energy, silence, comfort, service life…

hydro-pneumatic accumulators
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A complete range

<table>
<thead>
<tr>
<th>Volume (litres)</th>
<th>Max service pressure (bar)</th>
<th>Model</th>
<th>Oil side port</th>
<th>Technical details (see page)</th>
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energy storage

A hydro-pneumatic accumulator is a vessel which, in hydraulic circuits, is capable of storing a large amount of energy in a small volume.

a simple principle

If the very low compressibility of fluids makes it difficult to store their energy in small volumes, it does, however, enable them to transfer a significant force. Gas on the other hand is highly compressible, and can therefore store considerable amounts of energy in small volumes. The hydropneumatic accumulator makes use of these two properties.

How do accumulators work?

The hydropneumatic accumulator is a tank divided into two chambers by a flexible separator. One chamber is for fluid under pressure, the other for nitrogen gas.

It is charged with nitrogen to a pressure $p_o$.

When a fluid travels through the accumulator, and the pressure $p_1$ of that fluid is greater than the pre-charge pressure $p_o$ of the accumulator, then the gas compresses to $p_1$, the separator changes shape, and the accumulator can take in the corresponding volume of fluid.

Any pressure drop in the hydraulic circuit causes the accumulator to return fluid to the circuit, until pressure reverts to the initial $p_o$. 

energy, silence, comfort, service life...
What are accumulators used for?

Surge control

*The principle*

The accumulator takes in the kinetic energy produced by a moving column of fluid when the circuit is suddenly shut off (valve, solenoid etc.), or more generally, when there is a sudden change in circuit pressure.

![Surge control illustration](image)

Thermal change

*The principle*

The increase in volume due to increased temperature will be absorbed by the LEDUC accumulator.

![Thermal change illustration](image)

Shock absorbing – suspension

*The principle*

LEDUC accumulators, in a shock absorbing function, reduce fatigue of hydraulic and mechanical components.

*Examples*

- lifts,
- forklift trucks,
- agricultural machinery,
- construction equipment, etc.

![Shock absorbing illustration](image)

Energy recovery and restitution

*The principle*

The energy supplied by a given load can be absorbed by the accumulator and put back into a hydraulic cylinder to produce a mechanical movement.

*Example*

- closing railcar hopper doors.
Energy storage

The principle
In a circuit under pressure, the LEDUC accumulators mean a reserve of fluid may be kept permanently available. Thus a large amount of energy, accumulated by a low power system during periods of low or no usage, can be used in a very short time and within one cycle.

Examples
- automatic machines,
- braking or declutching of vehicles or construction equipment,
- emergency completion of working cycle in case of failure of main power source.

Pulsation dampening

The principle
Adding a LEDUC accumulator to a hydraulic circuit smooths out any flow irregularities from the pumps. This leads to better operation of the system, protection of the components and thus increased service life, and reduced noise levels.

Example
- dosage pumps.

Leak compensation

The principle
A leak in a hydraulic circuit can lead to pressure drop. The LEDUC accumulator compensates the drop in volume and thus maintains circuit pressure virtually constant.

Transfer of fluids

The principle
The LEDUC accumulator makes it possible to transfer hydraulic pressure between two incompatible fluids, via the diaphragm which separates the two fluids.

Examples
- transfer between hydraulic fluid and sea water,
- test bench, etc.

Transfer of fluids
• Technical description
The ACS type welded accumulators are made up of a shell in high resistance steel containing a fluid-gas separator. This separator is made of nitrile for the standard ACS range, and of hydrogenated nitrile for low temperature applications. The separator is fitted with an anti-extrusion stud, thus allowing rapid and total discharge of the accumulator.

• Advantages
- **Low temperature versions** suitable for operation at temperatures down to – 40°C.
- **Interchangeable**, given outer dimensions, with most accumulators available.
- Completely modular from 0.7 to 4 litres. This design concept means easy addition of intermediate models if required.
- The bladder offers exceptionally good resistance to fatigue.
- Rapid and total discharge possible due to the anti-extrusion stud actually fitted onto the bladder.

• Gas charging
Two versions of the ACS are available:
- with a charging screw,
- with a charging valve.

