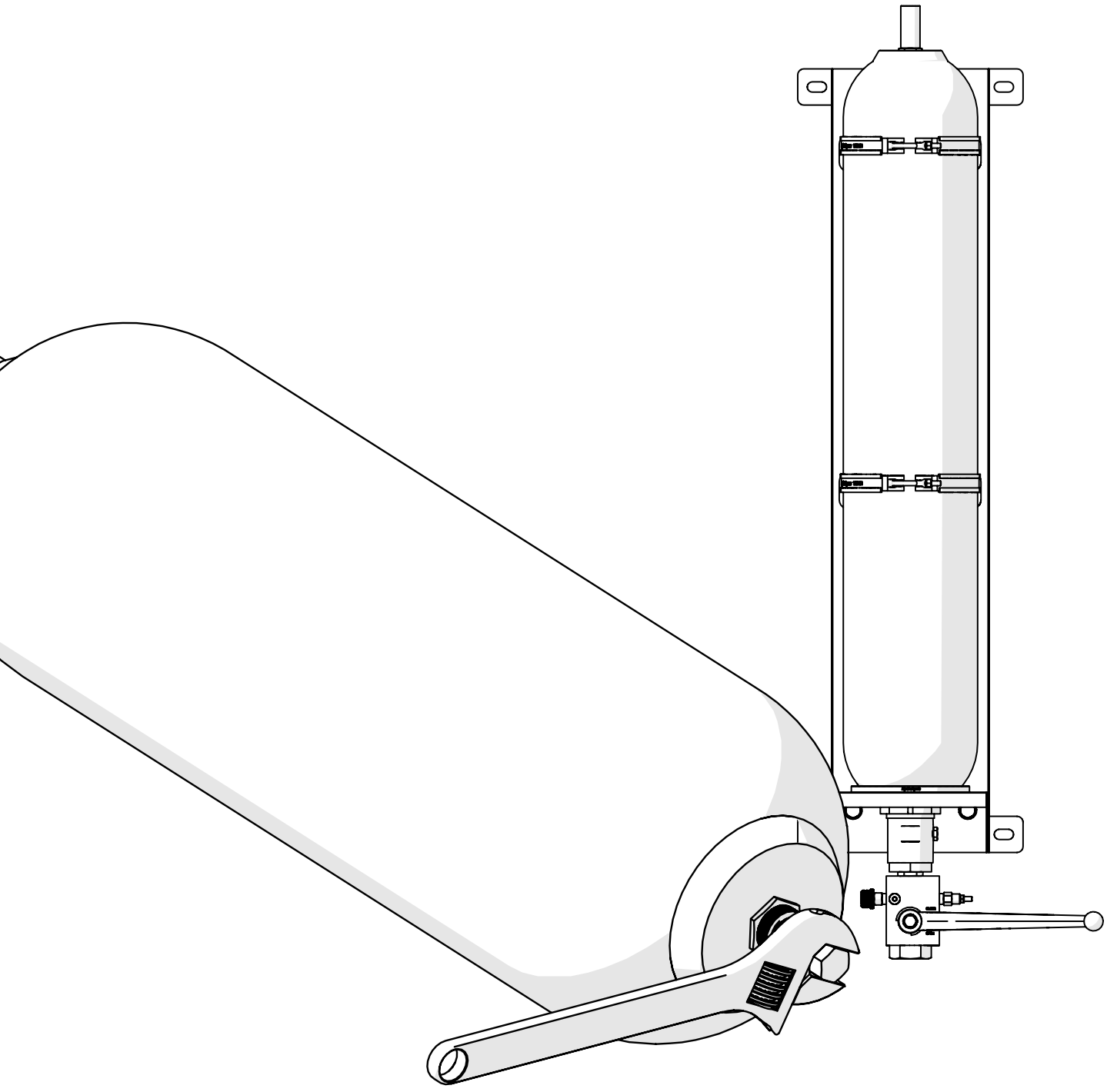
Hydro Lync

Engineering Excellence

Bladder Accumulators

User Manual and Maintenance Instructions



WARNING

Hydraulic accumulators are pressurized vessels and only qualified technicians should perform repairs. Never weld, braze or perform any type of mechanical work on the accumulator shell. Always drain the fluid completely from the accumulator before performing any work, such as recommended repairs or connecting pressure gauges.

