

OCTOPUS

ECO Multivalve



OCTOPUS Multivalve *manual*

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I. MULTIVALVE DESCRIPTION

The OCTOPUS multivalve has been designed in accordance with the Regulation No. 67-01 EKG ONZ. The product is a component of an LPG installation. The tank equipment (a multivalve and a refueling valve) enable the correct and safe use of a LPG car tank. The multivalve combines several valves into one device, each of which is crucial for correctness and collective operation.

The OCTOPUS multivalve is equipped with:

1. 80% FILLING LIMITER
2. SAFETY VALVE
3. FIRE VALVE
4. ELECTROMAGNETIC OPERATING VALVE
5. OVERFLOW VALVE
6. CHECK VALVE
7. MANUAL OPERATING VALVE
8. FUEL GAUGE

1. 80% FILLING LIMITER

In accordance with **UNECE Regulation No. 67-01:**

“80% filling restriction valve” means a device which limits the degree of filling of a tank to a maximum of 80% of its capacity.

The filling restriction valve assembly cuts off the fuel supply when refueling, after reaching 80% of the tank geometric capacity. The valve, in cooperation with a float located inside the tank, shuts off its inflow from the refueling valve after reaching the appropriate fuel level. As a result, 20% of the free space above the gas surface is provided, which allows the liquid mixture of propane and butane to expand with increasing temperature.

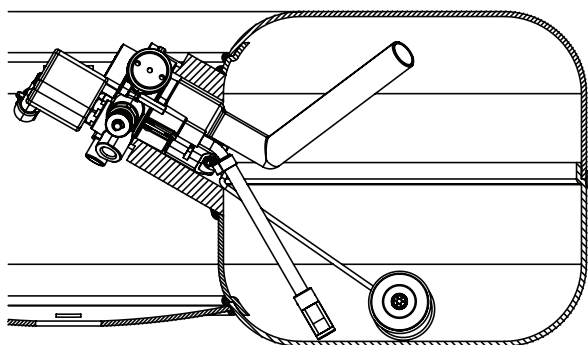


fig. 1. Position of the float in an empty tank

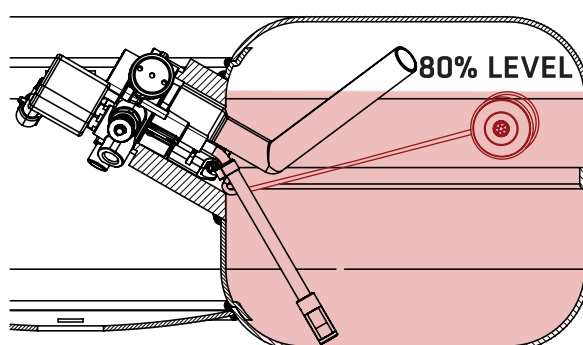


fig. 2. Position of the float in a full tank up to 80% of its capacity

2. PRESSURE RELIEF VALVE

The safety valve protects the tank against excessive pressure increase. It starts when this parameter exceeds 2.7 MPa. LPG fuel in the gaseous phase is then discharged to the environment (most often under the car) through ventilation ducts (connected to the housing in which the multivalve is placed).

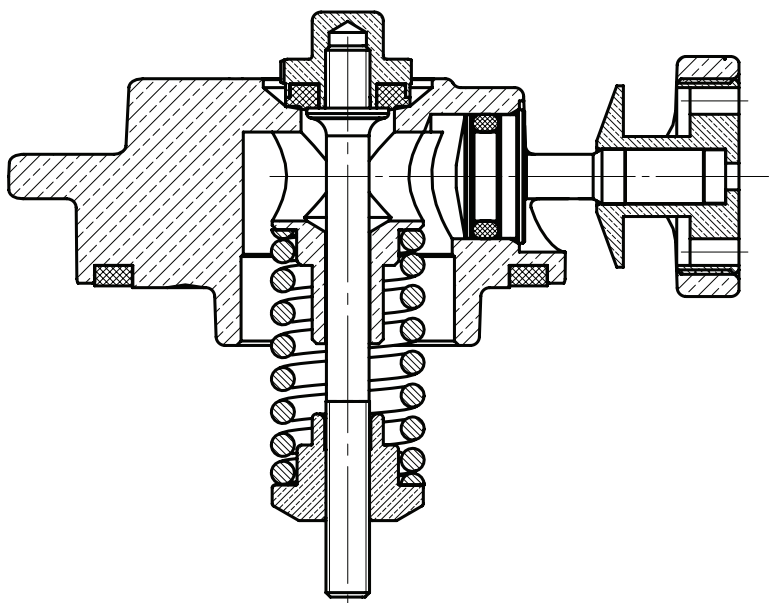


fig 3. Safety valve closed

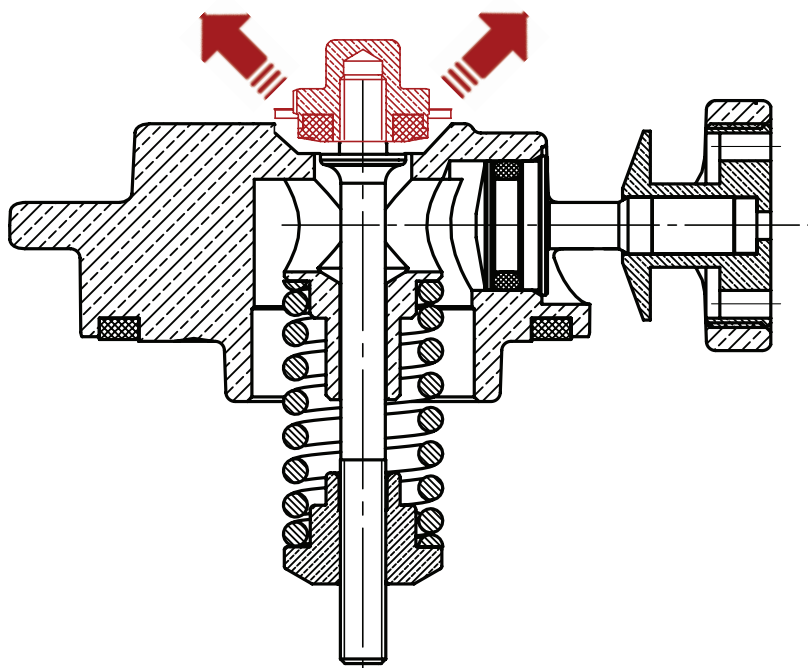


fig. 4. Safety valve open

3. PRESSURE RELIEF DEVICE (FIRE VALVE)

The fire (fusible) valve ensures safety in extreme situations (such as a car fire). It opens (is destroyed by the fuse melting) after the tank jacket reaches 110°C and drains the gas from the tank. Thanks to the use of a fire valve (which supports the operation of the safety valve), the gas pressure in the tank is quickly reduced.

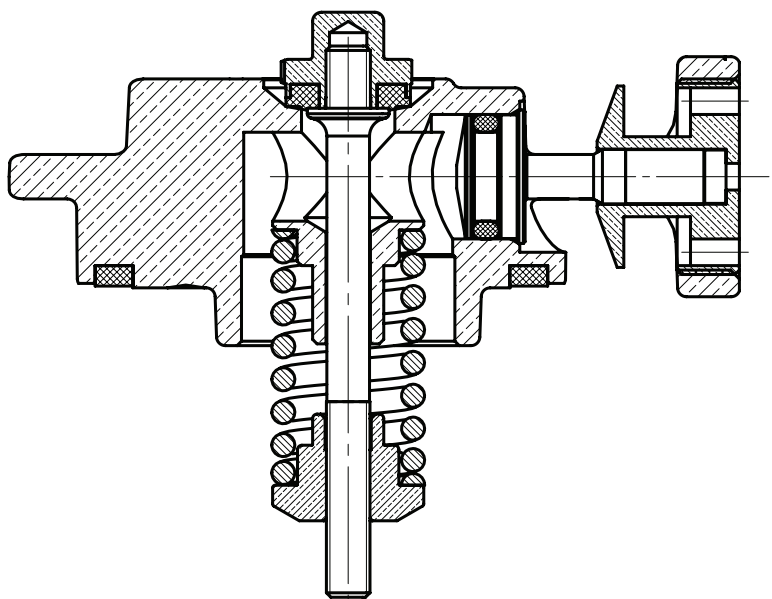


fig. 5. Fire valve under normal operating conditions

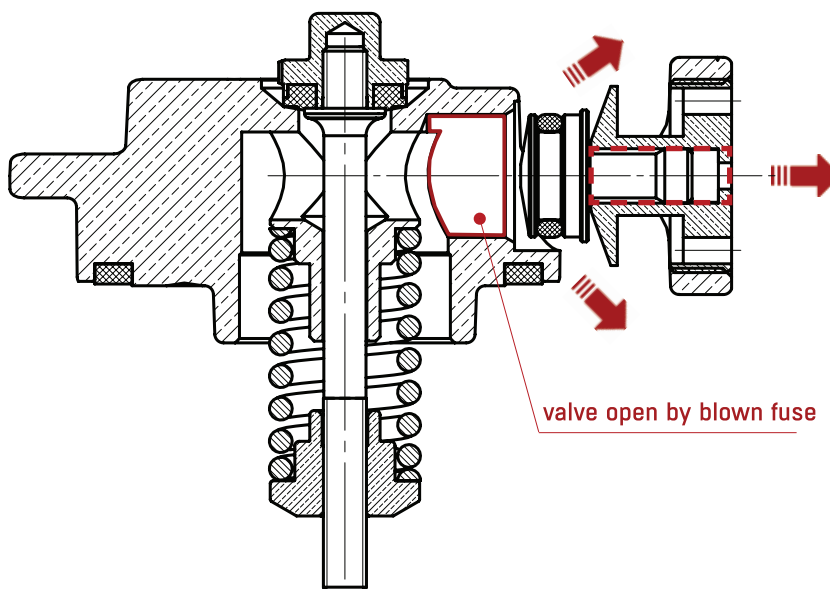


fig. 6. Fire valve open

4. ELECTROMAGNETIC VALVE

The operating solenoid valve opens when the gas system is turned on, and closes when the system is not working. To open it, it is necessary for the rotational speed signal to appear, while it is closed when this signal disappears. The valve ensures safety by closing the gas flow in emergency situations, when the engine is stopped without the driver's will (e.g. during a collision or a car accident).

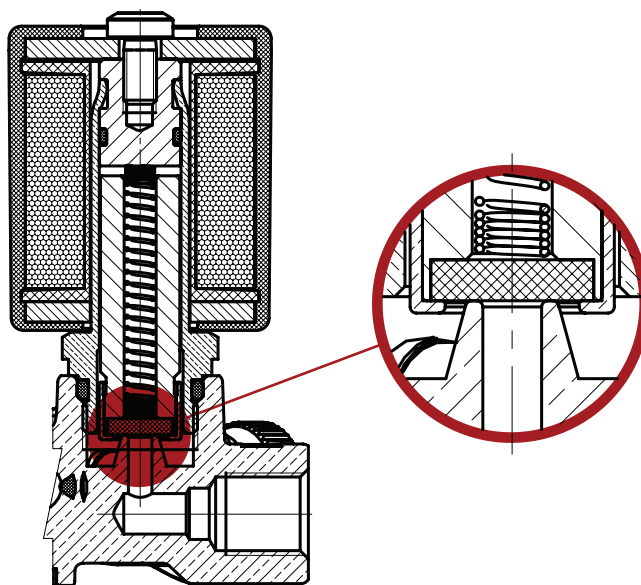


fig. 9. Solenoid valve in closed position

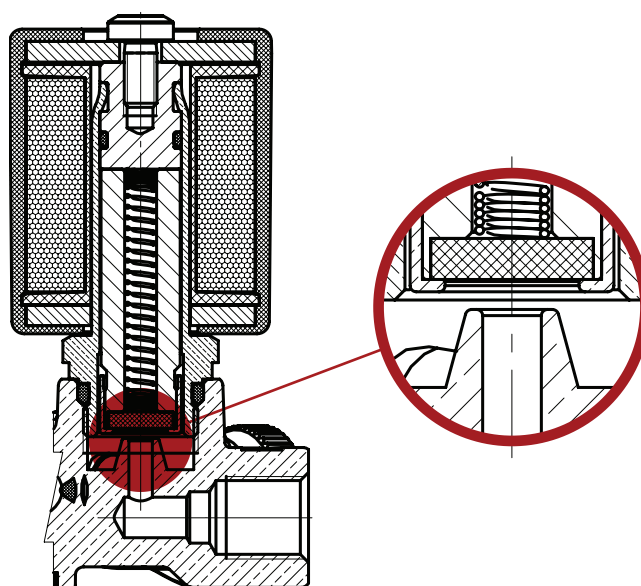


fig. 10. Solenoid valve in the open position

5. EXCESS FLOW VALVE

The gas overflow valve is actuated when the gas flows too quickly (in excess of engine demand). It happens when the pressure pipe located under the car is damaged (cut) or disconnected.