• Examples of applications
- Energy storage
- Suspension

**Deformation of the bladder**

\[ p_0 V_0 \]
\[ p_1 V_1 \]
\[ p_2 V_2 \]
Welded cylindrical accumulators

- Extreme operating temperatures
  - Standard version: 
    - 20°C to +120°C
  - "Low temperature" version:
    - 40°C to +120°C

- Filling gas
  Nitrogen only.

- Operating fluids
  - Mineral-based hydraulic fluids.
  - Other fluids: please ask.

- Volumetric ratio \( \frac{V_0 - V_2}{V_0} \)
  The recommended volumetric ratio of this type of accumulator is 0.75.
  For example: an ACS 4 accumulator can take in a maximum volume of 0.75 \( V_0 = 0.75 \times 4 = 3 \) litres.

- Accessories
  Safety blocks, see pages 12 and 13.
  Fixation devices, see page 14.

- Order codes
  See page 16.

### Leduc part number

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<tr>
<th>Leduc part number</th>
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<th>maximum pressure bar (CE)</th>
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<th>ØB</th>
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* dimensions with VGL 4 fitted
** US version
 Dimensions are given only as an indication.

For other oil side threads, please contact our Customer Service Department

For other oil side threads, please contact our Customer Service Department

*with 50/flats - ** US version

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HYDRO LEDUC - BP 9 - F-54122 AZERAILLES - Tel : +33 383 767 748 - Fax : +33 383 752 158 - Website : www.hydroleduc.com
**Technical description**

LEDUCE spherical accumulators consist of two hemispherical shells which are screwed together and which hold a diaphragm. This diaphragm has a metal stud which closes off the operation hole when the fluid is completely discharged. There is therefore no danger of damage to the diaphragm. The gas side port is fitted with a charging valve allowing the pressure in the accumulator to be checked or changed.

**Advantages**

The diaphragm only changes position, the elastomer in fact works little. The LEDUC spherical accumulator owes most of its qualities to its diaphragm and metal pin:
- excellent gas/fluid tightness.
- possibility of total and rapid discharge.
Can be adapted to suit a wide range of fluids.

**Various versions**

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<th>AF version 500 bar</th>
<th>AX version 250 bar</th>
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<td>Shell of high resistance steel, for operation at low temperatures and/or high pressures. Maximum service pressure : 500 bar.</td>
<td>Shell made of stainless steel, operation possible with most corrosive fluids. Maximum service pressure : 250 bar.</td>
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**AS version 400 bar**

Carbon steel shell. Maximum service pressure 400 bar (250 bar for AS 0.7 model).


**Examples of applications**

- Anti-pulsation
- Transfer of fluids

**Deformation of the diaphragm**
Spherical accumulators

• Extreme operating temperatures
  
  *shells*
  - AF type: steel, operation from –40°C to +120°C
  - AX type: stainless steel, operation from –35°C to +120°C
  - AS type and AC 0.02: steel, operation from –20°C to +120°C

• Separators
  - Standard: nitrile, operation from –20°C to +100°C
  - Special: from –40°C to +120°C (dynamic use)

• Filling gas
  Nitrogen only.

• Operating fluids
  - Corrosive or non-standard fluids: please consult our Customer Service Department.

• Volumetric ratio \((V_0-V_2)/V_0\)
  The volumetric ratio of this type of accumulator is 0.75. For example: an AX 1 accumulator can take in a maximum volume of 0.75 \(V_0 = 0.75 \times 1 = 0.75\) litres.

• Accessories
  Safety and shut-off blocks, see pages 12 and 13.
  Clamps, see page 14.
  Adaptors, see page 14.

• Order codes
  See page 16.

---

**Dimensions in mm**

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<th>Leduc part number</th>
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<th>maximum pressure (V_0)</th>
<th>weight</th>
<th>(A)</th>
<th>(B)</th>
<th>(\Ø C)</th>
<th>(D)</th>
<th>(E)</th>
<th>(\Ø F)</th>
<th>(\Ø G)</th>
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<td>4.1</td>
<td>400</td>
<td>22</td>
<td>298</td>
<td>202</td>
<td>251</td>
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<td>40</td>
<td>247</td>
<td>105</td>
<td>M33 x 2</td>
<td>20</td>
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<tr>
<td>AS 10 00 060141</td>
<td>10.19</td>
<td>400</td>
<td>53</td>
<td>391</td>
<td>268</td>
<td>339</td>
<td>52.5</td>
<td>52.5</td>
<td>333</td>
<td>105.1</td>
<td>M33 x 2</td>
<td>20</td>
</tr>
<tr>
<td>AC 00 02 060955</td>
<td>0.017</td>
<td>400</td>
<td>0.640</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**AC 00 02** 060955  0.017  400  0.640  see drawing above

