Fawcett Christie Hydraulics Ltd

PRODUCT INFORMATION
for
GAS-LOADED HYDRAULIC ACCUMULATORS

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Important Safety Note

Gas loaded accumulators operate at high pressures and must always be treated with caution.

You must ensure that you are competent to work with this equipment.

Transportation, handling and storage

ACCUMULATORS and RELATED PRODUCTS

Transportation and handling:

Accumulators must be stored securely to prevent damage caused from their weight / shape. Safe lifting procedures should be implemented and weights should be identified on all packages. Take special care not to damage the gas valve as an **UNEXPECTED RELEASE OF GAS MAY OCCUR.**

Avoid skin contact with any fluid that might be expelled from the accumulator. Use personal protective equipment if appropriate.

Short Term Storage:

When stored in a stable, non-severe environment, accumulators can be left in their original packing for a number of weeks without fear of deterioration.

Long Term Storage:

If accumulators are to be stored for longer periods of time, special precautions may need to be taken.— CONSULT FCH FOR FURTHER INFORMATION.

ELASTOMERIC COMPONENTS (SPARES)

All elastomeric (rubber) compounds specified by FCH fall into the category of low susceptibility or high resistance to deterioration by ageing. Details of material classification and shelf life expectancy can be found in BS ISO 2230; 2002 and our Technical Specifications, available on request.

Ideal Storage Conditions:

Stored under ideal conditions, elastomeric components have an expected shelf life of 8-10 years.

- Elastomers, and bladders in particular, should be stored in a stress-free condition either due to natural shape or by partially inflating to natural size using nitrogen gas.
- At temperatures between –5ºC and +5ºC.
- In a dark, sealed box and away from direct sunlight, heat or rotational electrical equipment.

Storage Conditions Less Than Ideal:

Where ideal storage conditions cannot be met, elastomeric components, particularly bladders, have an expected shelf life of 2-3 years if they are stored as follows:

- Stored in a stress-free condition either due to natural shape or by partially inflating with compressed air or nitrogen gas, so that they lay flat without bending or folding. Bladders should not be stacked.
- At temperatures up to 25ºC.
- Stored in darkness either in a dark room or covered with clean, opaque polythene and away from direct sunlight, heat or rotational electrical equipment.

Inspection Before Use:

- If possible, inflate bladders to not more than 1½ times natural diameter.
- Visually examine seams for defects, and surface for crazing.
- Immerse in water to inspect for leakage or perforations.

NOTE: Elastomers not stored properly will be subject to attack from ozone, heat or UV light. Cracking will develop within one year. Elastomers should be replaced if storage extends beyond 5 years.

Installation

INSPECTION OF ACCUMULATOR

Fawcett Christie accumulators and associated products are thoroughly inspected at the factory prior to despatch and are ready for installation following precharging.

After unpacking, inspect the accumulator for possible damage caused in transit.

- Check the following items for tightness;- all nuts, screws, locking rings, bleed screws, adaptors and fittings, as applicable.
- Check that the maximum working pressure of the accumulator is equal to or greater than the maximum pressure of the system. (see INTERPRETATION OF MARKINGS)
- Ensure that you are using the correct accumulator for the application paying particular attention to the risk of corrosion from either the system fluid or the environment.

INSTALLATION RECOMMENDATIONS

- All accumulators are supplied un-precharged unless a precharge pressure is specified when ordering. **Prior to applying hydraulic pressure to the system all accumulators must be precharged with NITROGEN GAS ONLY. (for precharging procedure see COMMISSIONING)**
- It will be necessary to check the gas precharge pressure at regular intervals (see ROUTINE MAINTENANCE). Consideration should therefore be given to the following:

  - The provision of a safety block fitted between the accumulator and fluid pressure line to enable isolation of hydraulic system pressure.
  - The location of the gas charging valve with regard to the potential for accidental damage and safe discharge of high-pressure gas.
  - The provision of a warning label (in addition to that provided on the accumulator nameplate) stating “PRE-CHARGED WITH N2 GAS AT....bar”.

