPG



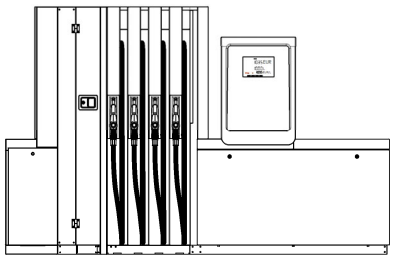
BMP4048.OWD+MOD4012.OWD/LPG-HR

Figure 43 – Overview of standard OCEAN TOWER COMBI LPG dispensers with and without reel of LPG hoses (-HR)

2.5.22. COMBINED OCEAN TOWER DISPENSERS WITH ADBLUE® MODULE

The combined OCEAN TOWER dispensers with the AdBlue® module consist of the basic dispenser for liquid fuels of the OCEAN TOWER series and the additional dispensing module AdBlue®. The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one to eight fuel dispensing hoses wound in dispenser and one or two AdBlue® dispensing hoses wound in the heated add-on module.

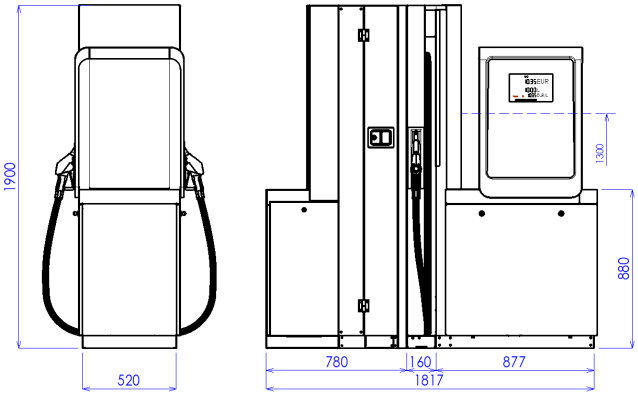
List of standard dispenser models:



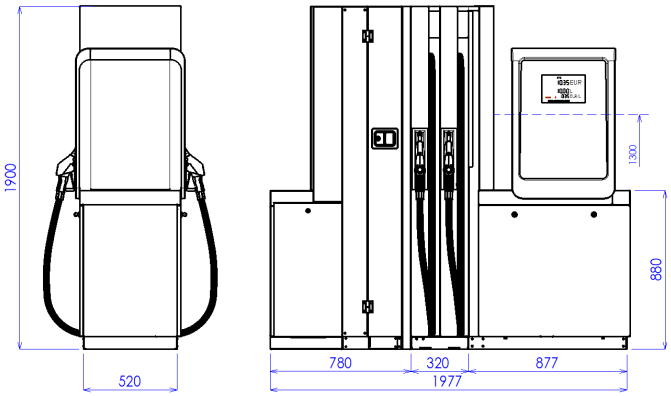
Combined fuel dispenser	+ AdBlue module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(number of simultaneous deliveries)*
BMP4011.OWL(R)	**+ MOD4011.OWL(R)/AdB**	1	2	2	1+1	1
BMP4011.OWL(R)-2C	**+ MOD4011.OWL(R)/AdB**	1	2	2	1+1	2
BMP4012.OWD	**+ MOD4012.OWD /AdB**	2	2	4	2+2	2
BMP4012.OWD -4C	**+ MOD4012.OWD /AdB**	2	2	4	2+2	4
BMP4022.OWL(R)	**+ MOD4011.OWL(R) /AdB**	1	3	3	1+1	1
BMP4022.OWL(R) -2C	**+ MOD4011.OWL(R) /AdB**	1	3	3	2+1	2
BMP4024.OWD	**+ MOD4012.OWD /AdB**	2	3	6	4+2	2
BMP4024.OWD -4C	**+ MOD4012.OWD /AdB**	2	3	6	4+2	4
BMP4033.OWL(R)	**+ MOD4011.OWL(R) /AdB**	1	4	4	3+1	1
BMP4033.OWL(R) -2C	**+ MOD4011.OWL(R) /AdB**	1	4	4	3+1	2
BMP4036.OWD	**+ MOD4012.OWD /AdB**	2	4	8	6+2	2
BMP4036.OWD -4C	**+ MOD4012.OWD /AdB**	2	4	8	6+2	4
BMP4044.OWL(R)	**+ MOD4011.OWL(R) /AdB**	1	5	5	4+1	1
BMP4044.OWL(R) -2C	**+ MOD4011.OWL(R) /AdB**	1	5	5	4+1	2
BMP4048.OWD	**+ MOD4012.OWD /AdB**	2	5	10	8+2	2
BMP4048.OWD -4C	**+ MOD4012.OWD /AdB**	2	5	10	8+2	4

Notes: Standard output of fuel hoses (petrol, diesel…) is 40 L/min., standard output of AdBlue hoses is 40L/min. for filling into trucks or 10 L/min. for filling into passenger cars. Models marked -2C and -4C can simultaneously fill AdBlue® and one of the liquid fuels (petrol, diesel….). The output of the diesel hoses can be increased to 80 L/min (mark /H) or 120 to 150 L/min (mark /UH). ADBLUE® modules are equipped as standard with heating, which keeps the temperature of the hydraulic part at +10°C. AdBlue modules without heating are designed for areas where the ambient temperature does not fall below -5 ° C all year round. The filling module AdBlue can be equipped with AdBlue suction pump and a storage tank for 250 L of medium.

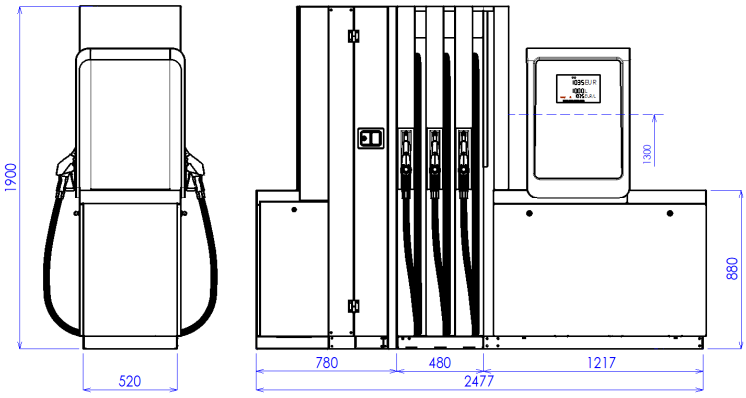
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



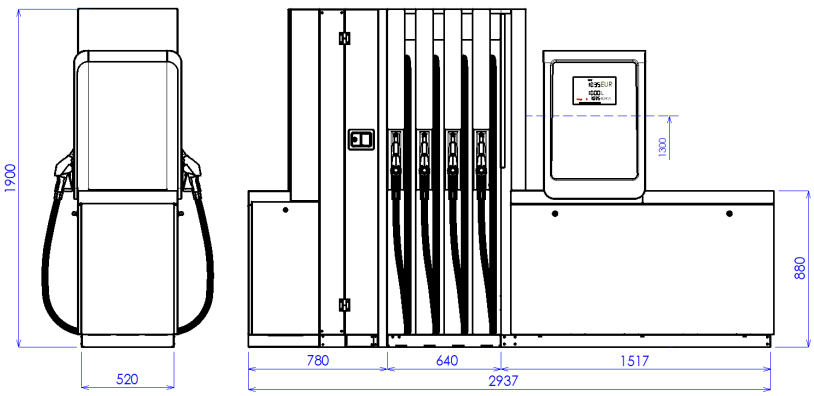
BMP4012.OWD+MOD4012.OWD/AdB



BMP4024.OWD+MOD4012.OWD/AdB

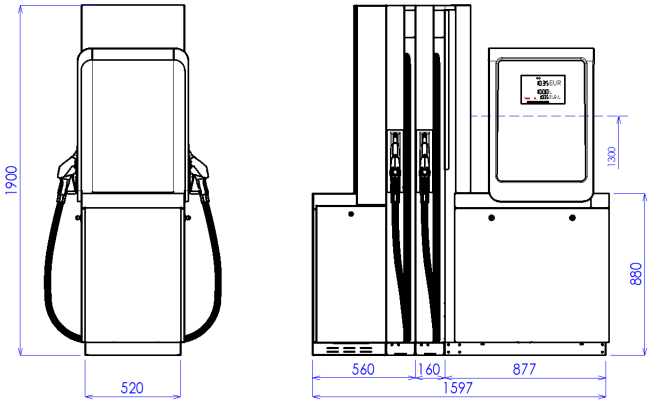


BMP4036.OWD+MOD4012.OWD/AdB

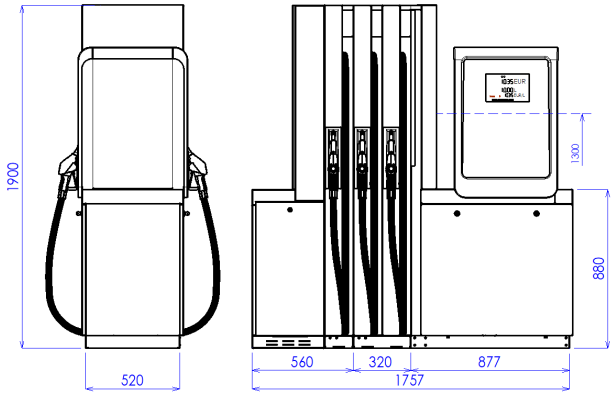


<---------- *BMP4048.OWD+MOD4012.OWD/AdB* <----------

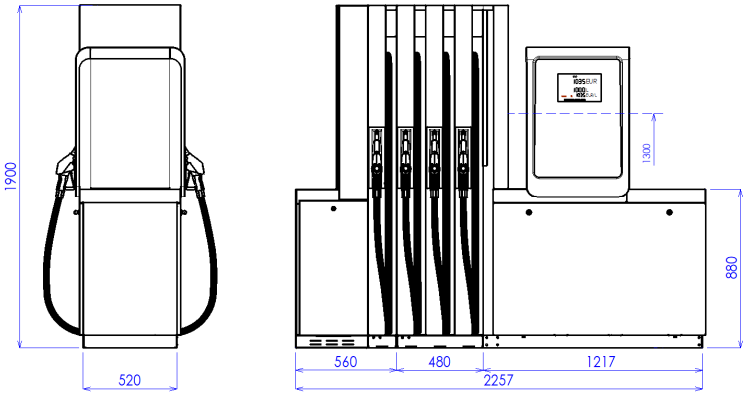
Figure 44 – Overview of standard OCEAN TOWER COMBI ADB dispensers with heating of the AdBlue module



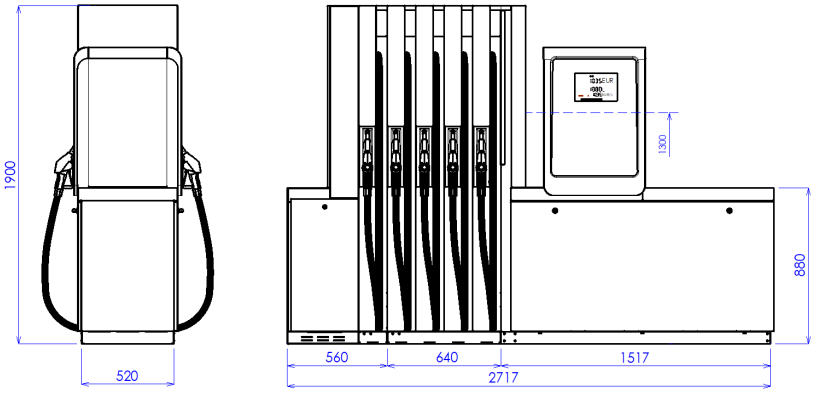
BMP4012.OWD+MOD4012.OWD/AdB/NoHeat



BMP4024.OWD+MOD4012.OWD/AdB/NoHeat



BMP4036.OWD+MOD4012.OWD/AdB/NoHeat



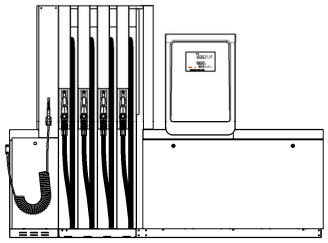
<---------- BMP4048.OWD+MOD4012.OWD/AdB/NoHeat <----------

Figure 45 – Overview of OCEAN TOWER COMBI ADB dispensers with AdBlue module without heating (for temperatures from 0°C to 40°C).

2.5.23. COMBINED OCEAN TOWER DISPENSERS WITH WSE MODULE

The combined OCEAN TOWER dispensers with the WSE module consist of the basic dispenser for liquid fuels of the OCEAN TOWER series and an additional dispensing module for filling windscreen washer liquids (WSE). The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one to eight fuel dispensing hoses wound in the dispenser and one or two free-hanging spiral WSE dispensing hoses.

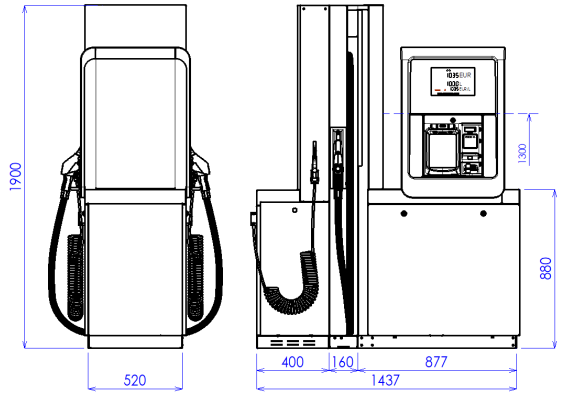
List of standard models:



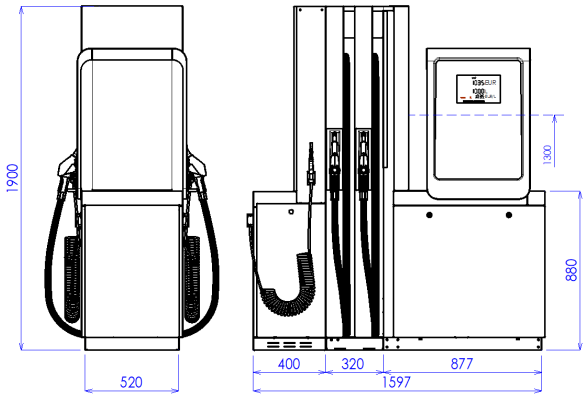
Combined fuel dispenser	+ WSE dispensing module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main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

Notes: The standard filling capacity of fuel hoses (petrol, diesel…) is 40 L/min., the standard filling capacity of hoses for dispensing WSE liquid is 20 L/min. Models marked -2C and -4C can simultaneously fill windshield washer fluid and one of the liquid fuels (petrol, diesel…). The output of the diesel hoses can be increased to 80 L/min (/H) or 120 to 150 L/min (/UH).

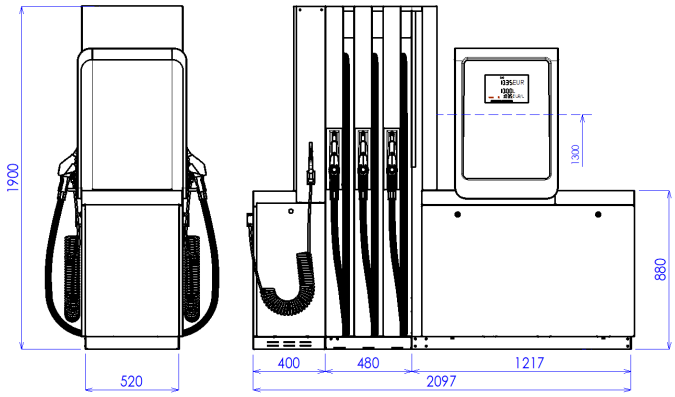
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



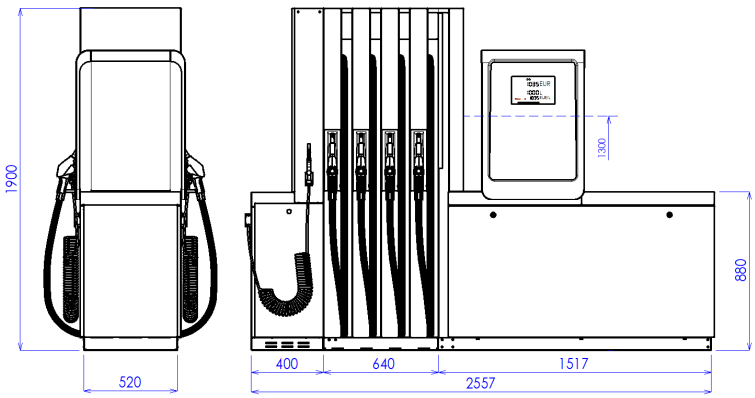
BMP4012.OWD+MOD4012.OWD/WSE



BMP4024.OWD+MOD4012.OWD/WSE



BMP4036.OWD+MOD4012.OWD/WSE



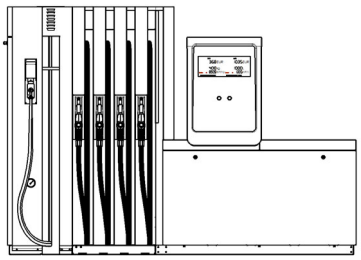
BMP4048.OWD+MOD4012.OWD/WSE

Figure 46 – Overview of OCEAN TOWER COMBI WSE dispensers

2.5.24. COMBINED OCEAN TOWER DISPENSERS WITH CNG MODULE

OCEAN TOWER combined dispensers with a CNG module consist of a basic dispenser for liquid fuels of the OCEAN TOWER series and an additional dispensing module for the filling of compressed natural gas (CNG). The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one to eight fuel dispensing hoses wound in the dispenser and from one or four free-hanging CNG dispensing hoses.

List of standard dispenser models:

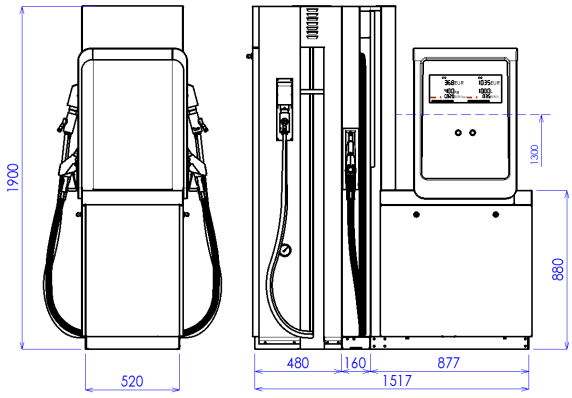


Combined fuel dispenser	+ CNG filling module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(number of simultaneous deliveries)*
BMP4011.OWL(R)	**+ MOD40x1.OWL(R)/CNG**	1	2	2	1+1	2
BMP4012.OWD	**+ MOD40x2.OWD /CNG**	2	2	4	2+2	4
BMP4022.OWL(R)	**+ MOD40x1.OWL(R) /CNG**	1	3	3	1+1	2
BMP4024.OWD	**+ MOD40x2.OWD /CNG**	2	3	6	4+2	4
BMP4033.OWL(R)	**+ MOD40x1.OWL(R) /CNG**	1	4	4	3+1	2
BMP4036.OWD	**+ MOD40x2.OWD /CNG**	2	4	8	6+2	4
BMP4044.OWL(R)	**+ MOD40x1.OWL(R) /CNG**	1	5	5	4+1	2
BMP4048.OWD	**+ MOD40x2.OWD /CNG**	2	5	10	8+2	4

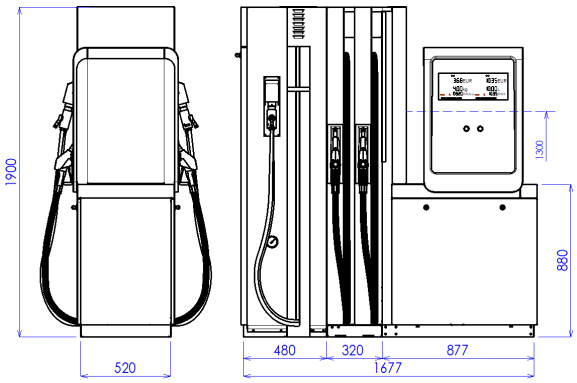
Notes: The standard filling capacity of fuel hoses (petrol, diesel…) is 40 L/min., the standard filling capacity of hoses for the delivery of compressed natural gas is 30 kg/min. All models can simultaneously fill CNG and one of the liquid fuels (petrol, diesel…). The output of the diesel hoses can be increased to 80 L/min (/H) or 120 to 150 L/min (/UH). The output of CNG hoses can be increased to 70 kg/min (/H).

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

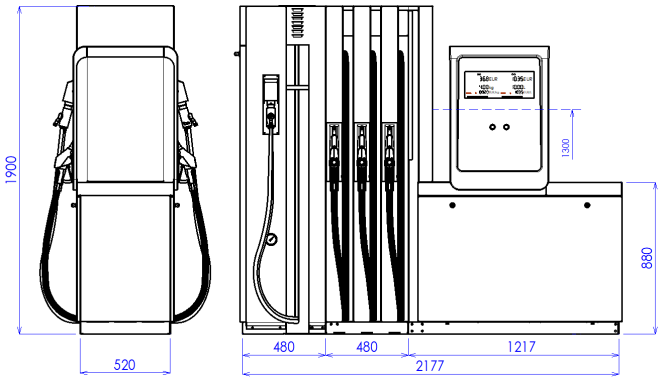
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



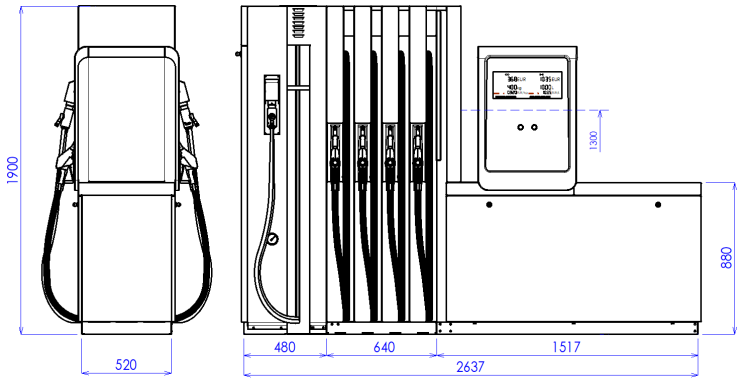
BMP4012.OWD+MOD40x2.OWD/CNG



BMP4024.OWD+MOD40x2.OWD/CNG

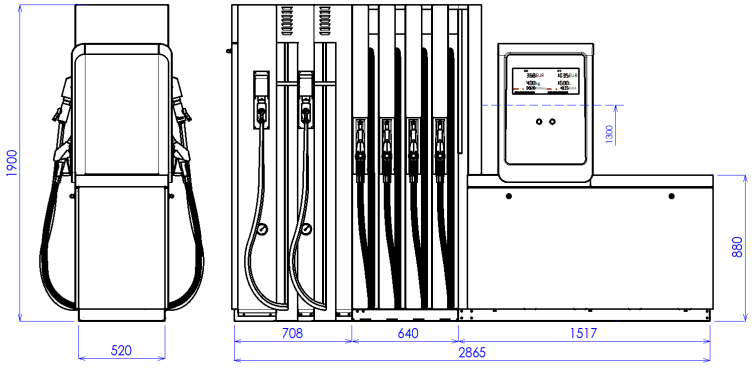


BMP4036.OWD+MOD40x2.OWD/CNG



BMP4048.OWD+MOD40x2.OWD/CNG

Figure 47 – Overview of OCEAN TOWER COMBI CNG dispensers, x=1,2,3 is the number of the CNG pressure inputs



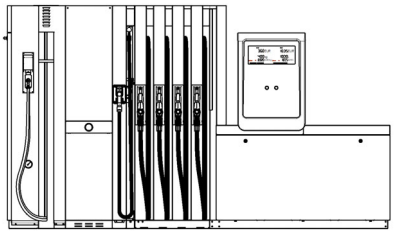
BMP4048.OWD+MOD40x4.OWD/CNG/H/H

Figure 48 – Example of the OCEAN TOWER COMBI CNG model with four CNG filling hoses for standard and high flow (/H)

2.5.25. COMBINED OCEAN TOWER DISPENSERS WITH LPG AND CNG MODULES

OCEAN TOWER combined dispensers with additional LPG and CNG modules consist of the basic dispenser for liquid fuels of the OCEAN TOWER series and additional dispensing modules for the dispensing of liquefied propane butane (LPG) and compressed natural gas (CNG). The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one to eight fuel dispensing hoses wound in the dispenser, one or two LPG dispensing hoses wound in the module and one or two free-hanging CNG filling hoses.

List of standard models:

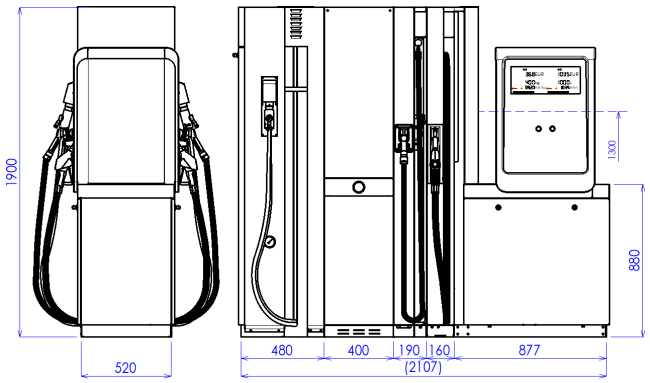


Combined fuel dispenser	+ LPG module	+ CNG module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of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

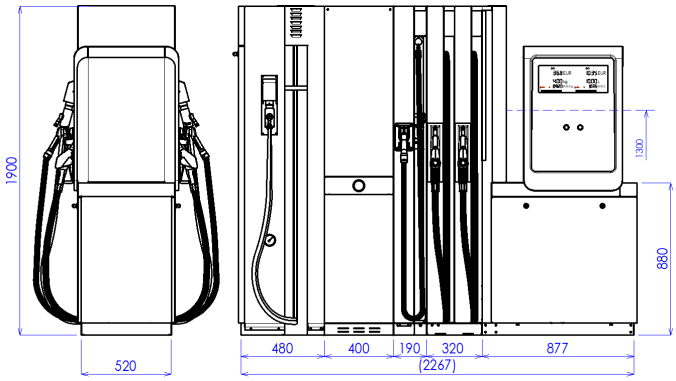
Notes: Standard filling capacity of fuel hoses (petrol, diesel…) is 40 L/min., standard filling capacity of LPG hoses is 50 L/min for single-sided dispensers and 35 L/min for double-sided dispensers, standard filling capacity of hoses for compressed natural gas dispensing is 30 kg/min. All models can simultaneously fill CNG and one of the liquid fuels (petrol, diesel, LPG…). 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 inlets (CNG pressure tanks) x = 1,2 or 3

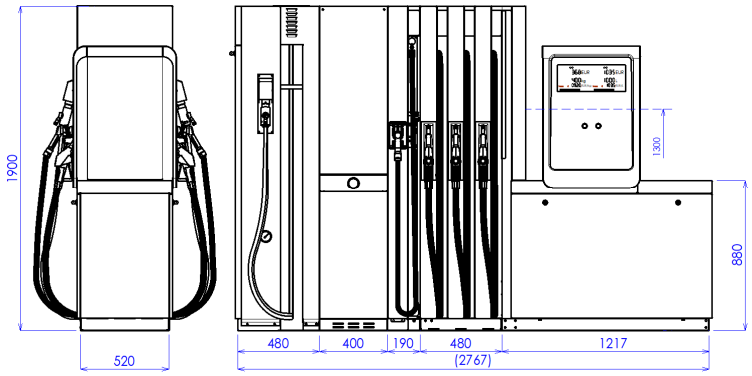
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



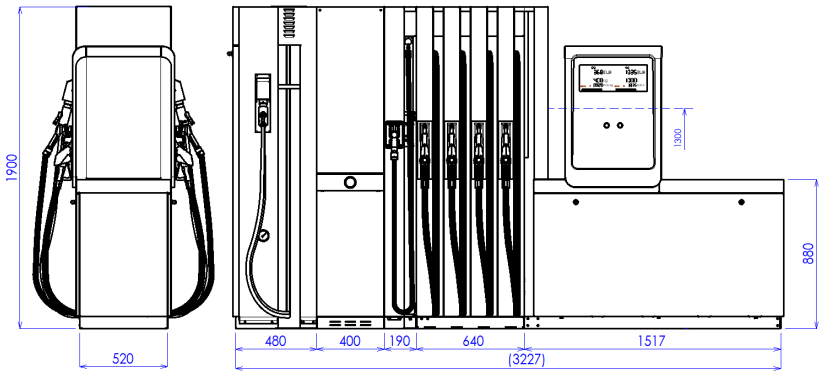
BMP4012.OWD+MOD4012.OWD/LPG+MOD40x2.OWD/CNG



BMP4024.OWD+MOD4012.OWD/LPG+MOD40x2.OWD/CNG



BMP4036.OWD+MOD4012.OWD/LPG+MOD40x2.OWD/CNG



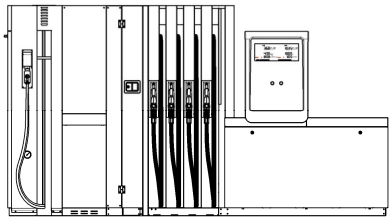
BMP4048.OWD+MOD4012.OWD/LPG+MOD40x2.OWD/CNG

Figure 49 -Overview of OCEAN TOWER COMBI LPG&CNG dispensers, x=1,2,3 is number of CNG pressure inlets

2.5.26. COMBINED OCEAN TOWER DISPENSERS WITH ADBLUE® AND CNG MODULES

OCEAN TOWER combined dispensers with additional AdBlue® and CNG modules consist of the basic dispenser for liquid fuels of the OCEAN TOWER series and additional dispensing modules for the dispensing of AdBlue® and compressed natural gas (CNG). The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one to eight fuel dispensing hoses wound in the dispenser, one or two AdBlue® dispensing hoses wound in the module and one or two free-hanging CNG filling hoses.