| AF 00 50 060972  | 0.45                     | 500                    | 2.8    | 184 | 89  | 114   | 12  | 23  | 112.5 | 40    | G3/8” | 16  |
| AF 01 00 060110  | 1.1                      | 500                    | 5.5    | 197 | 112 | 163.5 | 50.5| 50.5| 163.5 | 40    | M18 x 1.5 | 12 |
| AX 00 50 060972  | 0.45                     | 250                    | 2.8    | 184 | 89  | 114   | 12  | 23  | 112.5 | 40    | G3/8” | 16  |
| AX 01 00 060110  | 1.1                      | 250                    | 5.5    | 197 | 112 | 163.5 | 50.5| 50.5| 163.5 | 40    | M18 x 1.5 | 12 |

Dimensions are given only as an indication.
• Technical description
The ABVE bottle type accumulators consist of:
- a forged steel body,
- a bladder,
- a charging valve,
- an oil side orifice fitted with a poppet valve which prevents extrusion of the bladder,
  and an air bleed screw used during system start-up.

• Advantages
- bladder accumulator, component parts are interchangeable with those of major accumulators available.
- dimensions allow for easy installation and also use in batteries.

• Example of applications
- Energy storage

Deformation of the bladder

\[
\begin{align*}
p_0 V_0 & \quad \rightarrow \quad p_1 V_1 \\
p_1 V_1 & \quad \rightarrow \quad p_2 V_2
\end{align*}
\]
Bladder accumulators

- **Extreme operating temperatures**
  From –20°C to +80°C

- **Filling gas**
  Nitrogen only.

- **Operating fluids**
  - Non-standard and/or corrosive fluids: please consult our Customer Service Department.

- **Volumetric ratio \((V_0 - V_2)/V_0\)**
  The volumetric ratio of this type of accumulator is 0.75.
  For example, an ABVE 4 accumulator can take in a maximum volume of
  \(0.75 \times V_0 = 0.75 \times 4 = 3\) litres.

- **Accessories**
  Safety and shut-off blocks, see pages 12 and 13.
  Clamps, see page 14.
  Adaptors, see page 14.

- **Order codes**
  See page 16.

---

<table>
<thead>
<tr>
<th>Leduc part number</th>
<th>nitrogen capacity (V_0) litres</th>
<th>maximum pressure bar (CE)</th>
<th>weight kg</th>
<th>A</th>
<th>B</th>
<th>(\Omega C)</th>
<th>(\Omega D)</th>
<th>(\Omega E)</th>
<th>(\Omega F)</th>
<th>(\Omega G)</th>
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</thead>
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<tr>
<td>ABVE 4</td>
<td>066850</td>
<td>3.7</td>
<td>350</td>
<td>14</td>
<td>438</td>
<td>65</td>
<td>170</td>
<td>67</td>
<td>52.5</td>
<td>G1''1/4</td>
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<td>30</td>
<td>579</td>
<td>103</td>
<td>221</td>
<td>101</td>
<td>76</td>
<td>G2''</td>
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<td>17.8</td>
<td>330</td>
<td>50</td>
<td>879</td>
<td>103</td>
<td>221</td>
<td>101</td>
<td>76</td>
<td>G3/4'' - 1'' or full</td>
</tr>
<tr>
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<td>066880</td>
<td>32</td>
<td>330</td>
<td>80</td>
<td>1400</td>
<td>103</td>
<td>221</td>
<td>101</td>
<td>76</td>
<td>G3/4'' - 1'' or full</td>
</tr>
<tr>
<td>ABVE 50</td>
<td>066890</td>
<td>48.5</td>
<td>330</td>
<td>100</td>
<td>1914</td>
<td>103</td>
<td>221</td>
<td>101</td>
<td>76</td>
<td>G3/4'' - 1'' or full</td>
</tr>
</tbody>
</table>