- It is necessary to ensure that the accumulator is protected from overpressurisation. General protection is usually provided by the hydraulic system relief valve, which should be set at no higher than 10% above the maximum working pressure (MWP) of the accumulator. Specific protection for the accumulator can be provided in the following ways:

  - A hydraulic relief valve located in a safety block will prevent both liquid and gas side overpressurisation.
  - A fusible plug will relieve gas side pressure in the event of a fire.
  - A burst disc will relieve gas side overpressurisation.

- On storage applications a check valve fitted between pump and accumulator will ensure non-reversal of the pump.
- The accumulator should be safely mounted using the correct sealing system and OEM connectors. Special adaptors are available if required.
- For maximum efficiency and service life, accumulators should be mounted vertically where possible, fluid port down.
- A range of clamps, support brackets and other accessories are available to assist in installation.
- It is strictly **FORBIDDEN** to weld any form of bracket or attachment to accumulator bodies.

CONSULT FCH FOR FURTHER INFORMATION

Commissioning

IMPORTANT NOTES

Commissioning and particularly precharging contains inherent risks associated with the unexpected release of high pressure gaseous energy. Take into account the following:

- Gas jet effects and the acceleration of loose particulate.
- Asphyxiation due to the release of nitrogen gas in a confined space.
- Accumulator acceleration in the event of unexpected release of gas.
- Note the maximum working pressure of the accumulator and do not overpressurise.
- Ensure that any protective caps (usually plastic) are removed prior to precharging.
- Noise may be emitted in the event of sudden release of gas.
- Avoid direct contact with oil mists.
- Select the correct charging equipment in good working condition ensuring that pressure gauges are safety pattern type and all hoses must be designed to be used with gas.

PRECHARGING

USE ONLY oxygen-free DRY NITROGEN GAS.

1. All accumulators are supplied without precharge unless a precharge pressure is specified when ordering. Prior to applying hydraulic pressure to the system all accumulators must be precharged with nitrogen.
2. Check details of accumulator on label and shell for maximum working pressure. The maximum hydraulic system pressure must not exceed the MWP of the accumulator.
3. Always use a nitrogen pressure regulator valve when the accumulator shell pressure rating is lower than gas pressure in nitrogen cylinder.
4. Precharge pressures vary with operating conditions. CONSULT FCH if no precharge has been previously recommended. For a guide the following values can be used; - Storage application: 90% of minimum allowable system pressure, Shock application: 90% of flow pressure at accumulator position, Pulsation application: 70% of mean pumping pressure, **NB**. Allowing precharge to fall below 20% of maximum system pressure in a bladder accumulator may cause **premature failure of the bladder**. Excessive precharge pressures in relation to minimum system pressure may cause failures of the bladder and/or poppet valve and in piston accumulators, may cause excessive stresses due to the piston frequently contacting the end cap.
5. **Ensure that moving parts such as bladders and pistons are adequately lubricated with system fluid before commencing precharging. This is especially important where the system fluid is of low viscosity eg water based.**

CONSULT FCH FOR FURTHER INFORMATION.

PRECHARGING PROCEDURE

The following procedures should be adopted for safe precharging of accumulators.

For accumulators having a working pressure less than the nitrogen source refer to fig.2.

For accumulators having a working pressure equal to or greater than the nitrogen source refer to fig.3. see note 4.

For accumulators fitted with a permanent charging set refer to fig.4.

For transfer barrier accumulators fitted with a back-up-bottle or remote charging point, refer to fig.5.

Procedure 1. – using a Nitrogen Pressure Regulator Valve (NPRV) fig.2.

- Remove protective cap (1) if fitted and sealing cap (2).
- Attach NPRV (3) to nitrogen cylinder (4). Ensure centre spindle (10) is fully unwound.
- Attach charging set (5) to accumulator gas valve assembly (6) and connect charging hose (7) between NPRV (3) and charging set connection.
- Back off handle (8) anti-clockwise until loose, check gas bleed valve (9) on charging set is closed and screw handwheel (10) clockwise to open gas valve. **Do not screw knob down tight.**
- Open nitrogen cylinder valve by turning key (11), cylinder pressure will register on right-hand gauge (12). This pressure should be checked against the required precharge pressure.
- Turn handle (8) clockwise until outlet pressure on left-hand gauge (13) registers 10% higher than required precharge pressure. When pressure on the charging set and outlet gauges are equal, close nitrogen cylinder valve.
- Turn handwheel (10) anti-clockwise to seal gas valve. equivalen
- Crack bleed valve (9) to exhaust gas from charging hose and remove hose from charging set and replace hose connection sealing cap.
- Close bleed valve, turn handwheel (10) clockwise to open gas valve. **Do not screw knob down tight**. Crack bleed valve (9) to vent down to required precharge pressure. Close bleed valve.
- Turn handwheel (10) anti-clockwise to reseal gas valve, crack bleed valve and remove charging set from accumulator.
- Test gas valve for leaks using a leak detection spray or a soapy water solution.
- Replace sealing cap (2), tighten with pliers, and protective cap (1) if fitted.

