FOR YOUR SAFETY

- This paragraph contains important information concerning safety. Read carefully before using the pressure appliance – In this document, "pressure appliance" [accumulator] is defined as the unit formed by the casing, membrane and valve.

- Warnings and cautions

WARNINGS: this symbol indicates warnings that must be read prior to using the product to prevent possible physical harm to the user

CAUTIONS: this symbol indicates procedures for preventing product damage

WARNINGS

- To prevent risks of explosion or fire, do not expose the pressure appliance to direct or indirect heat sources.
- The pre-charge pressure must be equal to Po = P1 (Minimum operating pressure) x 0.8.
- If the pressure appliance operates at high temperature, the pre-charge pressure changes according to the formula below.

Example:

Let's assume to pre-charge the pressure appliance at 50 bar at an environment temperature of approx. 20°C and that it shall operate at a max. temperature of 200°C. The pre-charge value must be obtained using the following formula:

$$P0_{TA} \times \frac{(273 + TA)}{(273 + T2)}$$

Where

$P0_{TA}$ = Pre-charge pressure at environment temperature
TA = Environment temperature
T2 = Max. operating temperature

- It is strictly prohibited to make structural changes to the pressure appliance. [welding or drilling for installation].
- The customer shall install a safety system which protects the accumulator from unwanted overpressures.

- ***Use ONLY NITROGEN, never other types of gas: DANGER OF EXPLOSION***

CAUTIONS

- Never exceed the maximum pressure which is stamped on the equipment.
- Use grease type Castrol 8794 or similar for bladders : NBR – HNBR – NBR for low temperatures - VITON
- Use oil type Caldic 47V350 for other elastomers
- Upon system start, we recommend to verify the pre-charge pressure

- INSTALLATION

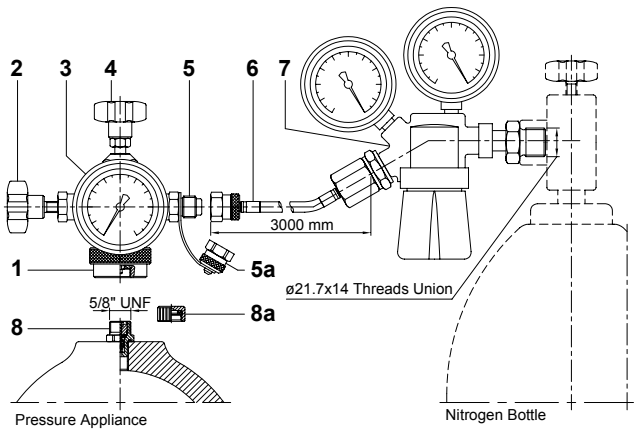
- Vertical or horizontal position according to the needs of the plant. It is strictly forbidden to install the equipment upside down, with the gasvalve downwards.
- When subject to vibration we advise to fix the equipment with the fasteners available on our catalogue.

- Some advice
- Use in your hydraulic system:
  - Check-valve between pump and accumulator
  - A limit valve, set under the p. max. indicated on the equipment
  - A safety block, in order to exclude the equipment and to discharge the accumulator safely

- If the equipment is precharged, the operator must proceed as follows:

1 **Verify or increase the precharge of the pressure appliance with the valve:**

a. Remove the protection cap (8a) of the valve (8) on the damper.
b. Fit the pre-charge device rotating the ring nut (1), ensuring that the discharge valve (2) is open.
c. Remove the cap (5a) and connect the hose (6) to the precharge attachment (5) already connected to the pressure reducer (7) fitted on the nitrogen bottle.
d. Close the discharge valve (2).
e. Gently screw the hand-wheel (4) until you are able to read the pressure of the gas contained inside the pressure appliance.
f. Checking the pressure gauge (3), increase the pre-charge pressure, operating the pressure reducer adjusting knob (7), up to a value slightly higher than the one selected.
g. Unscrew the handwheel (4), close the cock of the bottle and empty the hose (6) opening the valve (2).
h. Remove the hose (6), refit the cap (5a) on the attachment (5) and wait for a few minutes.
i. Close the discharge valve (2), screw the hand-wheel (4) and check the pressure: if it is correct unscrew the hand-wheel (4), open the discharge valve (2), remove the device by unscrewing the ring nut (1) and refit the protection cap (8a) on the valve (8).