*dimensions with VGL 4 fitted

---

Dimensions are given only as an indication.
Accessories

Safety and shut-off blocks

**BS1**

- **Symbole BS1 EQ**
- **Fonction Q**
  - Weight: 3.5 kg
- **Fonction M**
  - Weight: 5.2 kg
- Connections for M and T ports
  - Ø 1/4" gas cyl. - Spot-facing Ø 25 depth 1
  - Connection on accumulator side - Ø A

**BS2**

- **Symbole BS2 EQ**
- **Fonction Q**
  - Weight: 7.2 kg
- **Fonction M**
  - Weight: 11.8 kg
- Connection on usage side
  - **Standard version**
  - 4 threads holes M 12 depth 20
  - Celop flange 1" 1/4 400 bar
  - 51.6 x 51.6 between axis

**BS**

- **Thread gas cyl. A**
  - 3/4" 1" 1/4 2"
  - **B**
    - 16 20 24
  - **C**
    - 30 30 96

Dimensions in mm
Safety and shut-off Blocks

Description
These safety and shut-off blocks are designed to bring together in a single block the necessary safety organs required for the correct functioning of hydraulic circuits incorporating accumulators.

The basic block consists of:
- Ball valve with quarter turn closure, allowing the accumulator to be isolated from the circuit;
- Needle valve ensuring the manual decompression of the circuit;
- Pressure limiter (directly operated) set at the maximum operating pressure of the accumulator. This pressure limiter should never be used as the limiter to protect the hydraulic pump;
- Manometer plug;
- The E24 and E220 models are fitted with a 2 way, 2 position electro-valve, allowing decompression of the circuit by switching off the supply current;
- The Q version is fitted with one-way adjustable flow limiter. Mounted on the main block, this limiter controls the accumulator outlet flow, whilst inlet flow remains unrestricted.

Order codes for safety and shut-off blocks

<table>
<thead>
<tr>
<th>BS</th>
<th>1</th>
<th>E24</th>
<th>Q</th>
<th>330</th>
<th>BQ</th>
</tr>
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<tbody>
<tr>
<td>Size</td>
<td>1</td>
<td>E24</td>
<td>Q</td>
<td>330</td>
<td>BQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>= 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>= 24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decompression control:
- M = Manual
- E24 = Elec. 24 V-cc
- E220 = Elec. 220 V-50 Hz

Pressure limiter:
- Q : with limiter
- Nothing written : without limiter

Setting the pressure limiter

(0 to 400 bar) depending on type of accumulator:
0 to 400

Optional fitting for BS1:
- A : ACS 1 to ACS 4
- B : ABVE 4
- C : ABVE 10 to ABVE 50

Optional fitting for BS1 fitted with flow limiter:
- AQ : ACS 1 to ACS 4
- BQ : ABVE 4
- CQ : ABVE 10 to ABVE 50

Nota: order codes for the simplified safety and shut-off blocks: BS + pressure setting of the pressure limiter.

Example 1:
- A size 16 block, with control of electrical decompression 24 V DS, with pressure limiter set at 330 bar, and fitting flange 1”1/4: BS1E24Q330BQ.

Example 2:
- A size 24 block, with manual decompression control, pressure limiter set at 250 bar: BS2M250.

Example 3:
- (simplified safety and shut-off block): a simplified safety and shut-off block with pressure limiter set at 330 bar: BS330

General technical characteristics
- Nominal crossing diameter: 16 mm (BS 1 Block), 24 mm (BS 2 Block);
- Maximum working pressure: 350 bar;
- Temperature range: -20°C to +70°C;
- Fluid: mineral based hydraulic oil (for other fluids please contact our Customer Service department);
- Supply voltage of the decompression: valve 220 V AC / 50 Hz – 24 V;
- Energy input: AC: 50 VA; DC: 21 W;
- Flow: see pressure loss graph;
- Pressure limiter (nominal diameter): 6 mm (BS1), 10 mm (BS2);
- Fitting of the BS2 Safety block, output side: welding-neck flange (CETOP 400 bar standard).

NB1: the pressure limiter (0-400) is preset at 330 bar, but may be set at other values on request.

NB2: as standard, BS2 is fitted with a 2” port (accumulator fitting).