CAUTION

After discharging and/or completely draining the accumulator, the accumulator can build-up an amount of pressure again when the lines are later shut off on the fluid side. This problem must be taken into account generally and in particular before carrying out work on hydraulic systems which include connected hydraulic accumulators. All the fluid-side lines connected to the accumulator must therefore be depressurized and after that the lines remain open. Only then may the appropriate work be carried out.

Contents

1. General Notice

This equipment is designed, manufactured and tested in compliance with European Directive 97/23/EC. Strict compliance with the instructions given in this document and all relevant documents is essential. The supplier disclaims all liability for any direct or indirect damage to property or personal injury and all responsibility for consequential damage such as, for example, operating losses arising from the failure to follow the instructions given below.

Before commissioning and during operation, it is important to refer to the regulations for the use of hydraulic accumulators in force on the installation site. Compliance with current regulations is the responsibility of the operator who must ensure that the documents supplied with the equipment are kept in a safe place. They may be required for inspection purposes.

2. Safety Devices

Current site regulations require the use of all or some of the following safety devices:

- Overpressure protection device
- Decompression device
- Pressure gauge
- Pressure gauge connector
- Isolator
- And so on

The operator is required to comply with these regulations. Hydrolync units use all or some of these devices (supplied as optional extras).

3. Handling and Storage

The original packing is suitable for handling and storing the equipment, unless otherwise specified.

3.1 Handling

Handle with care. Provide lifting gear that is suitable for the weight of the accumulator. The inflation valve must not be subjected to any impact, however slight.

3.2 Storage

Store in a cool, dry place. Do not expose to flames or heat. It is recommended that accumulators be stored in a horizontal position. When storing accumulators in their original packaging, do not stack them, unless their volume is less than 4 liters (maximum 2 tiers). If the accumulators are to be stored for more than 5 years, all parts made of elastomeric material must be replaced before they are put into service (contact Hydrolync or an approved Hydrolync agent).
If they are to be stored for a period of 5 years or less, this period should be borne in mind when determining the dates of the first maintenance operations (see Section 6).
If the accumulators are to be stored for more than 6 months, they must be inflated to storage pressure (see Section 5.1.1).

4. Labeling and Marking

It is strictly forbidden to change any information and markings without the prior written agreement of Hydrolync.
The following information is indicated on the accumulator:

- Hydrolync logo
- Product description
- Date or Year of manufacture
- Accumulator reference
- Nominal volume V of the tank in liters
- Basic allowable limits:
  Temperature range T_S in °C
  Maximum pressure P_S in bar
- Test pressure P_T in bar
- Test date

And, if applicable:

- EC logo (CE-MARK)
- Accreditation number of the certifying body

And, on some models:

- Warning messages and safety instructions (“Danger”, “Use only nitrogen”, etc., or similar messages)
- Maximum inflation pressure $P_{o\,Max}$ in bar
- Allowable pressure range $\Delta P_{max\,i}$ in bar
- Fluid group
- Total dry weight in kg

In the event of any discrepancy between the information indicated on the nameplate and that given on other parts of the accumulator (body, mouth, etc.), always refer to the nameplate.

5. Commissioning

The equipment must only be commissioned by qualified technicians (contact Hydrolync or an approved Hydrolync agent). Before installation, visually check that the accumulator is not damaged. Before carrying out any work on the hydraulic system, ensure that it is depressurized. Incorrect installation may result in serious accidents.

It is strictly forbidden to:

- weld, solder, drill, or perform any other operation that may change any mechanical properties!
- modify the accumulator or its components without the prior written agreement of Hydrolync.

WARNING! Explosion hazard!

For further information about the commissioning or use of the accumulator, contact Hydrolync or an approved Hydrolync agent.

5.1 Commissioning Recommendations

5.1.1 Inflation pressure P_o - Maximum allowable inflation pressure

The inflation pressure (P_o) is calculated according to the operating conditions indicated by the customer. On some models, the maximum allowable inflation pressure is indicated on the accumulator. The accumulators are supplied as follows:

- Ready for use, inflated to P_o
- Inflated between 3 and 5 bar (storage pressure)

In this case, the accumulator must be inflated to P_o before it is put into service (see Section 0).

Limits : $P_o \leq 9/10$ of min. working pressure ; $P_o \geq 1/4$ of max. working pressure.