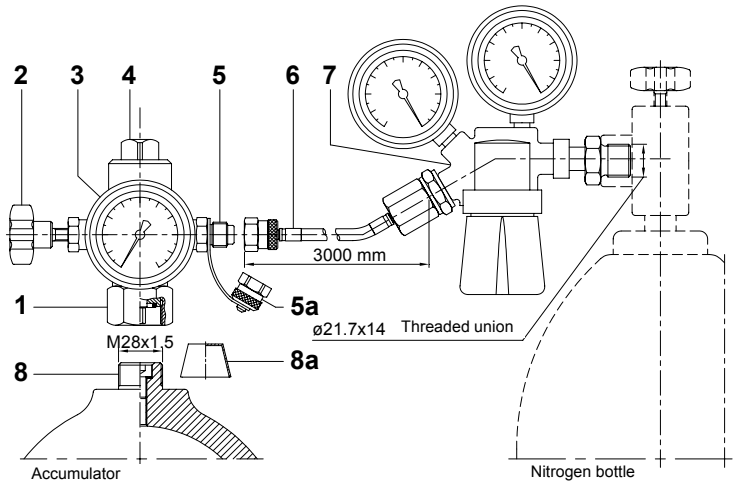


2 **To discharge the pressure appliance:**

a. Remove the protection cap (8a) of the valve (8) on the damper.
b. Fit the pre-charge device rotating the ring nut (1), ensuring that the discharge valve (2) is closed.
c. Screw, without forcing, the handwheel (4) and open the valve (2). Until complete discharge or until you reach the desired pressure.

3 **Verify or increase the precharge of the pressure appliance with the screw valve:**

a. Remove the protection cap (8a) of the valve (8) on the damper.
b. Unblock the screw without allowing any gas leak
c. Fit the pre-charge device rotating the ring nut (1), ensuring that the discharge valve (2) is open.
d. Remove the cap (5a) and connect the hose (6) to the precharge attachment (5) already connected to the pressure reducer (7) fitted on the nitrogen bottle.
e. Close the discharge valve (2).
f. Unscrew, with the use of a 19 monkey wrench, the frame (4) until you are able to read the pressure of the gas contained inside the pressure appliance.
g. Checking the pressure gauge (3), increase the pre-charge pressure, operating the pressure reducer adjusting knob (7), up to a value slightly higher than the one selected.
h. Gently unscrew the frame (4), close the cock of the bottle and empty the hose (6) opening the valve (2).
i. Remove the hose (6), refit the cap (5a) on the attachment (5) and wait for a few minutes.



j. Close the discharge valve (2), unscrew the frame (4) and check the pressure: if it is correct screw, without forcing, the frame (4), open the discharge valve (2), remove the device unscrewing the ring nut (1)
k. Completely tighten the screw by means of a dynamometrical wrench (the tightening torque is listed at the end of the document).
l. Refit the protection cap (8a) on the valve (8).

4 **To discharge the pressure appliance:**

d. Remove the protection cap (8a) of the valve (8) on the damper.
e. Unblock the screw without allowing any gas leak
f. Fit the pre-charge device rotating the ring nut (1), ensuring that the discharge valve (2) is closed.
g. Unscrew, by means of a 19 monkey wrench, the frame (4) and open the valve (2). Until complete discharge or until you reach the desired pressure.

STRIPPING DOWN THE ACCUMULATOR OF THE PLANT AND ITS MAINTENANCE

⚠	**WARNING** **These operations have to be carried out by expertised people, because if not performed correctly, they may compromise the correct functionning of the equipment**

- For technical informations and/or quotations contact Tel. +39-02-57603913 Fax +39-02-57604752 or E-mail saip@saip.it The person in charge is Sergio Zanardi
- With normal operation and respecting the parmeters shown on the equipment this intervention will not necessitate.

If the customer will do the maintenance in his own shop he has to take following precautions :

1. Make sure all the valves are in discharge position and the pumps are stopped. Make sure no pressure has been left at the liquid side.
2. ⚠ Make sure no pressure has been left at the gasside. Verify this with the checking device, Open the gasvalve to permit the gas in the accumulator to evacuate.
3. Strip down the accumulator from the plant.
4. ⚠ Screw out the gasvalve with care and screw of the upper part of the accu with a bandkey, take out the diaphragm.