NB3: all safety and shut-off blocks have an electrical interface designed according to CETOP 3 standard, covered by a sealing plate except for models E24 and E220. The other models can therefore be used with other supply voltages, in such cases the end-user should source and insert the necessary solenoids him/herself.

The safety and shut-off blocks are available in a simplified version.

They consist of:
- Pressure limiter (directly operated) set at the maximum operating pressure of the accumulator. This pressure limiter should never be used as the limiter to protect the hydraulic pump.

General technical characteristics
- Nominal crossing diameter: 16 mm;
- Maximum working pressure: 350 bar;
- Temperature range: -20°C to +70°C;
- Fluid: mineral based hydraulic oil (for other fluids please contact our Customer Service department);
- Pressure limiter (nominal diameter): 6 mm.

Graph of pressure drop as a function of flow
Clamps

For large capacity accumulators it is recommended to use seats. The number of fixation clamps used should be determined depending on the size of the accumulator.

<table>
<thead>
<tr>
<th>fixation clamps</th>
<th>type of accumulator</th>
<th>clamp reference</th>
<th>dimensions (mm)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>AS 00 50/AF 00 50</td>
<td>254021</td>
<td>163 144 90 118.5 M8 x 80 77.81 3</td>
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<td>AX 00 50/AS 00 70</td>
<td>254022</td>
<td>210 200 130 168 M10 x 8 8.8 92 4</td>
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<td></td>
<td>ACS 0.7/1/1.5/2.5/4</td>
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</table>

<table>
<thead>
<tr>
<th>fixation seats</th>
<th>type of accumulator</th>
<th>seat reference</th>
<th>dimensions (mm)</th>
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<td>108 80 210 175 150 40</td>
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<td>152 100 260 225 200 40</td>
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<table>
<thead>
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<th>adaptors</th>
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<th>adaptor outlet</th>
<th>reference</th>
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<td>AS/AF</td>
<td>G1/2</td>
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<td>AX 00 50</td>
<td>M18 x 1.5</td>
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<td></td>
<td>AS 00 70</td>
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<td>G1/2&quot;</td>
<td>EC 1054</td>
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<td>G3/8&quot;</td>
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<td>EC1058</td>
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<tr>
<td></td>
<td>ABVE 4</td>
<td>G3/4&quot; full</td>
<td>066305</td>
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<td></td>
<td>ABVE 10/20/32/50</td>
<td>G3/4&quot; G1&quot; full</td>
<td>066074 066068 066069</td>
</tr>
</tbody>
</table>

Dimensions are given only as an indication.
**Charging equipment**

### Charging kit

Reference : CGLU 4F/D* 066650  
CGLU 4F : includes hose adapter for use on French nitrogen bottles.  
*CGLU 4D* : German (European) version, available on request, includes hose adapter for use on German nitrogen bottles.

The charging kit comprises :  
- VGL 4 universal pressure charging and gauging device (M28 x 1.50 outlet)  
- two pressure gauge kits : 0 to 25 bar and 0 to 250 bar, additional manometers on request (0-100; 0-400)  
- adapters for connection to charging valves (M16x200 - 5/8” - G3/4” - 7/8” - 8V1)  
- 2.50 m-long hose, for connection to a source of nitrogen, standard version for pressures up to 400 bar. For higher pressures, please contact our Technical Sales Department  
- 6 mm A/F Allen wrench  
- spare seal kit.

### Charging and gauging device

Reference : VGL 4 066660

#### Description

The VGL 4 charging and gauging device is the essential instrument to check nitrogen filling pressure and to reduce nitrogen pre-charge pressure of accumulators, up to maximum working pressure of 400 bar.

#### Technical characteristics

- Maximum pressure : 400 bar
- Accumulator connection : M 16x200 - 5/8” 18UNF - G3/4” - M28 x 1.50 (7/8” 14 UNF - 8 V1 with CGLU 4)
- Pressure gauges : 63 mm diameter (glycerin-bath type) with G1/4” Cyl. rear outlet, fitted with a direct-connection to a rapid connector. Scale 0 to 400 bar (or other on request) with accuracy of 1.6.
Order code

AC : Cylindrical / spherical  
AS : Standard spherical  
AF : Low temperature, high pressure, spherical model  
AX : Spherical model in stainless steel  
ACS : Welded cylindrical  
ABVE : Bladder type