When inflating, never exceed maximum allowable pressure P_S (or maximum inflation pressure $P_{o\,Max}$, if applicable) indicated on the accumulator.

5.1.2 Inflation gas

Use only nitrogen that is at least 99.8 % pure. **It is strictly forbidden to use OXYGEN or air to inflate the accumulator!** Explosion hazard!

5.1.3 Maximum allowable pressure P_S

The maximum pressure (P_S) is indicated on the accumulator. Check that the maximum allowable pressure is greater than that of the hydraulic circuit. For any other pressure, you will have to contact Hydrolync.

5.1.4 Allowable pressure range

The maximum allowable pressure range ($\Delta P_{max\,i} = P_{max} - P_{min}$) between maximum and minimum hydraulic pressure is indicated on the accumulator. Check that the pressure range of the hydraulic circuit is inferior than the allowable pressure range.

5.1.5 Allowable temperature range T_S

The temperature range (T_S) is indicated on the accumulator. Check that the allowable temperature range covers the operating temperatures (environment and hydraulic fluid temperatures). For any other temperature, you will have to contact Hydrolync

5.1.6 Hydraulic fluid used

The accumulator materials are determined according to the hydraulic fluid used. Check that the fluid is compatible with the equipment. It is strictly forbidden to use an accumulator with a fluid for which it is not designed. A group 1 fluid, in particular, must not be used in an accumulator designed to use a group 2 fluid. The authorized fluid group (1 or 2) is indicated on the accumulator. Group 1 (dangerous fluids) includes explosive, highly flammable, easily flammable, flammable, highly toxic, toxic, combustive fluids (as defined in Article 2 Section 2 of European Directive 67/548/EEC of 27 June 1967). Group 2 (non-dangerous fluids) contains all the other fluids. When a group 1 (dangerous) fluid is used, all possible safety precautions must be taken in accordance with current site regulations. For further information, contact Hydrolync.

5.1.7 Installation site

Ensure that the labels and markings are clearly visible. Leave at least 200 mm above the inflation valve for the checking and inflation instruments. Where the model used is fitted with a bleeder screw, ensure that this is fully accessible. Take the environmental conditions into account and, if necessary, protect heat sources, electric and magnetic fields against lightning, moisture, bad weather and so on. For optimum performance, place the accumulator as close as possible to the unit being used, and install it vertically with the inflation valve upwards. The accumulator can also be mounted horizontally.

5.1.8 Mounting

Mount the accumulator as follows:

- Ensure that the pipes connected directly or indirectly to the accumulator are not subjected to any abnormal force,
- Hydrolync collars and brackets are designed for this purpose (and can be supplied as optional extras).

The accumulator must not subjected to any stress or load, in particular from the structure with which it is associated.

5.1.9 Final check before start-up

The pre-startup check must be carried out in accordance with current site regulations.

5.2 Hydraulic Pressurization

5.2.1 Inflation

1. Secure the accumulator.
2. Determine a safety area not in line with the openings (hydraulic and nitrogen side).

Caution: parts may be ejected in the event of component breakage.

3. Use a checking and inflation instrument (refer to the instructions on how to use the latter) to inflate, deflate and check the inflation pressure P_o.
4. Hydrolync checking-inflation tools (supplied as optional extras) are used to inflate, deflate and check the pressure of the accumulators.

Note: The nitrogen pressure varies according to the temperature of the gas. Whenever nitrogen is used to inflate or deflate the accumulator, allow the temperature to stabilize before checking the pressure. Never exceed the maximum allowable pressure P_s indicated on the accumulator (or the maximum inflation pressure $P_{o\ Max}$, if applicable).

5. Check the inflation valve for leaks (for example using soapy water).
6. Use the safety cap to protect the inflation valve.
7. First check the inflation pressure P_o.
8. Check the hydraulic circuit for leaks.
9. Check that the hydraulic pressure never exceeds the maximum allowable pressure P_s indicated on the accumulator. A screw that can be used to bleed the hydraulic circuit is provided on some models.

CAUTION: Never open the vent when the hydraulic system is pressurized!