STEPS TO REASSEMBLE EQUIPMENT L and LAV 0,1 and 0,35 litres :

1. Clean with care the inside of the components with compressed air. Make a visual check to make sure everything is cleaned well.
2. Replace the diaphragm with a new, original one. Lubrificate the outside of the diaphragm .
3. Lubrificate the seat of the diaphragm on the upper part of the accumulator.
4. Introduce the diaphragm in its seat. The operator must check the correct position of the seal-lip into its housing.
5. Screw manually the upper part of the accumulator on the lower part until the contact with the diaphragm increases the friction.
6. Terminate the closure of the equipment with the band-key until arriving at the torque value given on the end of this page.
7. Refix the gasvalve adding a joint of type OR2050 NBR. The torque value is indicated at the bottom of this page.
8. Actuate the precharging following the instructions of the manual of the device DP200.

STEPS TO REASSEMBLE EQUIPMENT LAV 0,5 / 0,75 and AMP 0,5 litres :

1. Clean with care the inside of the component with compressed air. Make a visual check to make sure everything is cleaned well.
2. [Only for LAV 0,75] lubrificate the seat of the joint on the upper part, put the diaphragm in position and lubrificate another time also the joint.
3. Replace the diaphragm with a new, original one and lubrificate it on the outside.
4. [Only for LAV 0,75] Position the ring, seat of the diaphragm.

5. Place the diaphragm. The operator must check that the seal-lip will be fixed correct in the housing.
6. [Only for LAV 0,75] Insert the metal fixing ring over the diaphragm and lubrificate.
7. Screw together the upper and the lower part by hand until the friction starts to increase due to the contact with the diaphragm.
8. Terminate the closure of the equipment with the band-key until arriving at the torque value given at the bottom of this page.
9. Refit the gasvalve adding a joint of type OR2050 NBR. The torque is indicated at the bottom of this page.
10. Actuate the precharging following the instructions of the manual of the device DP200.

N:B:: During the precharging it is necessary to fit the accumulator into a vise on a bench.

STEPS TO REASSEMBLE EQUIPMENT LAV from 1,5 up to 15 litres :

1. Clean with care the inside of the components with compressed air. Make a visual check to make sure everything is cleaned well.
2. Place the joint between the lower cap and the pipe.
3. Replace the diaphragm with a new,original one lubrificate it on the outside. .
4. Screw the lower cap together with the pipe maintaining the diaphragm in its seat upside.
5. Position the ring, seat of the diaphragm

6. Place the diaphragm. The operator must check that the seal-lip will be fiitted correct in the housing.
7. Insert the metal ring over the diaphragm and lubricate the part that will be in contact with the diaphragm [for volumes 1,5 and 2,5]
8. Position the joint between pipe and upper cap and lubricate with care.
9. Screw by hand the upper cap on the pipe until the contact with the diaphragm will increase the friction.
10. Terminate the closure of the equipment using a band-key until arriving at the torque given at the bottom of this page.
11. Refit the gasvalve adding a joint of type OR2050 NBR. The torque is indicated at the bottom of this page.
12. Actuate the precharging following the instructions of the manual of the device type DP200.

N.B.: During the precharging it is necessary to fit the accumulator into a vise on a bench.

- ❑ For accumulators of type LAV 2,5 it is necessary to observe following instructions during the start-up of the precharging with nitrogen.
- ❑ It is important to guide the antiextrusion disk into the correct position.
- ❑ The operator must use a pin of 4 mm. dia. And 250 mm lenght.
- ❑ Introducing this pin from the liquid port into the small hole at the centre of the disk before starting the precharge. Now open slowly the gasbottle and guide with the pin the diaphragm at the centre of the oilport.This way also the disk will be in the correct position for functioning and in this way the anti-extrusion disk will event the rubber of the diaphragm to come in contact with the edge of the oilport, which might cause rupture of the bladder itself.