List of standard models:

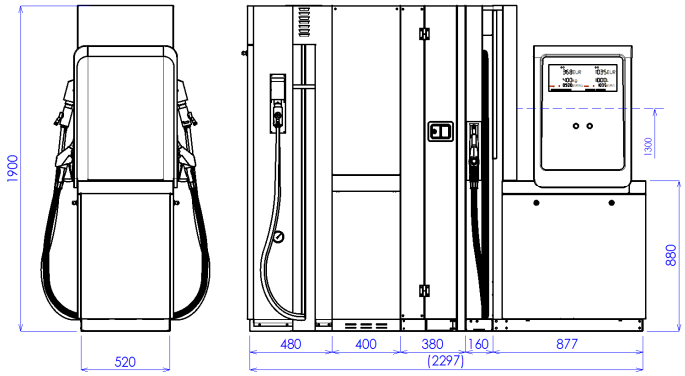


Combined fuel dispenser	+ AdBlue® module	+ CNG module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(number of simultaneous deliveries)*
BMP4011.OWL(R)	**+ MOD4011.OWL(R)/AdB**	**+ MOD40x1.OWL(R)/CNG**	1	3	3	1+1+1	2
BMP4012.OWD	**+ MOD4012.OWD /AdB**	**+ MOD40x2.OWD /CNG**	2	3	6	2+2+2	4
BMP4022.OWL(R)	**+ MOD4011.OWL(R) / AdB**	**+ MOD40x1.OWL(R) /CNG**	1	4	4	2+1+1	2
BMP4024.OWD	**+ MOD4012.OWD / AdB**	**+ MOD40x2.OWD /CNG**	2	4	8	4+2+2	4
BMP4033.OWL(R)	**+ MOD4011.OWL(R) / AdB**	**+ MOD40x1.OWL(R) /CNG**	1	5	5	3+1+1	2
BMP4036.OWD	**+ MOD4012.OWD / AdB**	**+ MOD40x2.OWD /CNG**	2	5	10	6+2+2	4
BMP4044.OWL(R)	**+ MOD4011.OWL(R) / AdB**	**+ MOD40x1.OWL(R) /CNG**	1	6	6	4+1+1	2
BMP4048.OWD	**+ MOD4012.OWD / AdB**	**+ MOD40x2.OWD /CNG**	2	6	12	8+2+2	4

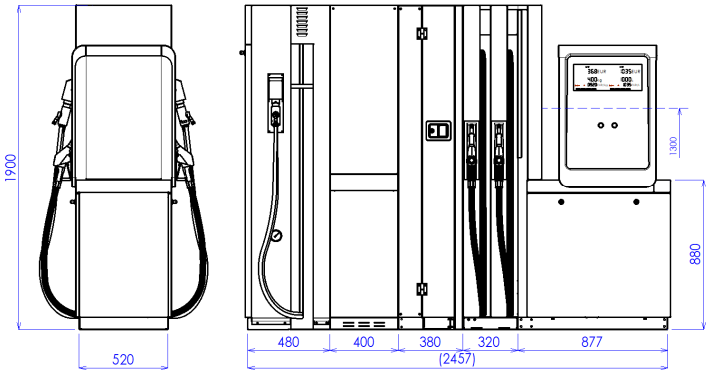
Notes: Standard filling capacity of fuel hoses (petrol, diesel…) is 40 L/min., standard output of AdBlue hoses is 40L/min. for filling into trucks or 10 L/min. for filling into passenger cars., standard filling capacity of hoses for compressed natural gas dispensing is 30 kg/min. All models can simultaneously fill CNG and one of the liquid fuels (petrol, diesel, LPG…). 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 inlets (CNG pressure tanks) x = 1,2 or 3

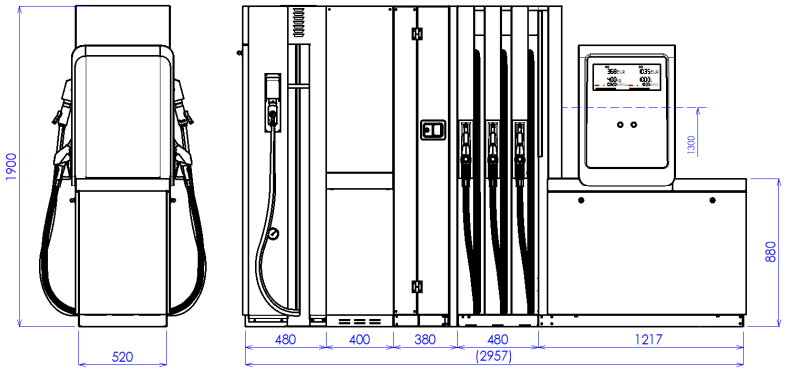
Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



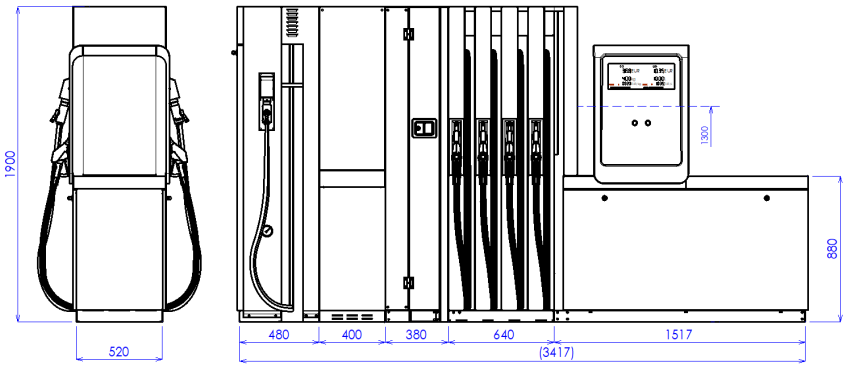
BMP4012.OWD+MOD4012.OWD/AdB+MOD40x2.OWD/CNG



BMP4024.OWD+MOD4012.OWD/AdB+MOD40x2.OWD/CNG



BMP4036.OWD+MOD4012.OWD/AdB+MOD40x2.OWD/CNG



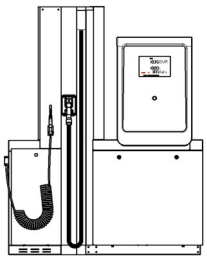
BMP4048.OWD+MOD4012.OWD/AdB+MOD40x2.OWD/CNG

Figure 50 -Overview of OCEAN TOWER COMBI AdB&CNG dispensers, x=1,2,3 is number of CNG pressure inlets

2.5.27. COMBINED OCEAN TOWER LPG DISPENSERS WITH WSE MODULE

The combined OCEAN TOWER LPG dispensers with the WSE module consist of a basic dispenser for dispensing liquefied propane butane of the OCEAN TOWER LPG series and an additional dispensing module for dispensing liquid for car windscreen washers (WSE). The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one or two LPG dispensing hoses wound in the dispensers and one to two free-hanging WSE dispensing spiral hoses.

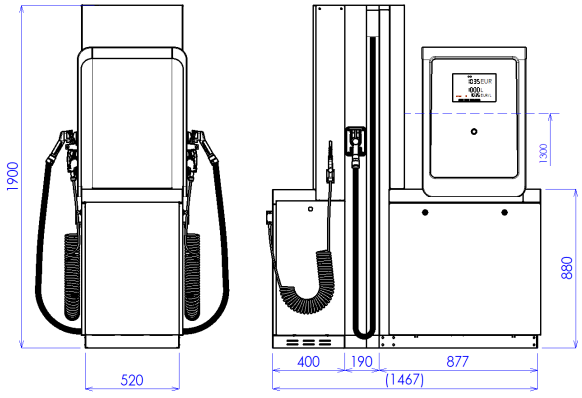
List of standard models of combined dispensers:



Combined LPG dispenser	+ WSE 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.OWL(R)/LPG	**+ MOD4011.OWL(R)/WSE**	1	2	2	1+1	1
BMP4011.OWL(R)/LPG-2C	**+ MOD4011.OWL(R)/WSE**	1	2	2	1+1	2
BMP4012.OWD/LPG	**+ MOD4012.OWD /WSE**	2	2	4	2+2	2
BMP4012.OWD/LPG4C	**+ MOD4012.OWD /WSE**	2	2	4	2+2	4

Notes: The standard filling capacity of LPG hoses (petrol, diesel…) is 35 L/min. for a double-sided dispenser and 50 L/min for a single-sided dispenser. The standard filling capacity of the hoses for WSE liquid dispensing is approx. 10 L/min. Models marked -2C and -4C can simultaneously fill windshield washer fluid and LPG.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

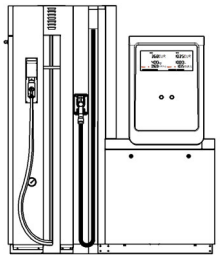


BMP4012.OWD/LPG+MOD4012.OWD/WSE

Figure 51 -Overview of OCEAN TOWER COMBI LPG dispenser with WSE module

2.5.28. COMBINED OCEAN TOWER LPG DISPENSERS WITH CNG MODULE

The combined OCEAN TOWER LPG dispensers with the CNG module consist of a basic dispenser for dispensing liquefied propane butane of the OCEAN TOWER LPG series and an additional dispensing module for filling compressed natural gas (CNG). The combined dispensers are available in single-sided left (L), single-sided right (R) and double-sided (D) versions with one or two LPG dispensing hoses wound in the dispenser and one to four free-hanging CNG dispensing hoses. List of standard models:

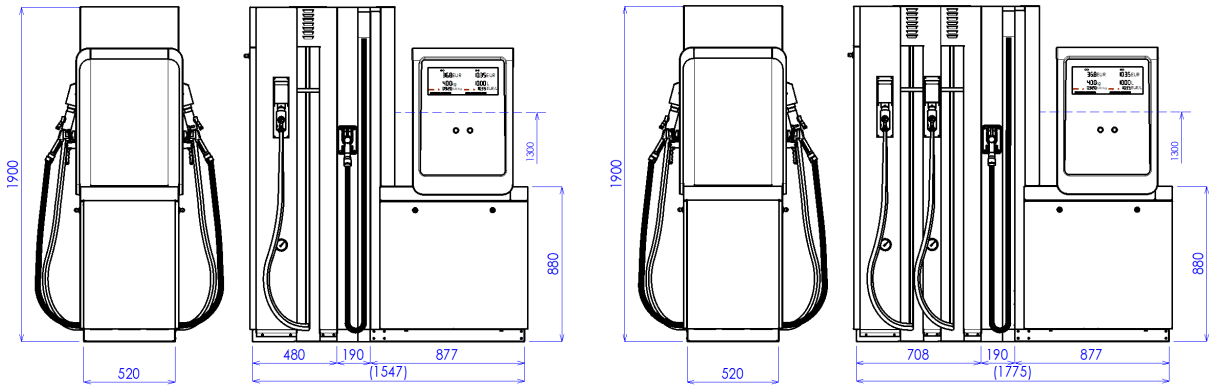


Combined LPG dispenser	+ CNG module	**Access to dispenser** *(2-double-sided, 1-single-sided)*	**Total number of products** *(number of pumps or inputs)*	**Total number of meters** *(number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(number of simultaneous deliveries)*
BMP4011.OWL(R)/LPG	**+ MOD40x1.OWL(R)/CNG**	1	2	2	1+1	2
BMP4011.OWL(R)/LPG	**+ MOD40x2.OWL(R)/CNG**	1	2	2	1+2	2
BMP4012.OWD/LPG	**+ MOD40x2.OWD /CNG**	2	2	4	2+2	4
BMP4012.OWD/LPG	**+ MOD40x4.OWD /CNG**	2	2	4	2+4	4

<u>Notes:</u> The standard filling capacity of LPG hoses is 35 L/min. for a double-sided and 50 L/min for a single-sided dispenser. The standard filling capacity of the hoses for the delivery of compressed natural gas is 30 kg/min. All models can fill CNG and LPG at the same time. The output of CNG hoses can be increased to 70 kg/min (/H).

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

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.



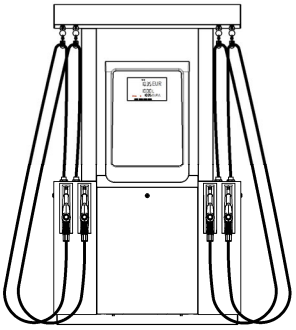
BMP4012.OWD/LPG+MOD40x2.OWD/CNG *BMP4012.OWD/LPG+MOD40x4.OWD/CNG/H*

Figure 52 -Overview of OCEAN TOWER COMBI LPG dispensers with CNG module, x=1,2,3 is number of CNG inlets

2.5.29. OCEAN HERO DISPENSERS

Multi-product OCEAN TOWER 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 eight delivery hoses for liquid fuel (gasoline, diesel, E85 ...) located on the front of the dispenser. Single-sided right version can be obtained by turning the the single-sided left dispenser by 180°.The dispensers are equipped with free hanging hoses or hose retractor system. There are two basic versions – a narrow variant (1080 mm) for 1 or 2 hydraulic systems and a wide variant (1280 mm) designed for 3 or 4 hydraulic systems.

List of standard OCEAN HERO models:

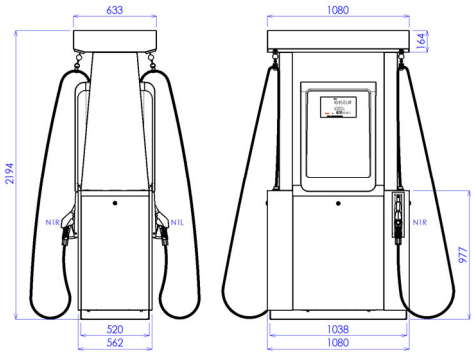


Dispenser model	**Access to dispenser** *(1-single-sided, 2-double-sided)*	**Total number of products** *(i.e., number of pumps or inputs)*	**Number of meters** *(i.e., number of measuring systems)*	**Number of delivery hoses** *(dispenser hose + module hose)*	**Number of main displays** *(i.e., number of simultaneous deliveries)*
BMP4011.OHL	1	1	1	1	1
BMP4012.OHD (-S)	2	1	2	2	2
BMP4022.OHD (-S)	1	2	2	2	1
BMP4024.OHD	2	2	4	4	2
BMP4033.OHL	1	3	3	3	1
BMP4036.OHD	2	3	6	6	2
BMP4044.OHL	1	4	4	4	1
BMP4048.OHD	2	4	8	8	2
BMP4021.OHD/UH-S	2	2	2	1	1
BMP4042.OHD/UH/UH	2	4	4	2	2
BMP4042.OHD/UH/UH-S	2	4	4	2	2

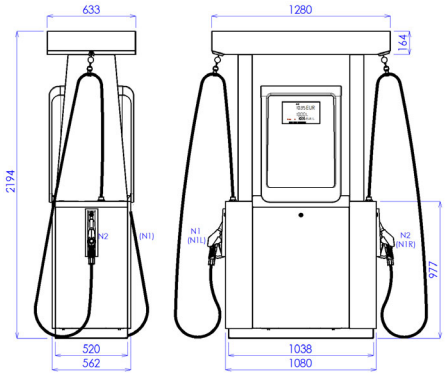
Notes: The pumping performance is strongly dependent on the conditions at the station (distance from the tank, suction height, pipe inner diameter... etc.). The standard pumping performance is within the range of 35 to 50 L/min. For special models (see chapter 2.4), the performance of the diesel hoses 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 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. For the single-product, two-product model and the high-performance dispenser (/UH), a side nozzle option (-S) is also possible.

Pictures (PNG, DWG) with dimensions of all models can be downloaded here: https://www.tatsuno-europe.com/_en/download/.

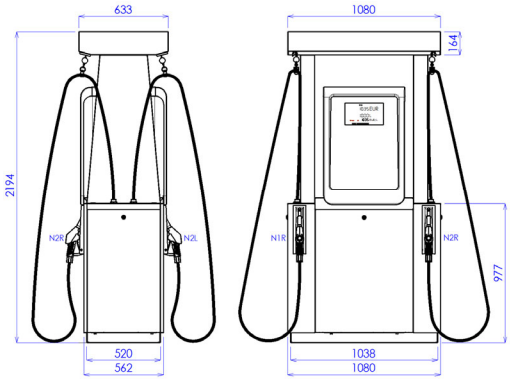
! The sale of the OCEAN HERO series dispensers will start on October 1st, 2022.



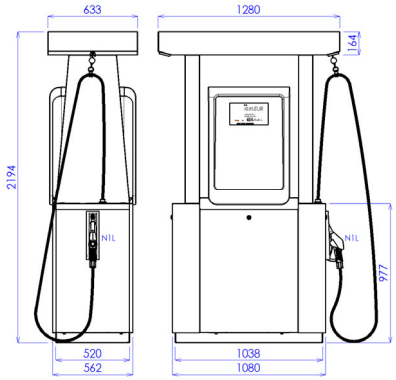
BMP4012.OHD; BMP4022.OHD



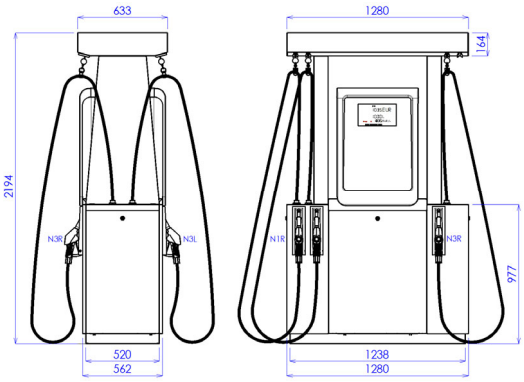
BMP4012.OHD-S; BMP4022.OHD-S



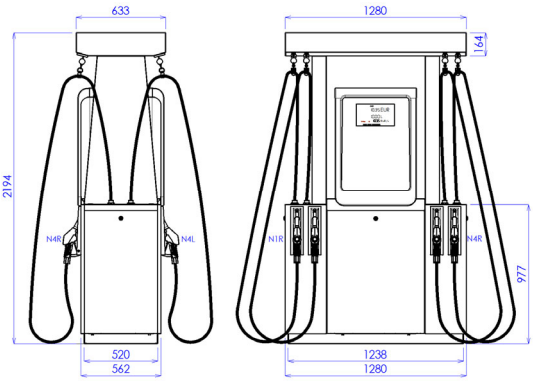
BMP4024.OHD



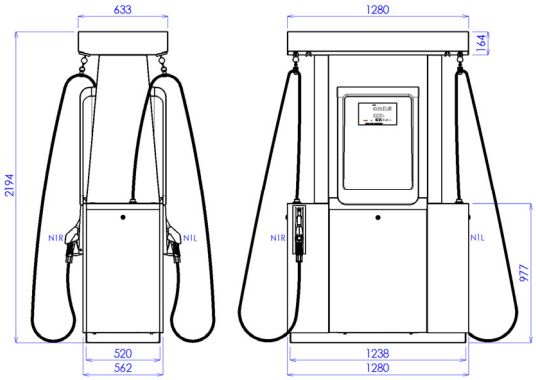
BMP4021.OHD/UH-S



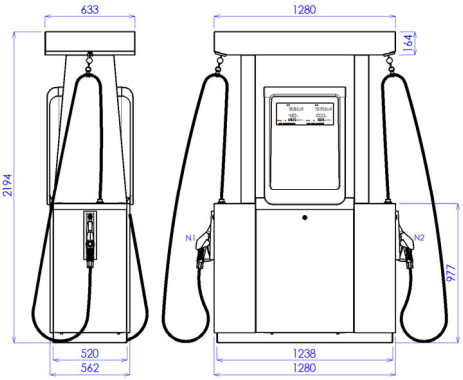
BMP4036.OHD



BMP4048.OHD



BMP4042.OHD/UH/UH

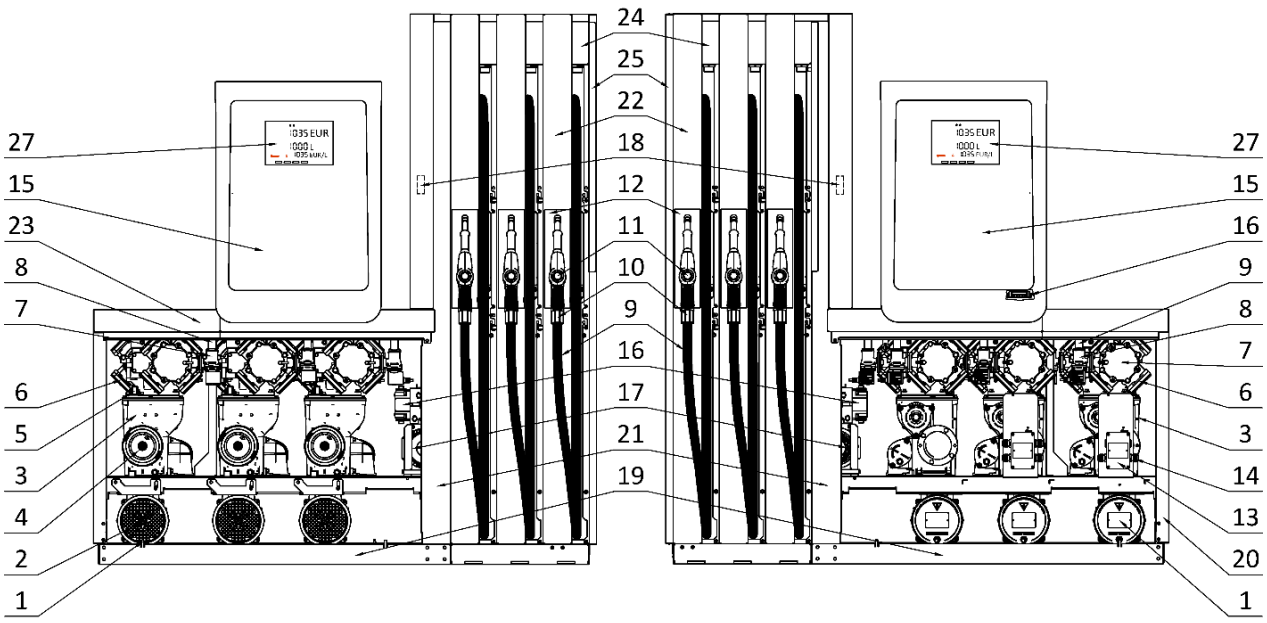


BMP4042.OHD/UH/UH-S

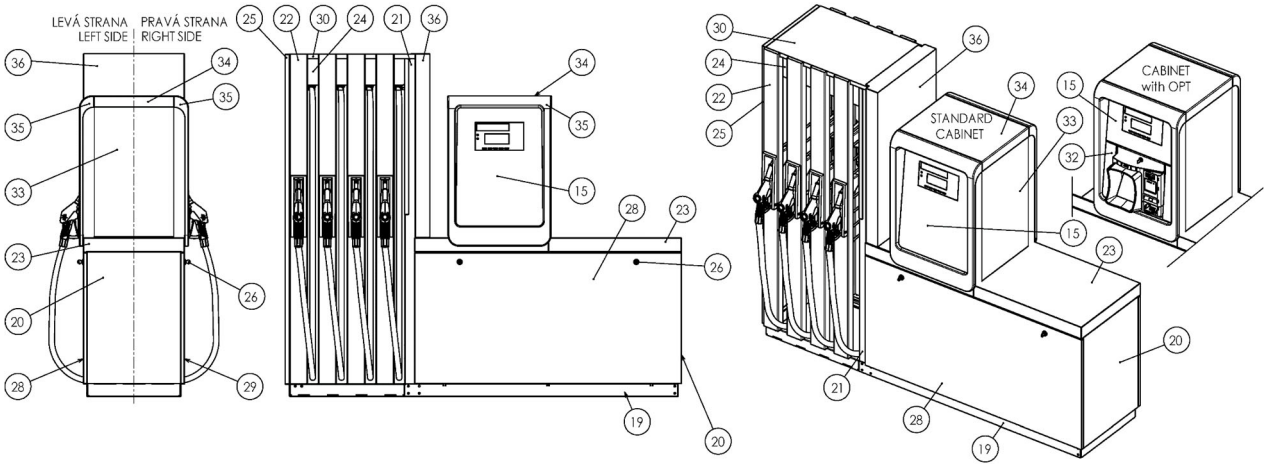
Figure 53 - Overview of standard OCEAN HERO models

2.6. TERMINOLOGY OF BASIC PARTS OF THE DISPENSER

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



Picture 54 - Basic parts of the OCEAN TOWER dispenser



Picture 55 - Covers of the OCEAN TOWER dispenser

Position	Device	Position	Device	Position	Device
1	Pump motor	**13**	Distribution box	**25**	Back Cover
2	Motor pulley	**14**	Cable bushing – IP66/ IP67	**26**	Lock
3	Pumping monoblock	**15**	Display mask plate	**27**	Display
4	Pump pulley	**16**	Vapour recovery pump	**28**	Door – left
5	Air separation sensor	**17**	Vapour recovery pump motor	**29**	Door – right
6	Pulser – pulse generator	**18**	Vapour flow sensor	**30**	Roof cover
7	Electro-magnetic valve	**19**	Dispenser foundation	**31**	-
8	Piping	**10**	Front column	**32**	OPT mask plate
9	Dispensing hose	**21**	Inner column	**33**	Counter cabinet cover
10	Breakaway coupling	**22**	Hose column	**34**	Counter cabinet roof
11	Dispensing nozzle	**23**	Hydraulics roof	**35**	Plastic cabinet frame
12	Nozzle boot	**24**	Column's roof	**36**	Inner column cover

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

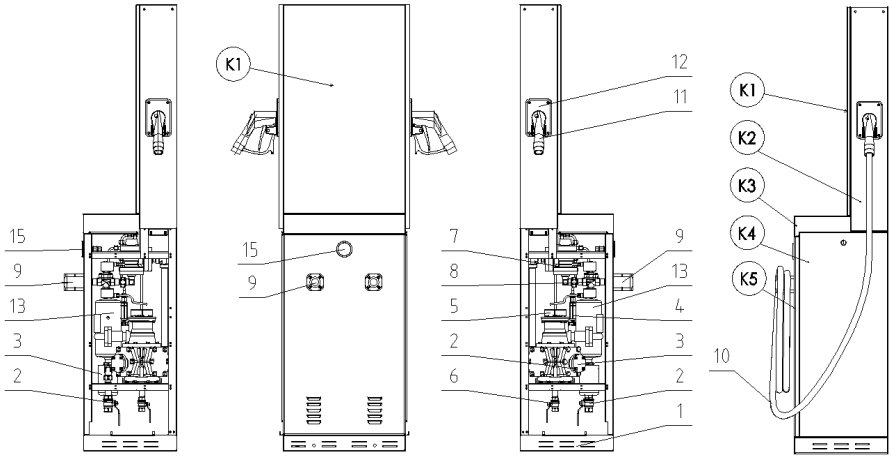


Figure 56 - Basic parts of the LPG dispensing module and its cover

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

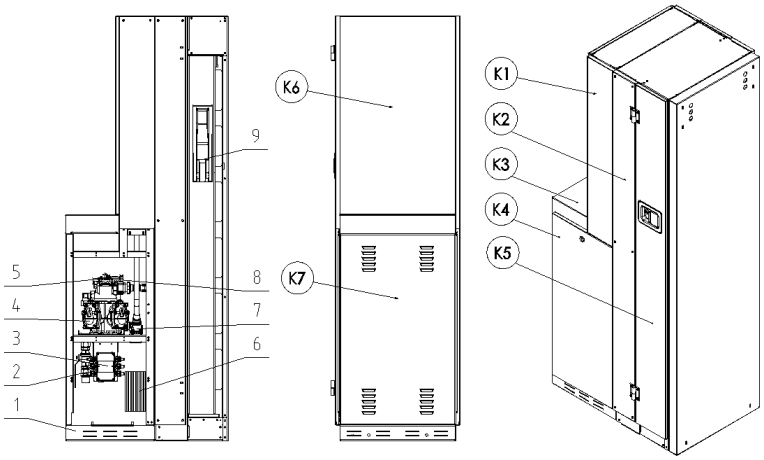


Figure 57 - Basic parts of the AdBlue® dispensing module and its cover

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

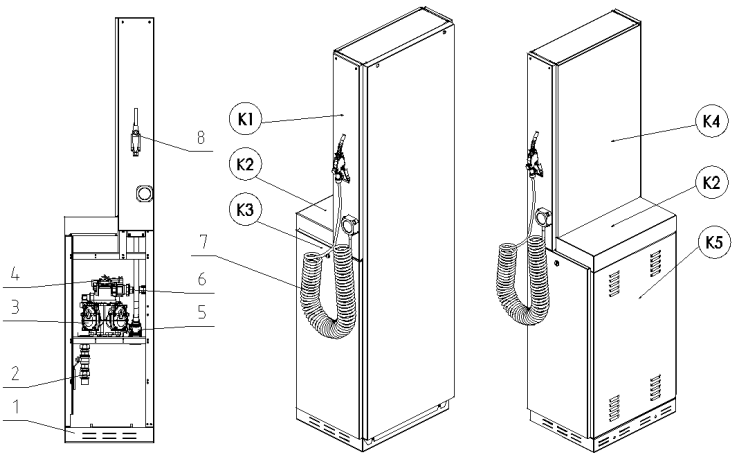


Figure 58 - Basic parts of the WSE dispensing module and its cover

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

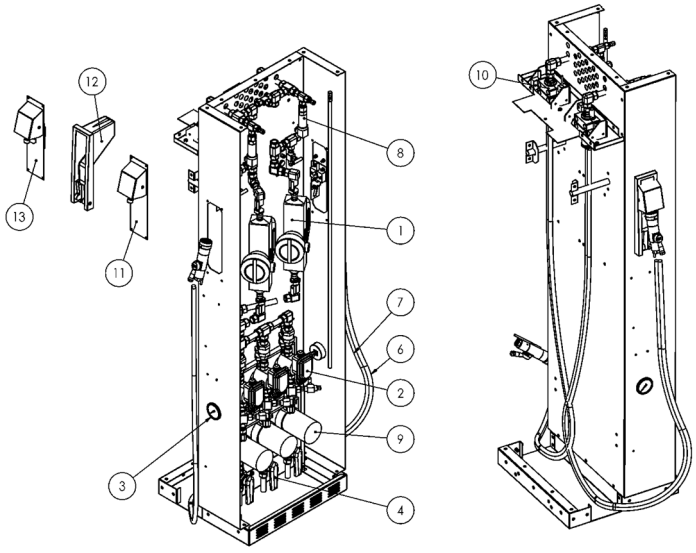


Figure 59 - Basic parts of the WSE dispensing module and its cover

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 57, or in the case of a combined dispenser, with several nameplates for individual fuels, see Figure 63. If the number of delivery hoses is higher than two then the dispenser is supplemented with the so-called orientation label, see Figure 59, 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 IEC 60079-0 and EN ISO 80079-36) 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.