6. Maintenance

Before removing the accumulator from the hydraulic circuit, you must ensure that there is no residual hydraulic pressure in the accumulator. Before dismantling the accumulator, ensure that no inflation pressure remains. Once they have been commissioned, Hydrolync accumulators require practically no maintenance. To keep the equipment in good working order and ensure a long service life, the following maintenance work is recommended:

6.1 Inflation pressure P_o Checks

When the accumulator has been commissioned, check the inflation pressure P_o once a week for the first month. After that, adjust the frequency of such checks (weekly, monthly, six-monthly, annually) depending on the pressure drop.

6.2 Other Operations

You are advised to carry out the following checks (at the intervals recommended by Hydrolync and depending on the operating conditions):

- Check the safety devices and connections.
- Check the accumulator mountings.
- Visually inspect the accumulator for any sign of wear and tear such as corrosion or deformation.
- If you are using an abrasive or corrosive fluid, check the inside of the accumulator.

To maintain an accumulator when it is in service (regular re-qualification operations, etc.), refer to the current site regulations.
For disassembly, cleaning and reassembly operations, contact Hydrolync or an approved Hydrolync agent. Use only original spare parts.

7. Accumulator Disposal and Recycling

Before recycling or disposing of an accumulator, de-pressurize it and remove the inflation valve. Decontaminate, if necessary.

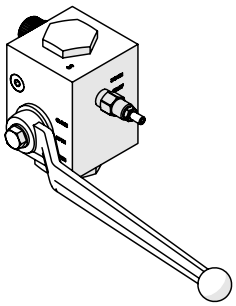
8. Maintenance Instructions

Protection and Precautions

Protective Gloves: Use chemical resistant gloves, if needs, to avoid prolonged or repeated skin contact from the cleaning solutions or solvents.

Eye protection: Use safety glasses before performing any maintenance on the accumulator.

8.1 Isolation and Draining



With safety block

- Close isolating valve
- Open the manual relief/drain valve until pressure gauge registers zero
- Remove the accumulator from safety block

With bleeder plug

- Isolate the accumulator from the system
- Open bleed facility draining system fluid into a suitable receptacle, until all fluid and pressure have been removed.
- Remove the accumulator from system pipework.

SAFETY NOTE : THE ACCUMULATOR CAN ONLY BE REMOVED FROM THE SYSTEM PIPEWORK ONCE THE HYDRAULIC PRESSURE HAS BEEN REMOVED FROM THE ACCUMULATOR

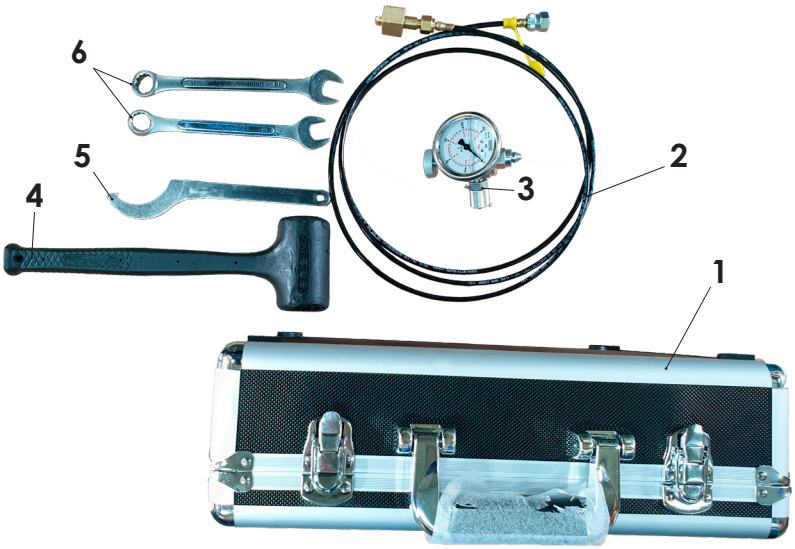
8.2 Spare parts and Tools

8.2.1 Spare parts

Parts

1. Shell
2. Bladder
3. Plug and Poppet assembly
4. Anti Extrusion ring
5. Back-up Ring
6. O-ring
7. Lock nut
8. Spacer
9. Name Plate
10. Gas Valve Adapter
11. Gas Valve Cap
12. Stem nut
13. Protective Cap