TORQUE VALUE FOR THE END-CAPS

L LAV 0,1-0,35		**69,9**	**Nm**
LAV AMP 0,5		**69,9**	**Nm**
LAV 0,75-1,5-2,5	**109,6**	**Nm**	
LAV 4 and more	**356**	**Nm**	

TORQUE VALUE FOR THE GASVALVE

Thread M12	**59,73**	**Nm**
Screw M8	**40**	**Nm**

EXAMPLE OF MARKING THE EQUIPMENT

CE xxxx
xxxx.x.x,x.xx.x.x.x
P.MAX xxx Bar
Lt xxx -xx +xx°C
Po xxx Bar
SAIP
01/02
xxxxxx/x

Legend

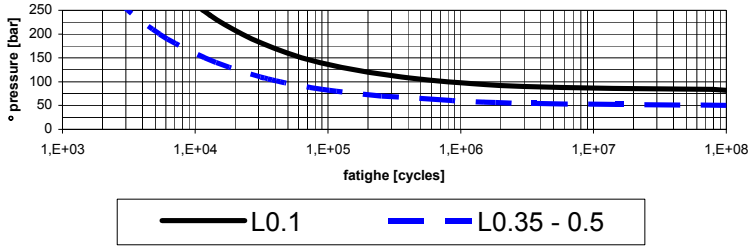
CE	Qualifying Authority Numbers
xxxx.x.x,x.xx.x.x.x	Pressure appliance type
P.MAX	Maximum pressure
Lt	Pressure appliance capacity
-xx +xx°C	Operating temperature delta
SAIP	SAIP marking
Po	Precharge pressure
01	Month of manufacturing
02	Year of manufacturing.
xxxxxx/x	Serial number

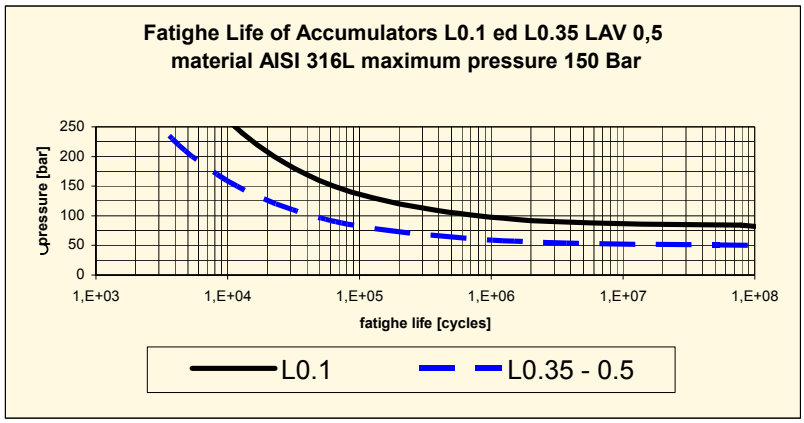
Note: the CE marking and the number of the certifying authority is imprinted for the pressure appliance in class II III IV.
The serial number is imprinted only on assemblies of category II, III and IV.

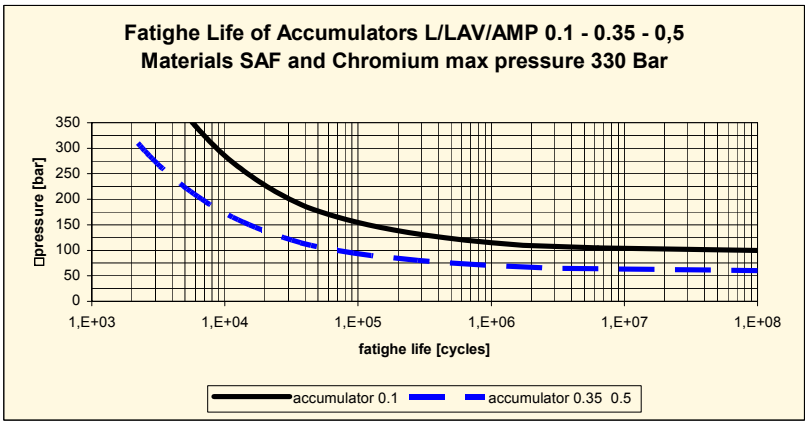
	WARNING
⚠	**Waste oils are toxic, and has to be treated according to the national laws regarding toxic waste.**

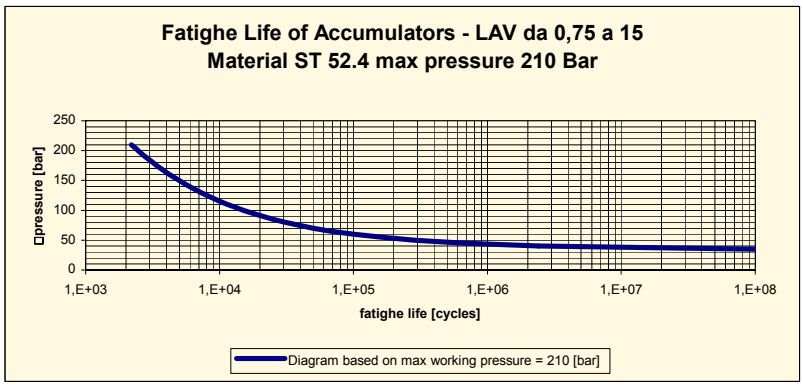
- The mechanical parts of the equipment are not subject to special rules.