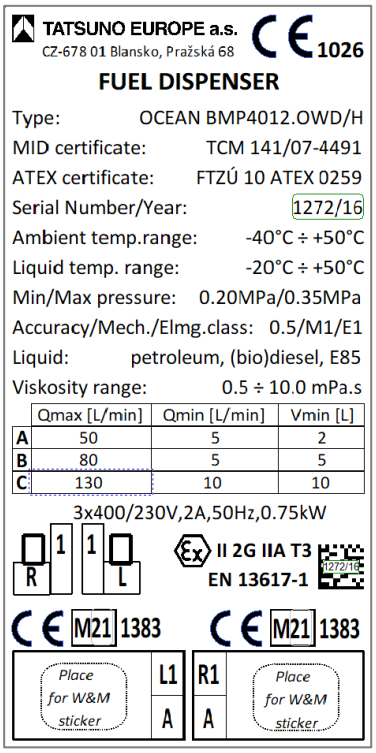


Figure 60 - Nameplate of a two-hose gasoline/diesel dispenser

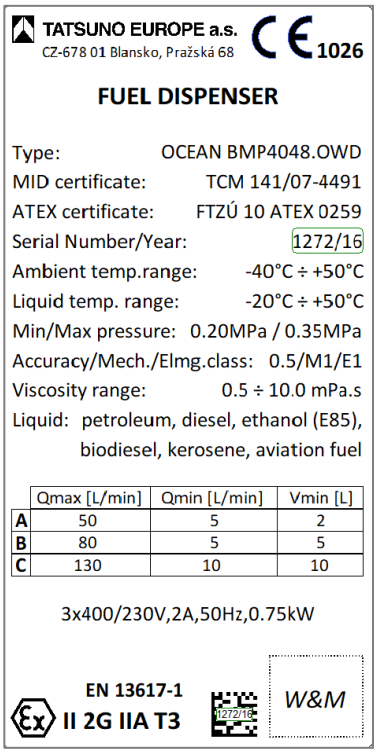


Figure 61 - Nameplate of the multi-hose gasoline/diesel combined dispenser

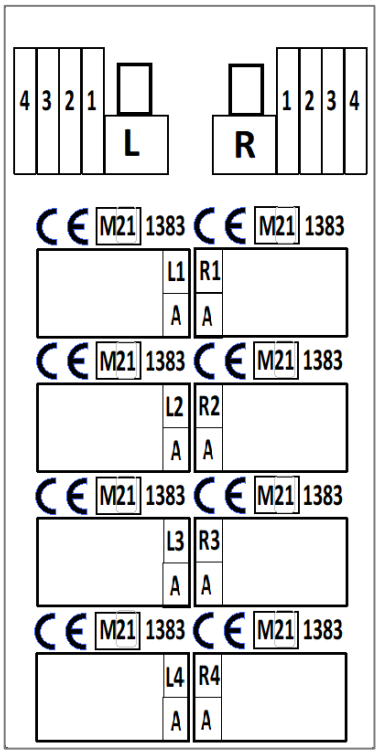


Figure 62 - Orientation label for multiple hose dispensers

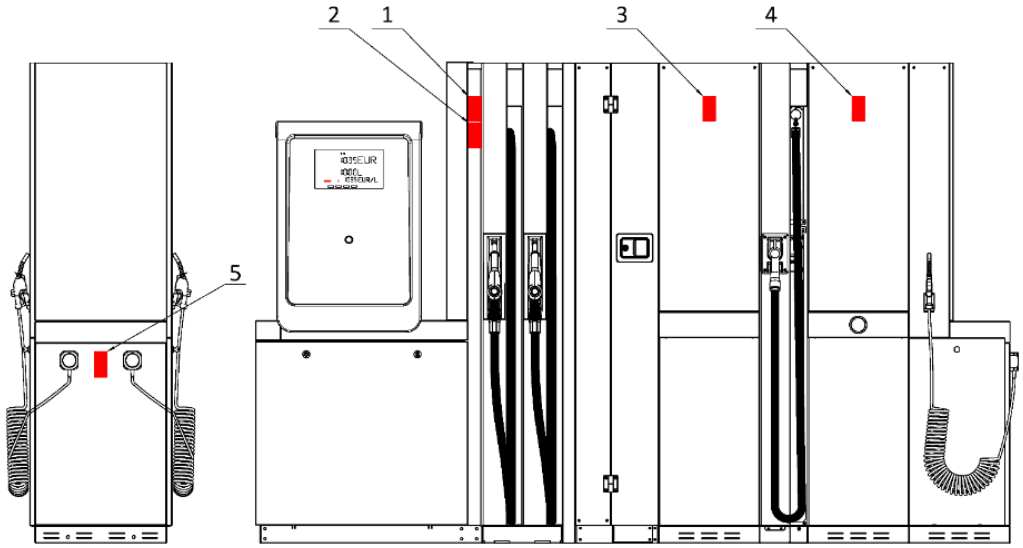


Figure 63 - Nameplate location on the combined dispenser

(1- nameplate of main gasoline/diesel dispenser, 2 - orientation label of main dispenser, 3, 4, 5 – nameplate of AdB, LPG, WSE modules)

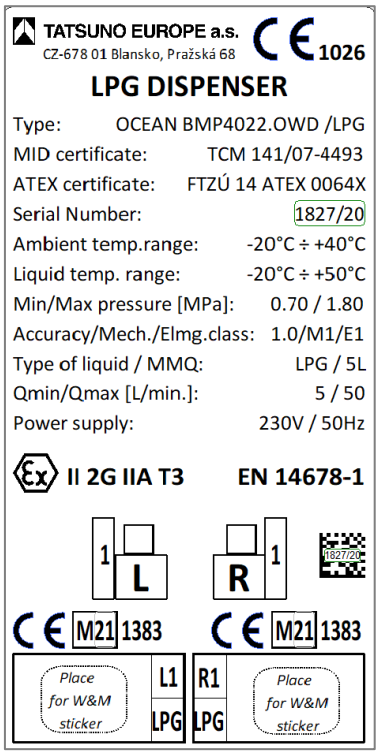


Figure 64 - Nameplate of two-hose LPG dispenser

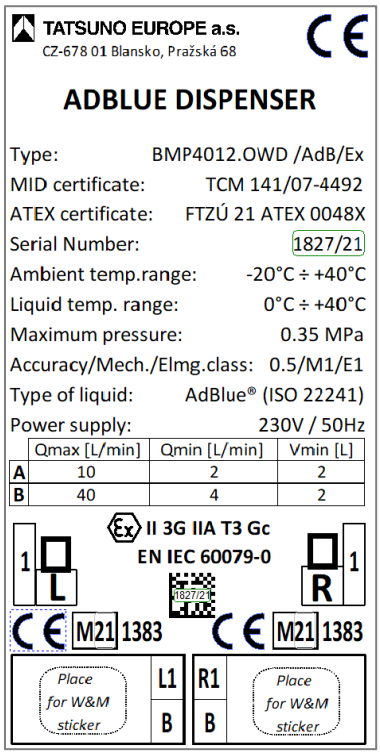


Figure 65 - Nameplate of two-hose AdBlue® dispenser

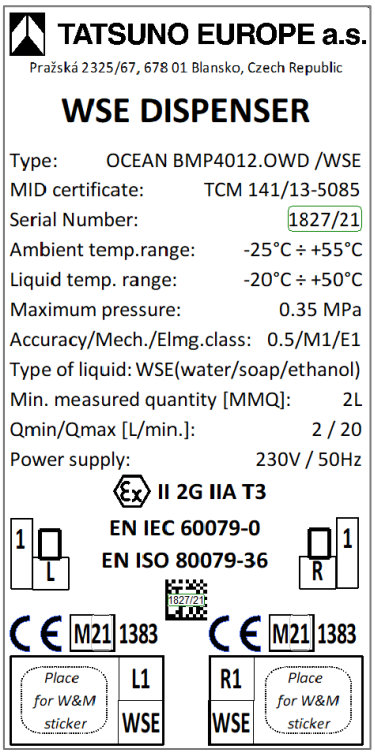


Figure 66 - Nameplate of two-hose WSE dispenser

Table 13 - Label information on the dispenser and module

TATSUNO EUROPE a.s.	Name and address of dispenser manufacturer
CE 1383	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
CE 1026	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
II 2G IIA T3	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

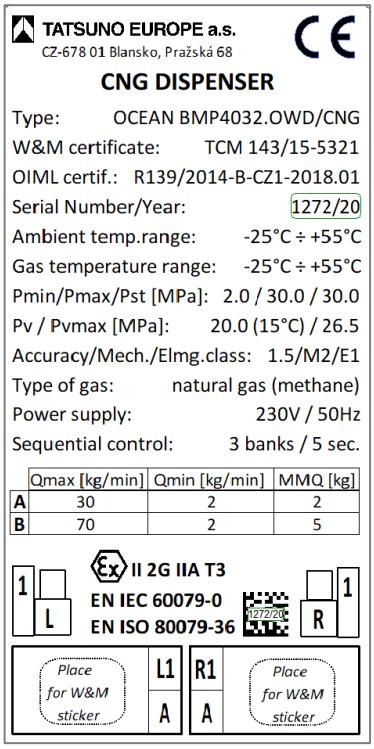


Figure 67 - Nameplate of two-hose CNG dispenser

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 untightens, 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 forklift 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.

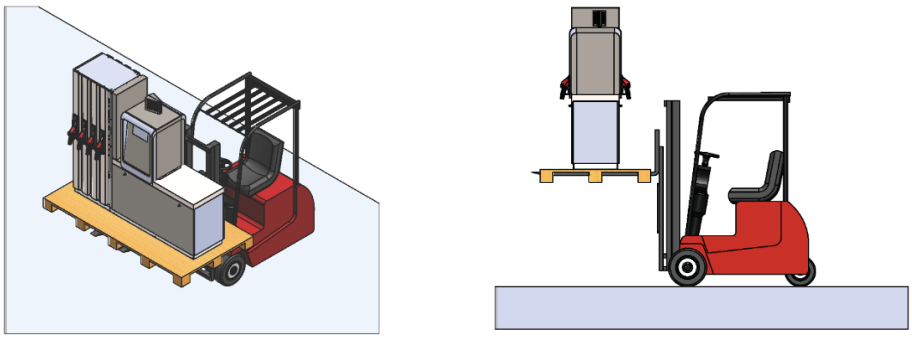
NOTICE

- *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.*

3.2.1. DISPENSER HANDLING

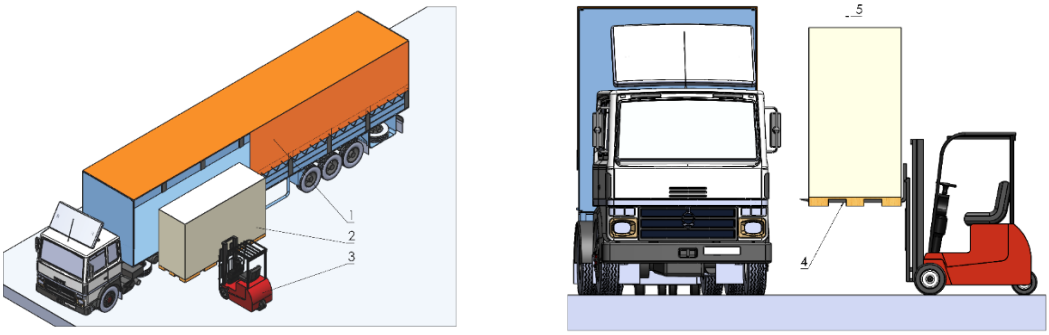
The following rules must be observed when loading, unloading and setting up the dispenser.

- Use a forklift to handle the fuel dispenser firmly attached to the wooden pallet. Follow the safety rules described by the forklift manufacturer.



Picture 68 – Using of a forklift during loading and unloading

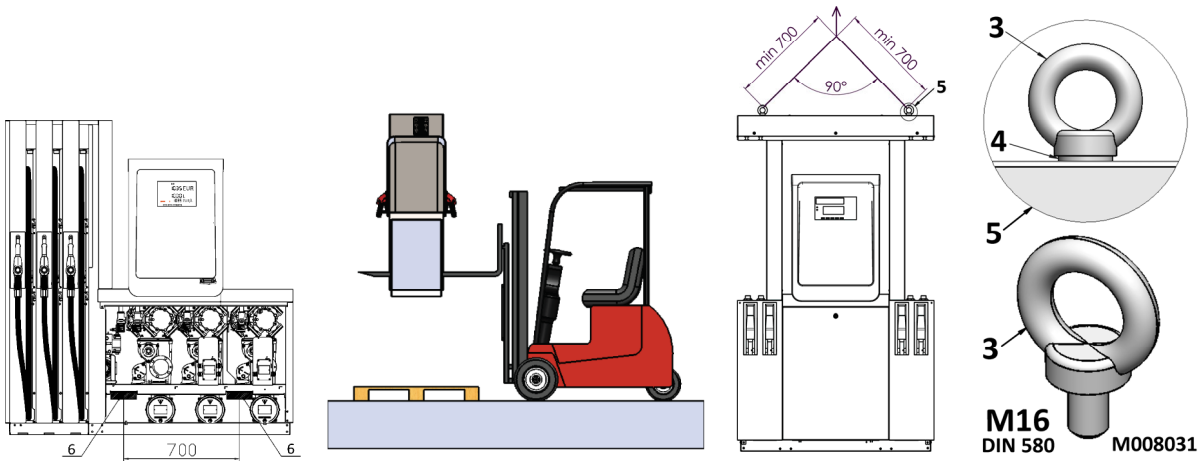
- When unloading and loading the fuel dispenser from or into the transport vehicle, use the direction from the side of the vehicle. Loading from the rear of the vehicle is dangerous and can damage the vehicle, the stand and injure people (see figure below).



Picture 69 – Permitted direction of loading and unloading of the dispenser

(1-transport vehicle, 2-dispenser on a pallet, 3-forklift, 4-wooden pallet, 5-permitted direction of loading and unloading)

- When installing the dispenser on the site, first remove the dispenser covers (doors) and loosen the anchor bolts between the wooden pallet and the dispenser. Then pick up the dispenser from a wooden pallet and place it on the prepared base frame on the site. Use the holes in the dispenser for the 100 x 40 mm load forks to lift (OCEAN TOWER) or two hanging eyes attached to the holes in the dispenser canopy (OCEAN HERO) – see Picture below.



Picture 70 – Lifting the dispenser from the wooden transport pallet

(3-hanging eye M16, DIN580, 4-Plastic washer; 5-using of hanging eye; 6-transport holes for support fork 100mm x 40mm)

NOTE *M16 hanging eyes (DIN580) are not part of the delivery of the dispenser. However, they can be ordered, no.: M008031.*

3.3. DISPENSER LOCATION

3.3.1. IN 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 1. The same figure shows the numbering of the dispenser products.

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 72.

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 71.

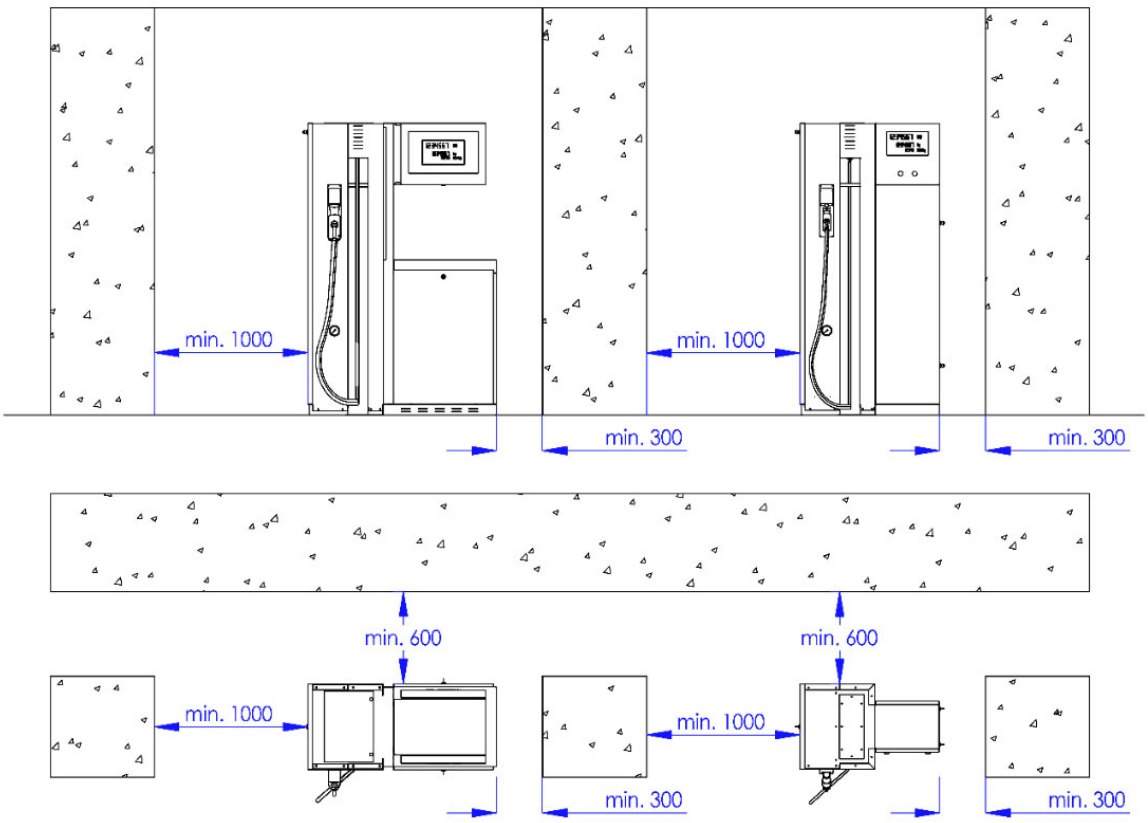


Figure 71 – Minimum recommended separation distance of the dispenser from a fixed obstacle

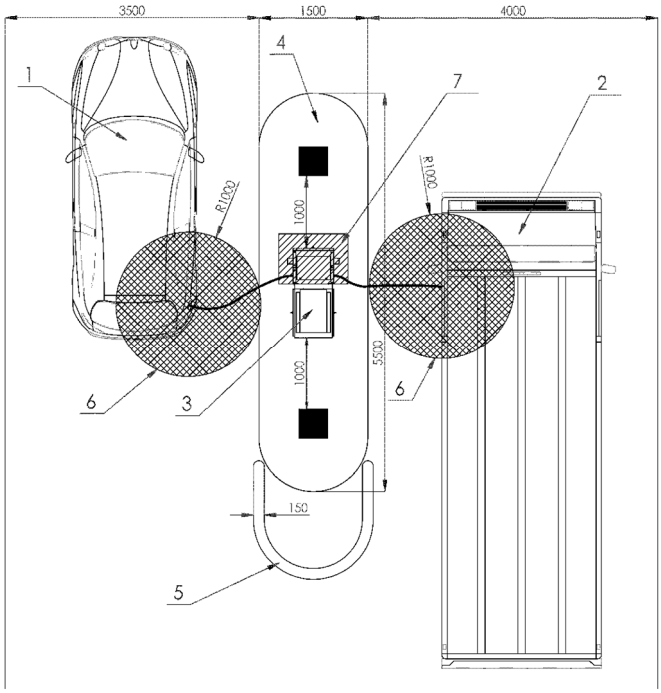


Figure 72 – Example of the CNG dispenser location at the fuel station
(1-refilling position for passenger cars, 2- refilling position for trucks and buses, 3-dispenser CNG dispenser, 4-dispenser refuge, 5-tube guard, 6-projection of the dangerous zone border (zone 1) of the filling end piece during delivery, 7- projection of the dangerous zone border (zone 2) of the CNG dispenser)

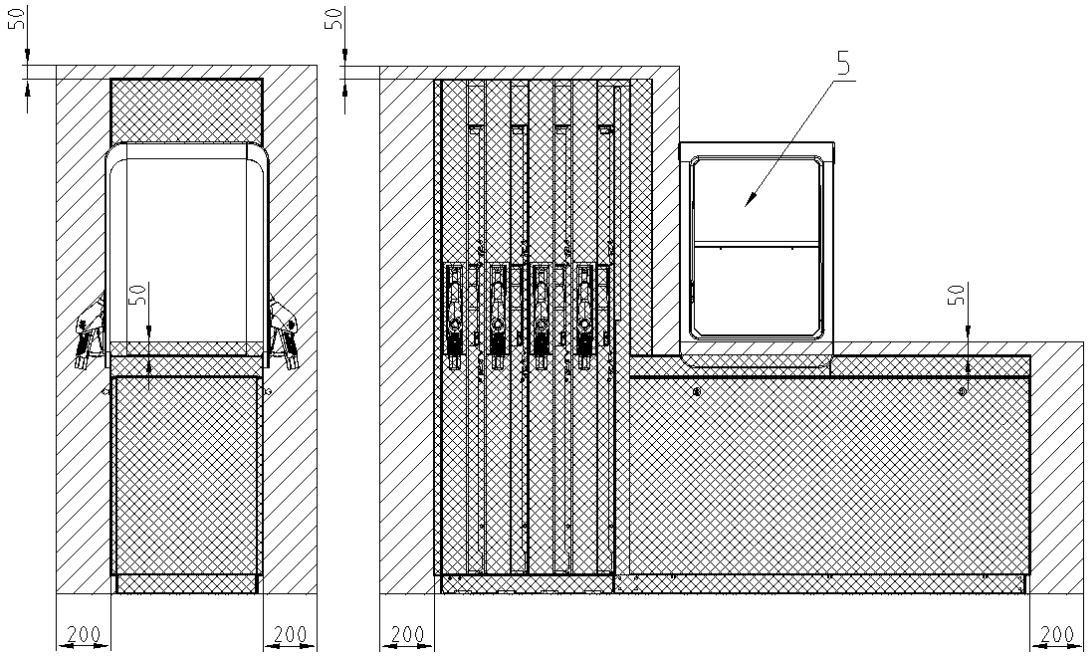
CAUTION->LPG *LPG dispensers/modules are standardly equipped with a breakaway coupling located between the deliver hose and the dispenser. It breaks and interrupts the flow of LPG at both ends if a force greater than 200 N and less than 500 N is applied to it.* ***However, for proper operation of the 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!***

3.3.2. INSTALLATION OF THE DISPENSERS IN TERMS OF EXTERNAL INFLUENCES (DANGER ZONES)

Dispensers for liquid (petrol, diesel, LPG) or gaseous fuel (CNG) create dangerous areas at the installation site - zones where under certain conditions (high surface temperature, flame, electric spark… etc.) the fuel or fuel vapor could ignite or explode.
Before installing the dispenser at the filling station, the following must be taken into account in particular:

- what danger zones the dispenser creates with its operation
- what danger zones are created by the surrounding equipment (adjacent dispenser, storage tank, etc …)

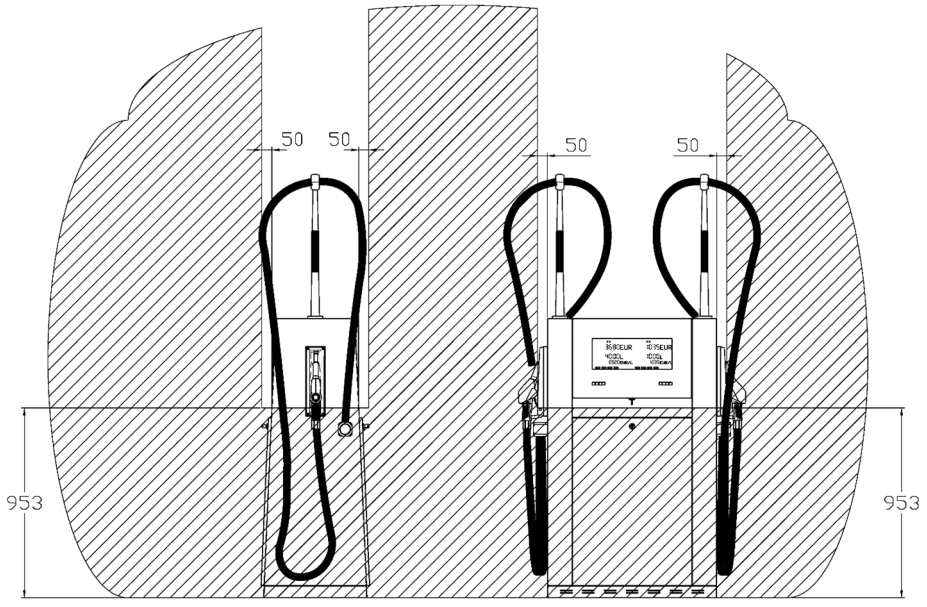
Hazardous areas (zones, areas with a risk of explosion) are determined according to EN 60079-10. For dispensers for liquid fuels such as petrol, diesel, E85, kerosene, aviation gasoline, etc., the dispenser zones are also regulated by the EN 13617-1 standard, for LPG dispensers, liquefied propane butane, the EN 14678-1 standard.
Drawings of the zones created by the dispenser are part of the mandatory documentation of the dispenser manufacturer, see documents *IN041-ML Installation plans I* and *IN043 ML Installation plans II*. The drawing of the zones must define the spatial distribution of the hazardous areas inside and outside the dispenser - see the example in the figure below, where hazardous zone 2 (simply hatched) occurs up to a distance of 20 cm vertically and 5 cm horizontally from the contour of the dispenser. Inside the dispenser, in addition to the meter housing, there is zone 1 or zone 0 (inside the vapour recovery pipes). All electrical and non-electrical equipment located in these zones must be designed and approved for this hazardous environment (ATEX certificate, documentation archiving…).