8.2.2 Tools

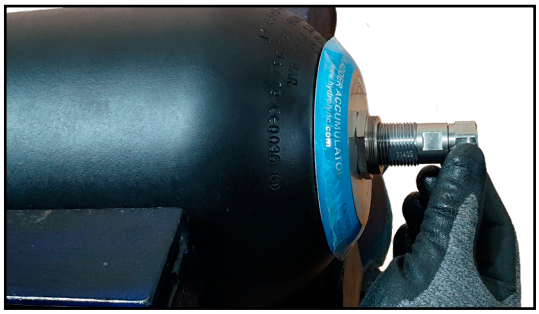


Parts

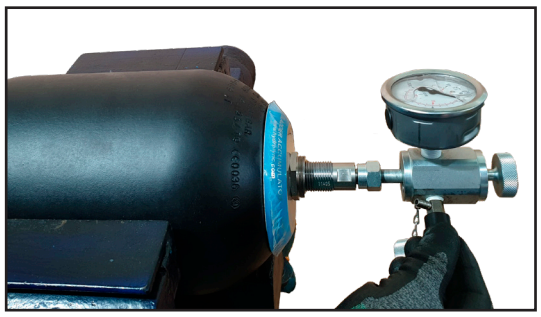
1. Tool Box
2. Charging Hose
3. Charging & Gauging Assembly
4. Rubber Mallet
5. Hook Spanner Wrench
6. Open end Box Wrench 18, 19, 32

8.3 Disassembly

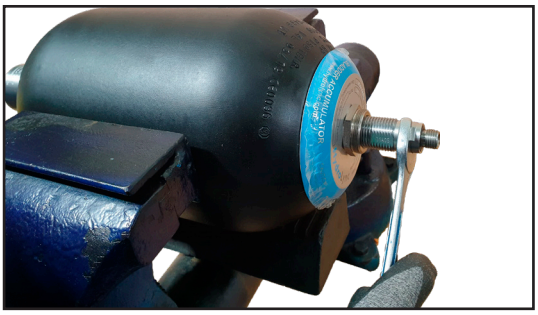
1. Remove the protective cap on the gas valve.



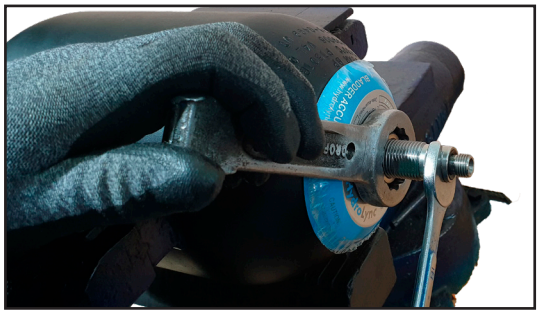
2. Remove the gas valve cap.



3. Connect a suitable charging & gauging assembly to the valve adaptor and release all the nitrogen pre-charge pressure from the accumulator until the gauge reads zero.



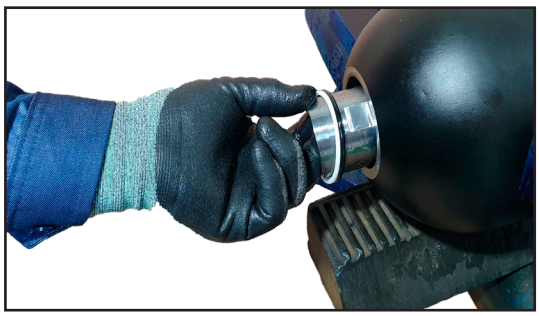
4. Remove the valve adaptor from the gas valve body.



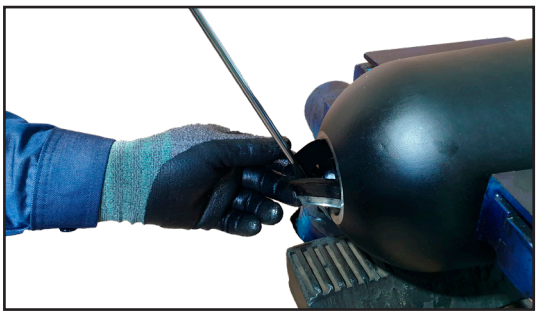
5. Remove the stem nut and the name Plate from the gas valve body. While removing the stem nut hold the gas valve body with a wrench so that The bladder will not rotate.