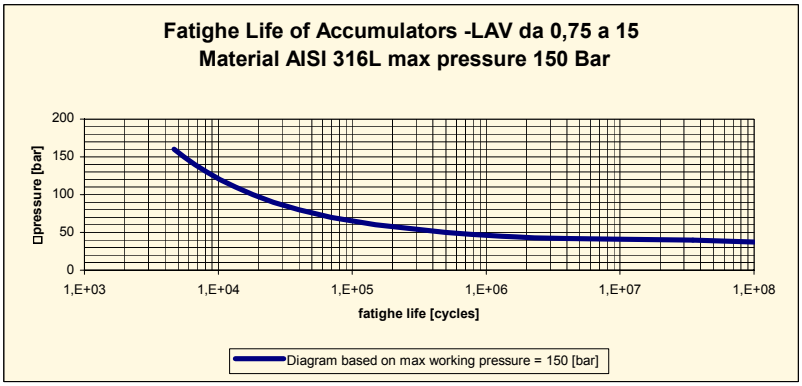
Fatighe Life of Accumulators L0.1 ed L0.35 LAV 0,5
material ST52.4 maximum pressure 210 Bar

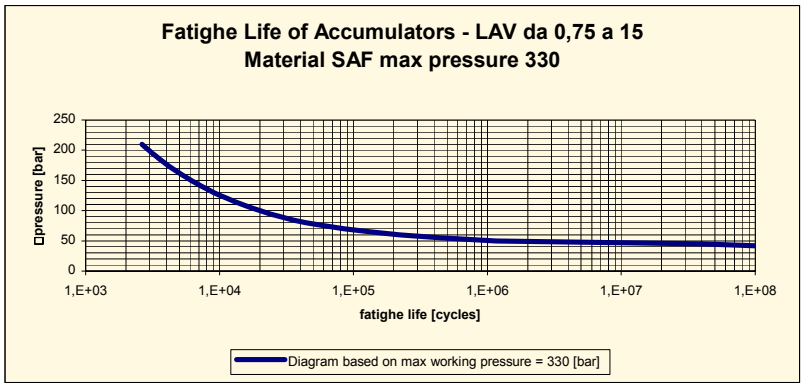



Fatighe Life of Accumulators L0.1 ed L0.35 LAV 0,5
material AISI 316L maximum pressure 150 Bar
pressure [bar]
250
200
150
100
50
0
1,E+03
1,E+04
1,E+05
1,E+06
1,E+07
1,E+08
fatighe life [cycles]
L0.1
L0.35 - 0.5


Fatighe Life of Accumulators L/LAV/AMP 0.1 - 0.35 - 0,5
Materials SAF and Chromium max pressure 330 Bar
pressure [bar]
350
300
250
200
150
100
50
0
1,E+03
1,E+04
1,E+05
1,E+06
1,E+07
1,E+08
fatighe life [cycles]
accumulator 0.1
accumulator 0.35 0.5


Fatighe Life of Accumulators - LAV da 0,75 a 15
Material ST 52.4 max pressure 210 Bar
pressure [bar]
250
200
150
100
50
0
1,E+03
1,E+04
1,E+05
1,E+06
1,E+07
1,E+08
fatighe life [cycles]
Diagram based on max working pressure = 210 [bar]


Fatighe Life of Accumulators -LAV da 0,75 a 15
Material AISI 316L max pressure 150 Bar
pressure [bar]
200
150
100
50
0
1,E+03
1,E+04
1,E+05
1,E+06
1,E+07
1,E+08
fatighe life [cycles]
Diagram based on max working pressure = 150 [bar]



NOTE: The directive defines the value of **> 2*10^6** to be the Endurance Limit of the equipment
NOTE: When the pressure values would go over the Endurance Limit shown in the diaphragm verify that the equipment will not go over the cycles shown in the diaphragm.