Picture 73 – Example of drawing the danger zones of the OCEAN TOWER dispenser according to EN 13617-1
(5 - non-explosive area)

CAUTION *TATSUNO EUROPE liquid or gaseous fuel dispensers must not be located in the danger zone. The electronic counters used in these dispensers are separated from other areas by a type 1 partition according to EN 13617-1, they are in an uncovered design (IP54 / IP55) and must therefore be located in a non-explosive area.*

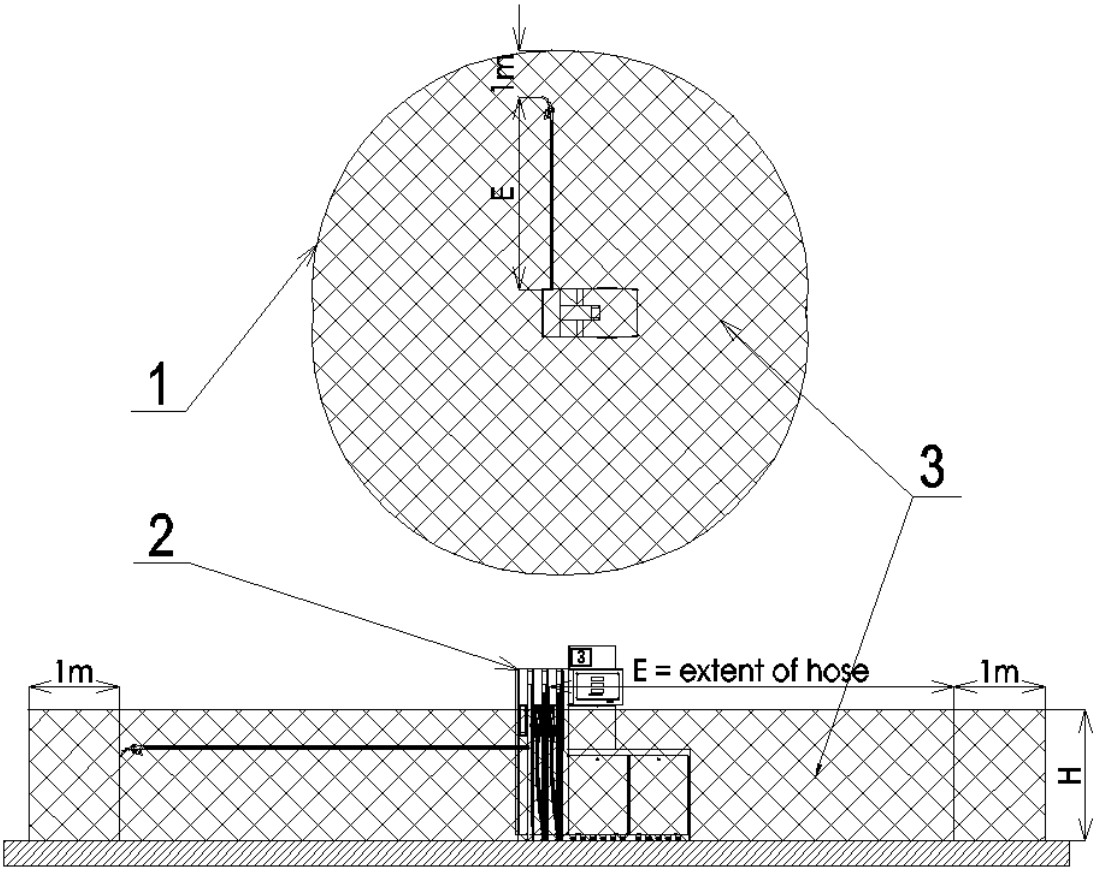
NOTICE- ADB *In the case of AdBlue® dispensers, the dispenser itself does not generate any danger zone (AdBlue is not a flammable or explosive medium). To install the AdBlue near the fuel dispenser or other equipment that generates the zone, it is necessary to take into account which parts of the dispenser can be installed "immersed" in the danger zone and which cannot - see Figure below.*



Picture 74 – Example of possible placement of the AdBlue® dispenser in zone 2

CAUTION ->ADB *AdBlue dispensers with additional marking /NoEx has not ATEX certification and must not be at the service station installed in hazardous zones 1 and 2. The following zone diagram (see Picture 75) is recommended for installation of dispensers without ATEX certification on petrol station equipped with fuel dispensers. The diagram is for*

guidance only, all local and national restrictions must be observed.



Picture 75 - Spatial restrictions for AdBlue dispensers without ATEX certification

Legend: 1- Top view (without scale), 2- Front view (no scale), 3 Prohibited area (dispensers without ATEX certification must not be installed in this area), E- Fuel dispenser hose reach, H-Height of dangerous zone.

3.3.3. ORIENTATION OF A SINGLE-SIDED DISPENSER

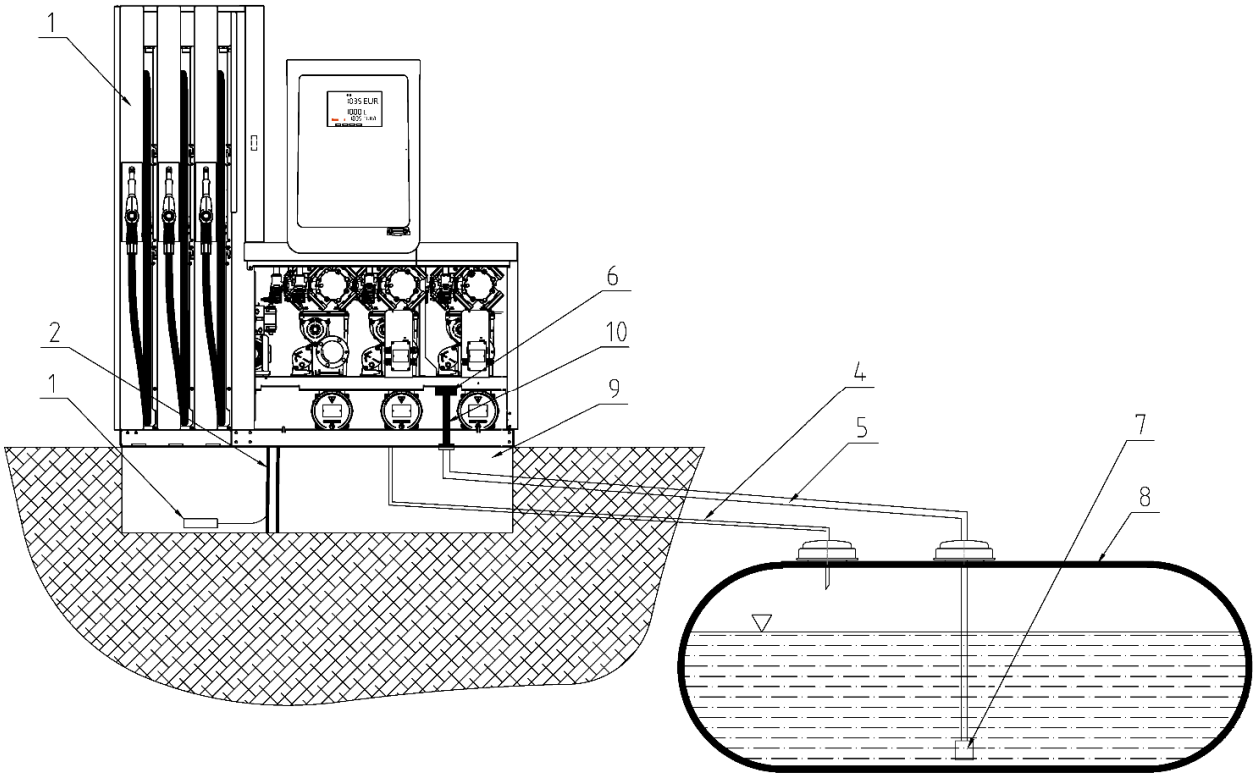
Single-sided dispenser stands are labelled "L" and "R" ("L" left/left-sided and "R" right/right-sided) after the dispenser type designation, e.g., BMP4011.OW**L,** see section 2.4. Dispenser orientation is determined by a view of the dispenser from the vehicle arrival direction, see Figure 1.

3.3.4. 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.

3.3.5. LIQUID FUEL TANK TYPE

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

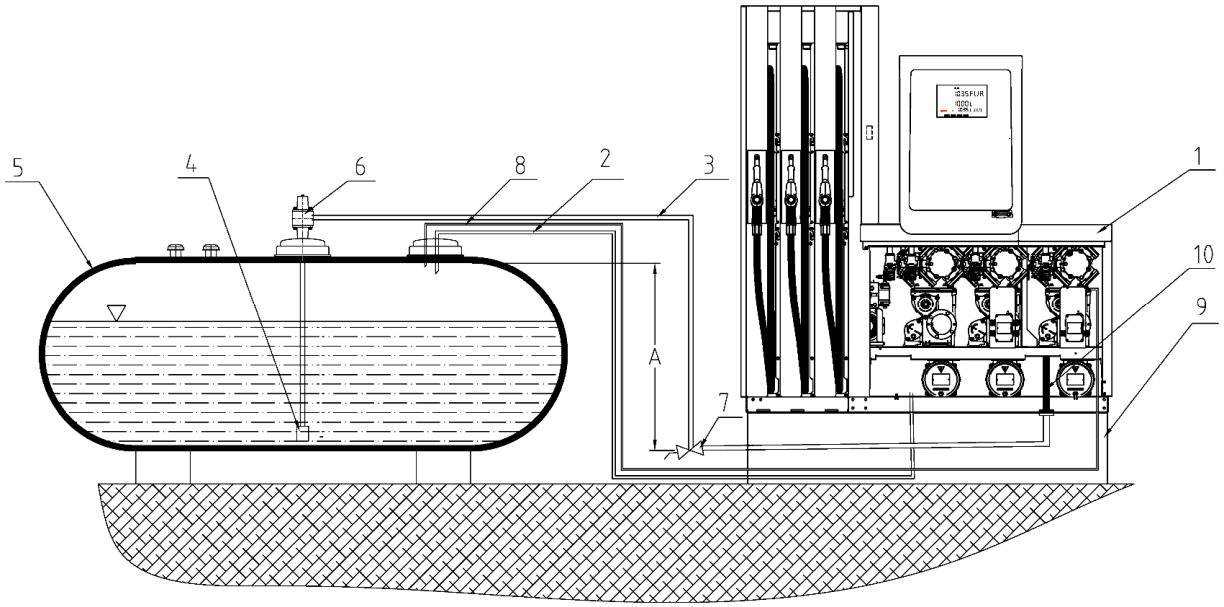


Picture 76– Example of connection of the dispenser with suction pumps to an underground tank

Legend: 1 – dispenser, 2 – electrical supply cables and data line, 3 – liquid sensor located at the bottom of the drip tray, 4 – vapor return pipe (recuperation), 5 – suction fuel pipe, 6 – check valve at the pump inlet, 7 – suction basket (without non-return valve), 8 – underground fuel tank, 9 – drip tray with dispenser base frame, 10 – connection piece (bellows) with 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 76)***

CAUTION B&D *If the dispenser is connected to an aboveground 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 77 – 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 77).***



Picture 77 – Example of connection of the dispenser with suction pumps to the aboveground storage tank

Legend: 1 – dispenser, 2 – vapor return line (recuperation), 3 – suction fuel line, 4 – suction basket (without non-return valve), 5 – above-ground fuel tank, 6 – overpressure non-return valve (OPW 199ASW), 7 –Drain and shut-off valve, 8 – return line from the dispenser pump separator, 9 – drip tray with base frame of the dispenser, 10 – connection piece (bellows) with 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 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.*

3.3.6. 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. If 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.*

3.3.7. SUCTION SYSTEM

In the case of a **suction system**, the suction pump is located directly in the dispenser. The pump is connected to the storage tank by a suction line, which draws fuel from the storage tank into the tank of the car. Examples of connection of suction line to pump are described in document IN041/IN043 - Installation plans.

NOTICE->B&D *The dispensers are designed to be connected to a **44.5 x 2.5 mm** suction fuel line terminated by oval flange **PN6 DN32 (G1/4")** according to **EN 13 365**. If another type of inlet pipe and flange is used then is necessary to discuss it with the dispenser manufacturer. The dispenser manufacturer is not responsible for the problems associated with inlet pipe leaks and poor connection to the suction pump.*

3.3.8. 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.*

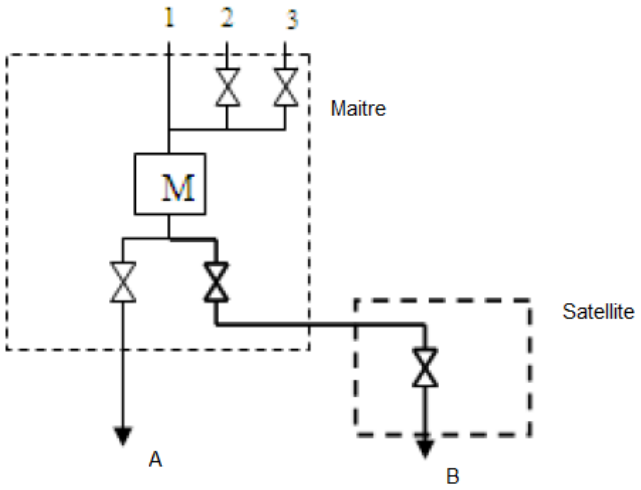
CAUTION ***It is necessary to ensure that the maximum allowed pressure of 0.35 MPa is not exceeded at the fuel inlet to the dispenser.***

The base plans of dispensers in a pressure design are shown in document IN041.

3.3.9. 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 document IN041/IN043.

CAUTION->CNG ***The CNG dispenser has a different function than the petrol dispenser. A measuring system with two delivery hoses cannot be used simultaneously (Lines A and B). One of these two hoses can be connected to a distribution satellite (see diagram below)***



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 past of dispenser standard equipment but 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.***

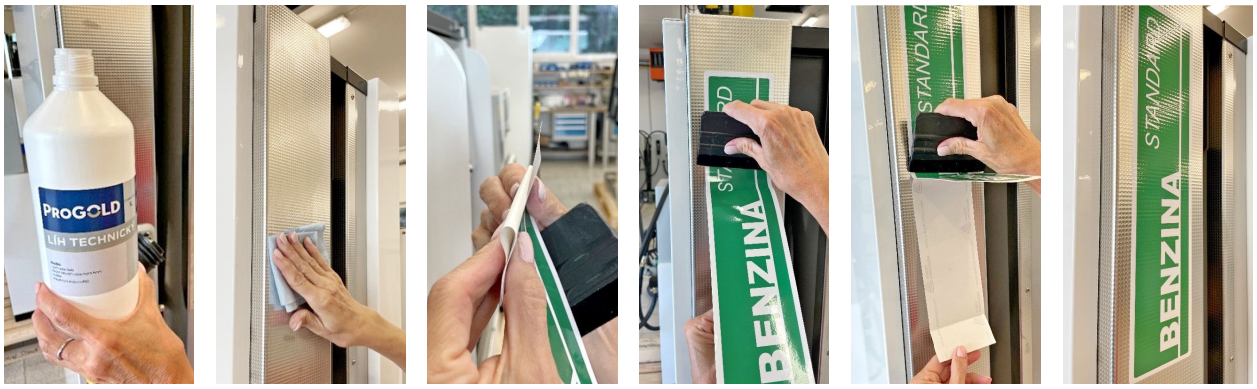
CAUTION->CNG ***The inlet pipeline of the dispenser must be secured by overpressure protection (overpressure valve, etc.) against pressure higher than the permissible maximum operating pressure.***

3.4.1. FITTING OF PRODUCT LABELS

After mechanically attaching the dispenser and connecting the products, it is possible to paste product labels indicating the type of pumped product to the nozzle columns (if they are not already stuck on the supplied dispenser).

The procedure recommended by the manufacturer (see Pictures below):

- Carefully degrease the surface on which the product label (sticker) is to be attached. Use alcohol and a clean cloth for this.
- Prepare the label for sticking by folding approximately 4 cm of the backing paper. Then we place the sticker exactly and straight on the prepared surface.
- Using a plastic spatula, carefully press the sticker onto the prepared surface along its entire length
- The sticker is stuck, the next 48 hours the glue will cure.



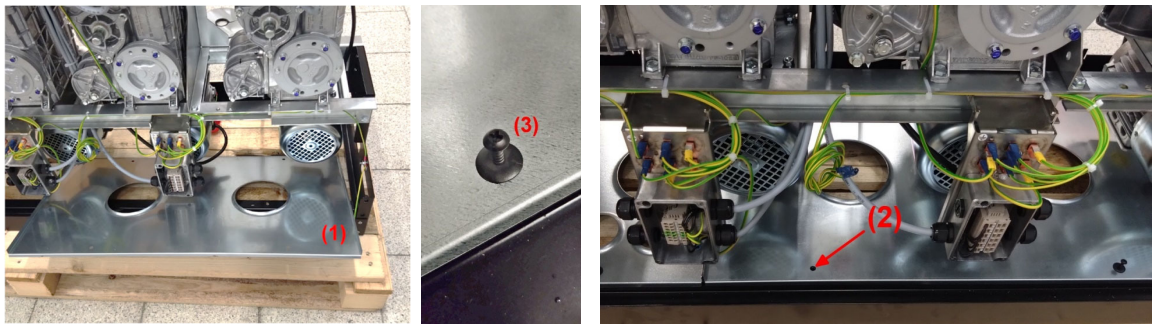
Picture 78 – Procedure for pasting the product sticker

3.4.2. DRIP PAN INSTALLATION

Is recommended following procedure:

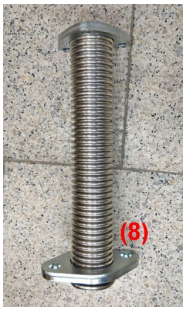
1. Remove side covers (doors) of the dispenser's hydraulic cabinet
2. Disconnect
   - all cables from distribution boxes (if installed),
   - all suction flexible pipes from pumping monoblocs (if installed) and
   - flexible pipe from vapour recovery outlet

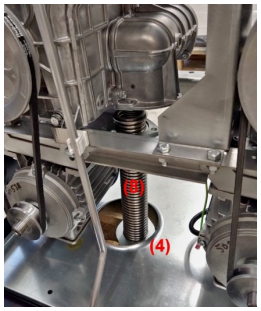
   The space between hydraulics and dispenser base must be free.
3. Put **Drip pan plate (1)** on the base frame of the dispenser and move the panel into position where fixing **hole on the drip pan plate (2)** will match with the hole on the dispenser base and fix the position of the drip pan plate by **plastic pin (3)**

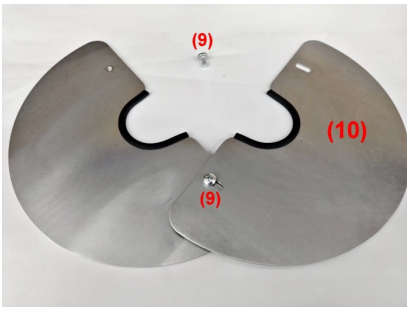


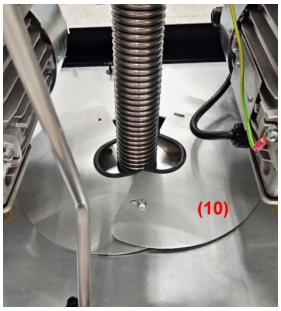
4. Pull the cables through small holes - **power cable** through the **hole (6)** and **data cable** through the **hole (7)** and connect cables into proper distribution boxes.

5. Connect vapour recovery flexible pipe with output pipe through the **hole (5)**
6. Connect **suction flexible pipe (8)** to pumping monoblock and inlet pipe through the **hole (4)**

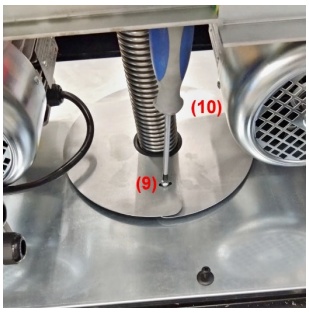


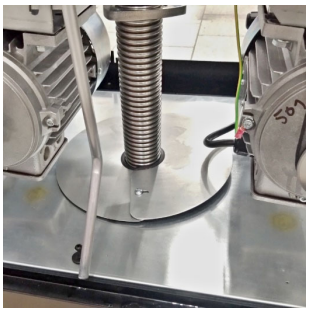






7. Release two **screws (9)** on the **drip donut (10),** put drip donut on the suction flexible pipe (8)
8. Tighten the **screws (9)** on the **drip donut (10)**





9. Install side covers (doors) of the dispenser's hydraulic cabinet

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 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 – Foundations 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.)
-

3.6.1. 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 - Foundation plans I. 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.

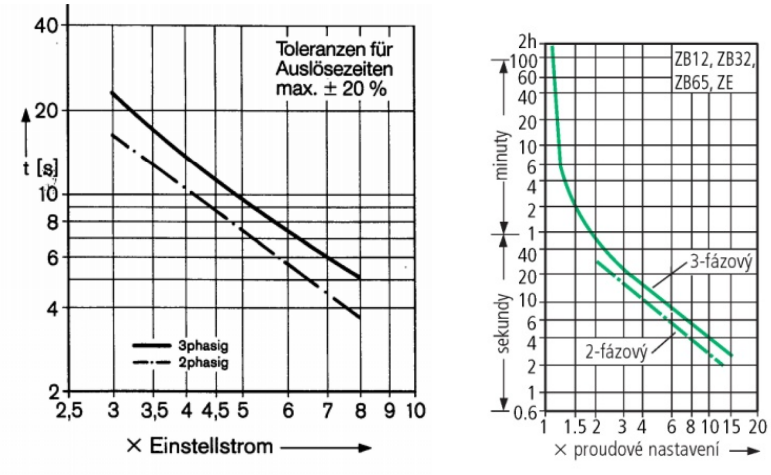
All TATSUNO EUROPE dispensers for gasoline and diesel delivery in a suction version are equipped with contactors and each motor is protected by thermal jet protection in the dispenser. Pump motors and vacuum pump motors switching is performed so that at any moment a maximum of two pump motors and possibly 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 79 – 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 ϕ = 0.8	cos ϕ = 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

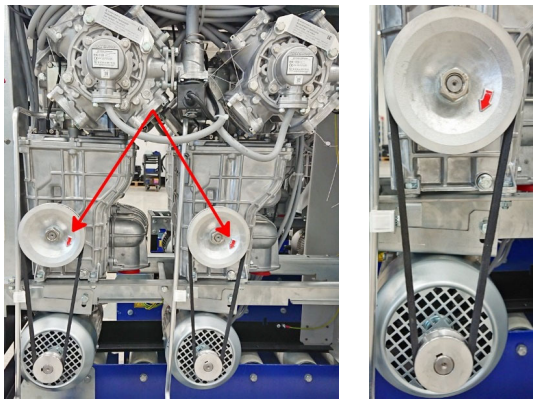


Figure 80 – Check of the pump motor direction of rotation (arrow)

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 above.*
Figure 80.

3.6.2. 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.

RECCOMENDATION *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.*

3.6.3. 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 cableF 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**.*

3.6.4. 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.

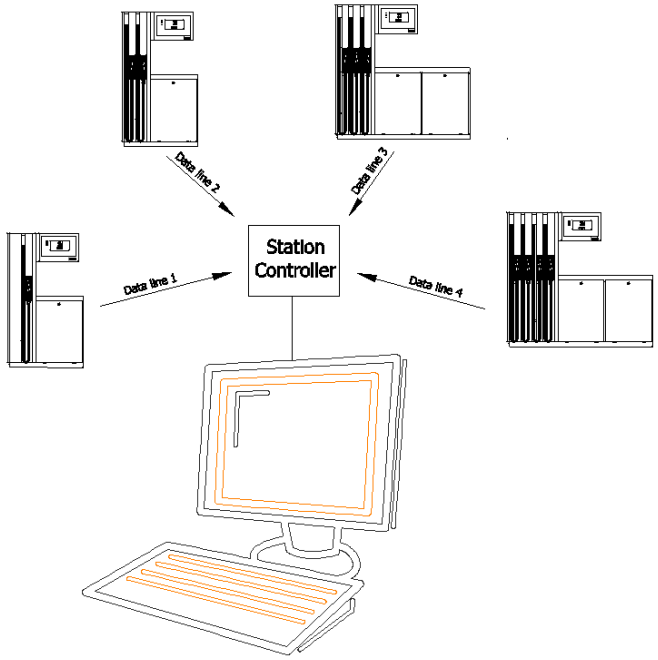


Figure 81 – Radial data line from dispensers

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 mm^2.** 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 concert 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****.*

3.6.5. 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 mm^2).

3.6.6. 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

3.6.7. 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.*

3.6.8. 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.*

3.6.9. 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 pre-set keypad buttons located on the dispenser.

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 pre-set keypad	Remote controller PDERT-XS, service PDERT-XO, manager	Remote controller PDERT-XS, service PDERT-XO, manager 12keys preset keypad
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.

4.1. PDEX5 COUNTER

The PDEX5 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.

NOTE *If the dispenser is equipped with a 12-button preset keyboard, then it can be used to enter the operator and manager mode of the dispenser counter - see chapter 5.3.13*

4.1.1. DESCRIPTION OF PDERT-5O REMOTE CONTROLLER

The keyboard of the PDERT-5O remote manager`s controller is described on Figure 83. 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. In the electronic counter, the dispensing hoses (L1...L5, R1…R5) and the products (P1…P5) are marked with the numbers 1, 2, 3… .9, 10, see Figure 82.