6. Remove the stem nut

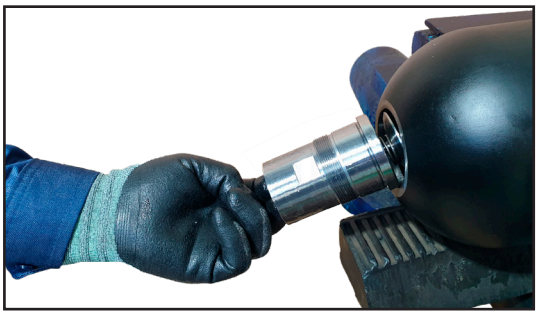
7. Remove the bleeder plug from the fluid port. Loosen locknut with a spanner wrench by turning 2 or 3 threads, then push the fluid port body into the accumulator shell if there is no hydraulic pressure. Remove the locknut and then remove the spacer.



8. Push the fluid port body into the shell and remove the back-up ring, "O" ring and the back-up ring.



9. Slide the anti-extrusion ring off of the fluid port. Carefully fold the anti-extrusion ring until it's sufficiently folded to allow removal from the shell



10. Remove fluid port from the shell.

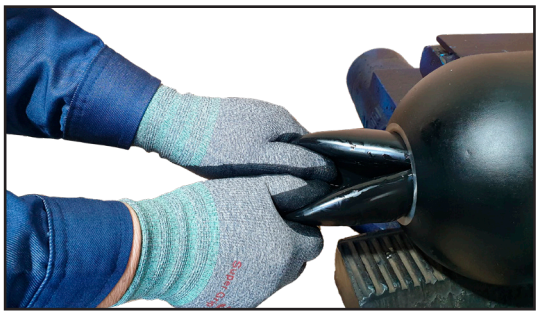
11. By squeezing the bladder discharge as much all as possible by hand, then pull the bladder out slowly through the fluid port opening of the shell.

8.4 Cleaning and Inspection

1. Clean all the metallic parts of the accumulator with an organic solvent.
2. Avoid exposing the rubber parts to the solvent to prevent any attack on the rubber.
3. Inspect the condition of the metallic components of the fluid port (poppet, spring, stop nut and piston) and replace the complete fluid port assembly if any of the components are damaged.
4. Push the poppet valve head to make sure it slides freely through the guide in the fluid port.
5. Clean the bladder with Isopropyl alcohol or equivalent.
6. Inspect the bladder for any visual damages. Replace if necessary.
7. Check that there is no corrosion inside or outside of the shell.
8. Replace all parts considered defective.
9. "O" Rings and back up rings must be replaced.

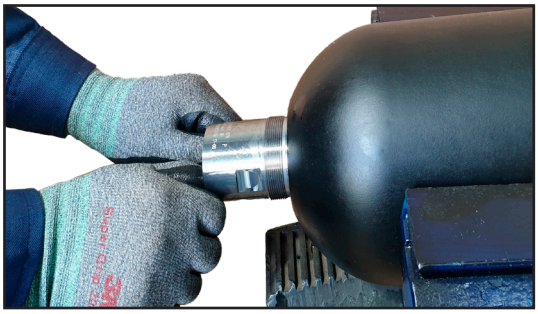
8.5 Assembly

1. Lubricate the accumulator shell and the bladder either with the medium used in the system or a similar product.



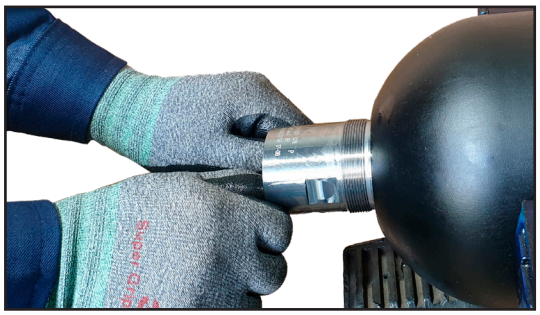
2. Fold the bladder and push into the shell. A void twisting the bladder while pushing it into the shell.