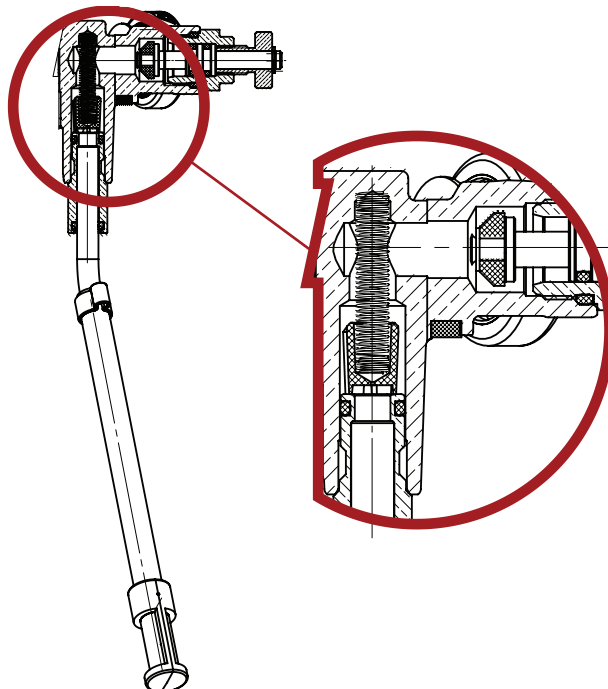


fig. 11. Overflow valve with engine off

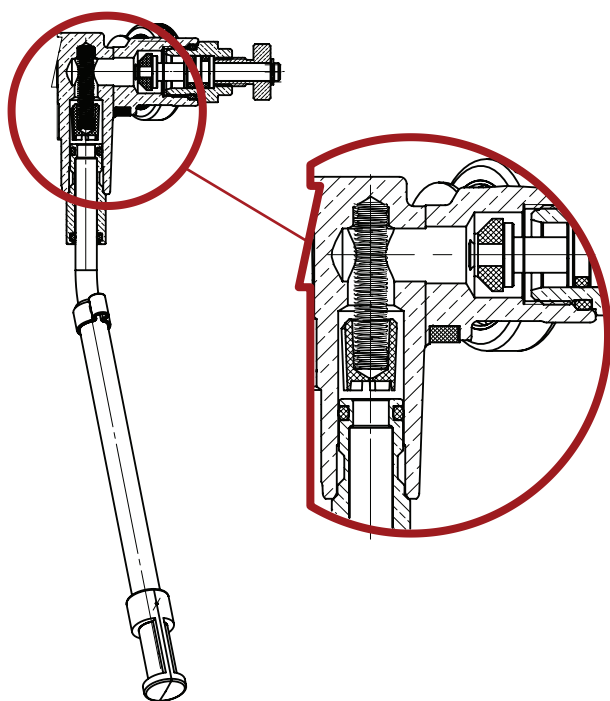


fig 12a. Overflow valve in operating position

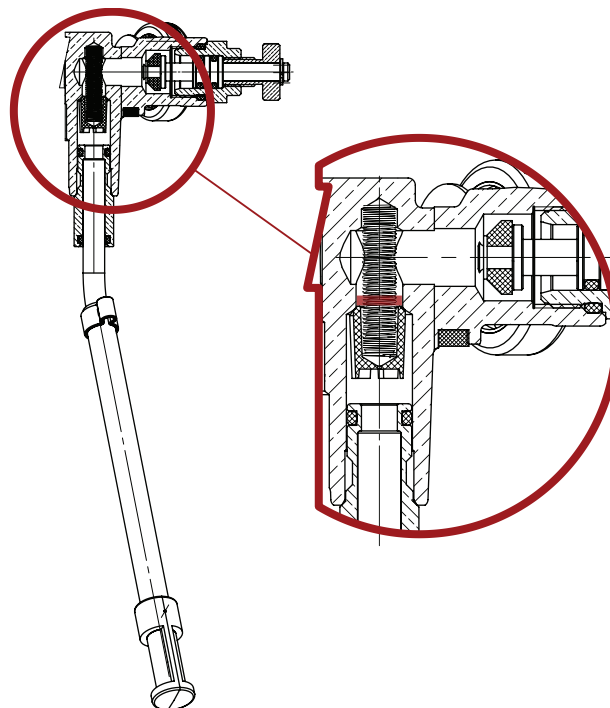


fig. 12b. Overflow valve in closed position

6. NON-RETURN VALVE

The non-return valve ensures (during refueling) the flow of LPG fuel only towards the gas tank. The piston supported by a spring is located in the channel, where liquid gas is forced during refueling. The pressure from the distributor pushes the piston away from the seat and deflects the support spring. After refueling stops, due to the pressure difference (pressure drop from the distributor side and overpressure in the tank), the piston is pressed against the seat. In this way, the tank is protected against fuel leakage in the event of damage to the pipe from the refueling valve.

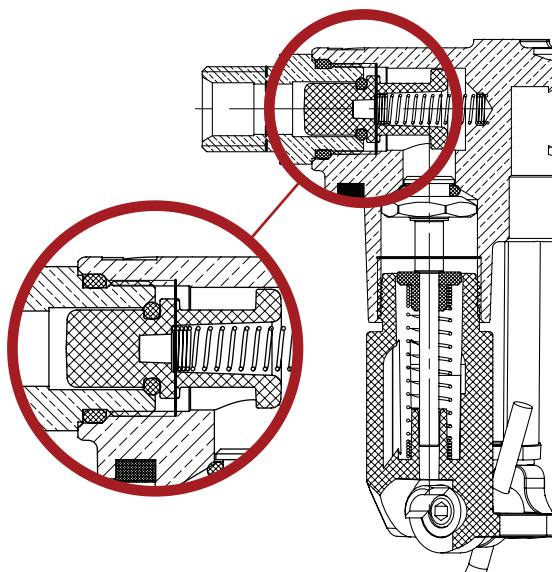


fig. 14. return valve in closed position

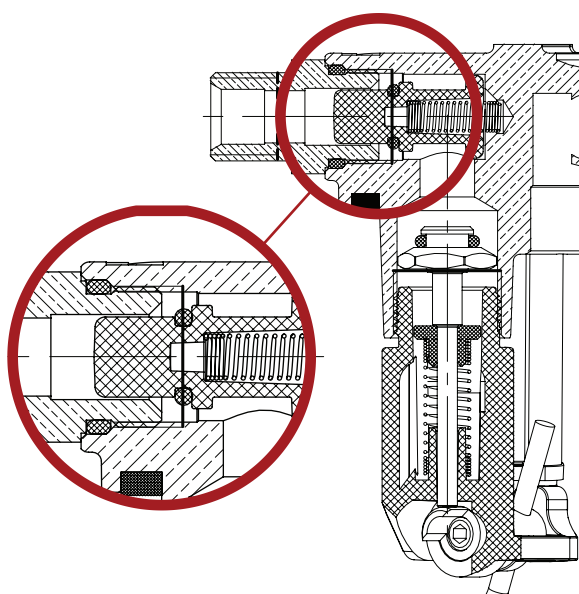


fig. 15. return valve when filling is the tank

7. MANUAL (SERVICE) VALVE

A manually operated discharge valve (draft valve) cuts off the gas supply from the tank to the reducer (evaporator) located in the engine compartment. It is mainly used in service works when it is required to unseal the high pressure system, e.g. during replacing the filter in the gas solenoid valve.

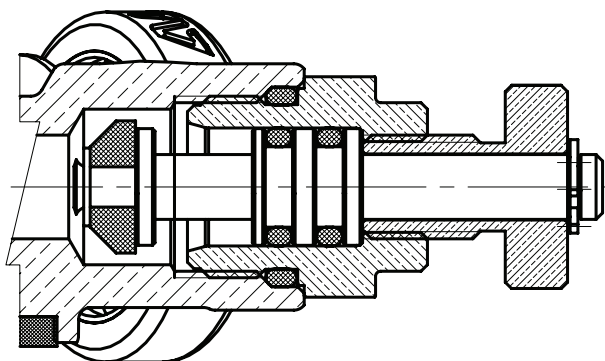


fig. 16. Manual shut-off valve in open position

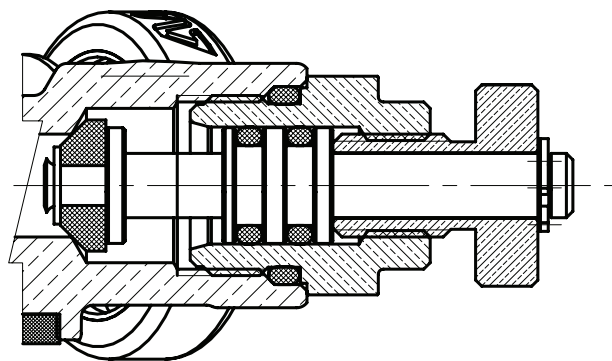


fig. Manual shut-off valve in closed position

8. FUEL GAUGE

Fuel position indicator it is an indicator cooperating with a float placed inside the tank. The movement of the float is transferred to the indicator by magnetic force (there is no mechanical connection between the float and the pointer). This indication is indicative only, and the tank installed in accordance with the regulations must have an indicator that is easy to read its fill level. It is very important in an emergency so that the emergency services can judge the amount of fuel in the tank. The electronic level gauge must be selected in accordance with with **UNECE Regulation No. 67-01**.

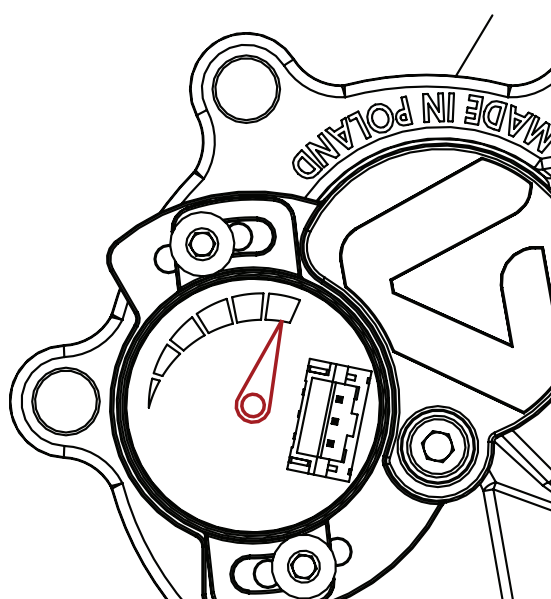


fig. 18.

II. INSTALLATION GUIDE

1. CHECKING THE MODEL AND SIZE OF THE MULTIVALVE

The compatibility of the type and size between the tank and the multivalve must be verified by the information indicated on the nameplate of the tank and the marking of the multivalve.

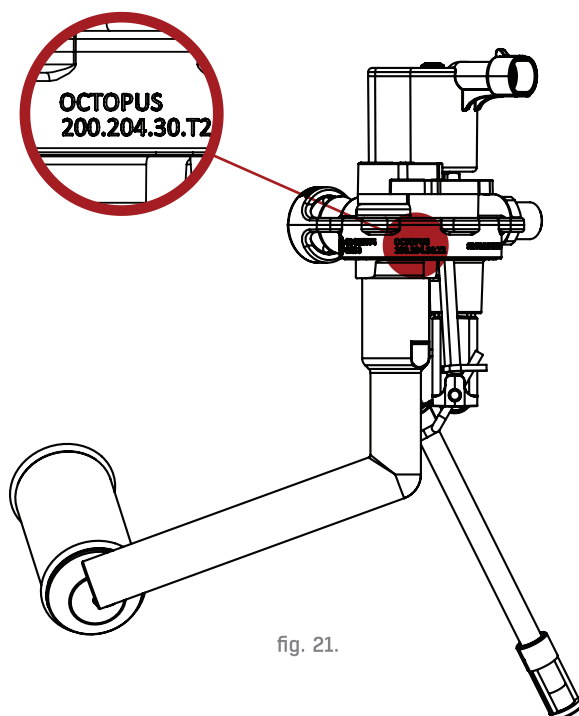


fig. 21.

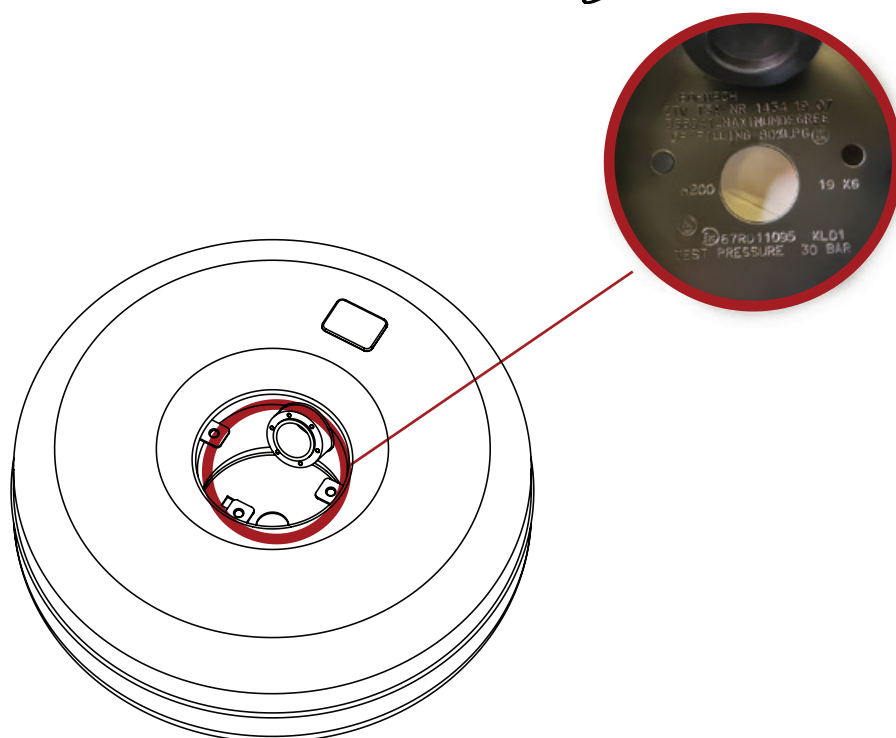


fig. 22.

2. TANK INTEGRITY AND OVERALL DIMENSIONAL CHECKS

The angular error of the threaded flange holes must not exceed 2°. The tank should be placed in a horizontal position. For proper inspection, insert two screws into the two opposite holes as shown in the figure below. The slope of the ring relative to the horizontal plane should be measured as shown below.

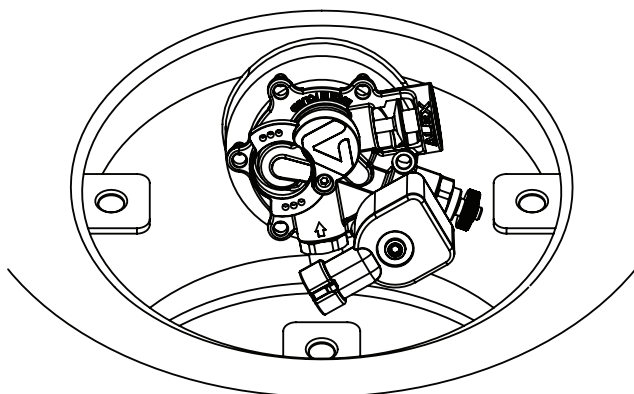


fig. 23.