ACCUMULATOR TYPE

<table>
<thead>
<tr>
<th>CAPACITY OF ACCUMULATOR (in litres), AND REFERENCE CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS</td>
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</tbody>
</table>

CHARGING VALVES AND SCREWS (see page 15)

<table>
<thead>
<tr>
<th>PRE-CHARGE PRESSURE (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
</tr>
</tbody>
</table>

PROTECTIVE TREATMENT (for AS, AC, AF)

S : Without protective treatment  
P : ARCOR® anti-corrosion treatment

TYPE OF DIAPHRAGM

E/1 : NBR (nitrile)  
E/2 : NBR (nitrile) stainless steel insert  
E/3 : ECO (epichlorydrine)  
E/4 : EPM (epr)  
E/5 : FKM (viton®)

OFFICIAL APPROVAL

S : unnecessary  
D : CE approval

Determining the right accumulator

Available on request, a disk to calculate the right accumulator as a function of your operating parameters.

Legislation

Hydraulic accumulators are gas pressure vessels. The manufacture of such products must conform to CE directive 97/23/CE. Local regulations and legislation must be strictly respected regarding the use of accumulators.

European legislation 97/23/CE

LEDUC accumulators of less than 1 litre capacity are supplied with a manufacturer’s certificate. They cannot be stamped CE, but conform to the CE directive. LEDUC accumulators of 1 litre capacity or more are supplied with a CE certificate of conformity. They bear the CE stamp and the reference of the official organisation certifying their conformity.

Use of these accumulators in France is governed by decree dated 15 March 2000 (Official Bulletin n°96).

Useful addresses:
- French legislation and application of directive 97/23/CE:
  http://www.adminet.com/jo
- European legislation:
  http://europa.eu.int

Independent approved organisations:
ASAP, APAVE, TÜV, VERITAS...
Precautions for use, and maintenance recommendations

Installing and connecting your accumulator

The accumulator must be installed in an easily accessible place and should be fixed in place using robust collars: see page 14. It is important that the markings engraved on the accumulators remain visible.

Hydraulic connections: the dimensions of the connection ports are specified on the preceding pages, for each accumulator. Pipes must not put any strains on the accumulator.

The accumulator must be connected to a hydraulic circuit using only mineral-based hydraulic oil or equivalent. For other fluids, please consult our Customer Service Department.

Any operation to modify the external appearance of the accumulator (welding, grinding, machining etc...) is strictly forbidden.

The accumulator should be suitably protected (paint or other protection) against external corrosion.

The circuit must include an isolation valve to isolate the accumulator, and also a means of checking that the hydraulic pressure never exceeds the maximum pressure engraved on the accumulator: see pages 12 and 13 regarding safety and shut-off blocks.

The accumulator must be connected to a pressure limiter set at a pressure not greater than the accumulator's maximum service pressure capability.

Charging

The pre-charge pressure must be less than the operating pressure engraved on the accumulator shell.

It is important to ensure the accessibility for a charging and gauging device (see page 15, charging equipment).

Pre-charge pressure must be checked before operation (see paragraph on "accumulator recommendations" below)

Use only nitrogen (N2, minimum quality I). If the nitrogen pressure of the installation connected - for the purposes of charging - to the accumulator is greater than the maximum acceptable pressure engraved on the accumulator, it is essential to install a pressure regulator between the bottle and the hose.

The influence of temperature on charging pressure should be taken into consideration.

A reference table is available from HYDRO LEDUC on request.

Start-up

Check that the hydraulic installation is able to withstand the maximum pressure engraved on the accumulator.

After the hydraulic connection to the circuit, the pipework must be bled carefully. Use the safety and shut-off blocks described on pages 12 and 13.

Use

The maximum hydraulic pressure must never exceed the operating pressure (PS) engraved on the accumulator shell: check using appropriate equipment (see page 15, charging and gauging kit).

The volumetric ratio \( \frac{V_0 - V_2}{V_0} \) must not be exceeded, see the technical description for each accumulator.

Bleed the pipework of any air.

The accumulator must operate within the prescribed extreme operating temperatures.

Maintenance and control

Before intervening in any circuit which has a gas filled pressure vessel, the pressure must be discharged from the circuit.

Check the nitrogen pressure regularly, see the "accumulator instructions" below, and page 15 regarding charging equipment.