3. Reinstall the name plate with a stem nut. Do not tighten the stem nut.

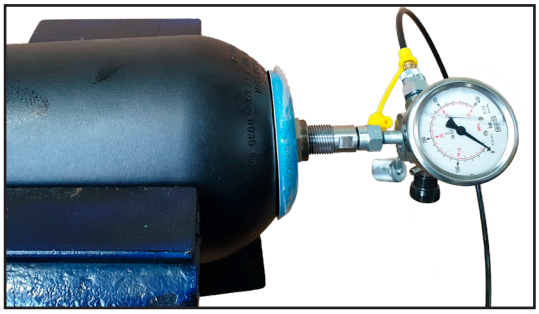


4. Insert the fluid port into the shell.

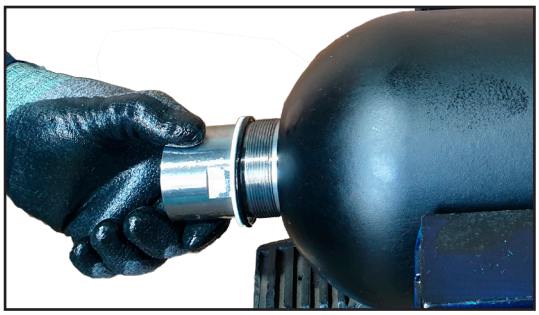
5. Insert the anti-extrusion ring



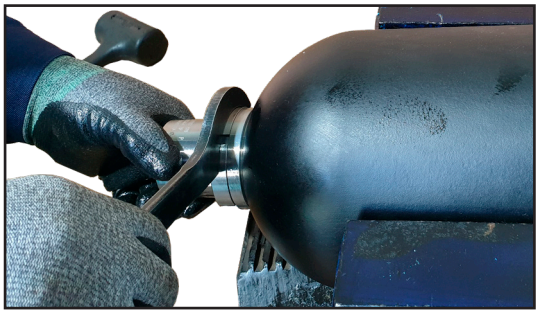
6. Pull the fluid port through the anti-extrusion ring and the port opening.



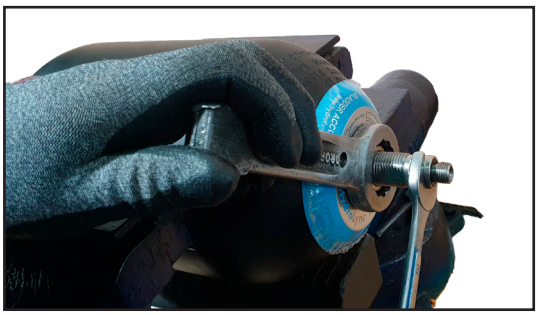
7. Attach the gas valve adapter. Install a charging and gauging assembly on the gas valve and put a low pre-charge of 30 psi (2 bar) to seat the fluid port and the anti-extrusion ring in place.



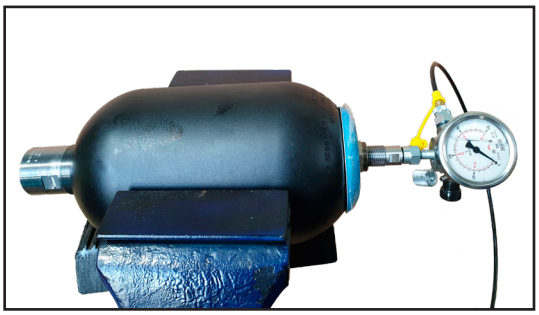
8. Hammer slightly the fluid port body at various angles using plastic hammer. And install the back up, O-ring, rubber back up and spacer in that order.



9. Tighten the locknut and install the bleeder plug.



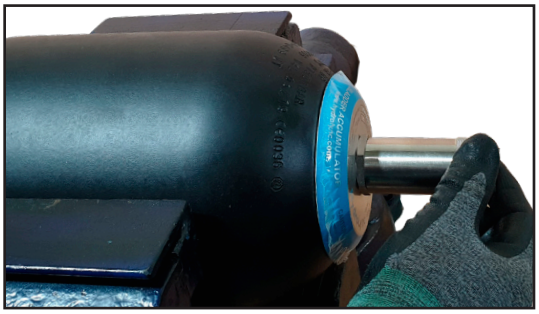
10. Remove charging and gauging assembly. And tighten the stem nut while holding the gas valve not to move.



11. Using a charging and gauging assembly pre-charge to the desired pressure at a moderate rate, using **DRY NITROGEN ONLY!**

12 . Check the valve for leaks with snoop or soap water.