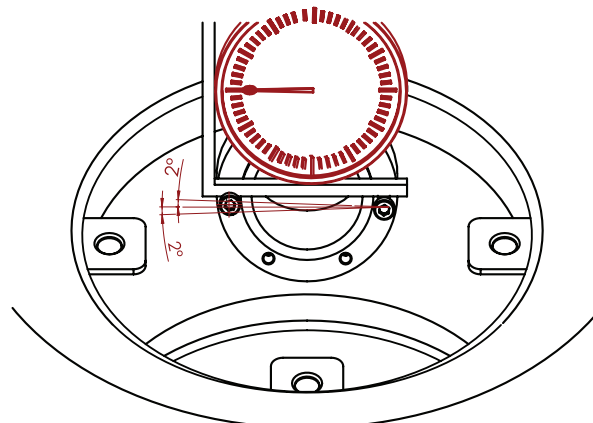
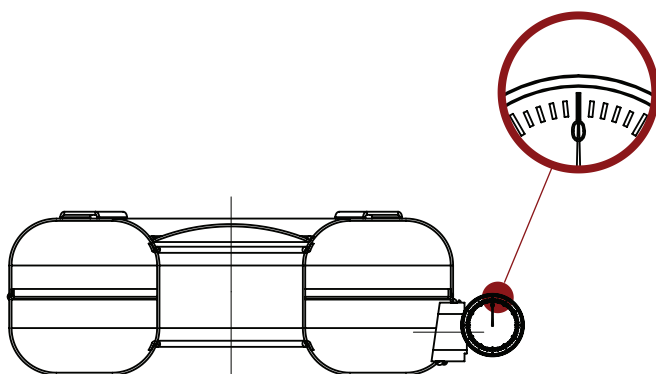


fig. 24.

In toroidal tanks, the slope of the flange should be checked with a goniometer. It must be 0° or 30°, respectively.



RYSfig. 25. 0° toroidal tank

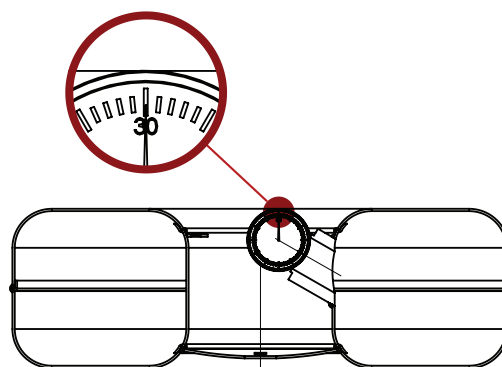
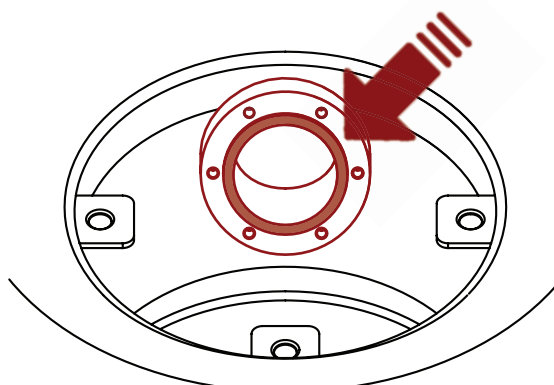


fig. 26. 30° toroidal tank

The seat ring have to be clean. Paint residues should be removed taking care not to cause flatness error, dents or scratches that could affect the multivalve sealing. The inner part of the tank must be cleaned of welding or grinding residues and drained of all traces of water.



RYS. 27.

3. INTEGRITY CHECK

The multivalve can be damaged by incorrect handling. The correct grip of the multivalve is shown below.

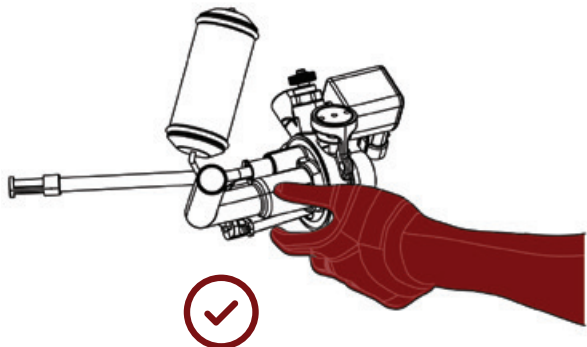


fig. 28a. Correct grip

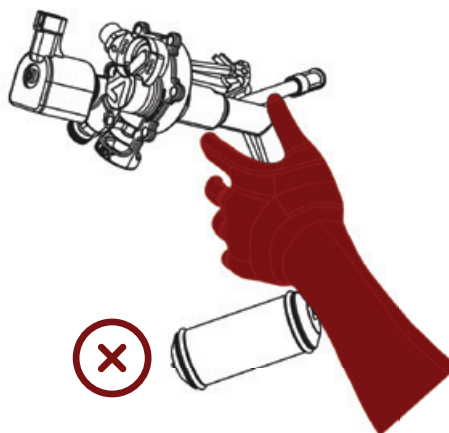


fig. 28b. incorrect grip

THE CORRECT MOVEMENT OF THE FLOAT ROD MUST BE CHECKED BY ROTATING IT IN THE WAY ACCORDING TO THE DRAWINGS BELOW

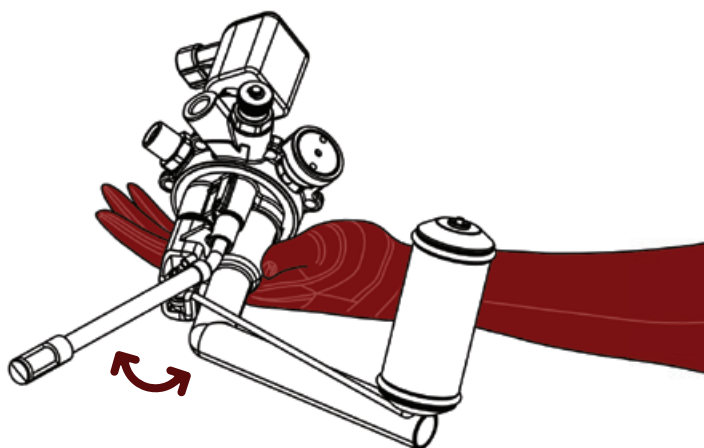


fig. 29. Maximum downward of the float

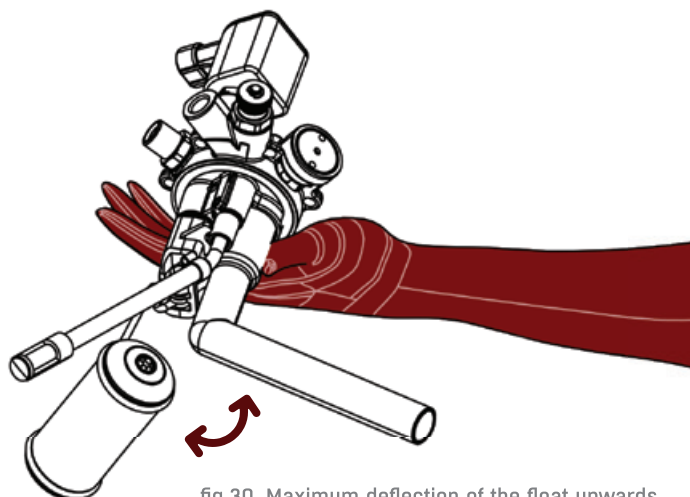


fig.30. Maximum deflection of the float upwards

4. INSTALLATION OF THE MULTIVALVE IN 30° CYLINDRICAL TANKS

In the cylindrical tanks located inside the vehicle, a multivalve should be installed together with a gas-tight housing.

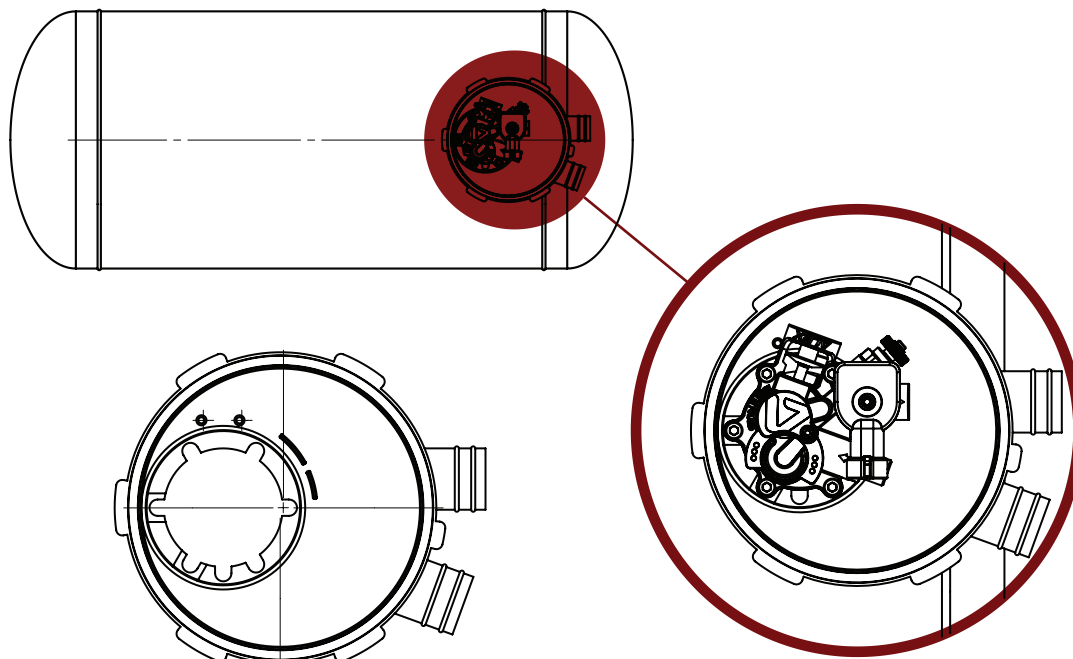


fig.31. Location of the multivalve

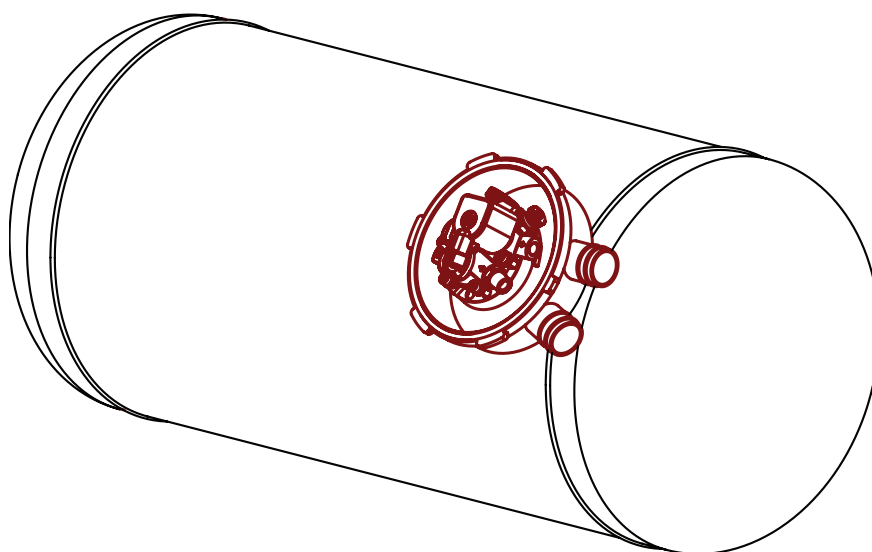


fig.32. Arrangement of the multivalve in 30° cylindrical tanks

INSTALLATION OF THE MULTIVALVE IN THE TANK

Place the O-ring on the tank flange. Then put on the gas-tight cover. Place the float rod in the mounting hole and then the drain tube. Do not force the components of the multivalve during assembly.

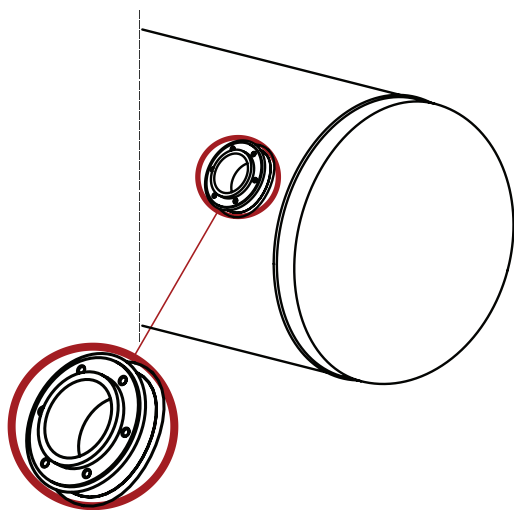


fig. 33.

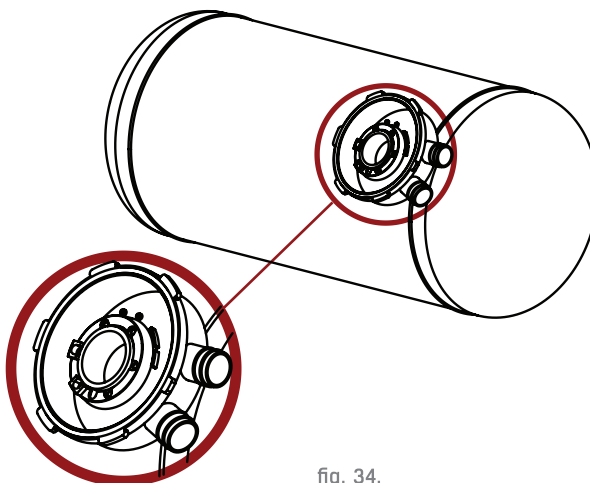


fig. 34.

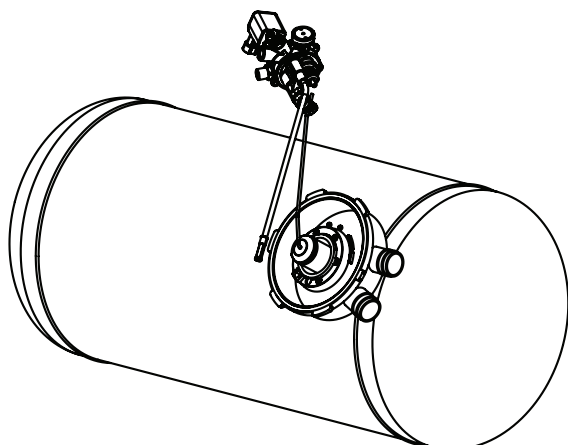


fig. 35.