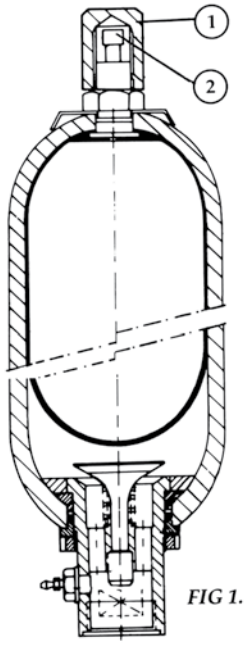

FIG 1.

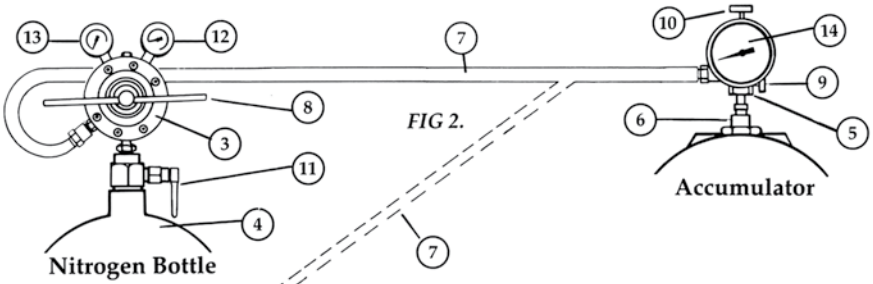

FIG 2.

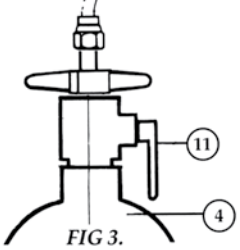

FIG 3.

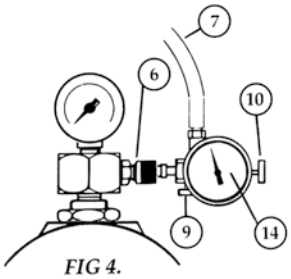

FIG 4.

Procedure 2. – Nitrogen Pressure Regulator Valve (NPRV) not required fig.2,3 & 4.

- Remove protective cap (1) if fitted and sealing cap (2).
- Attach charging set (5) to accumulator gas valve assembly (6). Ensure centre spindle (10) is fully unwound.
- Connect charging hose (7) to nitrogen cylinder (4) using the appropriate adaptor, and attach the free end to the charging set.
- Turn handwheel (10) clockwise to open gas valve. Do not screw knob down tight. Slowly open nitrogen cylinder by turning key (11).
- Allow pressure on the gauge (14) to read slightly in excess of required precharge and then close nitrogen cylinder valve.
- Turn handwheel (10) anti-clockwise to seal gas valve.
- Crack bleed valve (9) to exhaust gas from charging hose and remove hose from charging set and replace hose connection sealing cap.

Procedure 3. – Permanent Charging Set fitted fig.4.

Follow steps of Procedures 1 or 2 as appropriate but connect to the permanent charging set as shown in fig.4.

Procedure 4. – Transfer Barrier Type fig.5

When precharging transfer barrier accumulators the precharge pressure should never allow the fluid volume in the shell to exceed 80% of the total shell volume when working between max system pressure P3 and pre-charge pressure P1.

The method of connecting is as shown in fig.5 and the Procedures 1 or 2 should be followed depending on the working pressure of the system.