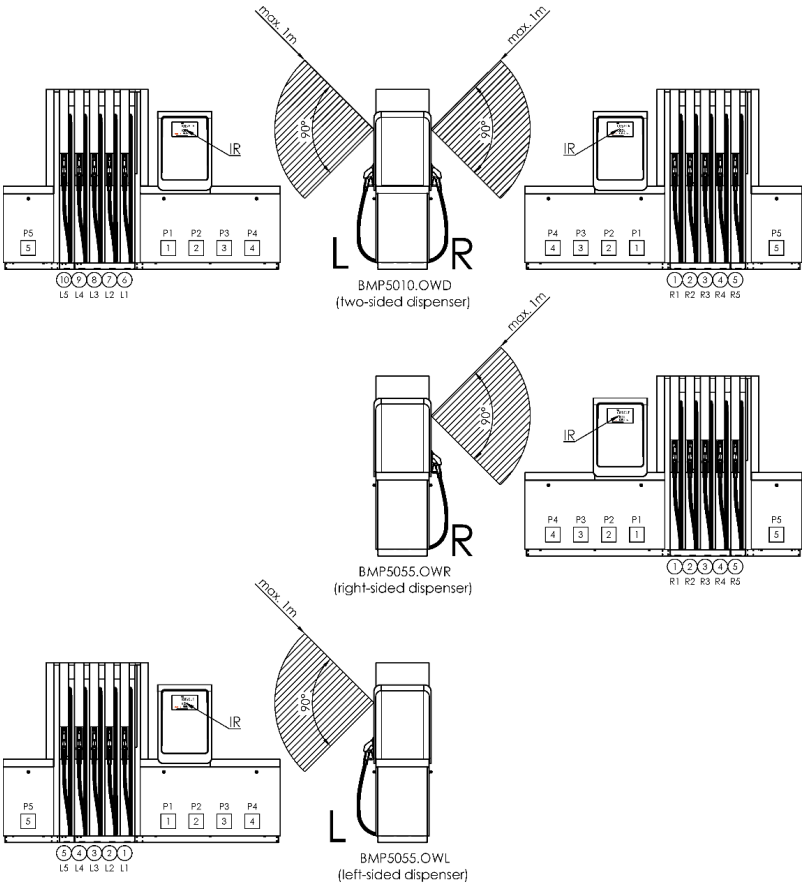


Figure 82 – Range of operation of the remote controller and marking of hoses and products in electronic counter
(IR - position of infrared receiver on the display; ①,②,③ … - nozzle position in calculator)

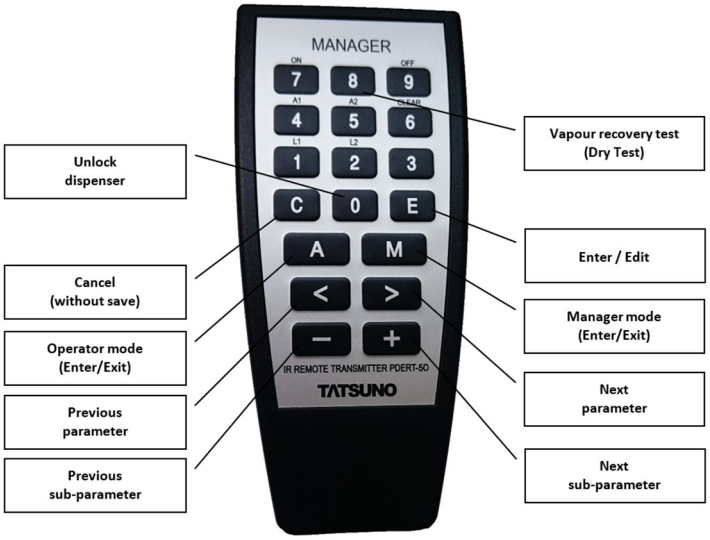


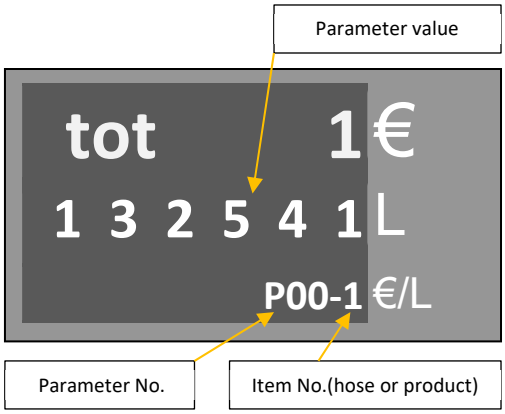
Figure 83 – Description of keys of the PDERT-5O remote controller

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 82. 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 <0>, <1>, …. <9> can be used just like the pre-set 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.
- **Vapour recovery system test (so-called "Dry Test").** If the dispenser is at idle status and all delivery nozzles have been hung, pressing the <8> key can test the vacuum pump function. The vapour recovery 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: P00
Item No.: 1 (dispensing hose order)
Parameter value: 1132541 (volume in centilitres)

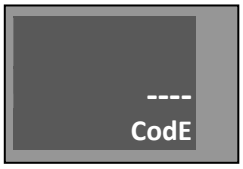
4.1.3. OPERATOR MODE

The operator mode of the PDEX5 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 83). The operator mode allows to view **but not change** the values of all parameters listed below, see table. Individual parameters will be described further. The operator mode is finished by pressing **<M>** or **<A>** keys. The mode is finished automatically if no remote controller button is pressed for 60 seconds.

Parameter	Description
P00	Non-resettable quantity totalizers - volume or weight
P01	Daily quantity totalizers - volume or weight
P02	Daily amount totalizers – in currency unit

4.1.4. MANAGER MODE

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”.

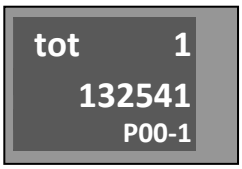


Example: *Gradually press **<M>** and **<1111>** and **<E>** keys.*

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.*

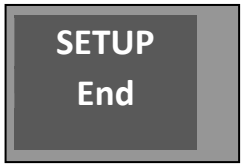
After entering the valid access password, the display shows the value of the first parameter P00-1. Now it is possible

to browse parameters by using the **<>>** key or by entering the **number of searched parameter** and confirm with the **<E>** key to go directly to the desired parameter. The Manager mode allows to view and change the values of parameters listed below, see table below.



Parameter	Description	Parameter	Description
P00	Non-resettable quantity totalizers	P20	Error message codes history
P01	Daily quantity totalizers - volume or weight	P21	Error message codes statistics of filling point A
P02	Daily amount totalizers – in currency unit	P22	Error message codes statistics of filling point B
P03	Unit price (manual/standalone mode)	P23	Error message codes statistics of filling point C
P04	Date and Time	P24	Error message codes statistics of filling point D
P05	Program version + checksums	P25	Last fuelling history of filing point A
P06	Modbus interface activation (licence status)	P26	Last fuelling history of filing point B
P07	not used	P27	Last fuelling history of filing point C
P08	Manager mode access password	P28	Last fuelling history of filing point D
P09	not used	P29	Maintenance history
P10	Serial numbers of peripheral units	P30	Correction factors history
P11	Vapour recovery user test duration (Dry Test)	P31	Number of events
P12	Dispenser control mode	P32	Control mode changes history
P13	Export of parameters	P33	Vapour recovery history of filling point A
P14	Current product temperature	P34	Vapour recovery history of filling point B
P15	Daily totalizers reset (P01 and P02)	P35	Average value of vapour/fuel ratio
P16-P19	not used	P36	Average value of vapour recovery feedback factor
P20	Error message codes history	P20	Error message codes history

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. When leaving the setting mode, the message **SETUP End** appears on the display, and then the last fuelling transaction is displayed (the last state of the display before entering the manager mode).



4.1.5. NON-RESETTABLE VOLUME TOTALIZERS (P00)

Non-resettable electronic totalizers for all dispensing hoses (nozzles) are saved in the memory of the electronic counter. These totalizers state what total volume was delivered by individual delivery hoses. **These totalizers cannot be modified in any way**.

Parameter	Meaning
P00-1	quantity of the fuel delivered by hose 1 in centilitres (x 0.01L)
P00-2	quantity of the fuel delivered by hose 2 in centilitres (x 0.01L)
…	…
P00-10	quantity of the fuel delivered by hose 10 in centilitres (x 0.01L)

NOTE *Number of totalizers of delivery hoses shown in the P00 parameter is conditioned by the configuration of the dispenser. The identification system of delivery hoses and products is described in Figure 82.*

4.1.6. DAILY QUANTITY TOTALIZERS (P01)

Electronic daily quantity totalizers for all dispensing hoses are stored in the electronic counter's memory. They indicate how much fuel has been delivered by the individual dispensing hoses after the last reset (e.g., after the start of the shift). **These totalizers can be reset at any time using parameter P15** (see description below).

Parameter	Meaning
P01-1	quantity of the fuel delivered by hose 1 in centilitres (x 0.01L)
P01-2	quantity of the fuel delivered by hose 2 in centilitres (x 0.01L)
…	…
P01-10	quantity of the fuel delivered by hose 10 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 82.*

4.1.7. DAILY AMOUNT TOTALIZERS (P02)

Electronic daily amount totalizers for all dispensing hoses are stored in the electronic counter's memory. They indicate total amount of the fuel that has been delivered by the individual dispensing hoses after the last reset (e.g., after the start of the shift). **These totalizers can be reset at any time using parameter P15** (see description below).

Parameter	Meaning
P02-1	amount of the fuel delivered by hose 1 in currency unit (x 0.01€)
P02-2	amount of the fuel delivered by hose 2 in currency unit (x 0.01€)
…	…
P02-10	Amount of the fuel delivered by hose 10 in currency unit (x 0.01€)

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 82.*

4.1.8. FUEL PRODUCT UNIT PRICES (P03)

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 **<E>** key and entering the price in the **<PPPP>** format and confirming by the **<E>** key. The decimal point is not entered. E.g., unit price 1.03 €/L is entered as number 0103, price 34.15 CZK/L as number 3415, etc.

Parameter	Meaning	Factory setting
P03-1	fuel product unit price of hose 1	0,00 €/L
P03-2	fuel product unit price of hose 2	0,00 €/L
…	…	…
P03-10	fuel product unit price of hose 10	0,00 €/L

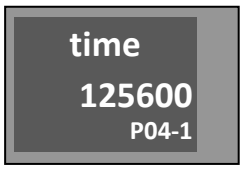
NOTE *Number of fuel products shown in the P03 parameter is conditioned by the configuration of the dispenser. The identification system of delivery hoses and products is described in Figure 82. if you change the unit price, such change will be reflected after a subsequent lift of the delivery nozzle.*

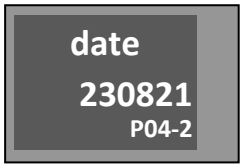
NOTICE *Values set in the P03 parameter are valid **in the dispenser manual mode only.** If the dispenser is connected to the central control system of the fuel station, then the fuel unit price is set directly by the control system before each delivery. In such case the values of the P03 parameter are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

4.1.9. CURRENT TIME AND DATE (P04)

This function allows to view and set the current time and date. The setting is made by pressing the **<E>** key by entering the time/date in the correct format and confirming with the **<E>** key.



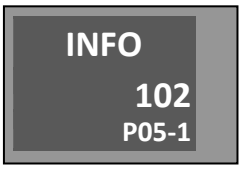


Parameter	Meaning	Factory setting
P04-1	Time setting, format HHMMSS (i.e., 125600 = 12:56:00)	0:00:00
P04-2	Date setting, format DDMMYY (i.e., 230821 = 23. 08. 2021)	1.1.2001

NOTE *The time/date information is used by parameters P20 to P34 to record the exact moment of the fault, end of delivery, change of dispenser control mode…, etc. The date/time data has only an informative function, it does not affect the process of fuel delivery.*

NOTICE *The internal clock is reset at least 5 days after the power supply off. Time and date values will switch to factory setting and must be set again!*

4.1.10. DISPLAYING THE PROGRAM VERSION AND CHECK SUMS (P05)



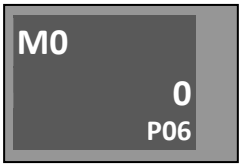
This function shows the number of the program version of the dispenser counter and different check sums. These values are intended for metrology authorities and authorized service engineers. The meaning of the individual parameters is described in the table below.

Parameter	Meaning
P05-1	Version of the metrologically relevant part of the program. It is specified in the type certificate (e.g., 102 = version V1.02)
P05-2	CRC (check sum) of metrologically relevant part of the program. It is specified in the type certificate (e.g., dbd2 FFA4)
P05-3	Version and release of the whole program (e.g., 1.02 release 14)
P05-4	CRC of the whole program (e.g., 27E6 622d)
P05-5	CRC of the temperature sensors unit PDEINP1 program (for temp. sensors 1 to 4). If not present „ - - - - “ is displayed
P05-6	CRC of the temperature sensors unit PDEINP1 program (for temp. sensors 5 to 8). If not present „ - - - - “ is displayed
P05-7	Date and time the program compilation. The first line shows the time (hhmmss) and the second the date (DDMMYY).
P05-8	CRC of the program of the pressure sensors unit PDEDPS with address 1. If not present, "- - - -" is displayed
P05-9	CRC of the program of the pressure sensors unit PDEDPS with address 2. If not present, "- - - -" is displayed
P05-10	CRC of the program of the pressure sensors unit PDEDPS with address 3. If not present, "- - - -" is displayed
P05-11	CRC of the program of the pressure sensors unit PDEDPS with address 4. If not present, "- - - -" is displayed

NOTE *Metrologically relevant data P05-1 and P05-2 also appear on the display for a while after the power on.*

NOTE *The calculated CRC (cyclic redundancy sum) values from sub-parameters 1 and 3 are checked after switching on. If the calculated checksum is different from the stored correct sum, the dispenser is blocked and error message E13 is displayed. Higher cyclic checksum orders are displayed on the amount line, lower orders on the quantity line. The CRC of the peripheral unit programs (PDEINP and PDEDPS) is checked before each delivery is enabled. If the calculated value of the peripheral unit checksum does not match the correct value, delivery (fuelling, pumping) is not started and the corresponding error message is displayed.*

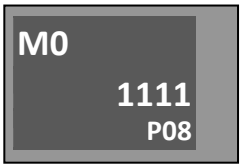
4.1.11. MODBUS INTERFACE ACTIVATION (P06)



The modbus interface (diagnostic data line) allows service organizations to remotely diagnose dispensers. Parameter P06 allows to activate the Modbus interface by entering a valid key (eight-digit code).

Parameter	Meaning	Factory setting
P06=0	The Modbus license is not valid. Modbus interface is not active	0
P06=1	The Modbus license is valid. Modbus interface is active	

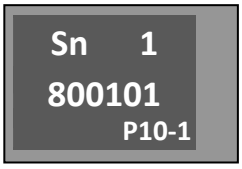
4.1.12. MANAGER MODE ACCESS PASSWORD (P08)



This function allows to view and change the password to the manager mode. The setting is made by pressing the **<E>** key by entering a new password in **<PPPP>** format and confirming **<E>**.

Parameter	Meaning	Factory setting
P08 = 1 to 9999	Manager mode access password	1111

4.1.13. SERIAL NUMBERS OF THE PERIPHERAL UNITS (P10)



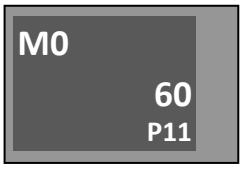
The parameter is used to display the serial numbers of the connected peripheral units. The actual serial numbers of the peripheral units are compared with the numbers stored in the processor unit memory. If a mismatch is detected, an error message is displayed and fuel delivery is not allowed. The list of periphearal units is below.

Example: *Parameter P10-1, serial number of the main processor unit SN: 18-00101 (see picture)*

Parameter	Peripheral unit	Error message in case of detected mismatch
P10-1	Main processor unit	
P10-2	Main temperature sensors unit PDEINP1 (for temp. sensors 1 to 4)	E83-1
P10-3	Auxiliar temperature sensors unit PDEINP2 (for temp. sensors 5 to 8)	E83-2
P10-4	Mass meter A	E84-1
P10-5	Mass meter B	E84-2
P10-6	Main displaying unit (Master) of filling point A	E80-1
P10-7	Auxiliar displaying unit (Slave) of filling point A	E80-2
P10-8	Main electromechanical totalizers unit (Master) of filling point A	E82-1
P10-9	Auxiliar electromechanical totalizers unit (Slave) of filling point A	E82-2
P10-10	Main displaying unit (Master) of filling point B	E80-1
P10-11	Auxiliar displaying unit (Slave) of filling point B	E80-2
P10-12	Main electromechanical totalizers unit (Master) of filling point B	E82-1
P10-13	Auxiliar electromechanical totalizers unit (Slave) of filling point B	E82-2
P10-14	Main displaying unit (Master) of filling point C	E80-1
P10-15	Auxiliar displaying unit (Slave) of filling point C	E80-2
P10-16	Main electromechanical totalizers unit (Master) of filling point C	E82-1
P10-17	Auxiliar electromechanical totalizers unit (Slave) of filling point C	E82-2
P10-18	Main displaying unit (Master) of filling point D	E80-1
P10-19	Auxiliar displaying unit (Slave) of filling point D	E80-2
P10-20	Main electromechanical totalizers unit (Master) of filling point D	E82-1
P10-21	Auxiliar electromechanical totalizers unit (Slave) of filling point D	E82-2
P10-22	Pressure sensors unit PDEDPS with address 1	E85
P10-23	Pressure sensors unit PDEDPS with address 2	E85
P10-24	Pressure sensors unit PDEDPS with address 3	E85
P10-25	Pressure sensors unit PDEDPS with address 4	E85

4.1.14. VAPOUR RECOVERY USER TEST DURATION – DRY TEST (P11)

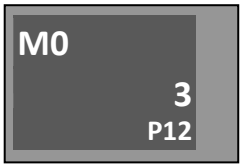
The parameter specifies the test duration in seconds for which the vapour recovery system vacuum pump will start after pressing the **<8>** button. The setting is made by pressing the **<E>** key by entering the test time in **<SSS>** format and confirming with the **<E>** key.



Parameter	Meaning	Factory setting
P11 = 5, 6...300	Dry Test duration in seconds	60 seconds

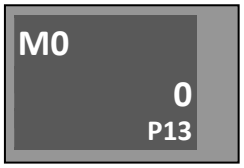
4.1.15. DISPENSER CONTROL MODE (P12)

The parameter defines how the dispenser is controlled.



Parameter	Meaning	Factory setting
12 = 0	<u>Automatic mode with remote control</u> The dispenser is remotely controlled by a control computer/controller via a data line. It starts fuel delivery only when an authorization command from the the control system (POS) is received. The authorization command includes the unit price of fuel for each refuelling, preset maximum price or quantity, and the product number. Fuel delivery will not start at zero fuel price, zero preset amount/volume or if the product number does not match. In the event of a communication failure, the dispenser locks up with error E18. Error E18 always occurs if no communication is detected for more than 3 seconds. After communication is established, the error disappears automatically.	0
12 = 3	<u>Manual mode</u> The dispenser is completely independent, not remote controlled. The data line is blocked. Unit fuel prices are controlled by parameter P03. If a special manual mode with locking after delivery or a mode with RELEASE signal control is not set, pumping will start immediately after the dispensing nozzle is picked up and the display is reset. Switching from automatic to manual mode can be blocked by switch SW1-2.	

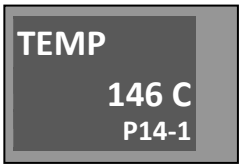
4.1.16. EXPORT OF PARAMETERS (P13)



To export the counter parameters from the memory to the memory card (SD card), press the **<E>** key, enter **<1>** and confirm with the **<E>** key. Before running the test, make sure that an SD card is inserted in the processor board. If the parameter export was successful, the message "done" will appear on the display. The file containing the parameters is saved on the card in the \CONFIG\EXPORT directory. When the data export is complete, the value of the parameter goes to the value 0.

Parameter	Meaning	Factory setting
P13=0	Idle status	0
P13=1	Export of parameters	

4.1.17. CURRENT PRODUCT TEMPERATURE (P14)

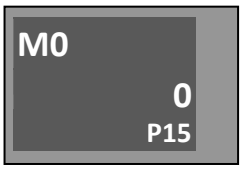


The function displays the current temperature of the fuel products measured by the temperature sensors in the hydraulic of the dispenser. The subparameter number corresponds to the nozzle/hose number, not the temperature sensor number. The update of the temperature values takes place continuously approximately once per second. The temperature is displayed to one decimal place, e.g., 146 = 14,6 °C.

Parameter	Meaning
P14-1	Temperature of the product assigned to nozzle/hose 1
P14-2	Temperature of the product assigned to nozzle/hose 2
...	...
P14-10	Temperature of the product assigned to nozzle/hose 10

NOTE *The number of nozzles/hoses displayed in parameter P14 is conditional on the set dispenser configuration. The system for marking dispensing hoses and products is described in Figure 77. If the temperature sensor is not connected, "- - -" will appear on the display.*

4.1.18. DAILY TOTALIZERS RESET (P15)



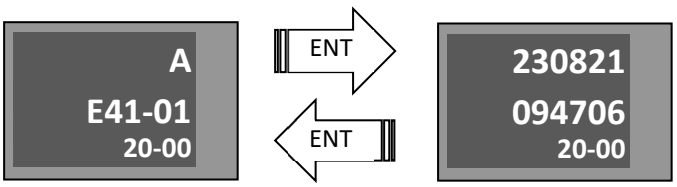
The parameter is used to reset all daily totalizers of dispensing hoses. After setting the parameter value to **<1>** and confirming (**<E> + <1> + <E>**), all totalizers that are part of parameters P01 and P02 will be reset to 0. The message "done" appears and the parameter value goes to 0.

Parameter	Meaning	Factory setting
P15=0	Idle status	0
P15=1	Daily totalizers P01 and P02 reset to 0	

4.1.19. ERROR MESSAGE CODES HISTORY (P20)

The function is used to display the history of the last 100 error message codes that have occurred and displayed on the dispenser. The table of error messages codes is given in chapter 0. After switching to parameter P20, the display shows the code of the last error message and the designation for the filling point where the error occurred A, B, C or D (e.g., E41-01 pulse generator connection error at input PUL1 for filling point A). After pressing the **<E>** key, the date and time of the fault will be displayed. After pressing the **<+>** key, the code of the penultimate error message code, etc. appears on the display.

Parameter	Meaning
(P)20-00	code of the last error
(P)20-01	code of the penultimate error
...	...
(P)20-98	99th error code in the sequence
(P)20-99	100th error code in the sequence

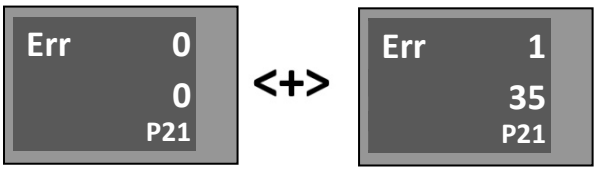


NOTE *If two identical error message code occur in a row, then only the last one is displayed.*

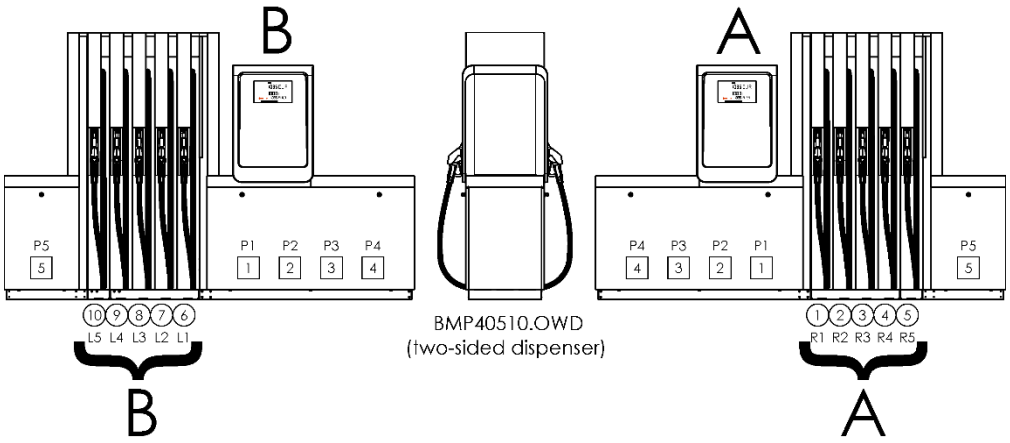
4.1.20. ERROR MESSAGE CODE STATISTICS OF FILLING POINT (P21, P22, P23, P24)

The parameter is used to display the cumulative numbers of individual error messages for a given filling point. The first line of the display shows the error message code and the second line the frequency of the error. After switching to parameter P21 (error message code statistics for filling point A), the display shows the fault frequency for error message code E0. After pressing the **<+>** key, the frequency of the error message code E1... etc... appears on the display. The table of error message codes is given in chapter 6.2.1.

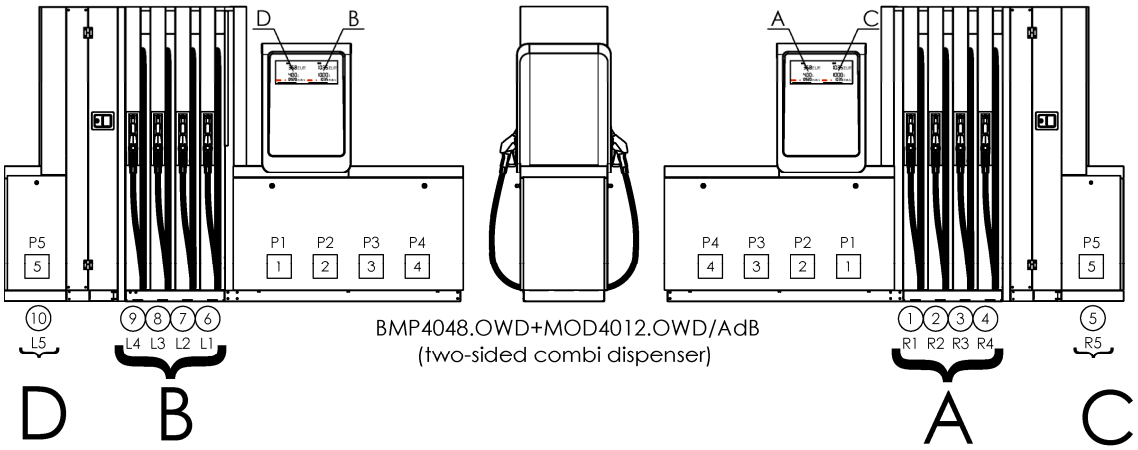
Parameter	Meaning
P21	Error message code statistics of filling point A
P22	Error message code statistics of filling point B
P23	Error message code statistics of filling point C
P24	Error message code statistics of filling point D



NOTE ***A filling point (dispensing site, dispensing point)*** *is defined as a place where one independent fuel dispensing (one pumping) can be performed. By default, a double-sided dispenser has two filling points - A and B (see Figure 79), a single-sided dispenser has one filling point - A. However, there are variants of dispensers, especially combined dispensers, where two simultaneous pumping can be performed on one side of the dispenser diesel + AdBlue). The double-sided dispenser then has four filling points A, B, C and D (see Figure 80) and the single-sided dispenser has two filling points A and B. Each filling point must have one main display and can serve one to five dispensing hoses.*



Picture 84 – Example of a standard dispenser with two filling points A and B
(two simultaneous deliveries, two main displays; ①,②,③ ... - nozzle position in electronic counter)



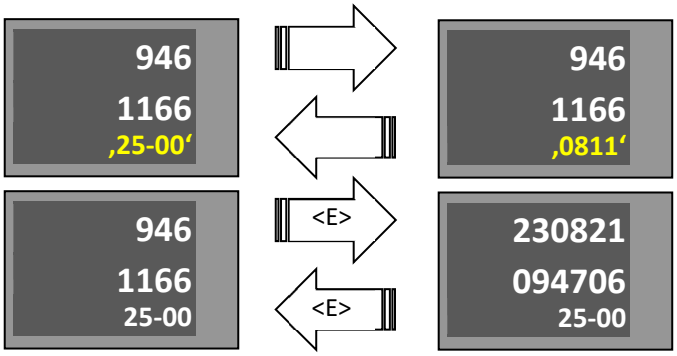
Picture 85 – Example of a combined dispenser with four filling points A, B, C and D
(four simultaneous deliveries, four main displays; ①,②,③ ... - nozzle position in electronic counter)

4.1.21. LAST FUELLING HISTORY (P25, P26, P27, P28)

The parameter is used to display the last 100 fuellings (deliveries) for a given filling point. After switching to parameter P25 (last fuelling history at filling point A), the display shows the last fuelling transaction. The transaction price with the parameter number flashes on the unite price display. After pressing the **<+>** key, the penultimate fuelling..., etc. appears. After pressing the **<E>** key, the date and time of the end of the saved fuelling will appear on the display.

Parameter	Meaning
(P)25	Last fuelling history at filling point A
(P)26	Last fuelling history at filling point B
(P)27	Last fuelling history at filling point C
(P)28	Last fuelling history at filling point D

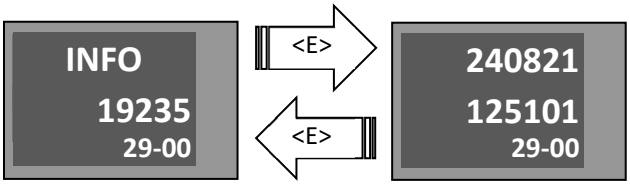
Example: Last fuelling at filling point A had a value of 11.66 L, 9.46 €, 0.811 €/L and was terminated 23.8.2021 at 9:47:06



4.1.22. MAINTENANCE HISTORY (P29)

The parameter allows you to display the identification codes of the last 50 service remote controllers that entered into service mode of the counter. After switching to parameter P29, the code of the last service remote controller (e.g., 19235) appears on the quantity display line. After pressing the **<+>** key, the penultimate remote controller code will appear. After pressing the **<E>** key, the date and time of entering the service controller into the setting mode of the dispenser counter will appear on the display (e.g., 24.8.2021 at 12:51:01).