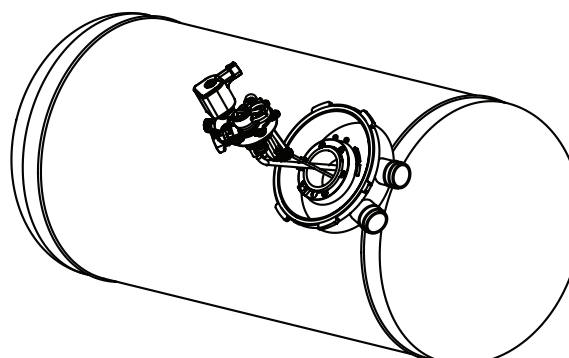
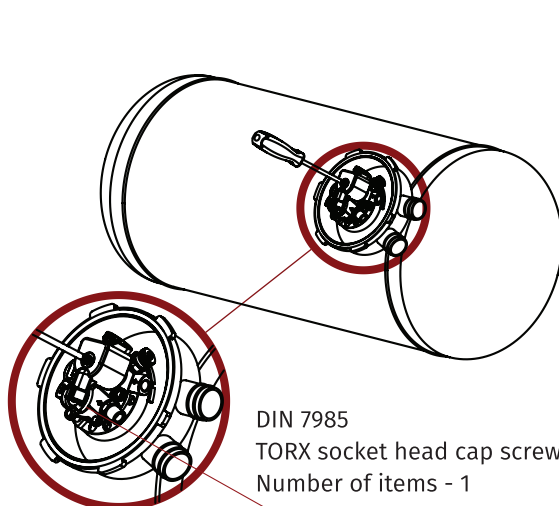


fig. 36.

To install multi-valve, you must first remove the coil by unscrewing the screw M4x8 with the key Torx T20.



DIN 7985
TORX socket head cap screw - M4 x 8
Number of items - 1

fig. 37

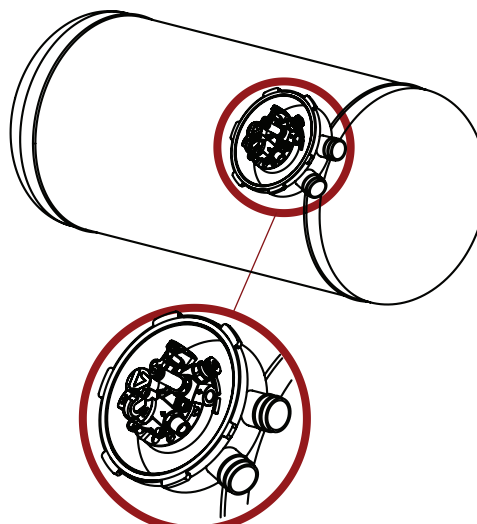


fig. 38

- Then, using the SW4 spanner, screw 6 M5x25 hexagon socket head cap screws to the tank flange. Tightening torque 3.5 +/- 0.5Nm.

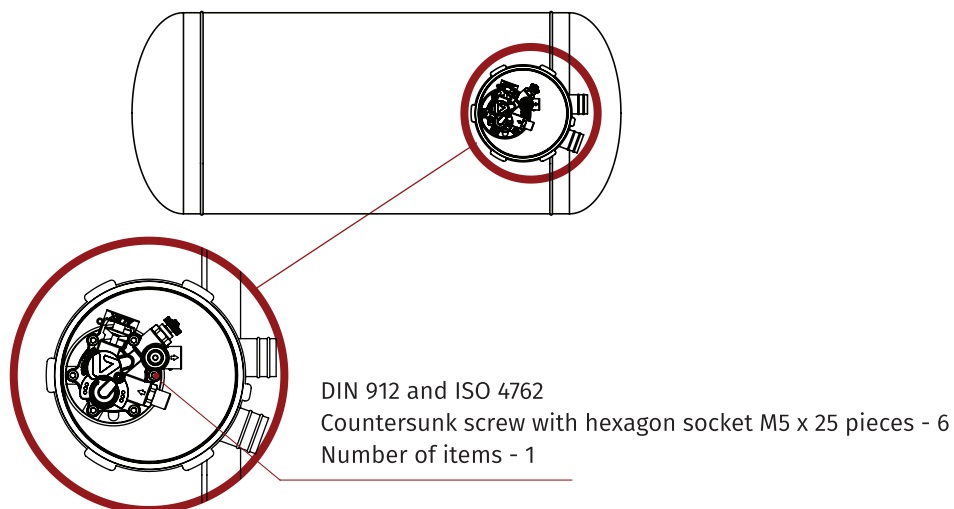


fig.39a.

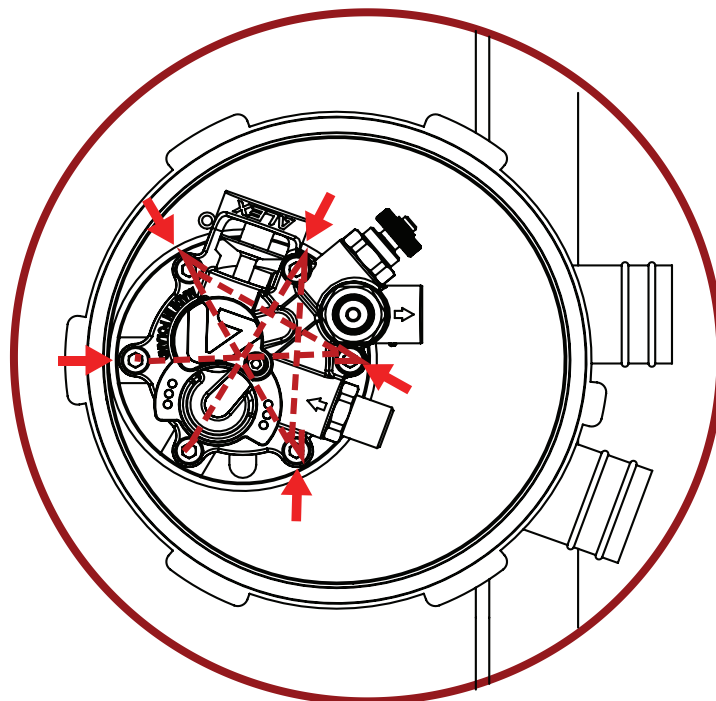


fig.39b.

THE COIL SHOULD BE SCREWED AFTER MOUNTING THE INLET AND OUTLET FITTINGS

Verify the operation of the fill restrictor valve system. The inspection should be carried out by turning the tank over and checking the correct indication of the fuel level indicator. In accordance with UNECE Regulation No. 67-01, part II paragraph 17.6.3.1: The automatic fill level limiter should be adapted to the fuel tank in question and should be installed in an appropriate position to prevent the fuel tank from being filled to more than 80% of its capacity.

Screw the fuel position indicator to the multivalve.

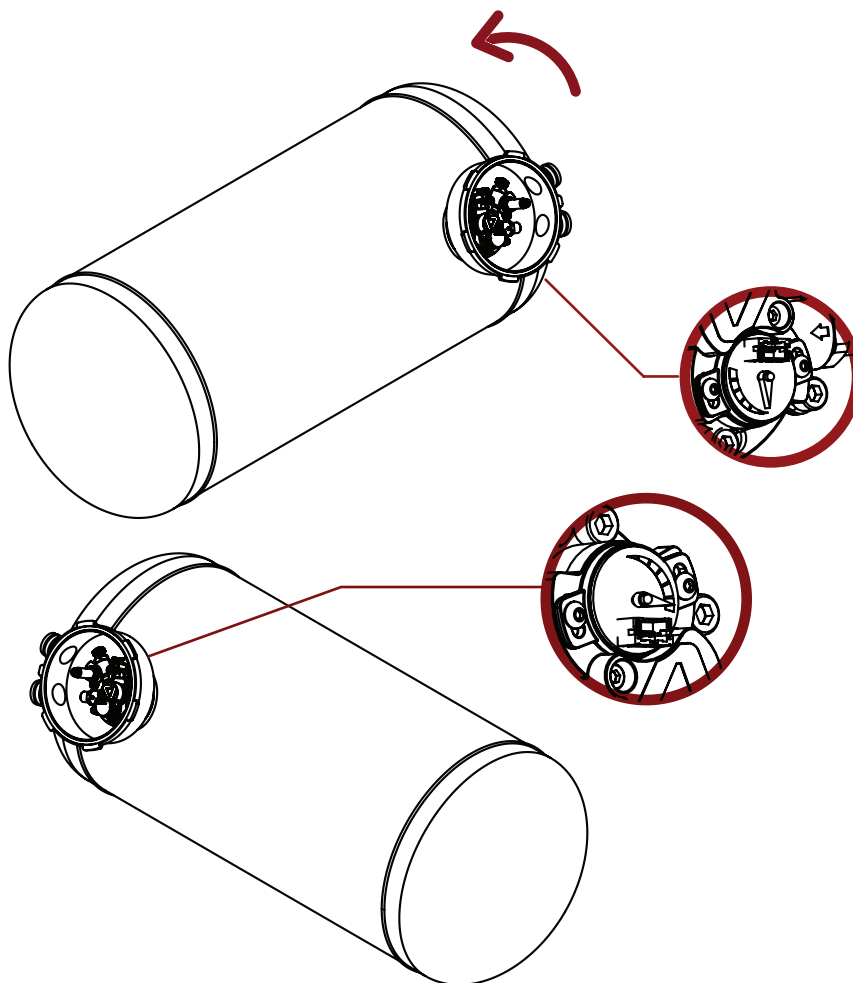
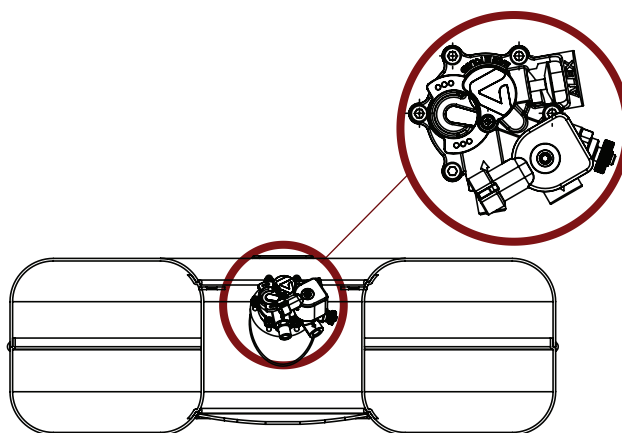


fig.40.

5. INSTALLATION OF THE MULTIVALVE IN 30° TOROIDAL TANKS

In a 30° toroidal tank, the mounting position of the multivalve is shown in the figure below.



RYS.41.

Place the float rod in the mounting hole, then insert the drainage tube. Do not force the components of the multivalve during assembly.

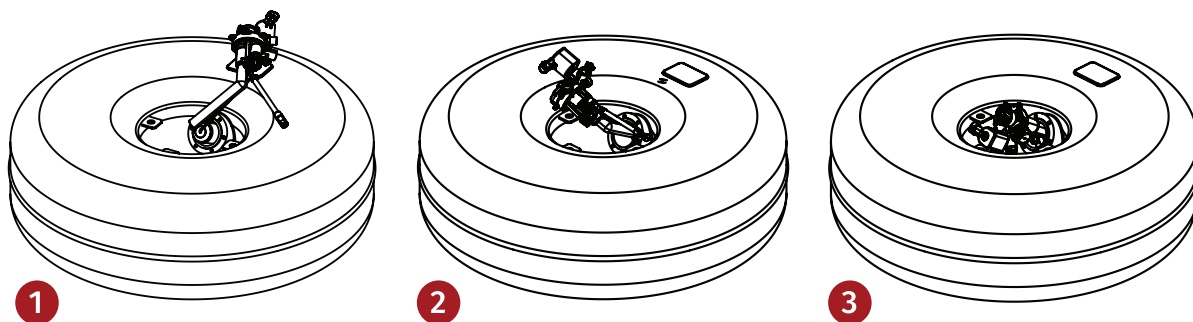


fig. 44 Placing the multivalve in 30° toroidal tanks

DURING ASSEMBLY, PAY PARTICULAR ATTENTION TO THE FILTER TUBE (GAS OUTLET) TO ENSURE CORRECT OPERATION OF THE FILLING RESTRICTOR VALVE. THE POSITION OF THE GAS EXIT TUBE MUST NOT RESTRICT THE MOVEMENT OF THE FLOAT ROD.

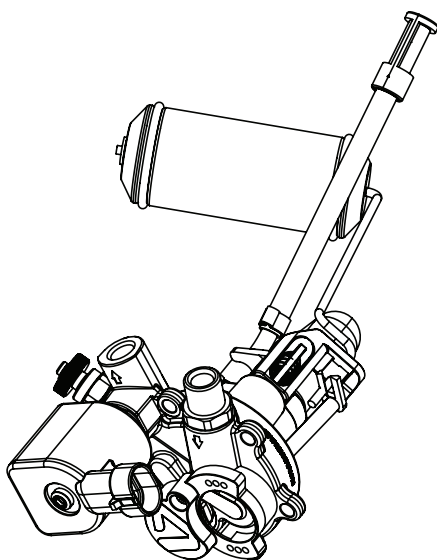


fig.45a. Correct assembly

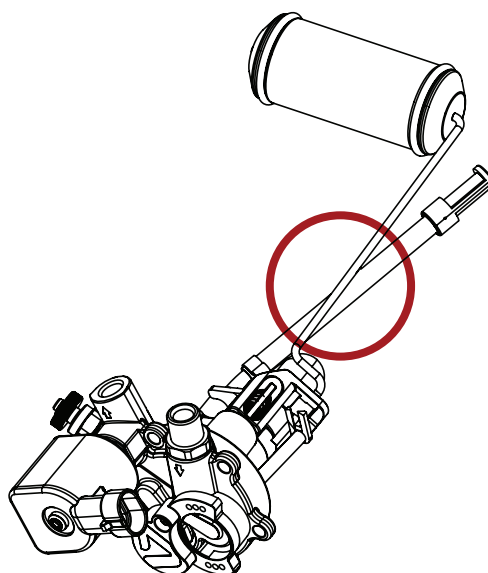


fig.45b. incorrect assembly

To install multi-valve, you must first remove the coil by unscrewing the screw M4x8 with the key Torx T20.