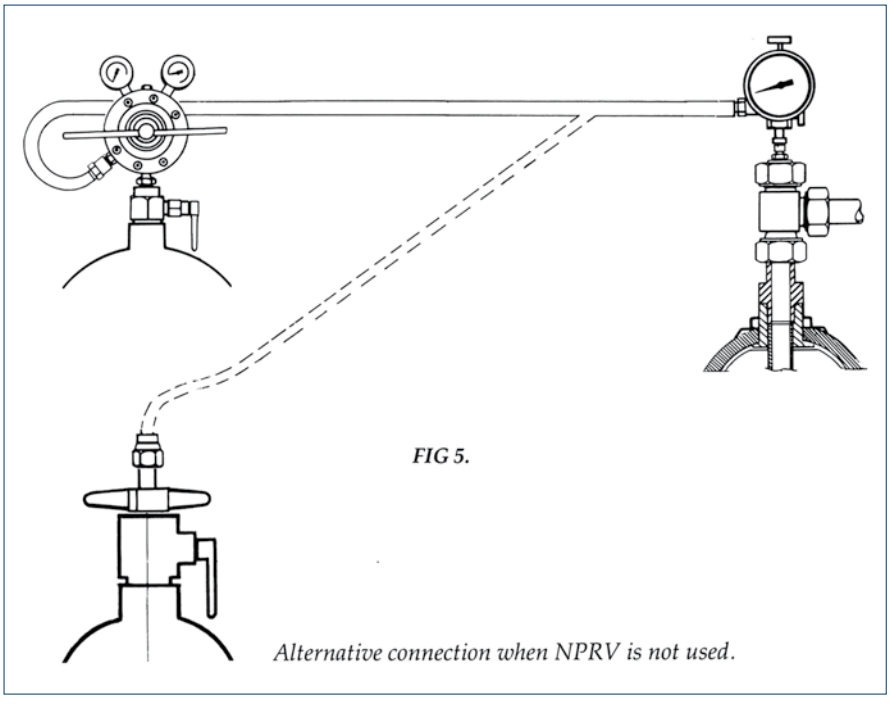

FIG 5.

Alternative connection when NPRV is not used.

Routine Maintenance

When a new accumulator has been in service for a short period, the precharge should be checked to ensure there is no leakage. Subsequent checks need only be at 6 monthly intervals except for very low pressure applications - CONSULT FCH FOR FURTHER INFORMATION

When checking the precharge of an accumulator installed in a system, the accumulator must be isolated from the system pressure and the fluid removed by carefully opening the bleed valve and collecting the fluid in a suitable receptacle. Alternatively, shut the system down and release the fluid pressure back to tank.

Fit a charging set (without charging hose fitted) ensuring the bleed valve is closed and cap is fitted to the charging connector.

Turn handwheel (10) clockwise and check precharge. **NB. Do not screw down tight.**

Replenish if required, following steps of Procedures 1 or 2 appropriately. (see COMMISSIONING)

Servicing

BEFORE CARRYING OUT ANYTHING OTHER THAN ROUTINE MAINTENANCE, CONSULT FCH FOR GUIDANCE IN SERVICING SPECIFIC TYPES OF ACCUMULATORS. **ONLY COMPETENT PERSONS SHOULD ATTEMPT THIS WORK**

Recycling

Before recycling or disposing of an accumulator, depressurise it and remove the gas valve. Decontaminate if necessary and dispose of in accordance with local regulations.

Interpretation of Markings

LABEL MARKINGS

Metal labels (or hard stamping as appropriate) are fitted to all Fawcett Christie accumulators and show essential user information, ie:

- Name and Address of Manufacturer / Supplier
- Model Identification Number
- Maximum Working Pressure (MWP)
- Actual Volume of Vessel
- CE – Mark and Identification No. of Notified Body (where appropriate)
- Gas Precharging Sequence

Warning and Safety Information is provided on adhesive labels.

Other essential information required by the applicable design code can be found permanently stamped on the shell itself. Typical details are shown below:

TYPICAL SHELL STAMPINGS (varies by product and design code requirements)

. DESIGN CODE

. MATERIAL CODE

. UNIQUE SERIAL NO

. MANUFACTURER

MAX WORKING PRESSURE .

VESSEL TEST PRESSURE .

DATE OF MANUFACTURE .

INSPECTION AUTHORITY STAMP .

CAPACITY OF VESSEL

INTERNATIONAL NETWORK

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