Check regularly that there is no external corrosion.

Recommendations concerning accumulators

Extract from instructions included with each accumulator delivered:

How our accumulators are delivered

- Either : pre-charged to a storage pressure of around 5 bar. In this case, before use charge to required nitrogen pressure using the charging assembly (VGL 4). Check the P 1620 valve or charging screw is airtight. Put the P 1620 back in place.
- Or : pre-charged with nitrogen to the pressure corresponding to that calculated for the working conditions of the application. In this case check that the pre-charge pressure marked on the label on the accumulator corresponds to the necessary calculated pressure.

Frequency of checks

The pre-charge pressure \( p_0 \) marked on the accumulator must be checked each time the accumulator is assembled in a system, and after every service. At least one check must be made during the first week of service.

The pre-charge pressure of the accumulator should also be checked at least once during the first week of service. Provided no gas leak is observed a further check should be made around 4 months later. Provided at this check there is still no gas leak, an annual check thereafter may be considered sufficient.

Checks

Ensure before any checks that the accumulator has been isolated from the circuit and decompressed on the oil side.

Use the LEDUC VGL 4 gauging device.

NOTE: use a manometer with a measuring range compatible with the nitrogen pressure you want to check.
Hydraulics, our center of expertise.

Hydro Leduc is committed to building on over 40 years’ experience in the design and manufacture of hydraulic components to satisfy customer needs with reliable products from a reliable source.

On a single site in North-eastern France, the company’s dedicated R & D, Production, Quality, Sales & Marketing and Customer Service Departments work together to interpret market requirements, develop innovative solutions and produce cost-effective components to suit. In-house prototyping and machining afford flexibility and reactivity to changing conditions or new requirements.
Hydraulics, our center of expertise.

**Industrial applications**

**DELTA SAE**

Variable displacement pumps with load sensing, pressure compensation, constant torque or other control devices. High pressure capabilities within minimal size. SAE shafts and flanges.

**Micro-hydraulics**

An area of unique Hydro Leduc know-how: micro-hydraulic pumps and systems. Axial and radial piston pumps, fixed or variable displacement, from just 20 mm³ in displacement, outer diameters of finished product from 1 inch (25.4 mm), for working pressures up to 1000 bar. Axial pistons micro-motors.

And to further assist customers in the high-tech fields of application, Hydro Leduc now designs, develops and manufactures the complete micro-hydraulic power-pack including electric motor, valving, tank, etc.

Micro-pumps and motors of fixed, variable or adjustable displacement.

**Truck hydraulics**

Hydro Leduc now offers three ranges of piston pumps to cover all truck hydraulic applications:

**PA / PAC**

- Fixed displacement in-line axial piston pumps, single and twin-flow models: high pressure, dual direction of rotation, protection of shaft seals.

**X**

- Axial piston pumps of bent axis design, fixed displacement: 7 pistons for optimal flow regularity, low noise level, very compact size envelope, protection of shaft seals.

Variable displacement pumps with load sensing control for direct PTO mounting. Extremely compact and suitable for operation at up to 400 bar continuous: the ideal solution for new technology cranes and sophisticated truck equipment.

**Hydraulic motors**

Fixed displacement hydraulic motors with bent-axis axial pistons.

**Let us surprise you...**

A strong research and development team enables components to be adapted or created to suit customer specifications, projects often carried out in close collaboration with the clients’ engineers to ensure optimization of the solution to its application.

*Brochure available upon demand.*
HYDRO LEDUC

HYDRO LEDUC
Head Office & Factory
BP 9 - F-54122 AZERAILLES - FRANCE
Tél. : (33) 03 83 76 77 40
Fax : (33) 03 83 75 21 58

HEKTOS Sławomir Pokraka
Wojska Polskiego 36
08-440 Pilawa - Polska
Tel. 48 / 022 2035079
Fax 49 / 022 2035080
www.hektos.eu
info@hektos.eu

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hydroakumulatory, akumulatory hydrauliczne, hydrakumulatory membranowe, hydrakumulatory pęcherzowe,
akumulatory hydrauliczne spawane, akumulatory hydrauliczne skręcane, akumulatory hydrauliczne nierdzewne,
bloki bezpieczeństwa i odcinające, napełniacze, złącza i obejmy.