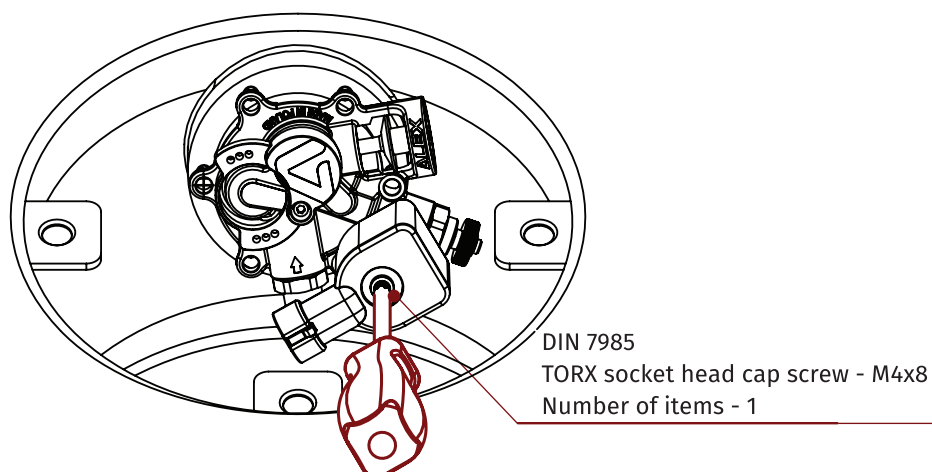


fig.46. Unscrewing the coil

- During assembly, be careful not to damage the coil. Then, using the SW4 wrench, screw 6 M5x25 hexagon socket head cap screws to the tank flange.

Tightening torque 3.5 +/- 0.5Nm.

DIN 912 and ISO 4762
M5 x 25 hexagon socket head cap screw
number of pieces - 6

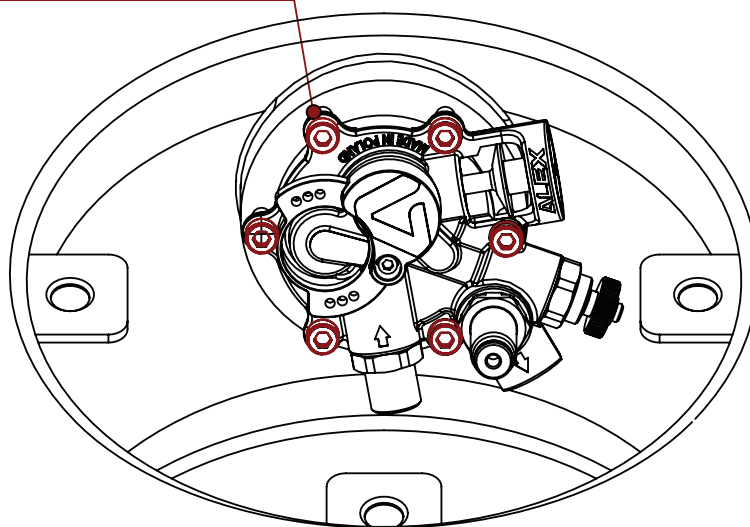


fig.47.

DO NOT REMOVE THE COIL PIN DURING DISASSEMBLY

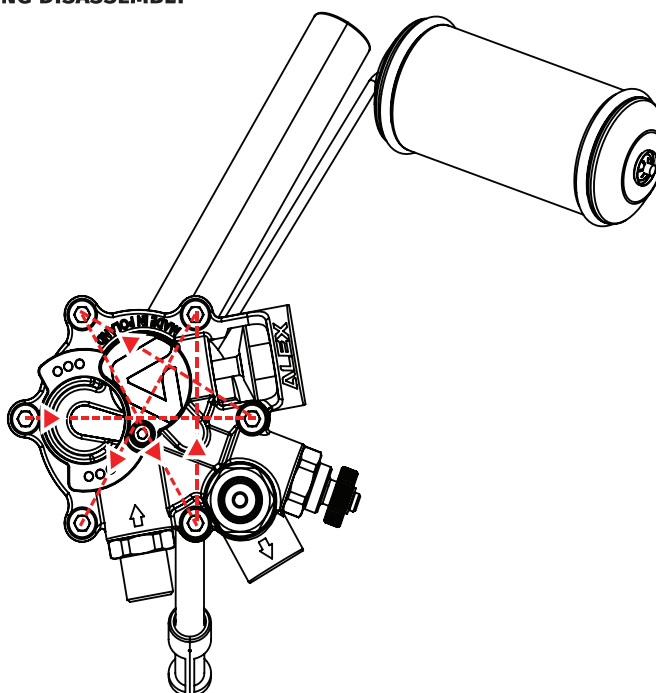


fig.48. Sequence of tightening the mounting bolts.

Verification of the system relief valves filling. The toroidal tank 30° multivalve mounting position shown in the figure below.

Screw the fuel position indicator to the multivalve. The inspection should be carried out by turning the tank over and checking the correct indication of the fuel level indicator. In accordance with **UNECE Regulation No. 67-01, part II paragraph 17.6.3.1:**

Automatic filling level limiter should be adapted to the tank

fuel and should be installed in an appropriate position of being unable to fill

Fuel tank powyżej 80% of its capacity.

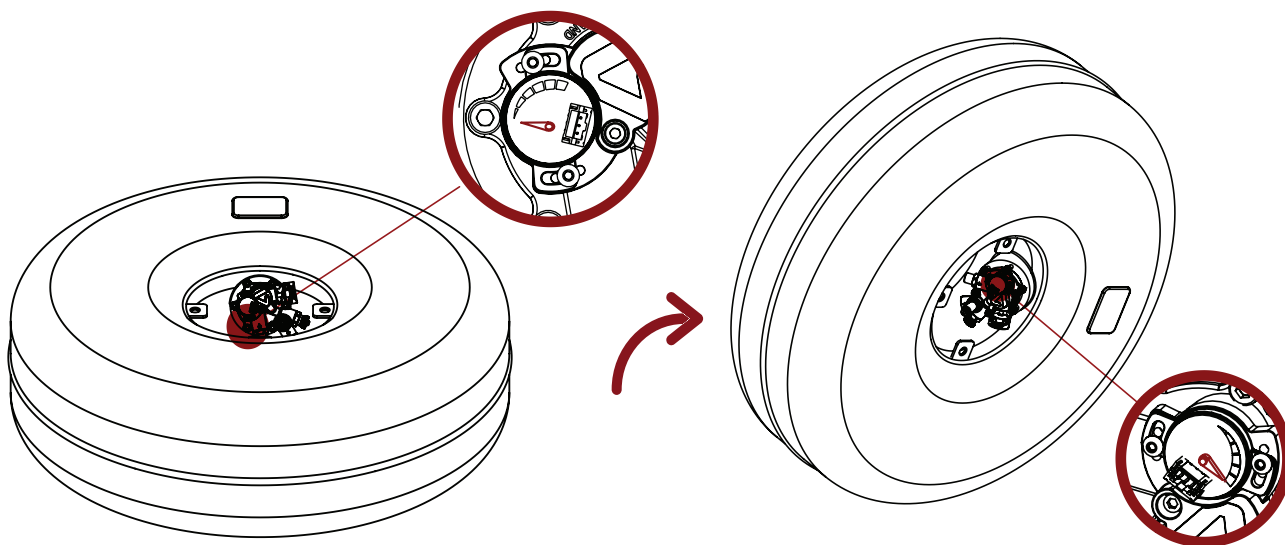


fig. 49. The method of carrying out the control

6. INSTALLATION OF A MULTIVALVE IN 0° TOROIDAL TANKS

In a 0° toroidal tank, the mounting position of the multivalve is shown in the figure below.

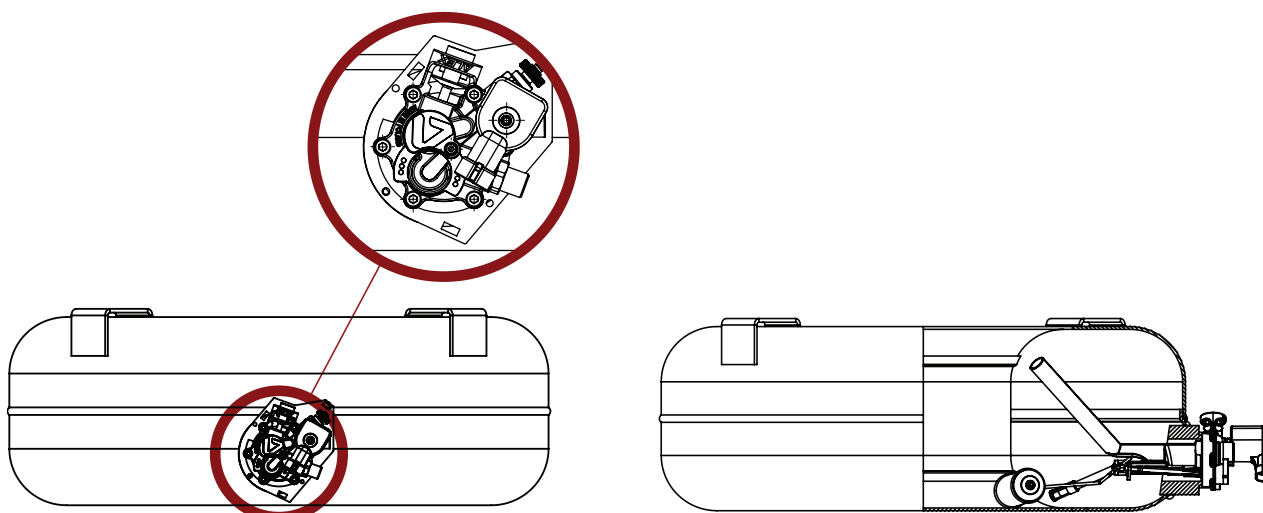


fig. 50.

Multivalve assembly for 0° toroidal tank version

The multivalve in 0° tanks is protected by a cover that prevents damage during use. For this purpose, before installation on the tank multivalve, apply the plastic cover and clamp.

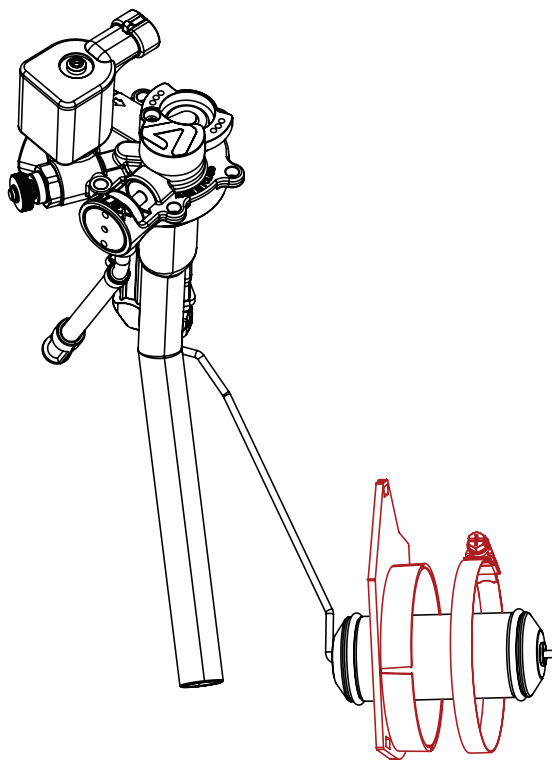


fig. 51.

The method of mounting the multivalve on the tank is presented below.

Place the float rod in the mounting hole, then insert the drainage tube. Do not force the components of the multivalve during assembly.

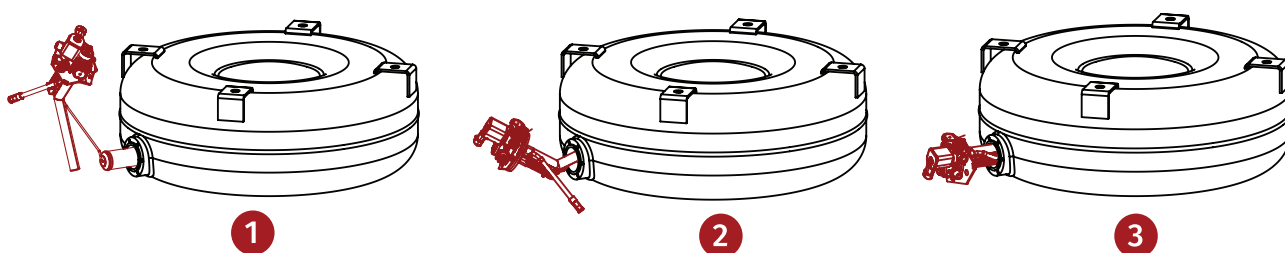


fig.52.

During assembly, pay special attention to the pipe with the filter in order to guarantee the correct operation of the valve limiting the filling to 80%.