Parameter	Meaning
P(29)-00	Code of the last remote controller
P(29)-01	Code of penultimate service controller
...	...
P(29)-49	Code of the 50th service controller in the sequence



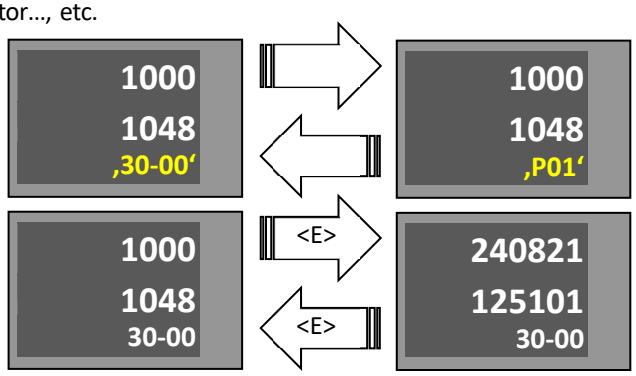
NOTE ***The yellow service remote controllers PDERT-5S*** *are used by authorized service personnel of TATSUNO EUROPE dispensers. The service controllers each have their own internal identification code, which is written into the memory of the dispenser counter when entering the service mode. Using parameter P29, it is therefore possible to find out who entered the service mode of the counter and when, i.e., to identify the service technician and the time of the service intervention.*

4.1.23. CORRECTION FACTOR CHANGES HISTORY (P30)

The parameter allows you to display the last 50 records of changes in the setting of correction factors of measuring devices (meters, pulse generators). After switching to parameter P30, the last record of the correction factor change appears on the display - the original correction factor appears on the amount display line, the new changed correction factor appears on the quantity display line, the measuring device number (P01, P02, ... P10) appears on the unit price display line and flashes with the parameter number and the sequence number of the correction factor change record. After pressing the **<+>** key, the penultimate record of the change of the correction factor..., etc. appears. After pressing the **<E>** key, the date and time of the correction factor change will appear on the display.

Parameter	Meaning
(P)30-00	Last record of the correction factor changes
(P)30-01	Penultimate record of the correction factor changes
...	...
P(30)-49	50th record of the correction factor changes

Example: *Last record (00) of the change of the correction factor of*



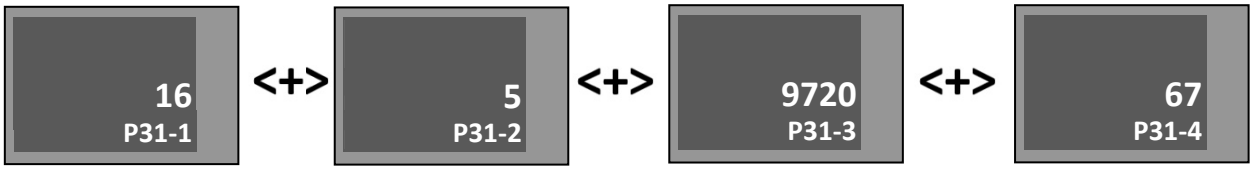
the measuring device P01, the original correction factor = 1,000, the new correction factor = 1,048, the date and time of the change of the correction factor = 24.8.2021 at 12:51:01)

NOTE ***The correction factor*** *(of meter, pulse generator …) is used in the metrological setting of the measuring device. Authorized service or legal metrology personnel will adjust it so that the measuring equipment complies with local regulations in terms of accuracy (MID guidelines, ….). The change of the correction factor is preceded by a removal of the metrological seal or sticker. After setting the factor, a new seal must be installed in the presence of a metrologist. Parameter P30 is used to check station owners and metrology officers.*

4.1.24. NUMBER OF EVENTS (P31)

The parameter is used to display the cumulative numbers of some important events, such as the number of correction factor changes, the number of peripheral unit serial numbers stored (i.e., the number of configuration saves), the number of counter starts (i.e., the number of power off), the number of service mode entries. After switching to parameter P31, the display shows the number of changes in the correction factors. After pressing the **<+>** key, the frequency of serial numbers..., etc. will appear on the display.

Parameter	Meaning
P31-1	Cumulative number of performed manual and automatic changes of the correction factor
P31-2	Cumulative number of peripheral unit serial number stores (= number of counter configuration stores)
P31-3	Cumulative number of power on counters (= number of power outages)
P31-4	Cumulative number of entries in configuration mode at the service level.

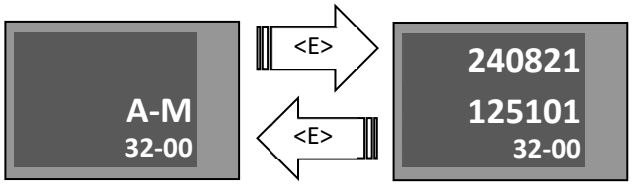


NOTE ***The serial numbers*** *of the peripheral units are stored during the installation and recovery of the new electronic counter of the dispenser, or after the replacement of some of its important parts (display, temperature sensor unit….). Entry into the service mode and removal of the metrological seal is necessary for storage.*

4.1.25. CONTROL MODE CHANGES HISTORY (P32)

The parameter allows to display the last 20 records about the change of the dispenser control mode, i.e., the change from manual to automatic mode and vice versa (see parameter P12). After switching to parameter P32, the last record of the change of the operating mode appears on the display - the amount display shows M-A (change from manual to automatic mode) or A-M (change from automatic to manual mode). After pressing the **<+>** key, the penultimate record of the change appears. After pressing the **<E>** key, the date and time of the mode change will appear on the display.

Parameter	Meaning
(P)33-00	Last change of the control mode
(P)33-01	Penultimate change of the control mode
…	…
P(33)-19	20th change of the control mode in the sequence



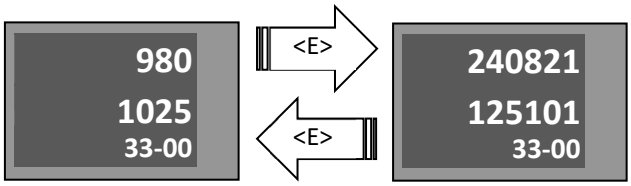
Example: According to the last record (00), the change from automatic to manual mode (A-M) took place on 24.8.2021 at 12:51:01.

NOTE *Monitoring of the change from automatic to manual mode is important. When fuel is fuelled in manual mode, POS-independent unit fuel prices are used and fuel dispensing data is not transmitted to the cash register. The transition from automatic to manual mode can be disabled by toggling switch SW1-2, which is protected by a seal.*

4.1.26. VAPOUR RECOVERY SYSTEM HISTORY (P33, P34)

The parameter is used to display the last 40 fillings on nozzles with activated vapour recovery for filling point A (P33) or B (P34). Records are only stored if the internal vapour recovery monitoring system is activated. After switching to parameter P33 (vapour recovery system history for filling point A), the display shows the vapour recovery values for the last delivery. The amount display line shows the percentage feedback factor value to one decimal place (see P36 for more information). The quantity display line shows the vapour / fuel ratio in percent with one decimal place. After pressing the **<+>** key, the penultimate filling appears. After pressing the **<E>** key, the date and time of the end of the saved delivery will appear on the display.

Parameter	Meaning
(P)33	Vapour recovery system history for filling point A
(P)34	Vapour recovery system history for filling point B

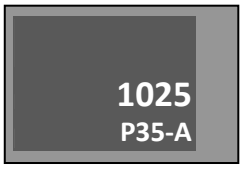


Example: According to the last record (00), fuel delivery took place on 24.8.2021 at 12:51:01, during which the vapor recovery feedback factor was 98.0% and the ratio of the volume of extracted vapours to the volume of flowed fuel was 102.5%

4.1.27. AVERAGE VALUE OF VAPOUR/FUEL RATION (P35)

The parameter is used to display the average value of the ratio of the volume of extracted vapors to the volume of fuel dispensed. The average is calculated from the last 40 fillings for filling points A and B. After switching to parameter P35, the display shows the average volume ratio value for filling point A (P35-A). The quantity display line shows the vapour/fuel ratio in percent with one decimal place. After pressing the **<+>** key, the average ratio value for filling point B (P35-B) appears.

Parameter	Meaning
P35-A	Average value of vapour/fuel ration for filling point A
P35-B	Average value of vapour/fuel ration for filling point A



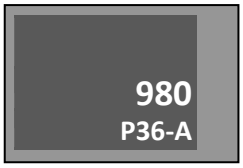
Example: The average value of the ratio of the volume of extracted vapours to the volume of dispensed fuel for filling point A is 102.5%

NOTE *The average value should be between 95% and 105%. If the value is lower than 95%, it probably means a problem with the vapor recovery vacuum pump or dirt in the VR piping. If the value is higher than 105%, then the regulation (VR solenoid valve) may not work properly.*

4.1.28. AVERAGE VALUE OF VAPOUR RECOVERY FEEDBACK FACTOR (P36)

The parameter is used to display the average feedback factor of the vapour recovery system. The average is calculated from the last 40 fillings for filling points A and B. After switching to parameter P36, the display shows the average value of the feedback factor for filling point A (P36-A). On the quantity display line, there is a percentage factor with one decimal place. After pressing the **<+>** key, the average factor value for filling point B (P36-B) appears.

Parameter	Meaning
P36-A	Average value of vapour recovery feedback factor for filling point A
P36-B	Average value of vapour recovery feedback factor for filling point B



Example: The average value of the vapour recovery feedback factor for filling point A is 98.0%

NOTE *If the factor value is less than 100%, it means that the feedback has reduced the flow of petrol vapor. Without feedback, the vapour/fuel ratio achieved would then be greater than 100%. If the value is higher than 100%, it means that the feedback increased the flow of gasoline vapours. Without feedback, the vapour/fuel ratio achieved would then be less than 100%.*

4.2. TBELTM COUNTER

The TBELTM electronic counter in the same way as the PDEX5 counter, see chapter 4.1, 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 PDEX5 counter (chapter 4.1). The difference is only in a few parameters - see below.

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

Parameter	Meaning	Corresponding PDEX5 parameter / Differences
01	Non-resettable quantity totalizers	P00
02	Daily quantity totalizers	P02 / quantity totalizers only
03	Product unit prices (in manual mode)	P03
04	Current time and date	P04
05	Program version and CRC (check sums)	P05
06	Error message code history	P20 / 100 error message code records
07	Fuelling history	P25 / 50 fuelling history records

Table 28 - List of parameters of the manager access mode of the TBELTM counter

Parameter	Meaning	Corresponding PDEX5 parameter / Differences
01	Non-resettable quantity totalizers	P00
02	Daily quantity totalizers	P02 / quantity totalizers only
03	Product unit prices (in manual mode)	P03
04	Current time and date	P04
05	Program version and CRC (check sums)	P05
06	Error message code history	P20 / 100 error message code records
07	Fuelling history	P25 / 50 fuelling history records
08	Manager mode access password	P08
09	Maintenance history	P29 / 50 records
10	Peripheral unit serial numbers	P10, see 4.2.1
11	- not used -	-
12	Dispenser control mode	P12
13	Error message code statistics	P21
14	Current product temperature	P14 / + temperature near the processor
15	Daily totalizers reset	P15

4.2.1. PERIPHERAL UNIT SERIAL NUMBERS (CODE 10)

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

Parameter	Unit	Error message code
10-1	Processor unit	
10-2	Main displaying unit (Master)	E80
10-3	Auxiliary displaying unit (Slave)	E81
10-4	Electromechanical totalizers unit	E82
10-5	Temperature sensors 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 error message code will appear on the display (see column Error message code in the table). Changing serial numbers is only possible in a service mode by the authorized employee after previous metrological seal damage.*

4.3. PDEX COUNTER

The PDEX electronic counter is the historical predecessor of the PDEX5 counter. It is set very similarly to the PDEX5 counter, see chapter 4.1, with the same remote controllers PDERT-5S (service) and PDERT-5O (manager). Using the controllers, it is possible to perform:

- 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 PDEX counter is almost identical to the same mode of the PDEX5 counter. The only difference is in the numbers of the individual parameters. Below tables describe the lists of operator and manager parameters of the PDEX counter. The last column in the table indicates the corresponding parameter of the PDEX5 counter, see chapter 4.1.

Table 29 - List of PDEX counter operator access mode parameters and differences from PDEX5

Parameter	Meaning	Corresponding PDEX5 parameter / Differences
01	Non-resettable quantity totalizers	P00
02	Daily quantity totalizers	P01, P02
03	Product unit prices (in manual mode)	P03
04	Current time and date	P04 / backup time = max 5 days
05	Program version and CRC (check sums)	P05
06	Error message code history	P20 / 10 records for filling point A and B
07	Fuelling history	P25, P26 / 10 records for filling point A and B

Table 30 - List of PDEX counter manager access mode parameters and differences from PDEX5

Parameter	Meaning	Corresponding PDEX5 parameter / Differences
01	Non-resettable quantity totalizers	P00
02	Daily quantity totalizers	P01, P02
03	Product unit prices (in manual mode)	P03
04	Current time and date	P04 / backup time = max 5 days
05	Program version and CRC (check sums)	P05
06	Error message code history	P20 / 10 records for filling point A and B
07	Fuelling history	P25, P26 / 10 records for filling point A and B
08	Manager mode access password	P08
09	Maintenance history	P29 / 10 records without time/date stamp
10-11	- not used -	-
12	Dispenser control mode	P12/it is not possible to disable the transition from automatic to manual
13	Error message code statistics	P21, P22/ common statistics for filling points A and B
14	Current product temperature	P14 / + temperature near the processor
15	Daily totalizers reset	P15
16	Working check number	-
17	Display intensity control	-
18	Display text messages	-
19	Display segment error	-

4.4. 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

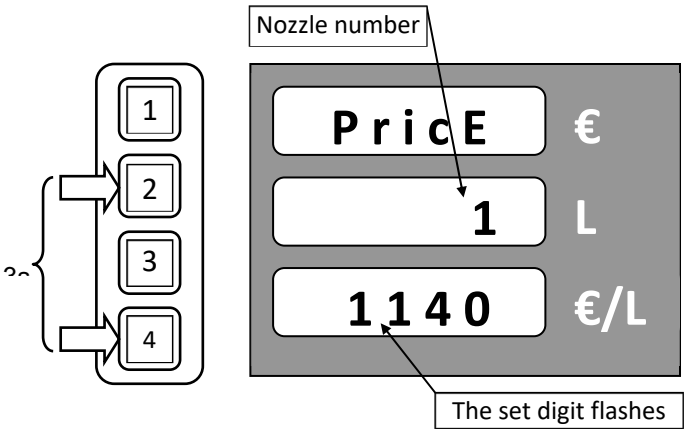
4.4.1. SETTING THE FUEL UNIT PRICE

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.

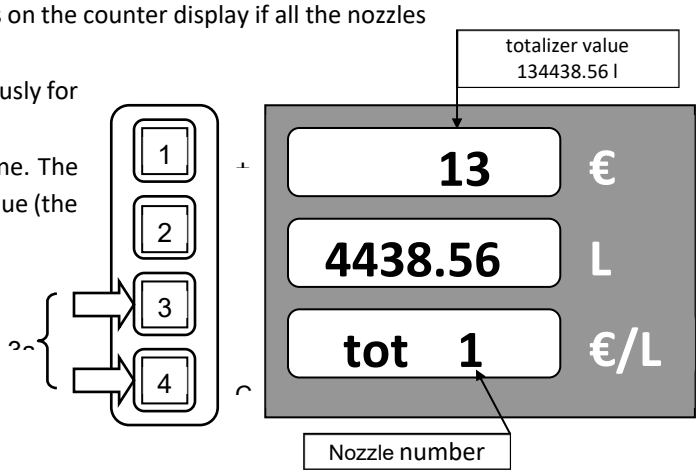


4.4.2. READING ELECTRONIC TOTALIZERS

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).

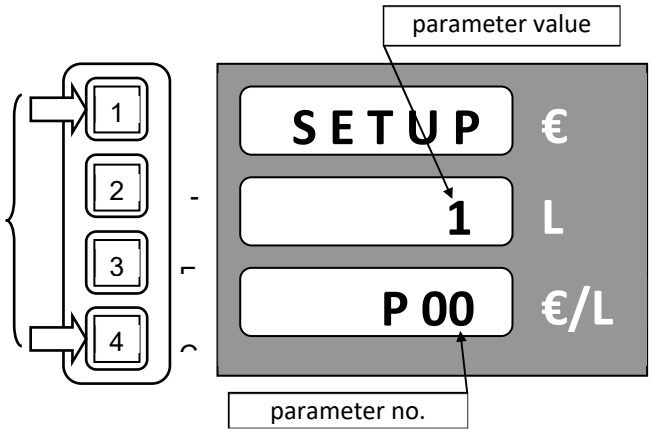


4.4.3. CHANGE OF THE WORKING MODE

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-LPG *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

ON/OFF switching 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:

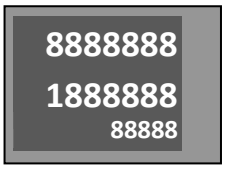
- The power supply of pump electric motors and suction vacuum pumps if included in the dispenser
- Power supply of the dispenser electronic counter, switching and heating circuits

Both power points are secured by the circuit breakers that enable the dispenser to be switched on/off.

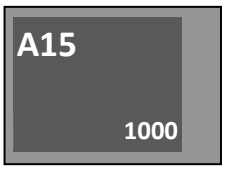
RECOMMENDATION ***We recommend that you turn on the dispenser as follows:***

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

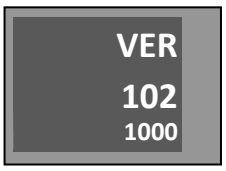
The following processes occur when the power of the PDEX5 counter is turned on:



- **test of display units** (displays). The backlight of the displays lights up and then all display segments are displayed (eights)) for approx. 1 second



- **time delay** when the counter is switched on. Time required to start the multimedia display. During the time delay, the displays show the filling point to which the display is connected A, B, C or D and the time in seconds remaining until the electronic dispenser counter is activated. The length of the time delay (15) can be set by the counter parameter, by default it is without delay. The positions of switches SW1-1, SW1-2, SW1-3 and SW1-4 are displayed on the unit price line (1=ON; 0=OFF). If switch SW1-1 is in position 1, then the selected metrological parameters cannot be set on the counter.

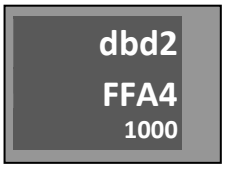


- **processor unit test.** Ten-second test in which all functions and memory of the processor unit are checked. During the test, the side of the counter to which the display is connected (A, B, C or D) is displayed, and:

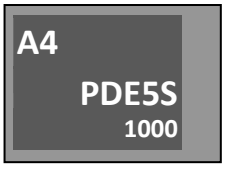
  - version of the metrologically relevant part of the program (VER 1.02),

  - checksum of the metrologically relevant part of the program (dbd2 2FA4).

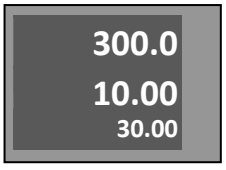
  - processor board type PDE5S or PDE5L



- **setting the counter status** before switching it off. The information that would appear on the display before the counter was last turned off is displayed. If the counter was operating in manual mode, then it is possible to start pumping immediately after picking up the gun. If the counter was operating in automatic mode, it waits for communication with the control computer to be established and, if necessary, for the transaction to be terminated (payment), if it was not terminated regularly before switching off.



Now the dispenser is ready for fuel delivery.



NOTE *The above-mentioned start of the electronic counter is described for the PDEX5 counter. The course is very similar for PDEX, TBELX and TBELTM counters. The version and checksum of the metrologically relevant part of the program and the status of switch SW1, which is covered by a cover and provided with a seal against misuse, are always displayed.*

5.2.1. ADBLUE DISPENSER COMMISSIONING

CAUTION-ADBLUE

All AdBlue® dispensers are tested and metrological verified during production. The test medium for these tests is water, which even after draining the dispenser partially adheres to the hydraulic system (pipes, meter, valve…) and can spoil the first AdBlue® deliveries to vehicles. **After installing the dispenser, it is therefore necessary to flush the hydraulic system of the dispenser with at least 10 to 20 L of AdBlue and then discard this initial dose - e.g., by diluting it with water and pouring it into the sewer system.**

5.2.2. CNG DISPENSER COMMISSIONING

Setting of mass flow meter zero-point

All CNG mass flow meters based on the principle of the Coriolis effect are sensitive to the setting of zero (zero flow rate) because with a decreasing flow rate the measuring error increases. The setting of zero must be carried out after every dispenser installation and every meter exchange. The dispenser counter allows carrying out the procedure of setting the zero-point using the service remote controller. The following procedure is intended for authorized service engineers or metrology officials only:

- **Close input ball valves** at the dispenser inlet and hang the filling nozzles onto the dispenser (filling nozzles must be in the nozzle boot during the zero-point setting process)
- The calibration switch SW1-1 must be in the OFF position.
- Set the parameter **P97 to value 1** to activate the procedure for setting the zero-point. The counter sends a command for setting the zero-point to the mass meter. Subsequently, the counter waits for a response from the mass meter. It then ones send information that the zero-point was set with the message “done” or was not set with the message “fail”.

Don’t exit setup until the zero-point setting procedure reports “done”!

NOTICE-CNG *If the zero-point value is not correct, or the process of zero-point not passed correctly then new filling is not allowed and error message E74 is appeared).*

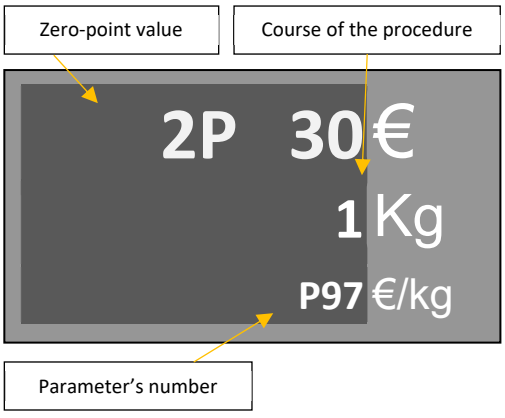
NOTICE-CNG *The amount display (€) shows the current value of the zero-point. The quantity display (kg) shows the course of the zero-point setting procedure.*

NOTICE-CNG *In the CNGmass (Endress&Hauser) meter, the course of the procedure is signaled by an increasing number 1 - 99. After reaching the value 99, the process is terminated, and the message "done" is shown.*

- Exit service mode by pressing <R> on yellow service remote transmitter change position of switch SW 1-1 to ON (PROTECTED)
- Open ball valves valves at the dispenser inlet.

Mass meter configuration

When the mass meter is installed into new dispenser or when the mass meter is changed to another one, it must be configured by the calculator TBELTM. This configuration is necessary to perform via parameter P99 = 4444. Function is enabled only in case when switch SW1-1 is in position OFF only (NOT PROTECTED). Switch SW1-1 is placed in the centre of the TBELTM processor unit and protected by the sealed metal cover. After start of function P99 = 4444 the counter sends the necessary parameters to the mass meter (see tables).



NOTICE-CNG *After start-up of calculator TBELTM and before every delivery transaction are checked values of the registers inside mass meter if they are equal with values saved in calculator memory. If not, error code E74 is appeared on display and delivery is not allowed. To disable the error is necessary to perform function P99 = 4444 again.*

NOTICE-CNG *To run function mass meter configuration is necessary to press <R> on yellow service remote transmitter PDERT-5S, enter service password (factory setting 11111111) followed by key <E>. In Service mode of calculator is necessary to press 99 with <E> to go on parameter 99 and after press <E> again, enter value 4444 and <E>. If function passed OK then message „done "appeared for a while.*

Table 31 – Registers of Micro Motion mass meter type CNG050

Micro Motion CNG050	
Register	**Value**
Measurement unit for mass total	kg
Measurement unit for volume total	L
Measurement unit for mass flow	kg/min
Measurement unit for volume flow	L/min
Density measurement unit	kg/m³
Temperature measurement unit	°C
Flow direction	bidirectional
Mass flow scale factor	according parameter P44
Volume flow scale factor	according parameter P44
Mass flow cut off	0,055 kg/min
Volume flow cut off	0,01 L/min
Flow dumping	0 s
Update rate	100 Hz
Slot address register	Addresses of registers in order: - mass flow - volume flow - density - temperature - mass total - volume total - diagnostic integer register 0001 - diagnostic integer register 0125 - diagnostic integer register 0419 - diagnostic integer register 0420 - diagnostic integer register 0421 - diagnostic integer register 0422 - diagnostic integer register 0423
Present flow signal offset at zero flow	Note: This value is stored after zero-point adjustment procedure, see later.
Sensor serial number	Number stored during Serial number storage procedure

Table 32 – Registers of Endress Hauser mass meter type CNGmass

Endress Hauser CNGmass	
Register	**Value**
Totalizer #1 assign	Mass flow
Totalizer #2 assign	Volume flow
Totalizer #1 mass unit	kg
Totalizer #2 volume unit	L
Totalizer #1 measuring mode	forward
Totalizer #2 measuring mode	forward
Unit mass	kg
Unit volume	L
Unit mass flow	kg/min
Unit volume	L/min
Unit density	kg/m³
Unit temperature	°C
Instl. dir. sensor	forward
m. factor mass flow	according parameter P44
m. factor volume flow	according parameter P44
m. offset mass flow	0
m. offset volume flow	0
m. factor density	1
m. offset density	0
m. factor temperature	1
m. offset temperature	0
Assign low flow cut off	mass flow
On value low flow cut off	0,055 kg/min
Flow dumping	0 s
Auto scan buffer	Addresses registers in order: - mass flow - volume flow - density

Endress Hauser CNGmass	
	- temperature - totalizer #1 sum - totalizer #1 overflow - totalizer #2 sum - totalizer #2 overflow
Zero-point	Note: This value is stored after zero-point adjustment procedure, see later.
Serial number	Number stored during Serial number storage procedure

5.3. DISPENSER OPERATION

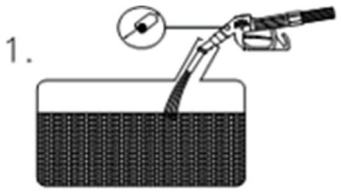
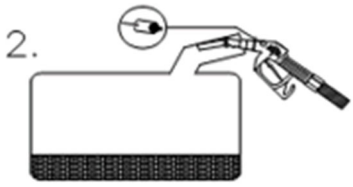
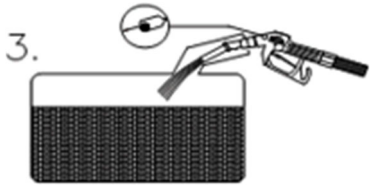
NOTICE ***The operator is responsible for the operation of the fuel station*** *and it is his duty to monitor the delivery of fuel and, in the event that the customer performs unauthorized operations at the self-service dispensers, he must instruct the customer about proper handling. The operator is 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 33 - Delivery nozzle positions during delivery

1. 	**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.
2. 	**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
3. 	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 locate done 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. 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. In 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 below

Table 34 - 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 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 logbook 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.

5.3.4. 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.*

5.3.5. 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 volume 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 0

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 volume of extracted vapours with the volume of filled 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.

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.*

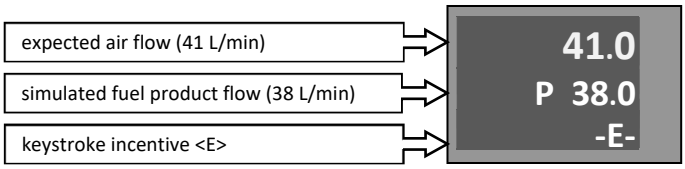
5.3.6. VAPOUR RECOVERY SYSTEM TEST

The PDEX or PDEX5 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 POS. It is therefore a so-called dry test, in which the fuel flow is only simulated. Only a manager service remote controller is required to run the test. To measure the air flow through the fume extraction system, a gas meter with a dispensing nozzle adapter must be used, for example TATSUNO VAPOR

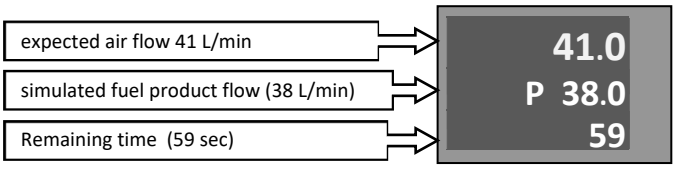
RECOVERY KIT (TATSUNO EUROPE) or SELF ADAPTION SET FOR VAPOR RECOVERY type MKNE-1094 (BÜRKERT) - see Figure 83.