13. Install a gas valve cap.



14. Install a protective cap.

9. Technical Information

9.1 Bladder rubber compounds

Common description	Abbreviation	Chemical description	Comments
Nitrile	NBR	Butadiene-acril-nitrile Rubber	Typical use : mineral oil High resistance to hydrocarbons.
Hydrogenated Nitrile	HNBR	Hydrogenated nitrile butadiene rubber	Improvement of thermal and mechanical resistance
Butyl	IIR	Isoprene Isobutylene Rubber	Second to EPDM for phosphate-ester use. No resistance to mineral oils. Excellent impermeability. Diluted acids and bases
Ethylene propylene	EPDM	Ethylene-diene-propylene Rubber	Typical use : phosphate ester.
Hydrin	ECO	Epichlorhydrin	Typical use : mineral oil Low temperatures
Fluorocarbon	FKM	Fluorocarbon rubber	Excellent resistance to aggressive fluids. Excellent ageing at high temperatures.

9.2 Bladder rubber compounds

Compound	Description	Comments
N28	Low ACN content nitrile	Low temperature
N33	Medium ACN content nitrile	Standard nitrile
N40	High ACN content nitrile	Gasoline (unleaded excluded) and high temperatures
NH1	HNBR	Better behavior than NBR at extreme high and low temperatures
ECO	Hydrin	Standard hydrin
EP1	EPDM	For phosphate-ester media
IIR	Butyl	Standard butyl
FKM	VITON ®	Standard fluorocarbon from Dupont de Nemours

9.3 Bladder operating temperatures

	N28	N33	N40	NH1	ECO	EP1	IIR	FKM
Max. Temperature	+80 °C	+90 °C	+105 °C	+130 °C	+115 °C	+120 °C	+120 °C	+140 °C

9.4 Bladder fluid compatibility

	N28	N33	N40	NH1	ECO	EP1	IIR	FKM
Mineral Oil	Medium	Good	Good	Good	Good	Weak	Weak	Good
Aromatics - Unleaded gasoline	Inferior	Inferior	Medium	Medium	Medium	Weak	Weak	Good
Water glycol	Medium	Medium	Medium	Medium	Medium	Good	Good	Good
Phosphate Ester (Skydrol)	Weak	Weak	Weak	Weak	Weak	Good	Medium	Weak

9.5 Bladder accumulator parts

Parts

1. Shell
2. Bladder
3. Plug and Poppet assembly
4. Anti Extrusion ring
5. Back-up Ring
6. O-ring
7. Lock nut
8. Spacer
9. Name Plate
10. Gas Valve Adapter
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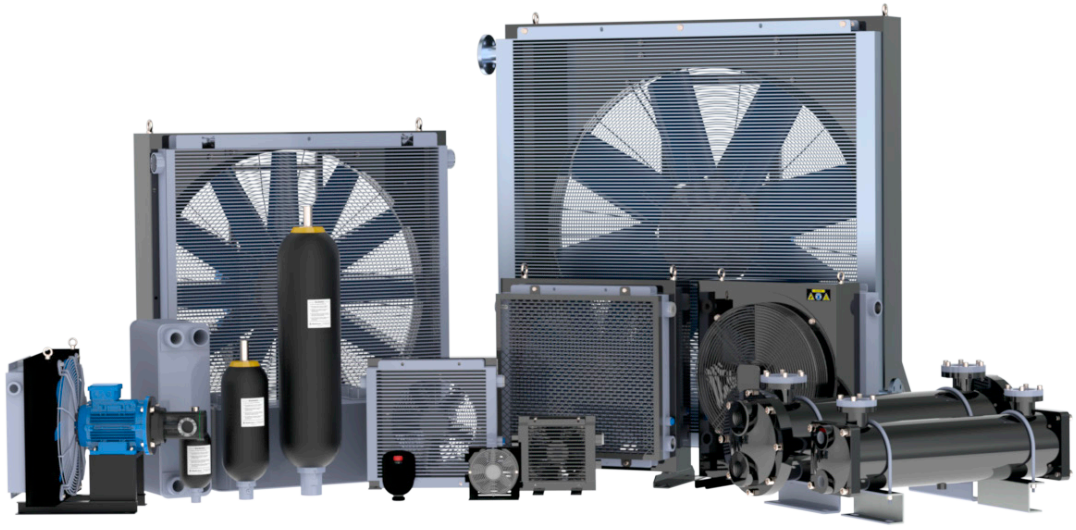
Engineering Excellence



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