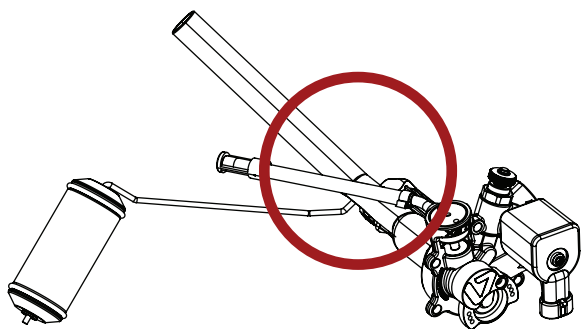


fig. 53. Incorrect assembly

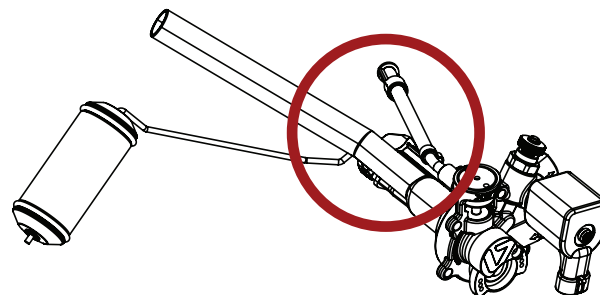
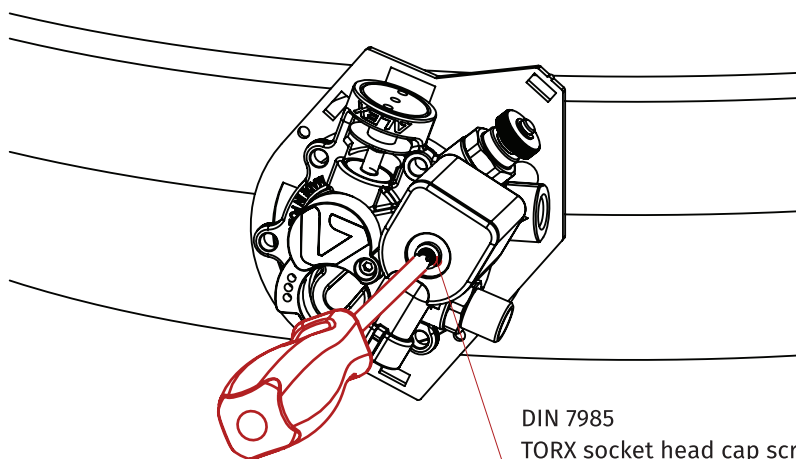


fig. 53a. Correct assembly

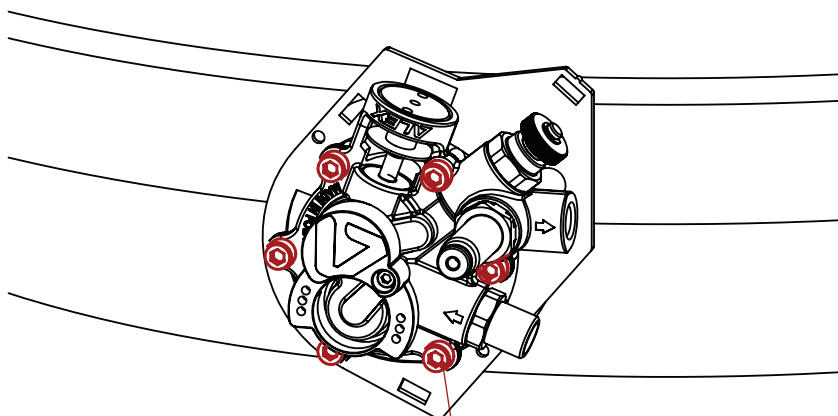
In order to install the multivalve, first remove the coil by unscrewing the M4x8 screw with the TORX T20 wrench.



DIN 7985
TORX socket head cap screw - M4 x 8
number of items - 1

fig. 54.

During assembly, be careful not to damage the coil.



DIN 912 and ISO 4762
M5 x 25 hexagon socket head cap screw
number of pieces - 6

fig.55.

Then, using the SW4 wrench, screw in 6 M5x25 hexagonal socket screws, to the tank flange.
Tightening torque 3.5 +/- 0.5Nm.

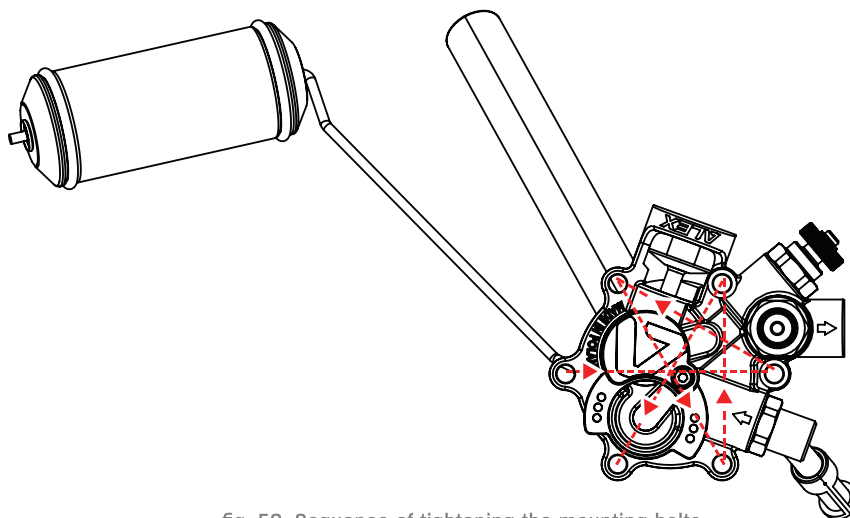


fig. 56. Sequence of tightening the mounting bolts.

Verify the operation of the fill restrictor valve system.

The inspection should be carried out by turning the tank over and checking the correct indication of the fuel level indicator. In accordance with UNECE Regulation No. 67-01, part II paragraph 17.6.3.1: The automatic fill level limiter should be adapted to the fuel tank in question and should be installed in an appropriate position to prevent the fuel tank from being filled to more than 80% of its capacity.

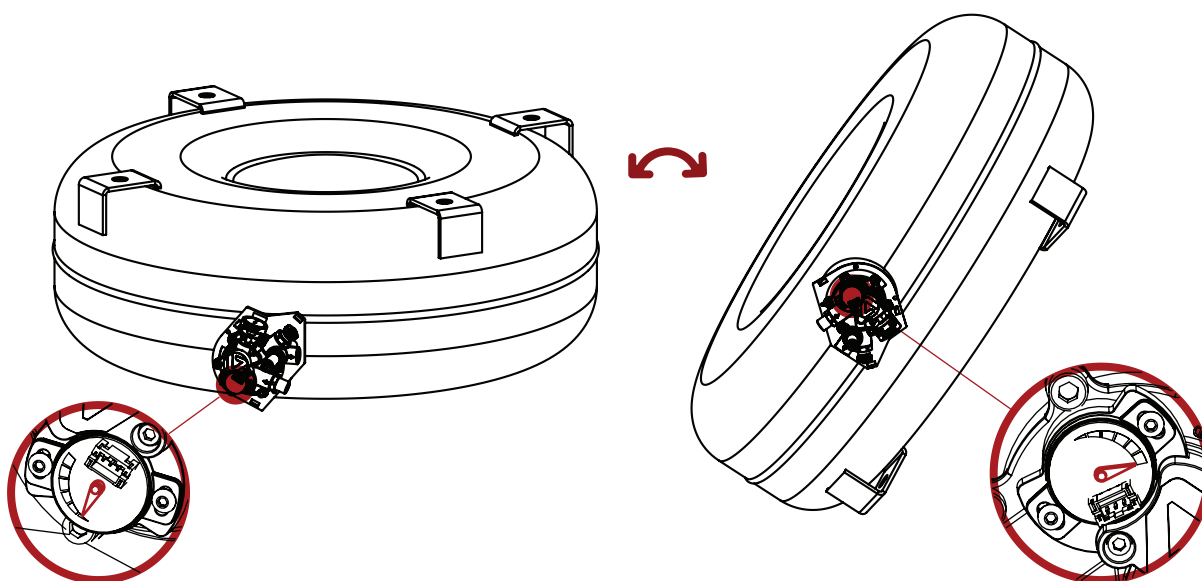


fig.57. The method of carrying out the control

7. GAS INLET AND OUTLET FITTINGS

Preparation of inlet and outlet fittings is recommended before installing the tank in the vehicle. The inlet and outlet connections should not be fastened unless the multivalve is permanently installed in the tank.

Outlet equipment

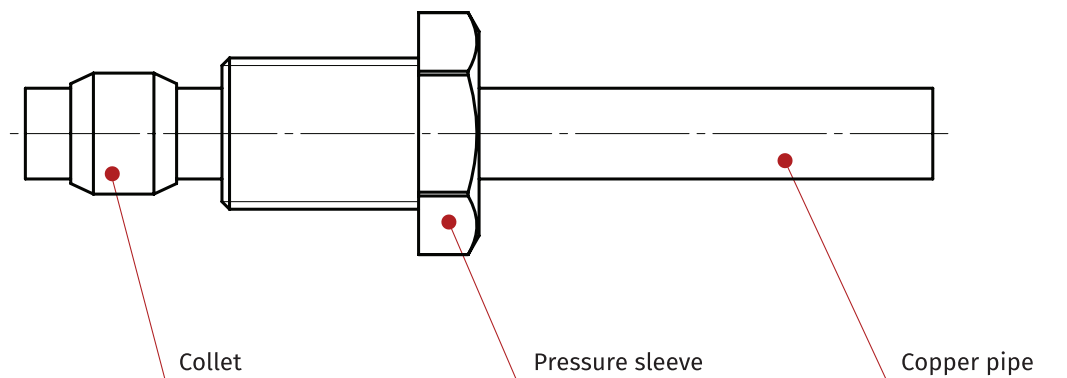


fig. 58.

The outlet stub should be placed in the opening and screwed on by hand. Then tighten with the SW14 wrench. Tightening torque 5 +/- 0.5 Nm.

During the fastening operation, it is recommended to push the copper tube into the multivalve body. After fixing, remove the nut and check the deformation of the sleeve.

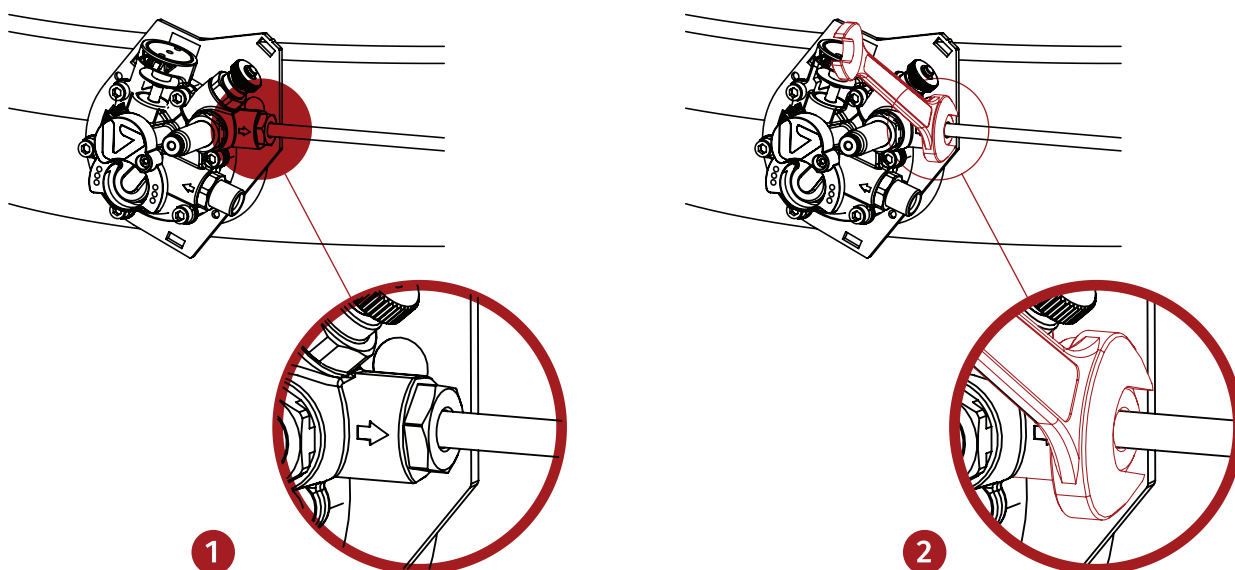


fig. 59.

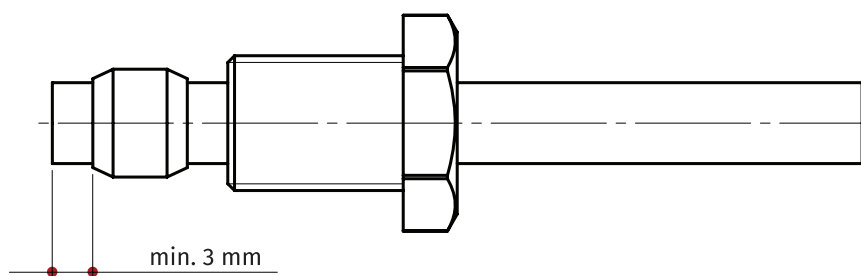


fig. 60. Correct assembly

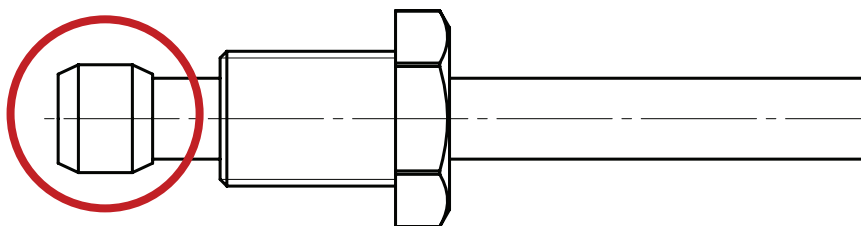


fig. 61. Incorrect assembly

Inlet equipment

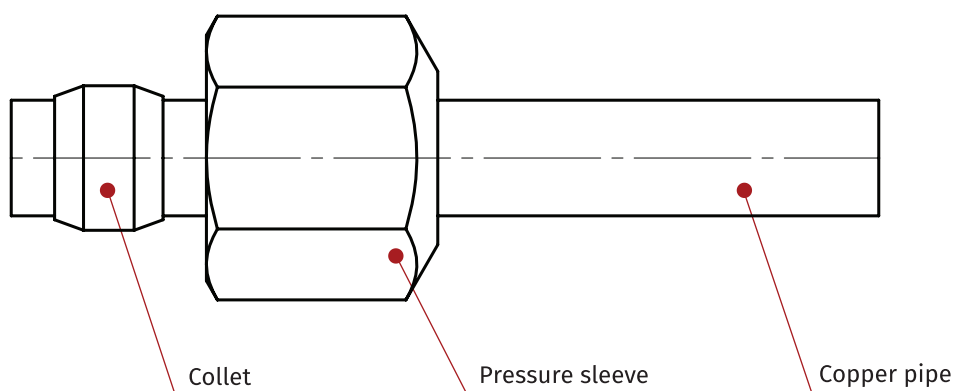


fig.62.