Test progress:

1) Before performing the test, it is necessary that the filling point is at idle state, i.e., all nozzles are in nozzle boots and the last transaction paid. Press the **<8>** key on the manager or service remote control to start the test mode. The quantity display line displays the value of the simulated fuel flow, whose default value $\overline{Q_K}$ = 38L/min. If we want to set a different value of the simulated fuel flow, then use the **<+>** and **<->** keys to change the value ± 0.5 l/min, or use the **<>>** and **<<>** keys to change the value ± 5.0 l/min. The amount display line shows the required air flow $\overline{Q_a}$ through the vapour recovery system $\overline{Q_a} = \overline{Q_K} . k$, (e.g., 41.0 l/min = 38.0 l/min x 1.08). The value of the correction factor "k" is stored in parameter M12-P02 (in the case of the PDEX5 counter) or in parameter P77 (in the case of the PDEX counter).

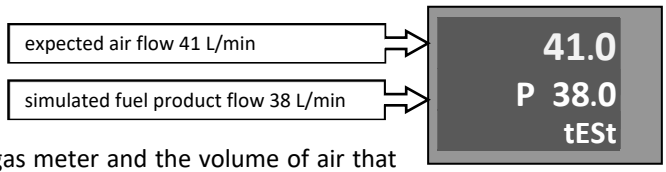


2) Remove the nozzle from the holder and place the reference gas meter adapter on the nozzle (see Figure 83, UMAX2 adapter). If an Elaflex nozzle is fitted, place it in the same position with the nozzle down to open the ON/OFF valve inside the nozzle. In the case of a Tatsuno nozzle, place a magnet on top of the nozzle to open the ON/OFF valve inside – see Picture 81.



3) Read the volume value on the gas meter and press the **<E>** key. The vacuum pump will start for the time set in parameter M0-P11 (factory setting = 60 seconds). At the same time, the corresponding VR proportional valve opens to the value corresponding to the set simulated fuel flow $\overline{Q_K}$. Air begins to flow through the vapour recovery system. The set time will count down to 0 on the unit price display line.

4) At the end of the test period, the test ends, i.e., the vacuum pump is switched off and the proportional valve closes. The new test can be started by pressing the **<E>** key again. The value of the air volume after the test is read from the gas meter and the volume of air that flowed during the test is calculated.



Test evaluation:

The equations apply to determine the vapour/fuel ratio R

$$R = \frac{V_a}{t \cdot k \cdot \overline{Q_K}}$$

Picture 86 – Position of the magnet for VR valve opening (TATSUNO ULTRA nozzles)

where:

R … is the vapour/fuel ratio;

t ... is the test duration in minutes (default duration is 1 minute);

V_a … is the volume of air that flowed through the gas meter during the test in litres;

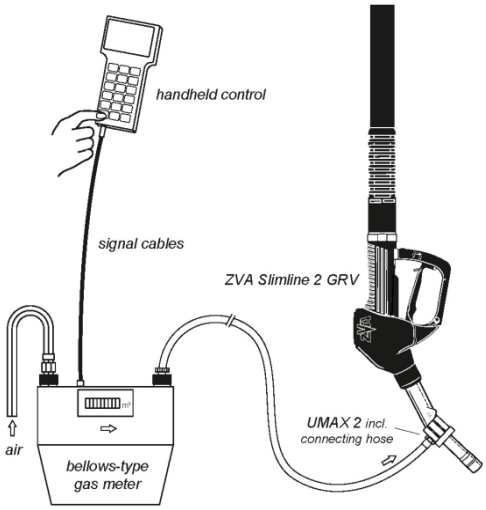
$\overline{Q_K}$ ... is the simulated fuel flow in litres per minute;

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

The vapour recovery system is OK if the ratio of vapours and fuel R is in the range 0.95 to 1.05.

NOTICE *It is essential that the vacuum pump is warmed up to operating temperature for the test to be performed correctly. Therefore, it is necessary to perform one "empty" test before the measured test.*

NOTICE *To comply with all conditions of EN 16321-2: 2013, it is necessary to ensure that the ambient temperature during the test is in the range of +5°C to +25°C and the measuring gas meter is calibrated in the working range of 10 l/min to 60 l/min. with an accuracy of max. 2%.*

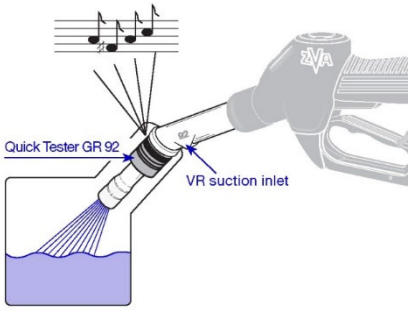


Picture 87 - Connecting the delivery nozzle with an adapter and gas meter

A simple function test is used to verify that all components of the vapour recovery system are working, i.e., the vacuum pump is pumping, the VR pipes are not clogged, the solenoid valve and the dispensing nozzle valve open.

Procedure for a simple function test of the vapour recovery system:

1) All nozzles on the tested part of the dispenser are hung up and the filling point has a completed and paid filling (transaction). Pick up the nozzle for which is necessary to verify the functionality of the vapour recovery and instead quickly insert a spare nozzle or magnet so that the delivery does not start and the dispenser remains at idle status.
2) Attach an adapter - whistle (Quick Tester GR92 - see Picture 83) to the picked-up dispensing nozzle. Then hang the dispensing nozzle downwards with the outlet spout to open the internal ON/OFF vapour recovery valve.
3) Press the **<8>** key on the manager or service remote controller. The screen (1) will appear on the display - see previous test.
4) Press the **<E>** key. The vacuum pump starts for the time set in parameter P11 (factory setting = 60 seconds). At the same time, the corresponding proportional valve (VRA or VRB) opens and air flows through the dispensing nozzle. The set time up to 0 will be counted down on the unit price display line.
5) At the end of the test period, the test ends, i.e., the vacuum pump is switched off and the valve is closed. The new test can be started again by pressing the **<E>** key.



Picture 88 – Functional recuperation test with Quick Tester GR 92 adapter

Test evaluation:

The vapour recovery system is functional if a whistling sound is heard from the adapter during the test, see Picture 83 - which is proof of the air flowing through the entire recuperation system.

NOTE *The Quick Tester GR 92 adapter is manufactured by ELAFLEX (Germany). If an adapter is not available, the functionality of the recuperation system can also be verified with a plastic bag, which is wrapped around the neck of the nozzle and which deforms*

(vacuums) during the test.

5.3.7. 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 ±0.15°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 or for LPG – see tables below. 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.

Table 35 - Volume values for selected liquid fuels at temperature T and dispensed volume V_n = 100 L

Liquid	ρ_0 [kg/m³]	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 36 - Volume values for various ratios of liquefied propane butane at temperature T and dispensed volume V_n = 100 L

%Propane / %Butane	ρ_0 [kg/m³]	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

5.3.8. 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 4.1.8 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.

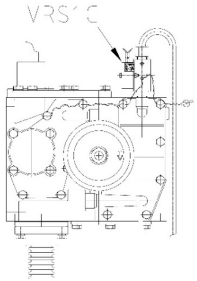
In case you have to switch the dispensers from automatic to manual mode - e.g., because of a crash in the control system, you have to do the following:

- **PDEX5 counter (PDEX, TBELTM)**. It is necessary to change the value of parameter M0-P12 (P12) from value 0 to value 3 using the IR remote control and to check the setting of unit prices in parameter M0-P03 (P03) – see chapters 4.1.8, 0 and 4.3
- **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.

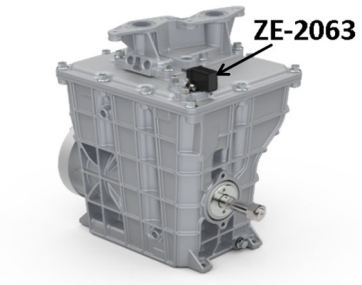
NOTICE *The switch from the automatic to manual mode must be discussed with the service engineer in advance!*

5.3.9. AIR SEPARATION SENSOR (VRS1.G & ZE-2063)

According to type certificate TCM 141/07-4491, all TATSUNO pumps for diesel and biodiesel must be equipped with air separation sensor. The VRS1.G flow sensor is mounted on the air separator of the TATSUNO FP-1001 pumping monoblock, the ZE-2063 flow sensor is a part of the TATSUNO FP-1022 monoblock. If the volume of separated air is higher than the volume that the pump monoblock is able to safely separate, then the air flow sensor and subsequently the corresponding input (BL1… BL4) on the counter processor unit are activated. The counter interrupts delivery (pumping) and error E51 appears on the display.



Picture 89 - Pumping monoblock FP-1001 with air flow sensor VRS1.G



Picture 90 – ***Pumping monoblock FP-1022 (MVP-X) with air flow sensor ZE-2063***

The procedure of dispenser locking and declaring an error is as follows:

A critical amount of air is sucked into the pump monoblock (e.g., if the suction line is broken). The VRS1.G sensor is activated and the BL input goes to the active state, then for a test time of 1 to 50 seconds (standard 10 sec.) the counter performs the first test cycle, i.e., closes the valve as when pumping to the preselected volume (flow approx. 2 to 5 L / min) and monitors the status of the BL input when the pump motor is running. If the BL input goes to the inactive state during the T_{test} time, then the valve opens fully and pumping continues. If the sensor status does not change during the T_{test} time and remains active, then the pumping is stopped and error message code E51 is displayed. The number of "successful" cycles, i.e., cycles where no error E51 occurs, is limited to 3 by default during one filling. After exceeding the maximum number of test cycles, the pump is terminated and error message code E52 occurs.

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

5.3.10. AIR VENT

To check air ventilation flow (air separation) drop end of air vent tube in a small vessel with fuel – the same fuel as tank. Start the pump in by-pass mode by removing the nozzle from its holder and let it run for a while before opening the nozzle.

- When bubbles appear constantly, it means that there is an air entry in the pump or the installation before the pump.

NOTICE *1) Put the tube not too deep in vessel. 2) If the end of the vent pipe is difficult to reach then try feel with you hand if a stream of air or vapour is expelled from the vent.*

5.3.11. PRESSURE DIFFERENCE CONTROL AT LPG DISPENSERS

During LPG filling, the pressure of the liquid phase which is charged to the vehicles must be at least **one bar higher** than the pressure of the gas phase which is returned to the storage tank. If this condition is not met, the correct function of the gas phase separator and thus the accuracy of the measurement is not guaranteed. The dispenser counter (PDEX5) allows you to check the value of the difference between the liquid phase pressure and the gas phase pressure in two ways:

- by using a differential pressure switch (TRAFAG pressostat)
- using two pressure sensors of the pressure measuring unit (PDEDPS)

The differential pressure-dependent filling control function is the same for both types of sensing. If the gas phase pressure is not at least one bar lower than the liquid phase pressure, the correct function of the separator is not ensured and the counter automatically throttles or closes the solenoid valve completely (according to the setting of service parameter M10-P05). If the pressure conditions do not equalize within the time set by parameter M10-P03, the LPG filling is terminated and error message E86-1 is displayed. If the pressure difference rises above one bar again during the time given by parameter M10-P03, the valve opens and LPG filling continues. During one delivery, the pressure difference can drop a maximum of three times. When the pressure difference drops for the fourth time, the delivery is stopped and error E86-2 is displayed. The most common cause of the decrease in pressure difference is the tightness of the gas phase return pipe due to impurities or freezing, or a long unprotected pipeline exposed to high temperatures, in which the liquid phase is gasified and the efficiency of the separator is insufficient.

5.3.12. PRESET KEYPAD

TATSUNO EUROPE dispensers may be equipped with a so-called preselection keypad enabling preset the delivered amount or quantity (volume or weight) 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. The dispensers can be equipped with the following two types of preselection keypads (see pictures below):

- 4-key preset keypad with 3 fixed amount or volume values (3 values of the buttons can be freely set using the service parameters of the counter)
- 12-key preset keypad that allows to enter any value for a preset amount or volume

Picture 91 – 4buttons preset keypad

Picture 92 – 12buttons preset keypad

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

a) Example of entering the pre-selection in Euros

- The customer arrives to the dispenser and wants to deliver fuel for €10.
- a) Press the **<5€> key twice** on the 4-key preset keypad
  b) Press the **<1> <0> keys** on the 12-key preset keypad
- 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 entering pre-selection in litres

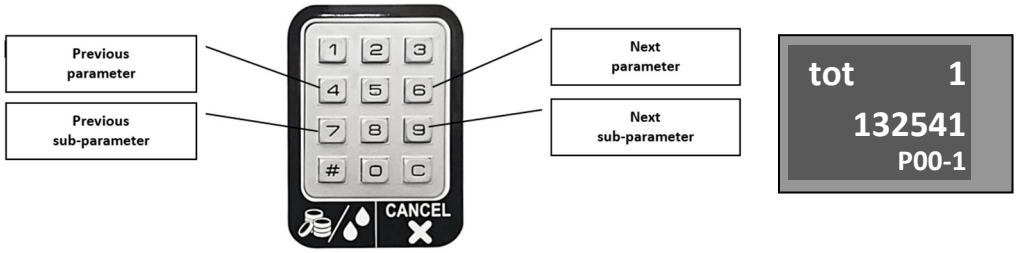
- The customer arrives to the dispenser and wants to refill 20 litres of fuel.
- a) Press the **<10L> key twice** on the 4-key preset keypad
  b) Press the **<2> <0> <#> keys** on the 12-key preset keypad
- He/she selects the product he/she wants to deliver, lifts the delivery nozzle from the dispenser 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.

5.3.13. USING THE 12-KEY PRESELECTION KEYBOARD TO DISPLAY AND SET PARAMETERS

If the dispenser is equipped with a 12-button preselection keyboard, then it is possible to enter the operator or manager mode of the dispenser and read or set parameters in the M0 menu.

Operator mode

- Hang all dispensing nozzles. The dispenser must be in the "idle" state.
- Press the <**1**>, <**2**> and <**3**> buttons simultaneously and hold them down for at least 3 seconds.



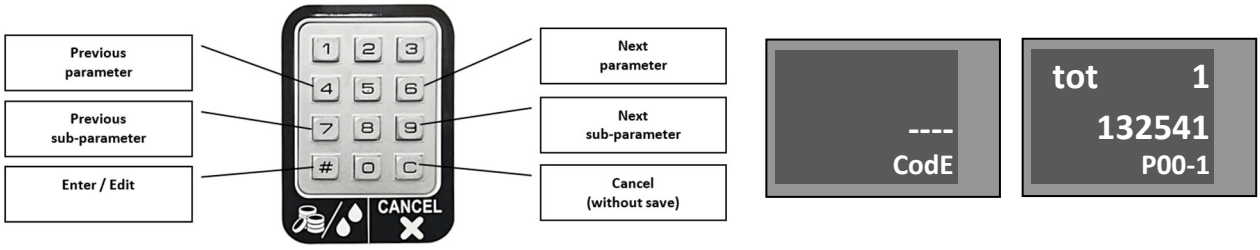
The the value of non-reset quantity totalizer for nozzle #1 will appear on the display.

- Select the parameter number using the <**4**> or <**6**> key.
- Select a sub-parameter (nozzle number, product number...) using the <**7**> or <**9**> key.
- Read the value of the required parameter.
- To exit the configuration mode, press and hold the <**1**>, <**2**> and <**3**> keys.

NOTE *To use the 12-key keyboard to enter the operator or manager mode of the dispenser, it is necessary to set the service parameter P9-23 to the value 1. Details on setting the dispenser parameters are in chapter 4.1*

Manager mode

- Hang all dispensing nozzles. The dispenser must be in the "idle" state.
- Press the <**3**>, <**5**> and <**7**> buttons simultaneously and hold them down for at least 3 seconds.



A prompt to enter the manager access password will appear on the display

- Enter the 4-digit management password and confirm with the <**#**> key. Dashes will appear on the display instead of the password. After successfully entering the password, the dispenser counter will go to the M0 management menu, and the value of the non-reset quantity totalizer parameter for nozzle #1 will appear on the display.
- Select the parameter number using the <**4**> or <**6**> key.
- Select a sub-parameter (nozzle number, product number...) using the <**7**> or <**9**> button.
- Open the parameter for editing by pressing the <**#**> key.
- Enter a new parameter value and confirm with the <**#**> key.
- To exit management mode, press and hold the <**3**>, <**5**> and <**7**> keys

5.3.14. "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 L/min) and trucks (Q_{max} = 80 L/min).

Functional principle:

- 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.

- 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.

5.3.15. "MIN" BUTTON FOR DELIVERY CONTROL

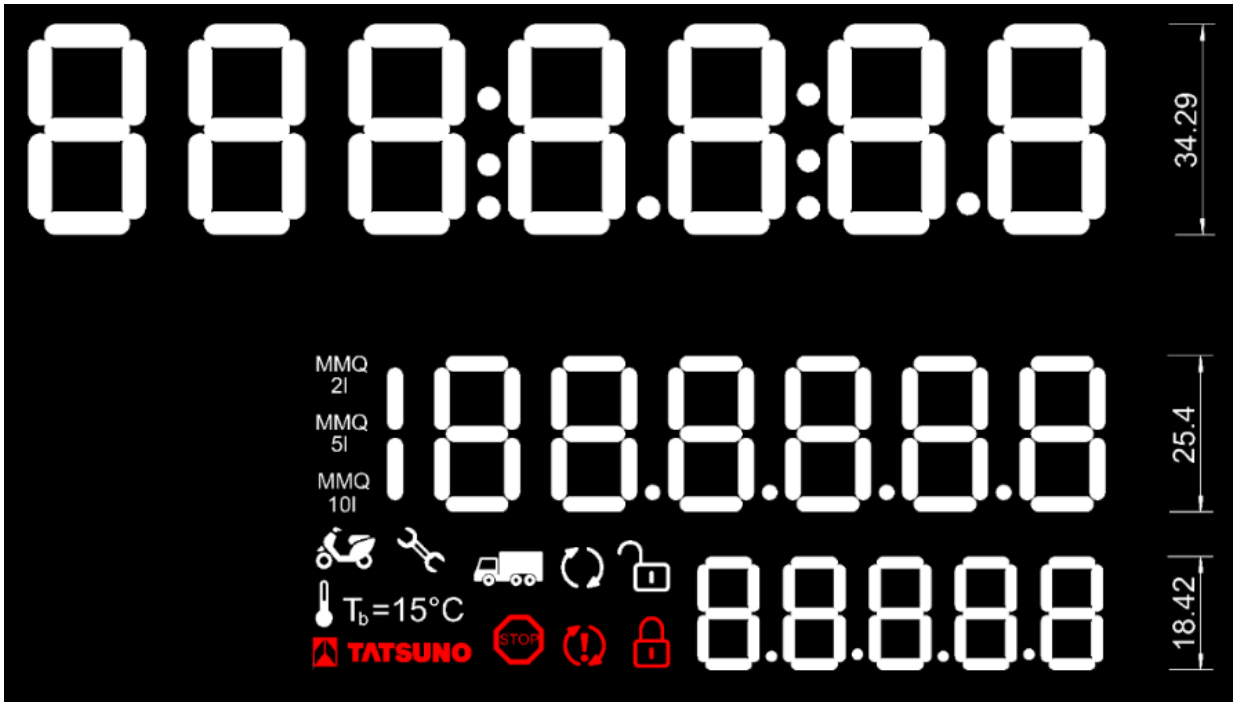
For fuel dispensers, the "MIN" button on the display of the dispenser is used to control the fuel flow in the delivery hose, especially when pumping fuel into small motorcycles or small containers (Q_{min} = 4 - 6 L/min).

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.

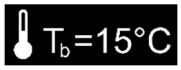
The limited flow value Q_{lim} can be set for each delivery hose using the counter parameter.

5.3.16. DESCRIPTION OF THE PDEDIL 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

Display segment	Function	Note
	Minimum Measured Quantity	- the display is set by parameter P91 for each delivery hose
	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 5.3.14) or the MIN button is pressed (see 5.3.15).
	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 5.3.5)
	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 0)

5.3.17. 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!***

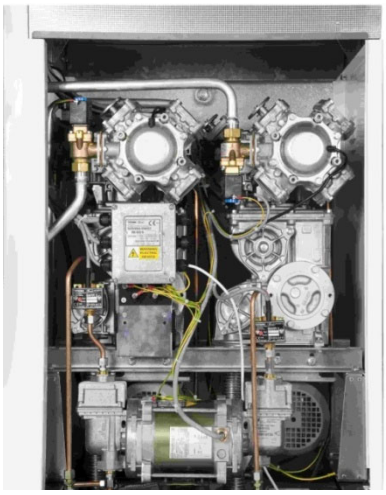


Figure 93 - Uncovered dispenser, side B

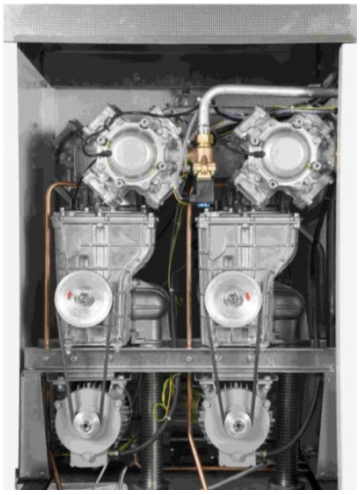


Figure 94 - Uncovered dispenser, side A

CAUTION ***The belt between the motor and the pump (e.g., suction vacuum pump) is antistatic and cannot 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).

WARNING ***It is forbidden to clean the painted parts of the dispenser with chlorine-based products!!! Chlorine-containing products (disinfectants such as SAVO) cause corrosion of metal parts of the dispenser.***

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)*

WARNING ***Do not wash stainless steel covers with detergent and chlorine-based products!!!***

6.1.2. MAINTENANCE OF THE CNG DISPENSER/MODULE

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

Table 37 - Maintenance schedule for the CNG dispenser/module (according to ISO 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) Mechanical calibration of the meter
(2) Manual electronic calibration of the meter
(3) Automatic electronic calibration (PDEX5 counter only)

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 95) 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 counterclockwise, it is possible to correct meter accuracy within the range of ±1.3 % in steps corresponding to a change of 0.04 %.

NOTE *The calibration wheel for fuels (FM-1007) and AdBlue (FM-1022) can be turned through 17 holes in both directions. The difference of precision between two adjacent holes is ±0.08 %. The wheel can be fixed also in a position between holes, i.e., the difference of precision is ±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 ±0.08 %.*

NOTICE ***The FM-1025 petrol piston meters (MVP-X hydraulics) can only be calibrated electronically.***

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 38 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 to increase the number of shaft revolutions and thus also pulses.
3) The calibration wheel is 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

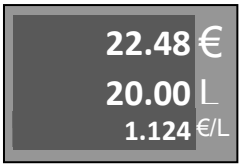


Figure 95, position B, C, D, E).

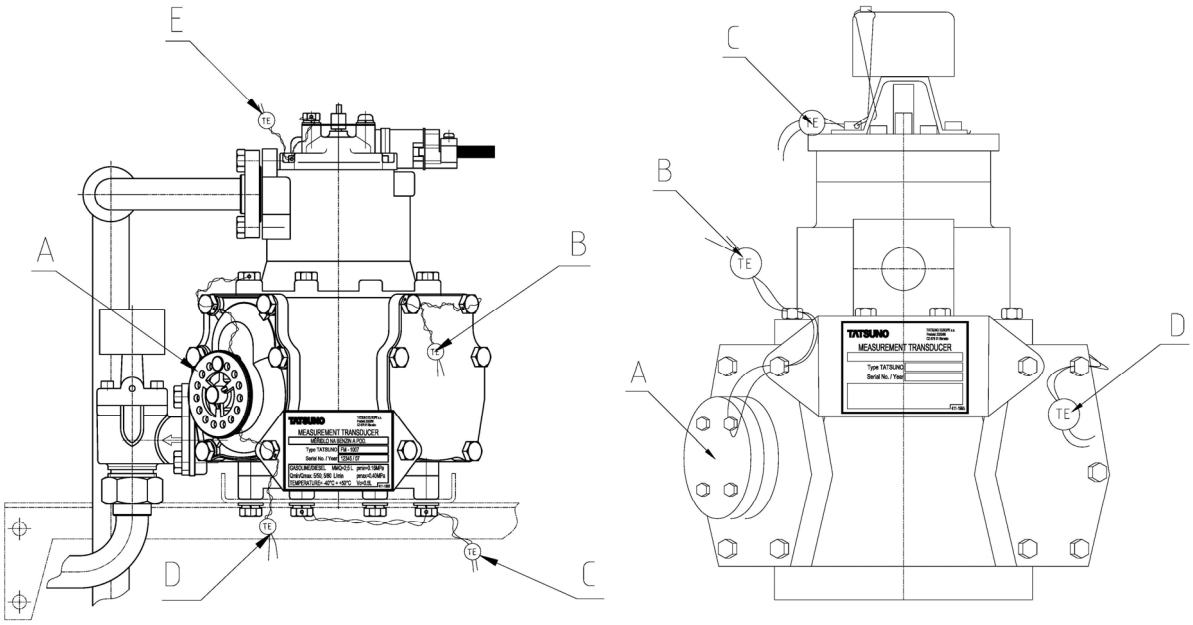


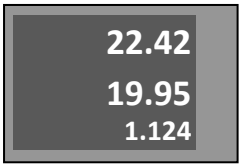
Figure 95 – Piston meters of fuel (type FM-1007) and LPG (type MP-02524 and FM-1029), A=calibration wheel

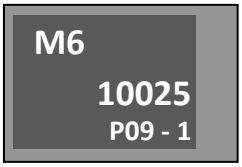
Manual electronic calibration of the meter is performed on all types of meters by manually changing the counter parameter:

- for the PDEX5 counter by changing the value of the correction factor in parameter **M6-P09** (the default value of the parameter is 10000, which corresponds to a correction factor of 1.0000)
- for the PDEX counter by changing the value of parameter **P44**, which indicates the number of pulse generator pulses for filling 1L of fuel (the standard value of the parameter is 10000, which corresponds to the value of 100.00 pulses per liter)
- for the PDELTx counter, by changing the value of parameter **P14, P15, P16 or P17**, which indicates the number of pulse generator phases for filling 1L of fuel (default parameter value is 400 which corresponds to 400 pulse phases per litre = 100 pulses per litre)

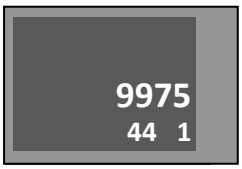
The parameter value can only be changed after switching switch SW1-1 to the OFF position and using the yellow service remote controller PDERT-5S (see figure on the right). Switch SW1-1 is protected by a cover and a seal. The procedure for manual electronic calibration of the meter is as follows:

1) Accurate fuel delivery is performed into the calibrated vessel (e.g., 20L)
2) According to the dispenser display value, the corrected parameter value is read from the calibration table (see Table 38).
   E.g. when filled 20L calibrated vessel, the value 19.95L appears on the display, which is according to Table 38, out of tolerance by -0.25% and the corrected value of parameter M6-P09 is 10025 (for PDEX5 counter) or corrected value of parameter or the corrected value of parameter P44 is 9975 (for PDEX counter).





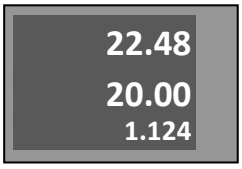
PDEX5



PDEX

3) The processor unit cover is de-sealed, removed and switch SW1-1 is switched to the OFF position.

4) Using the service remote controller PDERT-5S, the service mode of the counter is entered by entering the service password. The value of the parameter is changed and the service mode is exited.
5) New accurate fuel delivery is performed into the calibrated vessel (20L)
6) If everything is OK i.e., the indicated volume on the display corresponds to the volume of the calibration vessel, switch SW1-1 is switched to the ON position, the processor unit is covered with a cover and sealed.