Place the inlet connector in the hole and screw it by hand. Then tighten with the SW17 wrench.

Tightening torque 5 + / v - 0.5Nm.

During the fastening operation, it is recommended to push the copper tube into the multivalve body.

After fixing, remove the nut and check the deformation of the sleeve.

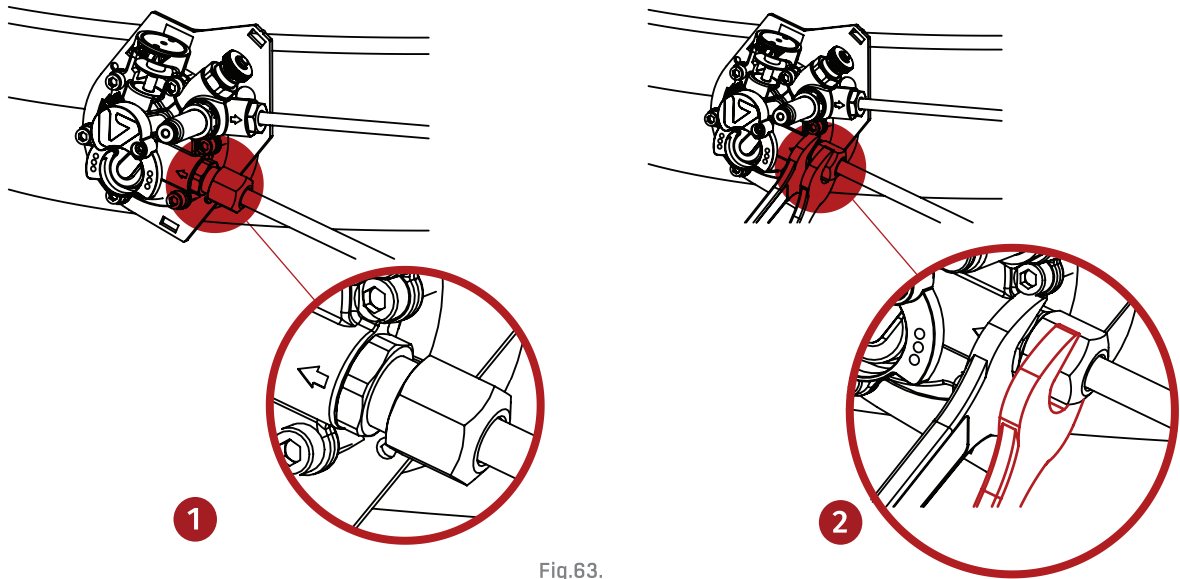


Fig.63.

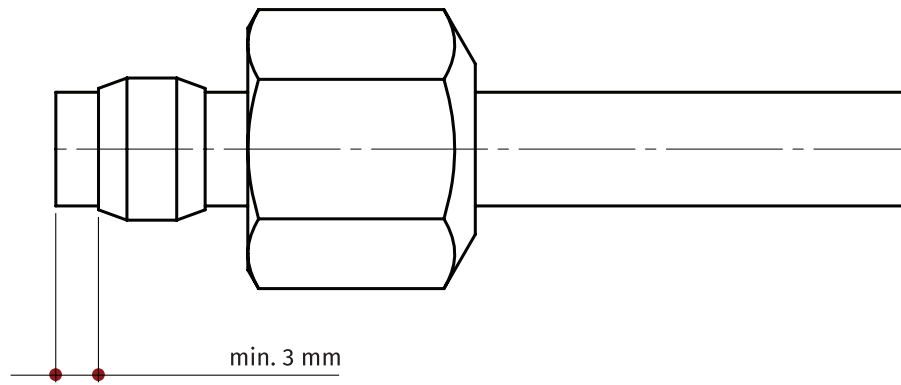


fig.64. Correct assembly

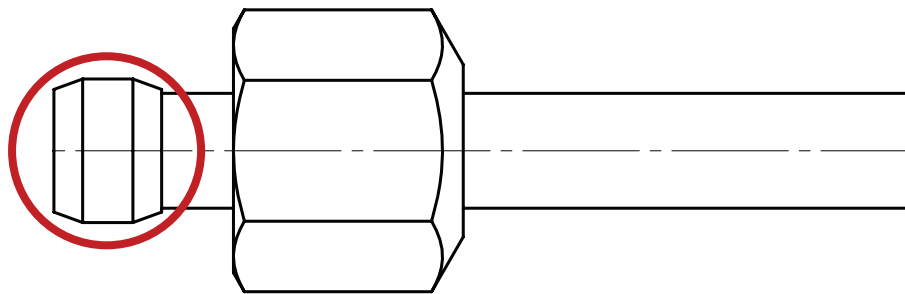


fig. 65a. Incorrect assembly

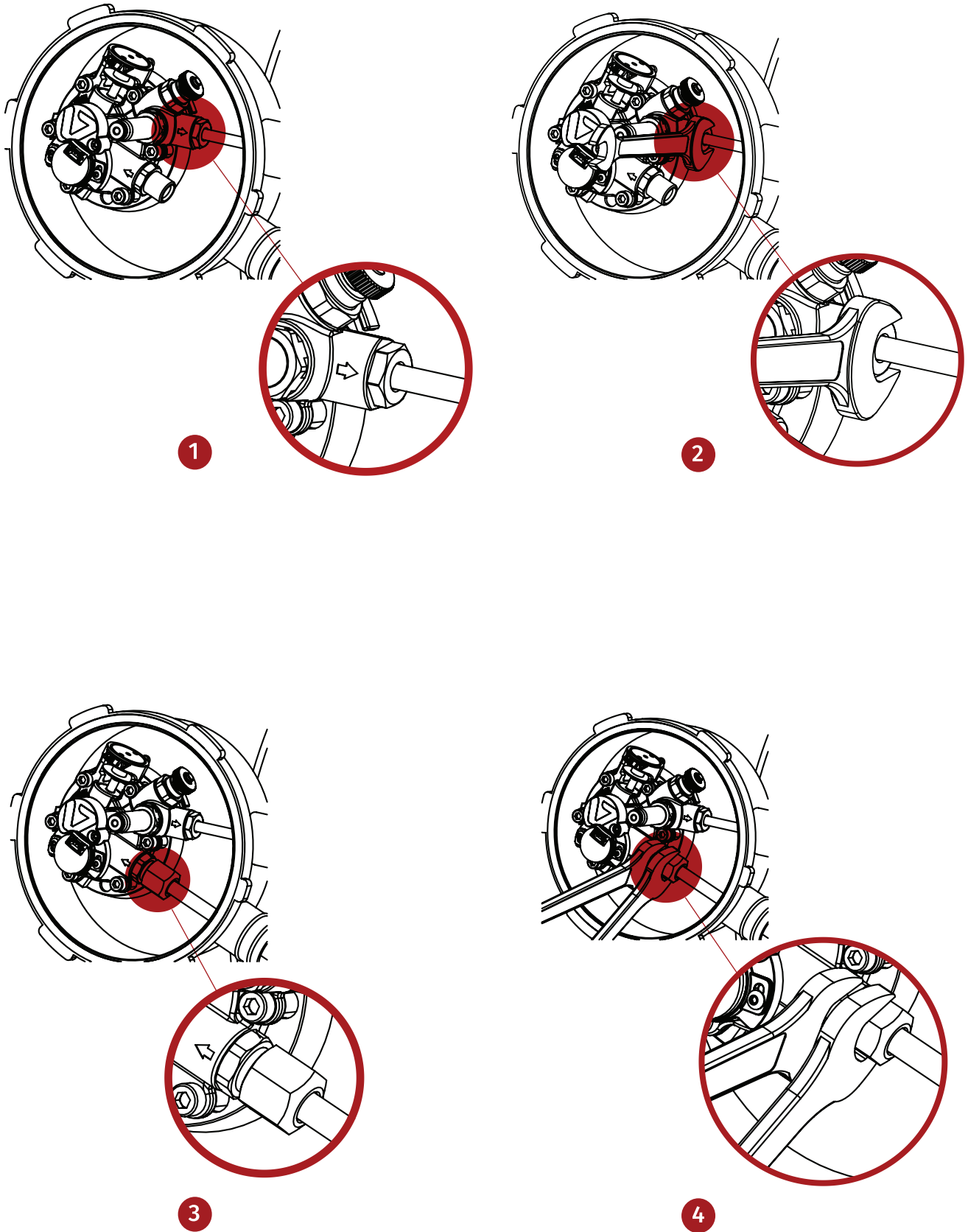


fig. 65b. Tightening method in a 30° cylindrical vessel

8. CONNECTING THE ELECTRIC WIRES

Screw the coil on with the M4x8 screw using the TORX T20 wrench.

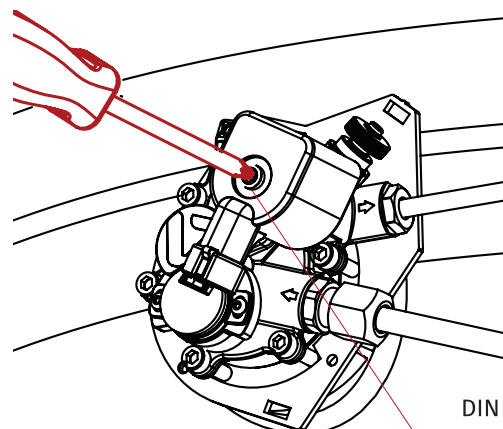


fig. 66a.

DIN 7985
TORX socket head cap screw - M4 x 8
Number of items - 1

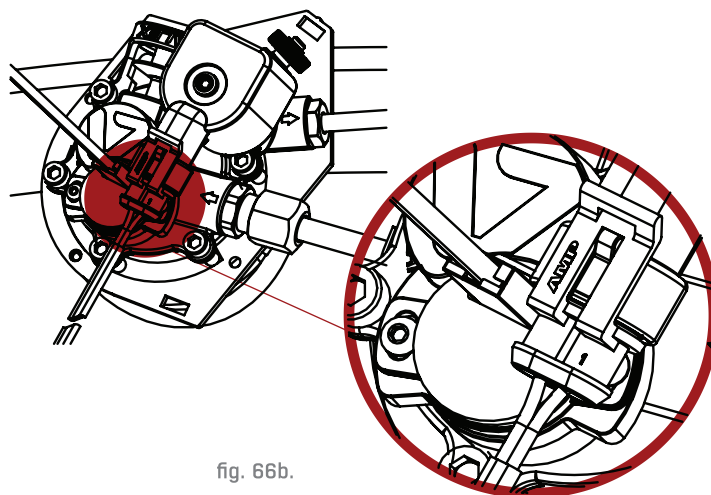


fig. 66b.

In the case of 0° external toroidal tanks, after installing the electric wires, put the cover of the protective cover on the multivalve. In the case of 30° cylindrical tanks, after installing the electric wires, put the cover of the gas-tight housing on the multivalve.

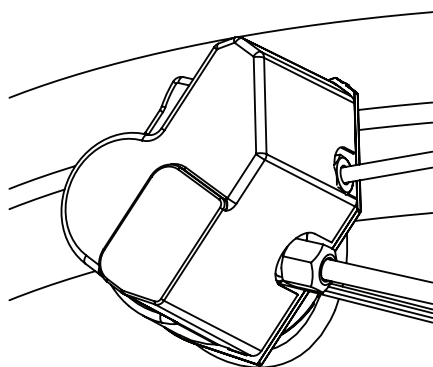


fig. 67a. Protective cover cover
in an external 0° toroidal tank

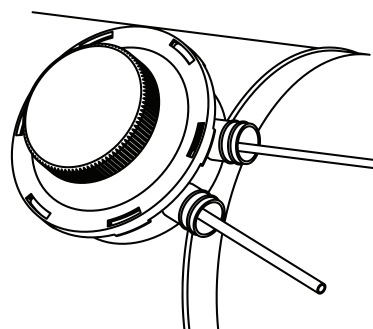


fig. 67b. Protective cover cover
in a 30° cylindrical tank

9. CALIBRATE THE POSITION OF THE FUEL POSITION INDICATOR

The setting of the fuel level indicator is to modify the position of the sensor using the holes in a plastic cover.

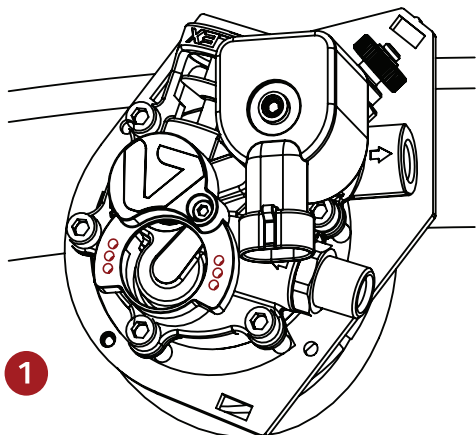


fig. 68a.

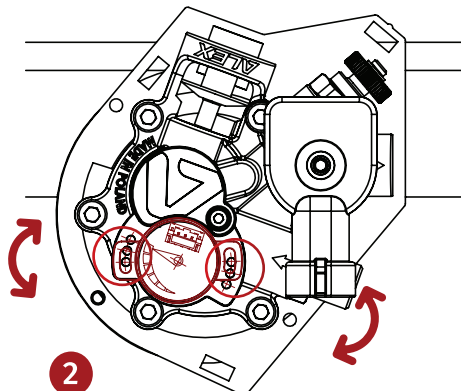


fig. 68b.

Turn the fuel gauge sensor clockwise until the pointer is in the empty tank position.

Turn the fuel gauge sensor counterclockwise until the pointer is in the full tank position.

We recommend setting the fuel gauge sensor to the extreme left (counterclockwise) position, because in this position the indication is more accurate at low gas levels.

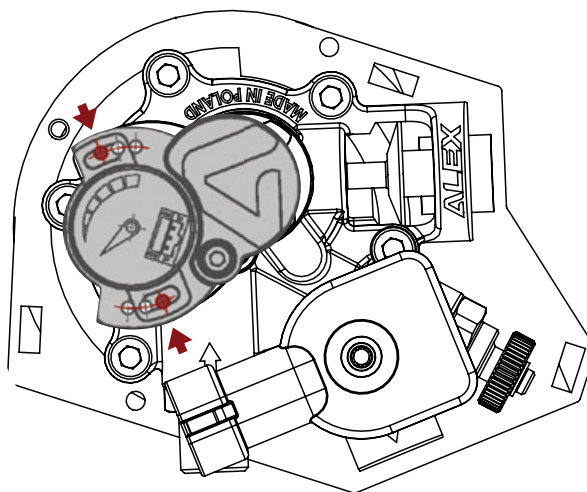


fig.69.

10. CHECKING THE INSTALLATION MOUNTED IN THE VEHICLE

In accordance with UNECE Regulation No. 67-01, part II paragraph 17.6.3.1: The automatic fill level limiter should be adapted to the fuel tank in question and installed in an appropriate position to prevent the fuel tank from being filled to more than 80% of its capacity.

The correct installation of the tank should be checked when the tank is full. Installation error in the tank axis in relation to the horizontal plane must not exceed $\pm 2^\circ$. A higher value may cause the valve to malfunction 80%.

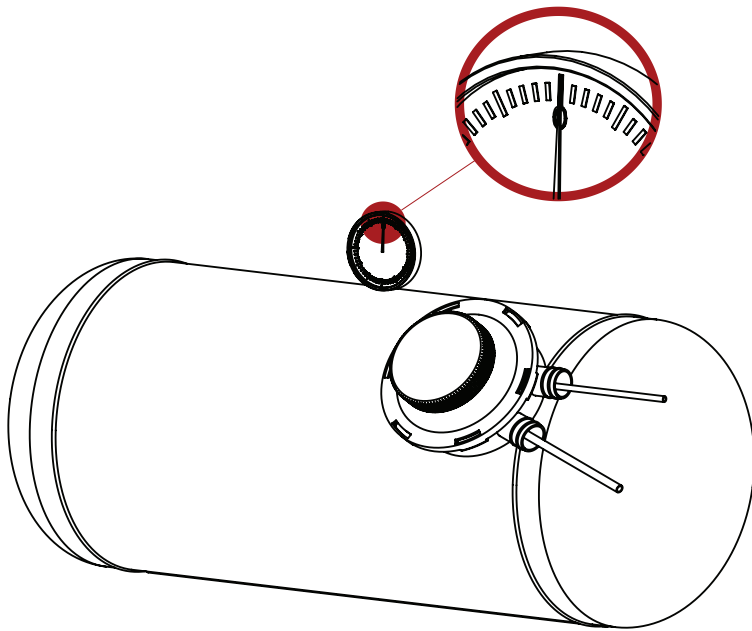


fig. 70. Control of the inclination of the 30° axis of the cylindrical tank

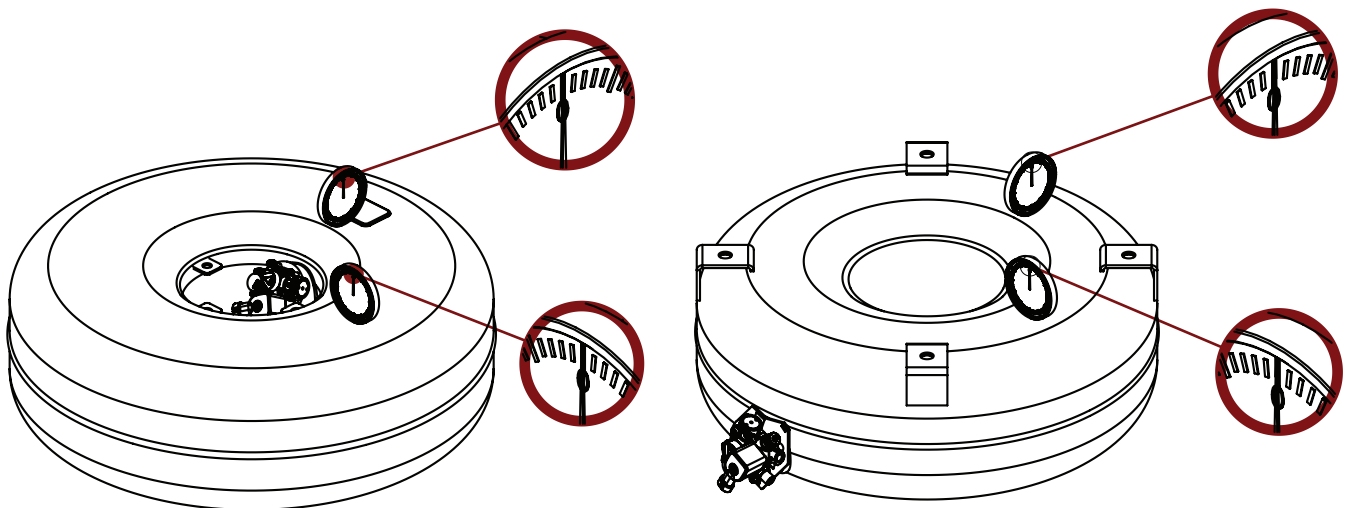


fig. 71. Control of the inclination of the axis of toroidal tanks

11. FINAL INSPECTION

After installing the multivalve in the tank, it is recommended to fill the tank and check:

- The tightness of the gasket and the fittings of the inlet and outlet pipes by leak detector or other equivalent method.

- Correct filling of the tank in accordance with UNECE Regulation No. 67-01, Part II, paragraph 17.6.3.1:

The automatic filling level limiter should be adapted to the fuel tank and should be installed in an appropriate position to prevent filling the fuel tank to more than 80% of its capacity.

- Correct operation of the shut-off solenoid valve.

12. FILLING VALVE

The refueling valve is a device for the remote filling of the LPG fuel tank. Equipped is a check valve to avoid backflow of fuel from the tank.

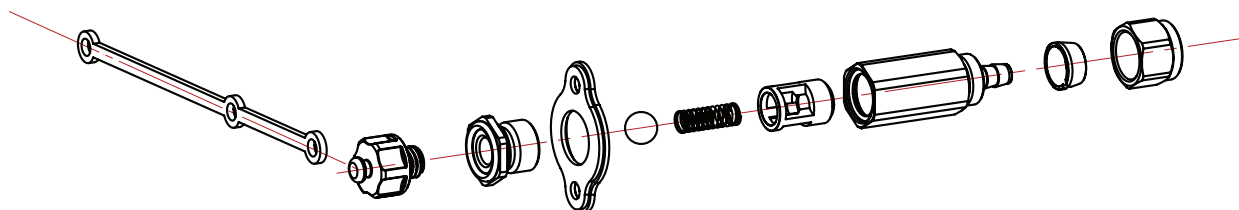


fig. 72. Components of the refueling valve

It is recommended that the refueling valve be located in a location that allows trouble-free refueling operation. The place must be free of dirt and water. It is recommended to install the valve refuel in the right position for connecting the adapter.

During installation, pay attention to the copper pipe located in the multivalve inlet. The bending radius must not reduce the cross-section of the pipe and reduce the efficiency of the LPG system.

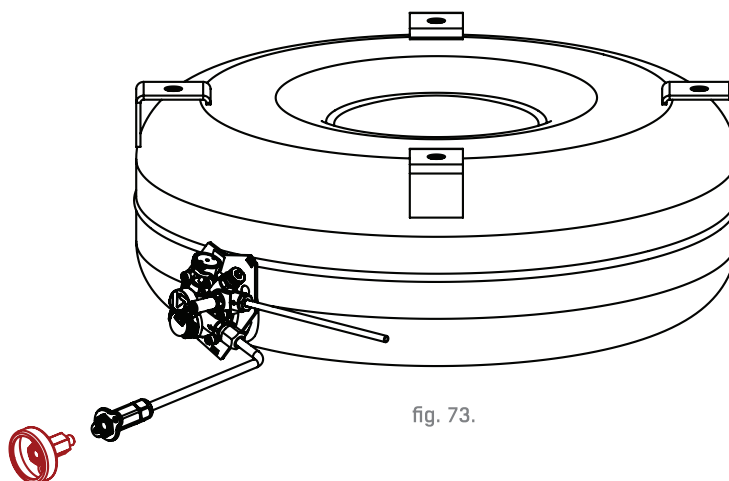


fig. 73.

- It is recommended to install the refueling valve to prevent it from turning
- It is recommended to install a refueling valve to prevent bending or damaging components installation during refueling
- It is recommended to screw on the refueling valve cap to prevent the ingress of contaminants.

III. TROUBLESHOOTING

1. The engine does not work with LPG.

- a) The manual operating valve is closed.
 - Open the operating valve.
- b) Overflow valve stuck closed.
 - Close the manual valve and open it again after a few seconds.
- c) Pipe is squashed or damaged.
 - Replace the tube / cable.
- d) No electrical connection.
 - Connect the electric wires correctly and / or check for interference.
- e) There are debris inside the service solenoid valve and blocking gas flow.
 - Replace the multivalve.
- f) Incorrect multivalve model installed.
 - Install the multivalve in accordance with the size of the tank.

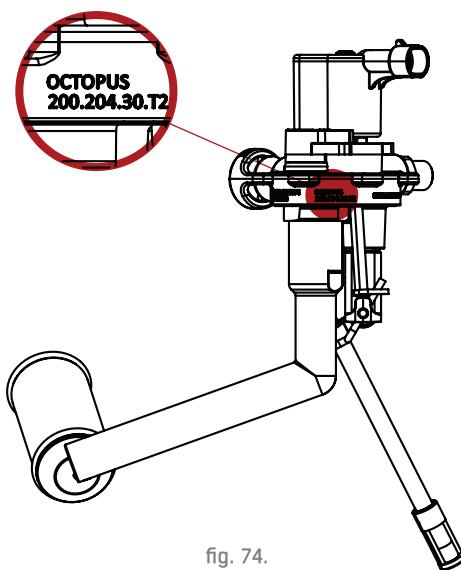


fig. 74.

- g) Defective shut-off valve.
 - Replace the coil, and if the replacement does not solve the problem, replace the multivalve.
- h) Insufficient gas flow to the regulator due to the small amount of LPG in the tank.
 - Fill the tank.

2. LPG does not flow during filling.

- a) Blocked non-return valve.
 - Replace the multivalve.

- b) The refueling valve is blocked by dirt or dust.
 - Replace the multivalve.
- c) Reduction in the flow cross section due to excessive bending.
 - Replace the tube.

3. Multivalve noise and vibration during filling operation.

- a) Insufficient pressure in the filling station pump.
 - Refuel at a different petrol station.

4. Incorrect fuel level indication.

- a) Float rod stuck in tank.
 - Check that the size corresponds between the tank and the multivalve. If it is not compatible, replace the multivalve with the proper one.
- b) The plastic tube with the filter overlaps the float rod.
 - Remove the multivalve from the tank, position the multivalve according to the instructions in Figure 53a.
- c) Faulty fuel position indicator.
 - Replace the fuel gauge and set it as instructed.

5. Incorrect filling of the tank.

- a) Incorrect installation of the tank.
 - Check that the procedures in accordance with the instructions were followed when installing the tank.
- b) Float rod damaged or bent.
 - Check the setting of the 80% fill limiting system at an authorized service center.
 - If the float rod is damaged, replace the multivalve.

6. Filling the tank 100%.

- a) Float rod damaged or bent during installation.
 - Check the setting of the 80% filling limiting unit at an authorized service center.
 - If the float rod is damaged, replace the multivalve.
- b) Incorrect installation of the multivalve in the tank.
 - Install the multivalve according to the instructions.
- c) Incorrect installation of the tank.
 - When filling, place the vehicle on a perfectly even, horizontal plane.
 - Check the tank installation by following the instructions on page 29.
- d) Insufficient pump pressure at the filling station.
 - Refuel at a different petrol station.
- e) The 80% filling restriction valve is blocked.
 - Check that the tank is empty.
 - Remove the multivalve and clean it with compressed air.
 - If the multivalve cannot be cleaned, it must be replaced.
- f) The plastic tube with the filter overlaps the float rod.
 - Remove the multivalve from the tank, correct the position of the tube according to figure 53a.
- g) Float rod stuck in tank.
 - Check that the size corresponds between the tank and the multivalve. In the event of non-compliance replace the multivalve with the correct one.

7. LPG leak from the tank.

- a) Incorrect tightening torque of the bolts securing the flange of the multivalve.
 - Fix the 6 bolts securing the multivalve to the tank.
 - The tightening torque should be between 3 and 4 Nm.
- b) Damaged tank face ring.
 - Remove the multivalve and follow the instructions on page 11.
- c) Damaged multivalve flange gasket.
 - Replace the multivalve.

8. Damaged threaded inlet and outlet fittings.

- a) The tightening torque of the bolts is too high.
 - Replace the multivalve.
- b) Improperly tightened inlet or outlet fittings.
 - Replace the multivalve.

9. Fuel gauge failure.

- a) Electric wire not connected.
 - Connect the electric wire in accordance with the instructions on pages 26-27.
- b) Damage to the spindle with the magnet during installation of the multivalve.
 - Replace the multivalve.
- c) Faulty fuel level indicator sensor.
 - Replace the sensor.
- d) Float rod stuck in tank.
 - Check compatibility of tank and multivalve.
- e) Float rod damaged or bent during installation.
 - Check the setting of the 80% filling limiting unit at an authorized service center.
 - If the float rod is damaged, replace the multivalve.
- f) The plastic tube with the filter overlaps the float rod.
 - Remove the multivalve from the tank, correct the position of the tube according to figure 53a.

10. Leakage of LPG from the tank during filling.

- a) Insufficient tightening torque for inlet fitting.
 - Install the inlet fitting correctly.
 - The tightening torque should be between 4 and 5 Nm.

11. LPG leak from the tank during normal operation.

- a) Leak at the pipe connection.
 - Install the outlet fitting correctly.
 - The tightening torque should be between 4 and 5 Nm.
- b) Insufficient tightening torque for nut and sleeve.
 - Install the outlet fitting correctly.
 - The tightening torque should be between 4 and 5 Nm.