Calibration of the meter at the dispenser equipped with temperature compensation of the volume

If temperature correction of the volume is activated in the dispenser, then a special service mode is used to calibrate the meter (for PDEX5 parameter M05-P00 = 6, for PDEX parameter P60 = 6), during which the display shows as temperature-corrected fuel volume, as well as the temperature uncorrected fuel volume together with the current fuel temperature.

The temperature-uncompensated volume data is always used to calibrate the meter.

Mechanical or electronic calibration of the meter is performed in the same way as described in the previous paragraphs of the chapter.

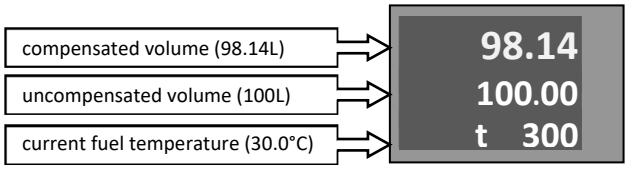


Table 38 - Calibration table for calibrated vessel 20L

Indicated quantity on the display [litres]	Quantity deviation [litres]	Error [%]	PDEX5 Correction factor	PDEX5 M6-P09	PDEX Pulse correction per litre (P44)	TBELTx Pulse phase correction per litre	Indicated quantity on the display [litres]	Quantity deviation [litres]	Error [%]	PDEX5 Correction factor	PDEX5 M6-P09	PDEX Pulse correction per litre (P44)	TBELTx Pulse phase correction per litre
19,75	-0,25	-1,25	1,0125	10125	9875	395	**20,00**	**0,00**	**0,00**	**1,0000**	**10000**	**10000**	**400**
19,76	-0,24	-1,20	1,0120	10120	9880		20,01	0,01	0,05	0,9995	9995	10005	
19,77	-0,23	-1,15	1,0115	10115	9885		20,02	0,02	0,10	0,9990	9990	10010	
19,78	-0,22	-1,10	1,0110	10110	9890		20,03	0,03	0,15	0,9985	9985	10015	
19,79	-0,21	-1,05	1,0105	10105	9895		20,04	0,04	0,20	0,9980	9980	10020	
19,80	-0,20	-1,00	1,0100	10100	9900	396	**20,05**	**0,05**	**0,25**	**0,9975**	**9975**	**10025**	**401**
19,81	-0,19	-0,95	1,0095	10095	9905		20,06	0,06	0,30	0,9970	9970	10030	
19,82	-0,18	-0,90	1,0090	10090	9910		20,07	0,07	0,35	0,9965	9965	10035	
19,83	-0,17	-0,85	1,0085	10085	9915		20,08	0,08	0,40	0,9960	9960	100,40	
19,84	-0,16	-0,80	1,0080	10080	9920		20,09	0,09	0,45	0,9955	9955	100,45	
19,85	-0,15	-0,75	1,0075	10075	9925	397	20,10	0,10	0,50	0,9950	9950	100,50	402
19,86	-0,14	-0,70	1,0070	10070	9930		20,11	0,11	0,55	0,9945	9945	100,55	
19,87	-0,13	-0,65	1,0065	10065	9935		20,12	0,12	0,60	0,9940	9940	100,60	
19,88	-0,12	-0,60	1,0060	10060	9940		20,13	0,13	0,65	0,9935	9935	100,65	
19,89	-0,11	-0,55	1,0055	10055	9945		20,14	0,14	0,70	0,9930	9930	100,70	
19,90	-0,10	-0,50	1,0050	10050	9950	398	20,15	0,15	0,75	0,9925	9925	100,75	403
19,91	-0,09	-0,45	1,0045	10045	9955		20,16	0,16	0,80	0,9920	9920	100,80	
19,92	-0,08	-0,40	1,0040	10040	9960		20,17	0,17	0,85	0,9915	9915	100,85	
19,93	-0,07	-0,35	1,0035	10035	9965		20,18	0,18	0,90	0,9910	9910	100,90	
19,94	-0,06	-0,30	1,0030	10030	9970		20,19	0,19	0,95	0,9905	9905	100,95	
19,95	**-0,05**	**-0,25**	**1,0025**	**10025**	**9975**	**399**	20,20	0,20	1,00	0,9900	9900	101,00	404
19,96	-0,04	-0,20	1,0020	10020	9980		20,21	0,21	1,05	0,9895	9895	101,05	
19,97	-0,03	-0,15	1,0015	10015	9985		20,22	0,22	1,10	0,9890	9890	101,10	
19,98	-0,02	-0,10	1,0010	10010	9990		20,23	0,23	1,15	0,9885	9885	101,15	
19,99	-0,01	-0,05	1,0005	10005	9995		20,24	0,24	1,20	0,9880	9880	101,20	
20,00	**0,00**	**0,00**	**1,0000**	**10000**	**10000**	**400**	20,25	0,25	1,25	0,9875	9875	101,25	405

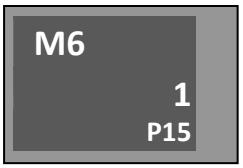
The special PDEX5 counter mode is used (M6-P09) for **automatic electronic calibration of the meter**, in which the correction factor of the meter is automatically calculated and set. In this way, it is also possible to calibrate dispenser with active temperature compensation of the volume.

The automatic meter calibration mode is activated by parameter M6-P15.

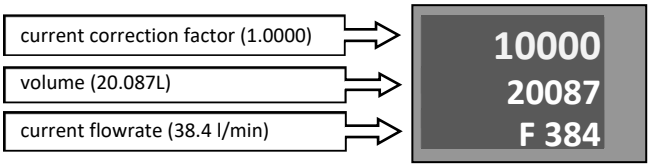
NOTE *For dispensers with ultra-high filling (130 L/min), where two meters are used for one dispensing hose / nozzle, it is necessary to first calibrate the main meter when setting parameter M6-P15 = 1. The counter does not start the auxiliary pump motor when calibrating the main meter. After calibration of the main meter, the auxiliary meter is calibrated when parameter M6-P15 = 2 is set. The counter does not start the main pump motor when calibrating the auxiliary meter.*

The procedure for automatic electronic calibration of the meter is as follows:

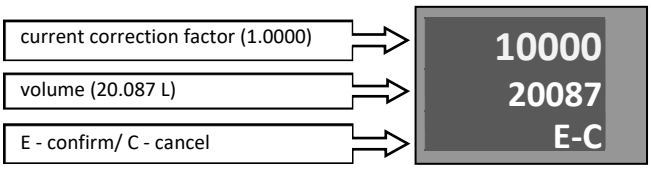
1) The PDEX5 counter processor unit cover is de-sealed, removed and switch SW1-1 is switched to the OFF position.
2) Using the PDERT-xS service remote controller after entering the service password, the service level of the counter configuration is entered and the parameter value in M6-P15 is changed to 1 or 2, thus activating the automatic meter calibration mode.



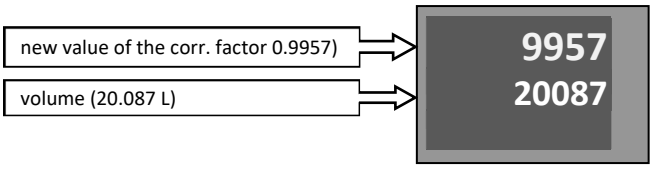
3) Accurate delivery into the calibrated vessel is performed. The vessel volume must be 10L, 20L, 50L, or 100L.



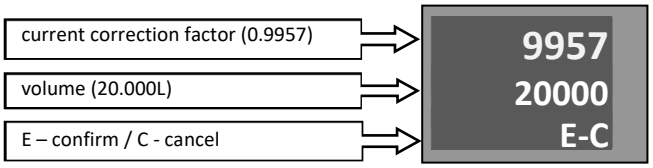
4) After hanging the nozzle, "E-C" appears on the bottom line of the display and the counter waits for confirmation whether it should consider the performed measurement valid and should calculate a new correction factor.



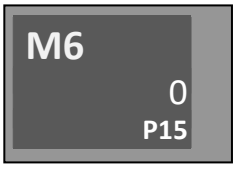
5) After pressing the **<E>** key, a new correction factor is calculated and saved automatically.



6) A new accurate delivery into the calibrated vessel is performed.



7) If equality is not achieved between the volume in the vessel and the indicated volume, the calibration can be repeated according to point 4).



8) If everything is OK, the switch back to the standard operating mode is performed by setting parameter M6-P15 to the value 0.

9) Switch SW1-1 is switched to the ON position, the processor unit is covered with a cover and sealed.

6.1.4. CALIBRATION OF THE PETROL DISPENSERS WITH ULTRA HIGH FLOW (/UH)

Very high-performance fuel dispensers (above 120 L/min; marked /UH) include two pumps and two meters - the main pump & meter and the auxiliary pump & meter. Calibration of the meters is performed in the same way as in chapter 6.1.3, only the following procedure must be used:

a) disconnect the auxiliary pump
b) calibrate the main meter as described in 6.1.3
c) connect the auxiliary pump
d) calibrate the auxiliary meter settings as described in 6.1.3

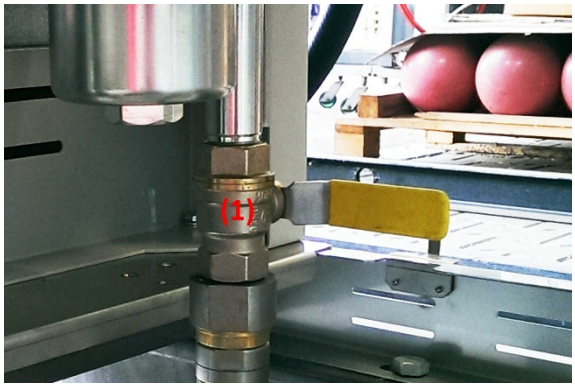
NOTE *The auxiliary pump can be disconnected and connected either directly in the dispenser's electronic cabinet by disconnecting the auxiliary pump motor contactor or by setting a parameter, eg PDEX: P84 = 0 (OFF) / 2 (ON). PDEX5: M8 / P11 = 0 (OFF) / 1.2... (ON).*

NOTE ***In the case of automatic electronic calibration of the meter (PDEX5 counter), it is not necessary to mechanically disconnect the pumps. When setting parameter M6-P15 = 1 and M6-P15 = 2, only one pump (main / auxiliary) is always switched on.***

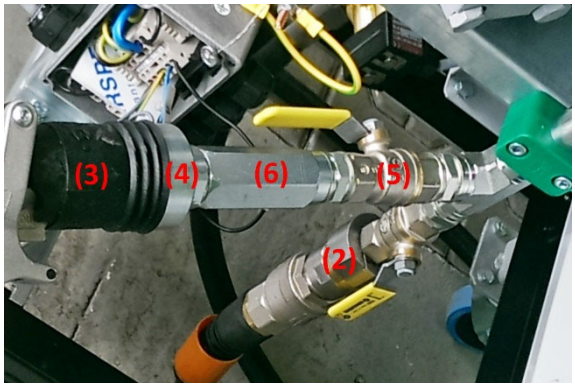
6.1.5. DEPRESSURIZING OF LPG DISPENSER

Before any service intervention in the LPG hydraulic module (e.g., replacement and/or cleaning of the inlet strainer, repair or replacement of the LPG meter, dispensing hose, dispensing nozzle ...), it is necessary to "depressurize" it, i.e., to drain the medium from the pressure module. The manufacturer recommends the following procedure:

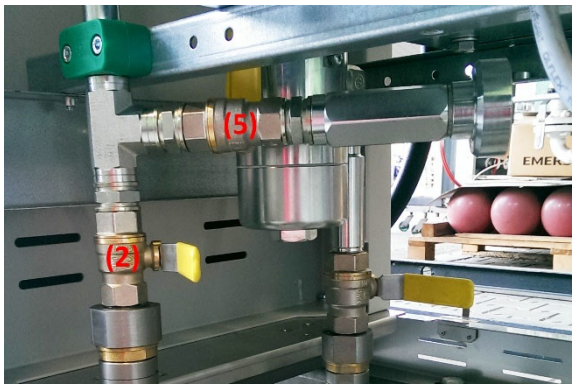
1.
Close the LPG liquid phase inlet ball valve (1).



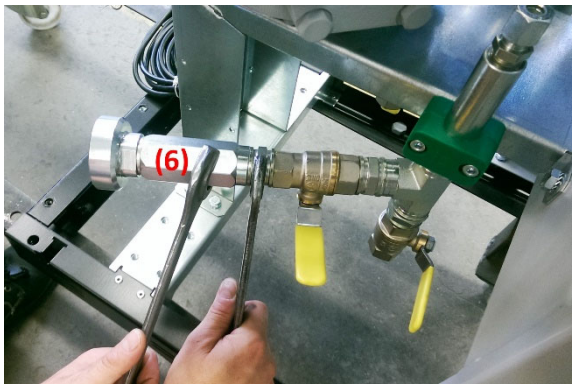
2.
Connect nozzle (3) to the auxiliary connector for return LPG outlet (4) and open auxiliary ball valve (5) located behind the check valve (6). Open the LPG vapour phase outlet ball valve (2).



3.
Start fuelling by pressing START button (ON/OFF switch). Error 51 stops the dispenser (low differential pressure). Repeat fuelling for the second nozzle (E51). Hang up both nozzles and close auxiliary ball valve (5) and the LPG vapour phase outlet ball valve (2).

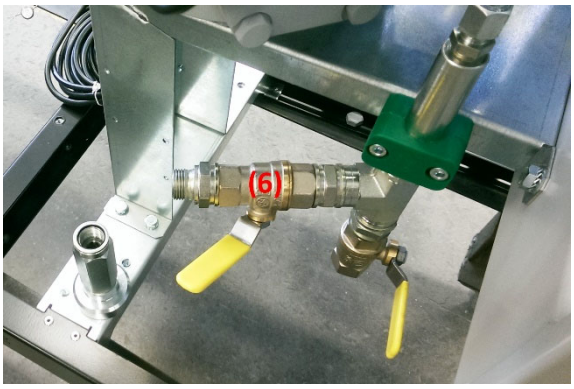


4.
Switch off power supply of the dispenser at main station switchboard and unscrew the check valve (6)



5.

Drain the rest of medium from LPG module by slow opening of auxiliary ball valve (5).



6.2. TROUBLESHOOTING AND SOLVING DISPENSER DEFECTS

When you encounter a problem, first read the **"What to do if ..." table** (see Table 39) 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 39 - 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. ➢ 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 unlocking the dispenser with the IR remote controller (press "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. If the dispenser 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. ➢ 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. ➢ 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. ➢ If the dispenser is operating in a manual mode without the remote control, then the unit price is incorrectly set. Set the fuel unit price, see chapter 4.1.8 and 4.3. ➢ 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 PDEX5, PDEX, 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 Error message code history and Error message code statistics.

Table 40 - 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 unblock 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 41 – Error message codes of the dispenser equipped with the PDEX5, PDEX, TBELTM or TBELTX counter

Code of message	Type of message	Cause of error message	Removing error message
OFF	FATAL	**Power failure** Power failure longer than 3-5 periods, 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	**Maximum time to interrupt delivery exceeded** **CNG: The STOP button was pressed but the nozzle was not hung up**	Hang up the nozzle or press the STOP button (CNG).
E1	NFAT	**Display failure.** 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.
E2	FATAL	**Display failure.** Mismatch between the actual number of displays and the set number. E2-1 main display fault (Master), E2-2 auxiliar display failure (Slave)	It is necessary to set the correct configuration of the displays in the counter, or to set the switch on the display (s) (Master/Slave) Turn the dispenser power off and on. If the fault persists, call an authorized service centre.
E3	NFAT	**Vapour recovery system failure** Fault of the vapour recovery flow sensor on side A (PDEX)	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E4	NFAT	**Vapour recovery system failure** Fault of the vapour recovery flow sensor on side B (PDEX)	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E5	ALERT	**Display failure** communication failure with the display or an electrome-chanical totalizer	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E6	NFAT	**Electromechanical totalizer failure** The totalizer is not connected or does not reply	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E7	NFAT	**Leakage in the hydraulic system** **CNG: Electromechanical totalizer coil failure**	Check hydraulic system. Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E8	ALERT	**Low fuel level in the storage tank**	After refuelling the storage tank, the fault automatically disappears.
E9	FATAL	**Repeated leakage of the hydraulic system**	Check hydraulic system leakages. Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E10	NFAT	**Error of temperature measuring sensor**	Check the temperature sensor interconnection. 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	**Temperature correction unit error** The PDEINP is not connected or has an incorrect checksum	Check the PDEINP interconnection. 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 checksum error** **E13-1** damaged non-metrological part of the program **E13-2** damaged metrological part of the program	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E15	NFAT	**Maximum product flow exceeded**	Check hydraulic system. 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.

Code of message	Type of message	Cause of error message	Removing error message
E17	NFAT	**Data line error** Error of serial communication line. Frames with an invalid checksum are received or the prescribed data line timing (timeouts) from POS is not correct.	Check that two dispensers do not 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	**Power failure during delivery** The last delivery was interrupted abnormally due to a power failure.	Check the dispenser power supply and interference effects (power source).
E21	NFAT	**Incorrect position of switches SW1-1 and/or SW1-4**	Check the position of the switches on the processor unit. Switch SW1-1 must be in the ON position and switch SW1-4 in the OFF position. The position of the switches can be found on the display after power on, see chapter 5.2. If the fault persists, call an authorized service centre.
E22	FATAL	**Data initialization.** Corrupted values of config. parameters in FRAM memory **E22-1** CRC values of config. parameters do not match **E22-2** The value of a parameter is out of range	It is necessary to set the counter parameters Call an authorized service centre.
E23	NFAT	**Corrupted values of the last filling in the FRAM memory** The CRC of the last filling values does not match.	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E24	FATAL	**Corrupted values of decimal residues of electromechanical totalizers in FRAM memory** The CRC values of the last remnants of electromechanical totalizers do not match.	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E25	FATAL	**Damaged values of electronic totalizers in FRAM memory** The CRC values of the electronic totalizers do not match.	Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E26	ALERT	**TOTAL STOP button pressed**	Unlock the TOTAL STOP button, turn the dispenser power off and on again.
E27	FATAL	**Blocking the dispenser by the manufacturer**	Enter the authorization code into parameter 16 (PDEX) Turn the power supply of the dispenser off and on. If the fault persists, call an authorized service centre.
E28	NFAT	**Unauthorized service remote controller** An unauthorized service remote controller was used to enter service mode.	The service remote controller identification number is out of allowed range. Use a permitted remote controller.
E29	NFAT	**Wrong password** A wrong password was entered to access the manager or service mode.	Enter the correct manager or service password. If the fault persists, call an authorized service centre.
E30	LOCK	**Product unit price is zero**	Set non-zero product unit price on the connected POS (P12=0), or in parameter P3 (P12=3) in manual mode.
E31	NFAT	**Pulse generator channel error** at input PDEX5 - PUL1 (PDEX - 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	**Pulse generator channel error** at input PDEX5 – PUL2 (PDEX - 2A)	
E33	NFAT	**Pulse generator channel error** at input PDEX5 – PUL3 (PDEX - 3A)	
E34	NFAT	**Pulse generator channel error** at input PDEX5 – PUL4 (PDEX - 4A)	
E35	NFAT	**Pulse generator channel error** at input PDEX5 – PUL5 (PDEX - 5A/1B)	
E36	NFAT	**Pulse generator channel error** at input PDEX5 – PUL6 (PDEX - 6A/2B)	
E37	NFAT	**Pulse generator channel error** at input PDEX5 – PUL7 (PDEX – 7A/3B)	
E38	NFAT	**Pulse generator channel error** at input PDEX5 – PUL8 (PDEX - 8A/4B)	
E39	NFAT	**Pulse generator channel error** at input PDEX5 – PUL9	
E40	NFAT	**Pulse generator channel error** at input PDEX5 – PUL10	

Code of message	Type of message	Cause of error message	Removing error message
E41	NFAT	**Connection error or internal pulse generator error** at input PDEX5 - PUL1 (PDEX - 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	**Connection error or internal pulse generator error** at input PDEX5 – PUL2 (PDEX - 2A)	
E43	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL3 (PDEX - 3A)	
E44	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL4 (PDEX - 4A)	
E45	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL5 (PDEX - 5A/1B)	
E46	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL6 (PDEX - 6A/2B)	
E47	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL7 (PDEX – 7A/3B)	
E48	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL8 (PDEX - 8A/4B)	
E49	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL9	
E50	NFAT	**Connection error or internal pulse generator error** at input PDEX5 – PUL10	
E51	NFAT	**Too much air in the petrol fuel or insufficient LPG pressure difference** **Petrol:** The air flow sensor on the output of pump air separator has been active for longer than specified by parameter M10-P03. **LPG:** The LPG pressure difference was less than 1 bar for longer than specified by parameter M10-P03. **E51-1** Main pump aeration or low pressure LPG difference (between gas and liquid phase> 1bar) **E51-2** Auxiliary pump aeration	Petrol: Check the intake manifold for leaks. LPG: Check the pressure in the supply line and the pressure in the return line of the gas phase discharge and the permeability of the line. Check the setting of the TRAFAG differential pressure switch or on connected pressure sensors. If the fault persists, call an authorized service centre.
E52	NFAT	**Too much air in the petrol fuel or insufficient LPG pressure difference** Petrol: Maximum number of air separation attempts exceeded LPG: A pressure difference of less than 1 bar was detected more than 3 times during one delivery. **E52-1** Main pump aeration or low LPG pressure difference **E52-2** Auxiliary pump aeration	Petrol: Check the intake manifold for leaks. LPG: Check the pressure in the supply line and the pressure in the return line of the gas phase discharge and the permeability of the line. Check the setting of the TRAFAG differential pressure switch or on connected pressure sensors. If the fault persists, call an authorized service centre.
E53	NFAT	**The dispenser door (cover) was opened** The cover sensor has been activated.	Close all dispenser doors and covers and clear errors by entering manager or service level setup mode by the remote controller.
E54	ALERT	**Vapour recovery system fault - warning** The vapour/fuel ratio is out of range. A deactivation timer has been started (48 or 72 hours) after which fillings points with vapour recovery will be blocked.	Eliminate a fault on the vapour recovery system. Call an authorized service centre.
E55	FATAL	**Vapour recovery system fault – filling is blocked.** Deactivation timer expired. Dispenser is blocked.	Eliminate a fault on the vapour recovery system. Unlock the vapour recovery system. Call an authorized service centre.
E56	NFAT	**Vapour recovery system fault** PDEX5: VFS flow meter fault PDEX: Vapour recovery system fault.	Troubleshoot the vapour recovery system. PDEX: The VAPORIX system must be unlocked using the service adapter. PDEX5: Check the VFS flow meter and verify that the vacuum pump is working. Call an authorized service centre.
E60	NFAT	**CNG: Leakage of the pressure system**	Check the pressure system for leaks. If the fault persists, call an authorized service centre.
E61	NFAT	**CNG: Insufficient pressure rise during leak test**	Check the pressure system for leaks. If the fault persists, call an authorized service centre.

Code of message	Type of message	Cause of error message	Removing error message
E64	NFAT	**CNG: Insufficient pressure rise during temperature compensation test filling.**	Check the pressure system for leaks. If the fault persists, call an authorized service centre.
E66	NFAT	**CNG: Disconnected or defective pressure sensor**	Check the connection of the pressure sensor. If the fault persists, call an authorized service centre
E67	FATAL	**CNG: Dispensing hose break** Hose breakaway sensor is active	It is necessary to repair the hose breakaway and/or adjust the position of the breakaway magnetic sensor. To clear the error message, it is necessary to turn the counter power off and on. Call an authorized service centre.
E70	NFAT	**Mass meter failure** The mass meter does not response	Check the mass meter connection. Check the settings of the mass meter communication parameters. Turn the dispenser power off and on. If the fault persists, call an authorized service centre.
E71	NFAT	**Communication error with mass meter** The mass meter does not response	Check the mass meter connection. Check the settings of the mass meter communication parameters. Turn the dispenser power off and on. If the fault persists, call an authorized service centre.
E72	NFAT	**Internal mass meter error**	Follow the documentation for the mass meter used.
E73	NFAT	**Mass meter reset error** Unsuccessful meter reset before delivery.	The error can be caused by the product flow at the idle status before start of delivery. Check the dispenser's internal pressure pipes. If the fault persists, call an authorized service centre.
E74	NFAT	**Mass meter configuration error** The meter configuration does not meet the requirements of the meter.	Mass meter configuration is required. Turn the dispenser power off and on. If the fault persists, call an authorized service centre.
E75	NFAT	**Mass meter zero point setting error** The current value of the meter zero point does not match the value stored in the counter.	It is necessary to set the zero point of the meter. Turn the dispenser power off and on. If the fault persists, call an authorized service centre.
E76	NFAT	**Damaged stored value of the meter zero point** The CRC stored values of the meter zero point do not match.	It is necessary to set the zero point of the meter. Turn the dispenser power off and on. If the fault persists, call an authorized service centre.
E80	NFAT	**The display serial number does not match** The serial number of the display differs from the stored one. Error message code detail: **E80-1** Main display serial number does not match **E80-2** Auxiliar display serial number does not match	The error appears after replacing the display. Peripheral unit serial numbers must be stored. Call an authorized service centre.
E81	NFAT	**CNG: The serial number of the auxiliar display does not match.** The serial number of the auxiliar display (Slave) is different from the stored one.	The error appears after replacing the display. Peripheral unit serial numbers must be stored. Call an authorized service centre.
E82	NFAT	**The serial number of the electromechanical totalizer unit does not match.** The serial number of the electromechanical totalizer unit differs from the stored one.	The error appears after replacing the totalizers unit. Peripheral unit serial numbers must be stored. Call an authorized service centre.
E83	NFAT	**The serial number of the PDEINP temperature sensors unit does not match.** The serial number of the PDEINP unit is different from the stored one.	The error appears after replacing the PDEINP unit. Peripheral unit serial numbers must be stored. Call an authorized service centre.
E84	NFAT	**The serial number of the mass meter does not match** The serial number of the mass meter differs from the stored one.	The error appears after replacing the mass meter. Peripheral unit serial numbers must be stored. Call an authorized service centre.
E85	NFAT	**The serial number of the PDEDPS pressure sensors unit does not match.** The serial number of the PDEDPS unit differs from the stored one.	The error appears after replacing the PDEDPS unit. Peripheral unit serial numbers must be stored. Call an authorized service centre.
E86	NFAT	**Insufficient LPG pressure difference** The pressure difference between the liquid and gas phases of LPG was less than 1 bar for a period longer than specified by the parameter. **E86-1** LPG pressure difference was less than 1 bar for longer than specified by the parameter. **E86-2** An LPG pressure difference of less than 1 bar was detected more than 3 times during one delivery.	Check the supply line pressure and the gas return phase line pressure and the line permeability. Check the pressure record in the LPG directory on the memory card. If the fault persists, call an authorized service centre.
E87	NFAT	**Electromechanical totalizer coil failure** The additional error message number corresponds to the totalizer number.	It is necessary to replace the totalizer coil. Call an authorized service centre.

Code of message	Type of message	Cause of error message	Removing error message
E88	NFAT	**LPG pressure sensor fault** **E88-1** Liquid phase pressure sensor fault **E88-2** Gas phase pressure sensor fault **E88-3** Fault in both pressure sensors	Check the connection of the relevant pressure sensor. Call an authorized service centre.
E89	NFAT	**PDEDPS pressure sensors unit failure** The unit does not communicate or has an incorrect checksum.	Check the connection of the PDEDPS unit and the setting of its address. Call an authorized service centre.
E90	NFAT	**Flow in the auxiliary meter detected during calibration of the main meter**	Check the auxiliary pump motor disconnection during the calibration of the main meter and the functionality of the valves and non-return valves in the hydraulic system. Call an authorized service centre.
E91	NFAT	**Flow detected in the main meter during calibration of the auxiliary meter**	Check the main pump motor disconnection during calibration of the auxiliary meter and the functionality of the valves and non-return valves in the hydraulic system. Call an authorized service centre.

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 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 type – 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
- Data sheet of the dispenser
- Logbook 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 PDEX5, PDEX or TBELTM counter)
- Foundation frame (may be ordered)

Spare parts catalogue

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

NOTES: