

# Hydro-pneumatic accumulators

- Diaphragm
- Bladder
- Bladder-diaphragm



 **HYDRO  
LEDUC**  
*make it simple*

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energy, silence, comfort, service life...

## ■ 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?

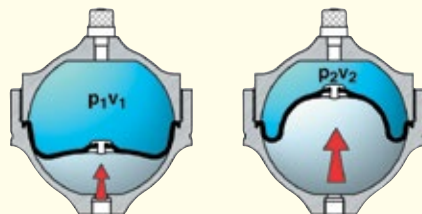
The hydropneumatic accumulator is a tank divided into two chambers by a flexible separator. One chamber is for fluid under pressure, the other for nitrogen gas.



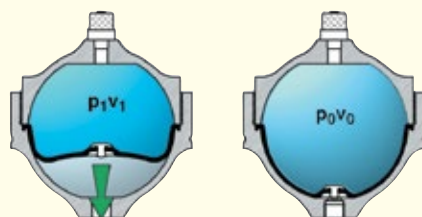
It is charged with nitrogen to a pressure  $p_0$ .



When a fluid travels through the accumulator, and the pressure  $p_1$  of that fluid is greater than the pre-charge pressure  $p_0$  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  $p_0$ .

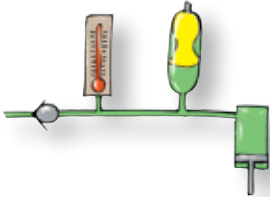


## ■ Surge control



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.

## ■ Thermal change



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

## ■ Shock absorbing – suspension



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

Examples:

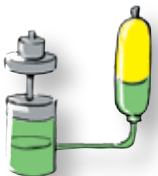
- lifts,
- forklift trucks,
- agricultural machinery,
- construction equipment, etc.

## ■ Energy recovery and restitution



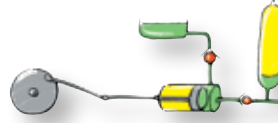
The energy supplied by a given load can be absorbed by the accumulator and put back into a hydraulic cylinder to produce a mechanical movement.  
Example: closing railcar hopper doors.

## ■ Leak compensation



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.

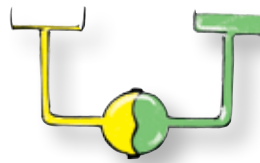
## ■ Pulsation dampening



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.

## ■ Transfer of fluids

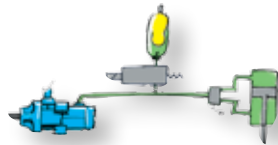


The LEDUC accumulator makes it possible to transfer hydraulic pressure between two incompatible fluids, via the diaphragm which separates the two fluids.

Examples:

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

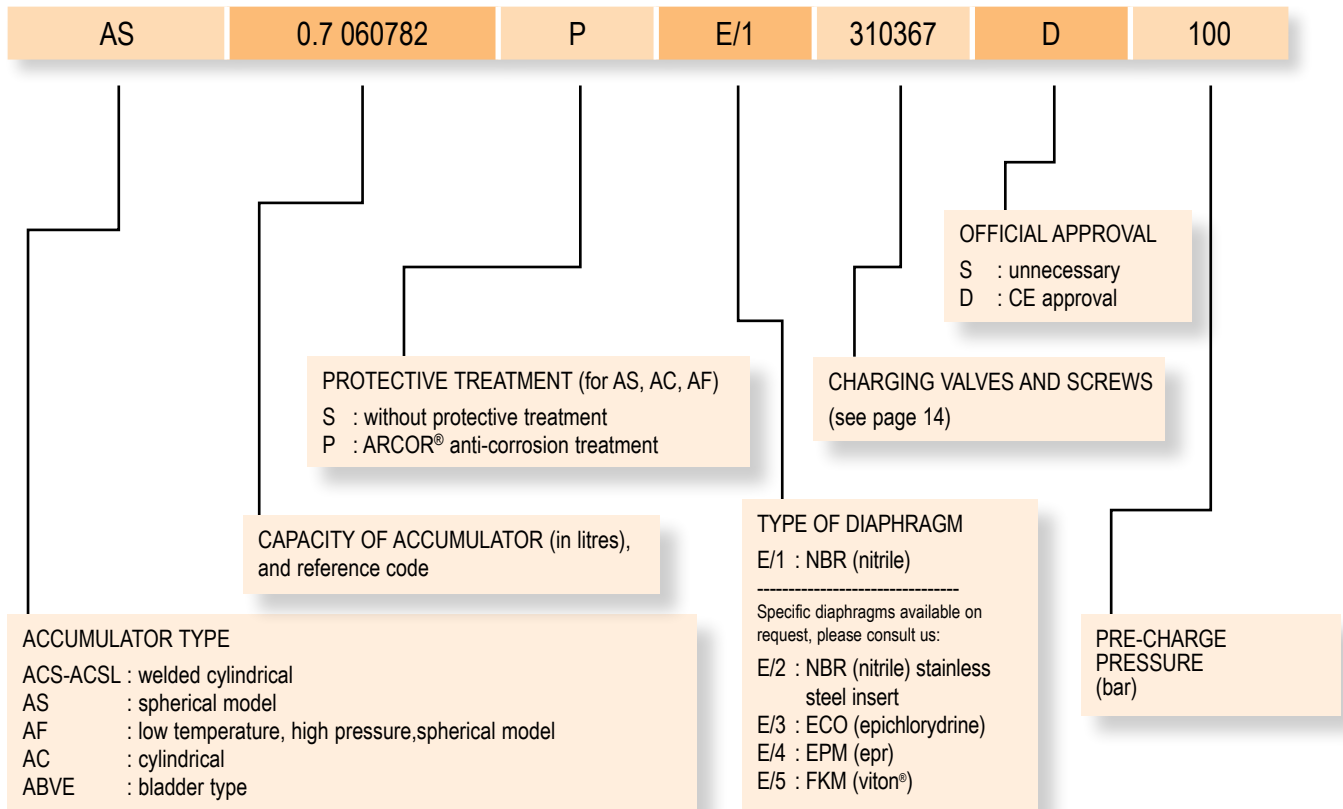
## ■ Energy storage



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.



**■ Main characteristics of hydropneumatic accumulators according to technology**

Main characteristics of accumulator	Type of accumulator	
	Diaphragm accumulator	Bladder accumulator
Volumetric ratio (capacity to store a volume)	Ratio limited to 4 in dynamic 6 for slow movement and 8 in static	Ratio limited to 4
Mounting position	Vertical position preferred for all cases where length/ diameter ratio > 4.	Vertical position
Gas loss (osmosis) Loss is proportional to sealing surface	Little to medium	Medium
Speed of restitution	Very quick	Quick
Capacity for total discharge	Yes	Only in particular conditions
Flow control	No	No
Control of the presence of fluid	No or unreliable	No or unreliable
Use at high temperature (+120°C)	Medium	Reduced
Use at low temperature (-30°C)	Medium	Reduced
Use with special fluids	Limited	Limited
Service life	Good	Good

## ACS

330 bar

- Maximum pressure . . . . . 330 bar  
 Extreme operating temperatures:  
 - standard version . . . . . - 20°C to + 120°C  
 - low temperature version . . . . . - 40°C to + 120°C

## ACSL

210 bar

- Maximum pressure . . . . . 210 bar  
 Extreme operating temperatures:  
 - standard version . . . . . - 20°C to + 100°C  
 - low temperature version . . . . . - 40°C to + 100°C

### Technical description

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

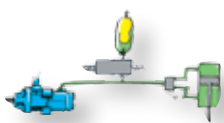
### Advantages

- 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-diaphragm offers exceptionally good resistance to fatigue.
- Rapid and total discharge possible due to the anti-extrusion stud actually fitted onto the bladder-diaphragm.

### Gas charging

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

### Examples of applications

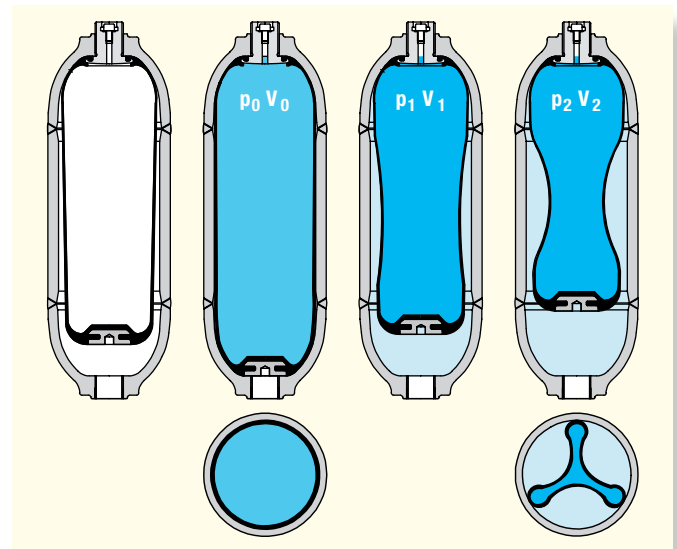


Energy storage



Suspension

### Deformation of the bladder-diaphragm



### Filling gas

Nitrogen only.

### Operating fluids

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

### Volumetric ratio $(V_0 - V_2)/V_0$

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

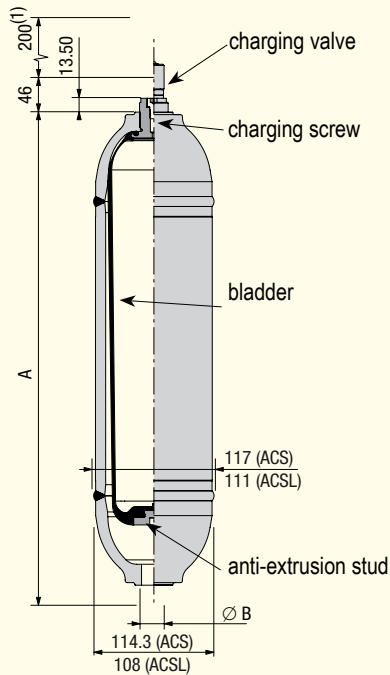
- Safety blocks, see pages 12 and 13.
- Fixation devices, see page 11.
- Adaptors, see page 11.

### Order codes

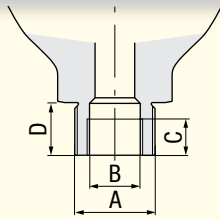
See page 3.

# Hydro-pneumatic accumulators welded cylindrical

## ACS - ACSL



(1) dimensions with VGL 4 fitted  
Dimensions are given only as an indication.



Leduc part n°	A	B	C	D
ACS 0,7 066695	M33 x 1.5	G1/2"	14	20
ACS 0,7 066735	M26 x 1.5	M14 x 1.5	14 (as per ISO 6149)	16

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



(1) US version.  
(2) on request: P1620 valve.

\* Other oil side threads can be offered on request.

ACS	reference	nitrogen capacity V <sub>0</sub> litres	maximum pressure bar CE	weight kg	A mm	oil side thread Ø B	gas side orifice
ACS0.7	066445	0.7	330	4	176	G3/8"	screw
	065975	0.7	330	4	176	G3/8"	P1620 valve
	066035	0.7	330	4	176	G3/4"	screw
	066130	0.7	330	4	176	G1/2"	screw
	066255	0.7	330	4	176	G1/2"	P1620 valve
	065950	0.7	330	4	176	M16 x 1,5	screw
	065952	0.7	330	4	176	M18 x 1,5	screw
	066845 <sup>(1)</sup>	0.7	330	4	176	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw
	065947 <sup>(1)</sup>	0.7	330	4	176	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	SCHRADER valve
ACS1	065960	1.1	330	5,9	246	G3/4"	screw
	065976	1.1	330	5,9	246	G3/4"	P1620 valve
	065964	1.1	330	5,9	246	M18 x 1,5	screw
	066855 <sup>(1)</sup>	1.1	330	5,9	246	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw
	065965 <sup>(1)</sup>	1.1	330	5,9	246	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	SCHRADER valve
ACS1,5	065940	1.5	330	7,8	315	G3/4"	screw
	065977	1.5	330	7,8	315	G3/4"	P1620 valve
	066840	1.5	330	7,8	315	M18 x 1,5	screw
	065945 <sup>(1)</sup>	1.5	330	7,8	315	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	SCHRADER valve
	066865 <sup>(1)</sup>	1.5	330	7,8	315	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw
ACS2	066705	2	330	9,9	393	G3/4"	screw
	066675	2	330	9,9	393	G3/4"	P1620 valve
ACS2,5	065910	2.5	330	11,5	464	G3/4"	screw
	065978	2.5	330	11,5	464	G3/4"	P1620 valve
	066875 <sup>(1)</sup>	2.5	330	11,5	464	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw
	065915 <sup>(1)</sup>	2.5	330	11,5	464	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	SCHRADER valve
	066685 <sup>(1)</sup>	2.5	330	11,5	464	1"1/16-12UN-2B(SAE12) <sup>(1)</sup>	SCHRADER valve
ACS4	065920	4	330	17,5	696	G3/4"	screw
	065979	4	330	17,5	696	G3/4"	P1620 valve
	066885 <sup>(1)</sup>	4	330	17,5	696	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw
	065925 <sup>(1)</sup>	4	330	17,5	696	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	SCHRADER valve
	066690 <sup>(1)</sup>	4	330	17,5	696	1"1/16-12UN-2B(SAE12) <sup>(1)</sup>	SCHRADER valve
ACSL *	reference	nitrogen capacity V <sub>0</sub> litres	maximum pressure bar CE	weight kg	A mm	oil side thread Ø B	gas side orifice
ACSL0.7	068125	0.7	210	3	175	G1/2"	screw <sup>(2)</sup>
	068275	0.7	210	3	175	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw <sup>(2)</sup>
	068385	0.7	210	3	175	M18x1.5	screw <sup>(2)</sup>
	068440	0.7	210	3	175	M18x1.5	P1620 valve
ACSL1	068130	0.99	210	4.5	245	G3/4"	screw <sup>(2)</sup>
	068160	0.99	210	4.5	245	G1/2"	screw <sup>(2)</sup>
	068280	0.99	210	4.5	245	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw <sup>(2)</sup>
	068395	0.99	210	4.5	245	M18x1.5	screw <sup>(2)</sup>
	068445	0.99	210	4.5	245	M18x1.5	P1620 valve
	068410	1.5	210	5.9	315	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw <sup>(2)</sup>
ACSL1.5	068410	1.5	210	5.9	315	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw <sup>(2)</sup>
	068450	1.5	210	5.9	315	M18x1.5	P1620 valve
	068450	1.5	210	5.9	315	M18x1.5	P1620 valve
ACSL2	068140	2	210	7.6	392	G3/4"	screw <sup>(2)</sup>
	068525	2	210	7.6	392	3/4-16UNF-2B(SAE8) <sup>(1)</sup>	screw <sup>(2)</sup>
	068455	2	210	7.6	392	M18x1.5	P1620 valve
ACSL2.5	068145	2.5	210	8.9	463	G3/4"	screw <sup>(2)</sup>
	068530	2.5	210	8.9	463	1"1/16-12UNF-2B(SAE12) <sup>(1)</sup>	screw <sup>(2)</sup>
	068460	2.5	210	8.9	463	M18x1.5	P1620 valve
ACSL4	068390	4	210	13.9	695	G3/4"	screw <sup>(2)</sup>
	068535	4	210	13.9	695	1"1/16-12UNF-2B(SAE12) <sup>(1)</sup>	screw <sup>(2)</sup>
	068465	4	210	13.9	695	M18x1.5	P1620 valve

# Hydro-pneumatic accumulators spherical

AF

500 bar

Maximum pressure . . . . . 500 bar  
Extreme operating temperatures – 20°C to + 100°C

AS

400 bar

Maximum pressure . . . . . 400 bar  
Extreme operating temperatures – 20°C to + 100°C

## Technical description

LEDUC 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.

Separator:

- Series, Nitrile: from – 20°C to + 100°C
- Special: from – 40°C to + 100°C dynamic use.

## Advantages

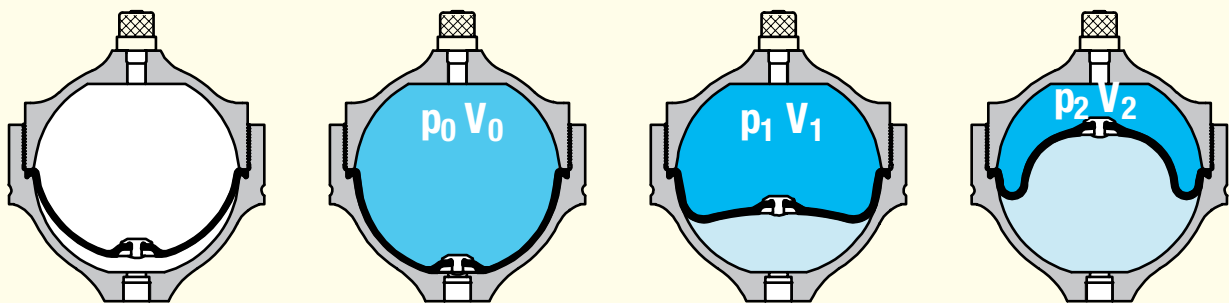
The diaphragm only changes position, the elastomer in fact works little. The LEDUC spherical accumulator owes most of its qualities to its diaphragm and metal pin:

- excellent gas/fluid tightness.
  - possibility of total and rapid discharge.
- Can be adapted to suit a wide range of fluids.hanged.

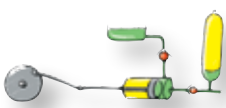
## Protection

Available on request for AF and AS versions: ARCOR® anti-corrosion treatment.

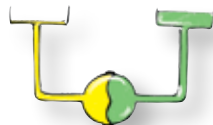
## Deformation of the diaphragm



## Examples of applications



Pulsation dampening



Transfer



## Filling gas

Nitrogen only.

## Operating fluids

- Mineral-based hydraulic fluids: standard diaphragm.
- 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

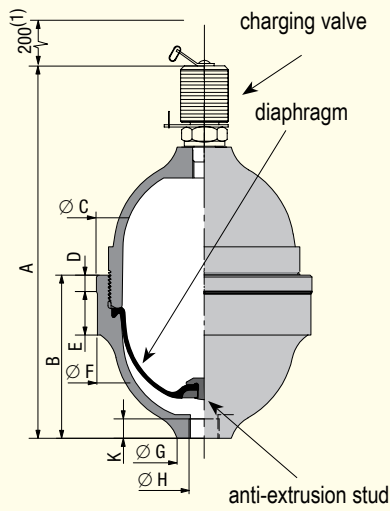
- Safety blocks, see pages 12 and 13.
- Fixation devices, see page 11.
- Adaptors, see page 11.

## Order codes

See page 3.

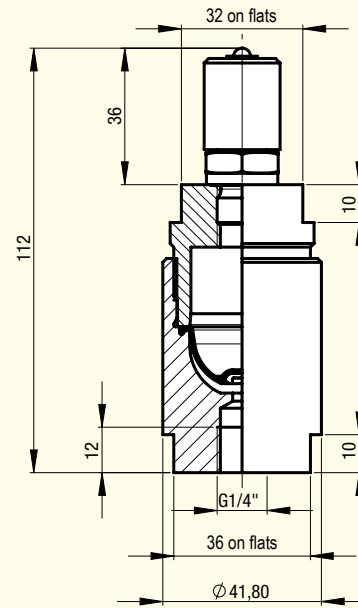


## AS-AF



(1) dimensions with VGL 4 fitted  
Dimensions are given only as an indication.

## AC 00 02



AF	reference	nitrogen capacity $V_0$ litres	maximum pressure bar CE	weight kg	dimensions (mm)								
					A	B	Ø C	D	E	Ø F	Ø G	Ø H	K
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

AS	reference	nitrogen capacity $V_0$ litres	maximum pressure bar CE	weight kg	dimensions (mm)								
					A	B	Ø C	D	E	Ø F	Ø G	Ø H	K
AS 00 20	060932	0.19	400	1.2	150	69	84.5	9	20	83.5	29	G1/4"	12
AS 00 50	060972	0.45	400	2.8	184	89	114	12	23	112.5	40	G3/8"	16
AS 00 70	060782	0.65	250	3	197	89	119.5	9	24	118.5	30	G3/8"	13
AS 01 00	060110	1.1	400	5.5	197	112	163.5	50.5	50.5	163.5	40	M18 x 1.5	12
AS 02 50	060812	2.55	400	14	251	161	213.5	37	29	210	51	G3/4"	17
AS 04 00	060121	4.1	400	22	298	202	251	44	40	247	105	M33 x 2	20
AS 10 00	060141	10.19	400	53	391	268	339	52.5	52.5	333	105.1	M33 x 2	20

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

**330 bar**

Maximum pressure . . . . . 330 bar  
 Extreme operating temperatures – 20°C to + 80°C

**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.

**Filling gas**

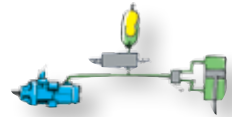
Nitrogen only.

**Operating fluids**

Mineral-based hydraulic fluids: standard bladder.  
 Non-standard and/or corrosive fluids: please consult our Customer Service Department.

**Deformation of the bladder**

**Example of applications**



Energy storage

**Volumetric ratio  $(V_0 - V_2)/V_0$**

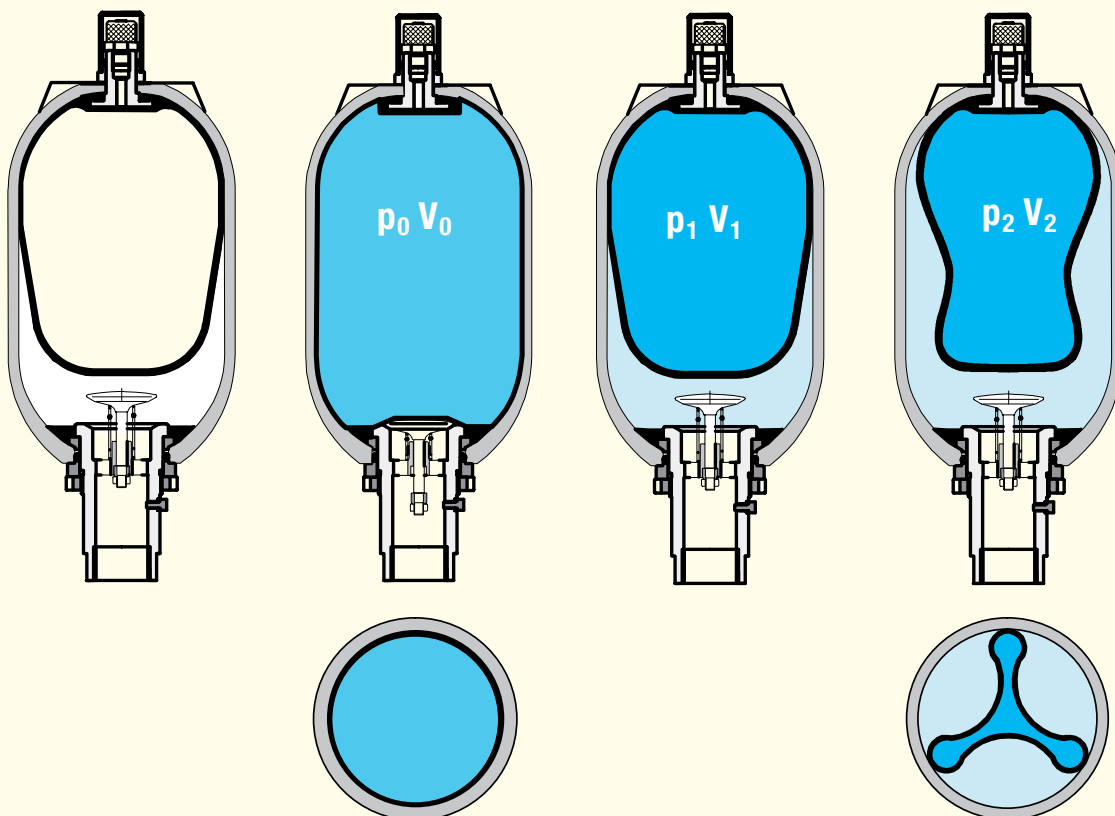
The volumetric ratio of this type of accumulator is 0.75.  
 For example, an ABVE 4 accumulator can take in a maximum volume of  $0.75 V_0 = 0.75 \times 4 = 3$  litres.

**Accessories**

Safety blocks, see pages 12 and 13.  
 Fixation devices, see page 11.  
 Adaptors, see page 11.

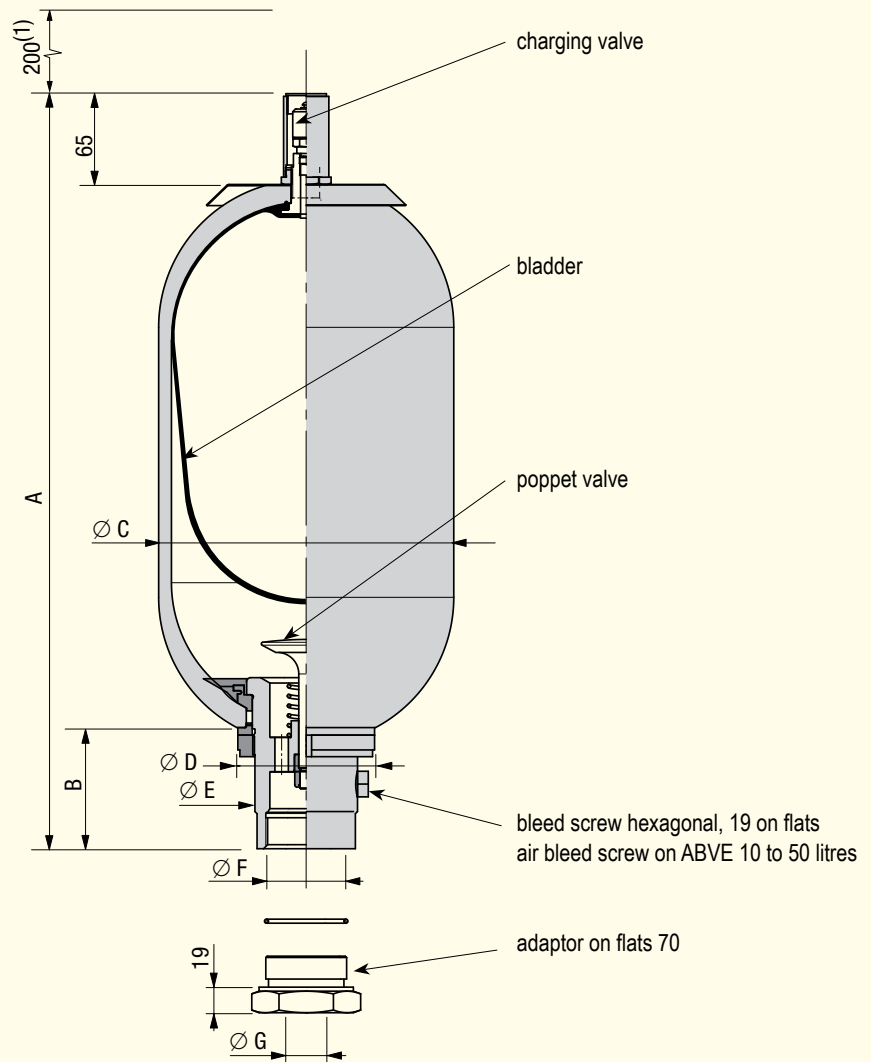
**Order codes**

See page 3.





## ABVE



(1) dimensions with VGL 4 fitted  
Dimensions are given only as an indication.

ABVE	reference	nitrogen capacity $V_0$ litres	maximum pressure bar CE	weight kg	dimensions (mm)						
					A	B	Ø C	Ø D	Ø E	Ø F	Ø G
ABVE 4	066850	3.7	350	14	420	65	169	75	53	G1"1/4	G3/4" or full
ABVE 10	066860	9.2	330	30	568	88	219	101	76	G 2"	G3/4" - 1" or full
ABVE 20	066870	17.8	330	50	888	88	219	101	76	G 2"	G3/4" - 1" or full
ABVE 32	066880	32	330	80	1380	88	219	101	76	G 2"	G3/4" - 1" or full
ABVE 50	066890	48.5	330	100	1885	88	219	101	76	G 2"	G3/4" - 1" or full

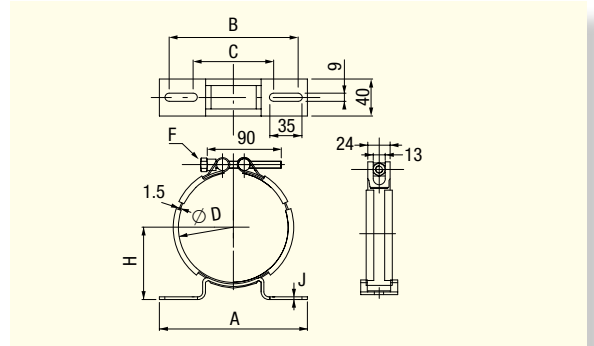
HYDRO LEDUC provides after sales service, supplies spare parts and can requalify your accumulators (retesting).

# Hydro-pneumatic accumulators clamps

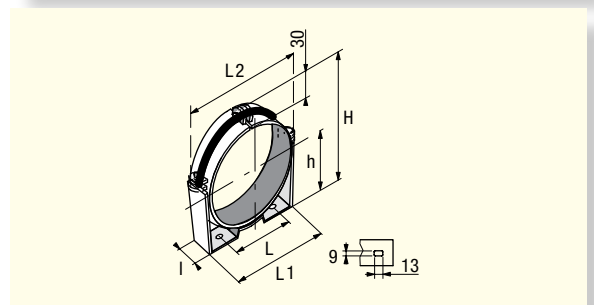
For large capacity accumulators it is recommended to use seats. The number of fixation clamps used should be determined depending on the size of the accumulator.

## Fixation clamps

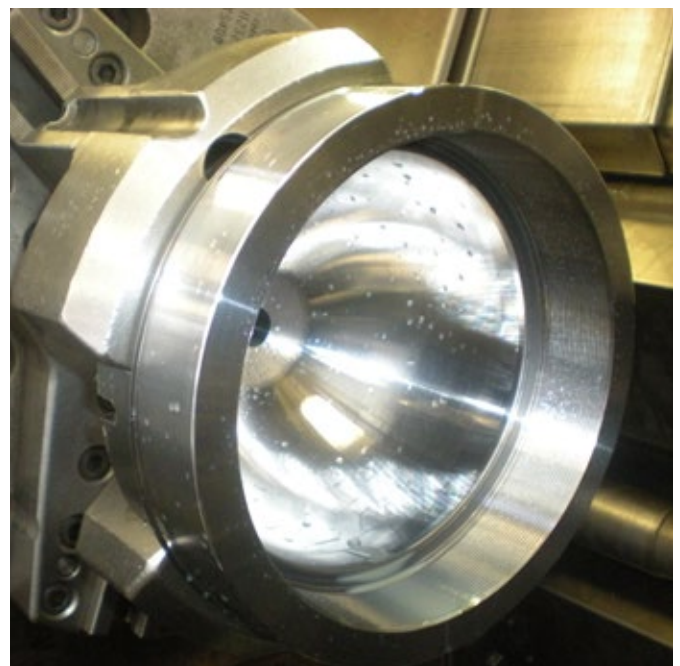
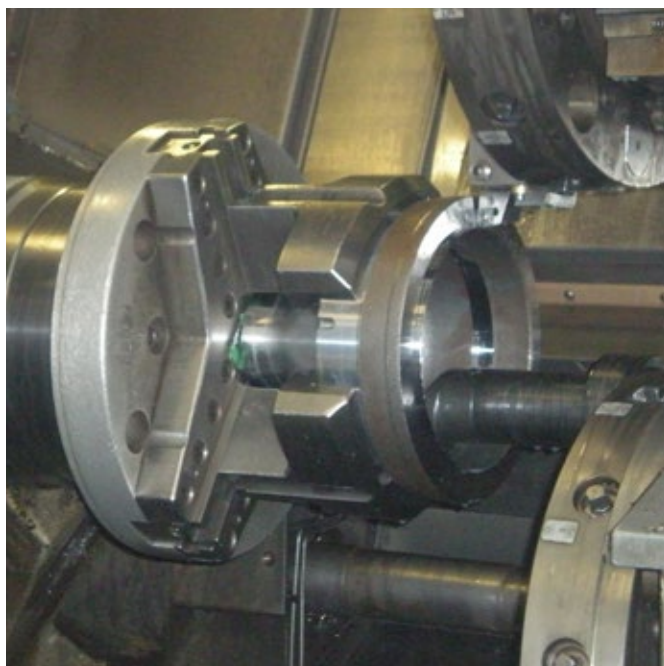
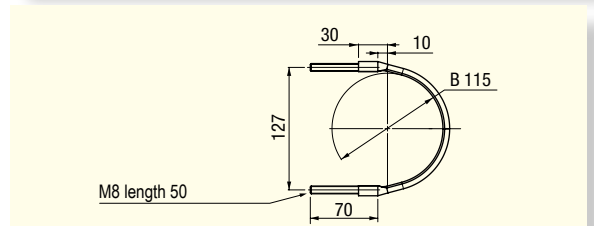
type of accumulator	clamp reference	dimensions (mm)						
		A	B	C	D	F	H	J
AS 00 50 / AF 00 50 AS 00 70 ACS / ACSL 0.7 / 1 / 1.5 / 2 / 2.5 / 4	254021	160	139	87	118.5	M8 x 90	72.56	3



type of accumulator	clamp reference	dimensions (mm)					
		H	h	L	L1	L2	I
AS 04 00	254005	285.5	132	248	300	-	30
AS 02 50	254006	248	113	212	254	-	30
ABVE 10 / 20 / 32 / 50	254007	-	119	216	254	297	30
AS 01 00 AF 01 00 ABVE 4	254022	207	92.5	148	184	-	30

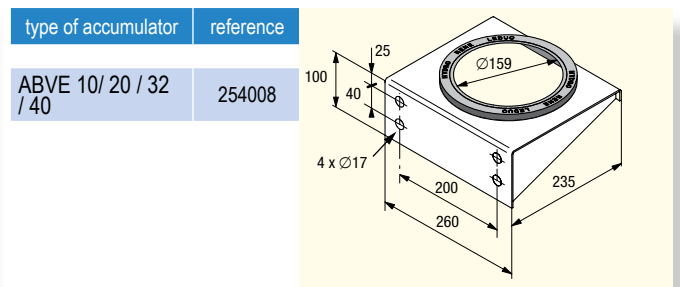
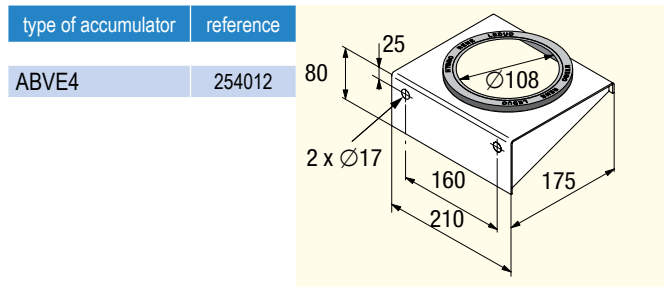


type of accumulator	clamp reference	
ACS / ACSL	065958	



# Accessories clamps

## Fixation seats



## Adaptors

type of accumulator	reference	oulet
AS 02 50	066451	G1/2"
AS/AF - AS 00 70	EC1063	G1/2"
	EC1069	M18 x 1,5
AS/AF	EC1054	G1/2"
	EC1056	G3/8"
AS 04 00 - AS 10 00	EC1061	G3/4"
	EC1058	G3/8"
	EC1059	G1/2"
ABVE 4	066305	G3/4"
	066307	blind
ABVE 10/20/32/50	066074	G3/4"
	066068	G1"
	066069	blind



## 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 a one-way adjustable flow limiter. Mounted on the main block, this limiter controls the accumulator outlet flow, whilst inlet flow remains unrestricted.

## 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 pre-set 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

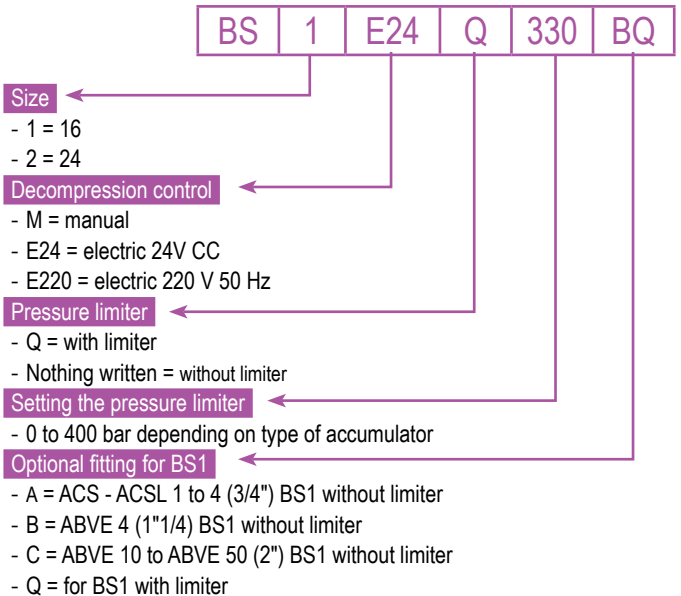
They consist of pressure limiter (directly operated) set at the maximum operating pressure of the accumulator. This pressure limiter should never be used as the limiter to protect the hydraulic pump.

## 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.

## Order codes for safety and shut-off blocks

Example of codification:



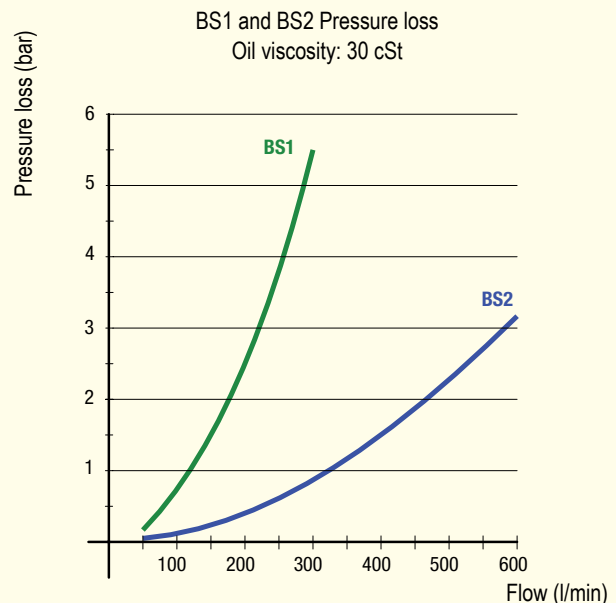
Nota: order codes for the simplified safety and shut-off blocks: BS + pressure setting of the pressure limiter

Example 1: a size 16 block, with control of electrical decompression 24V 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.

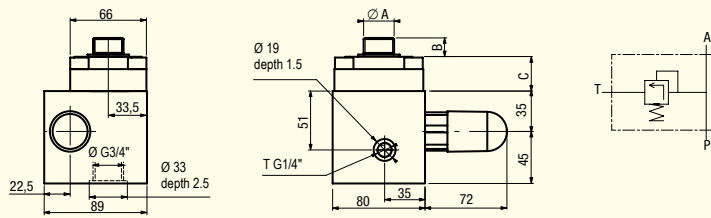
Example 3: (simplified safety and shut-off block): a simplified safety and shut-off block with pressure limiter set at 330 bar: BS330.

## Graph of pressure drop as a function of flow



# Accessories Safety and shut-off Blocks

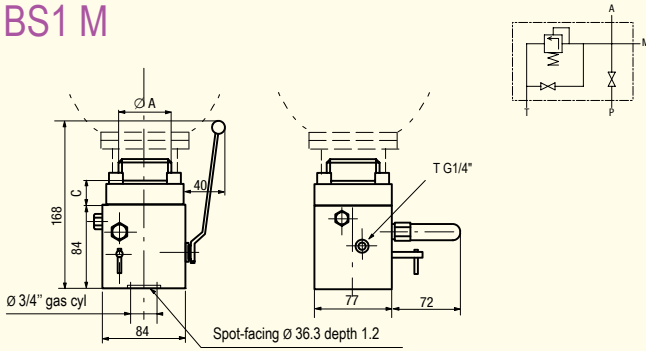
**BS**



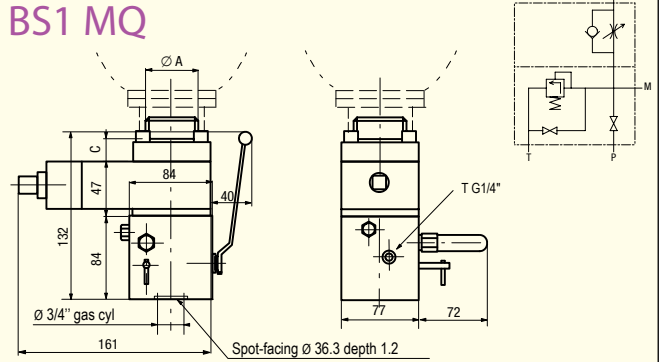
Safety blocks: Different versions available: please see order code system on page 12.

Thread gas cyl. Ø A	3/4"	1 1/4"	2"
B	16	20	24
C	30	30	35

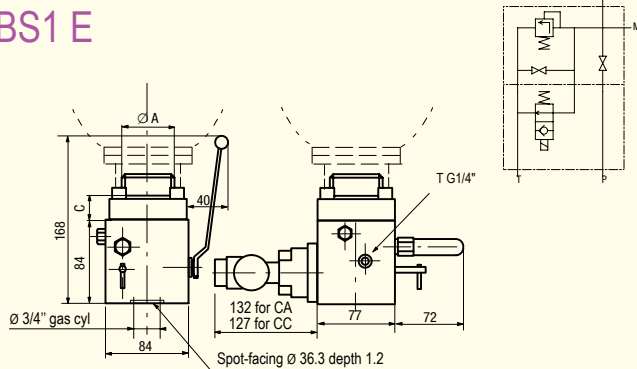
**BS1 M**



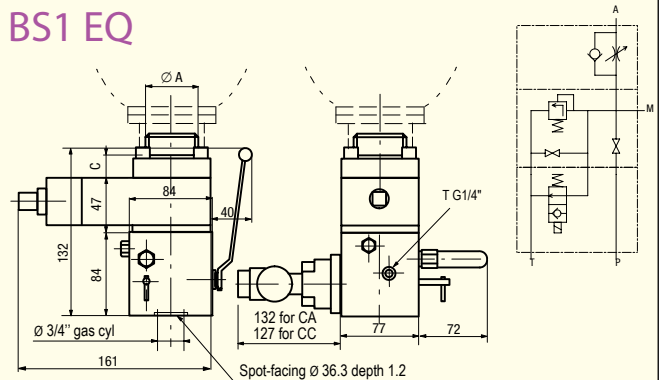
**BS1 MQ**



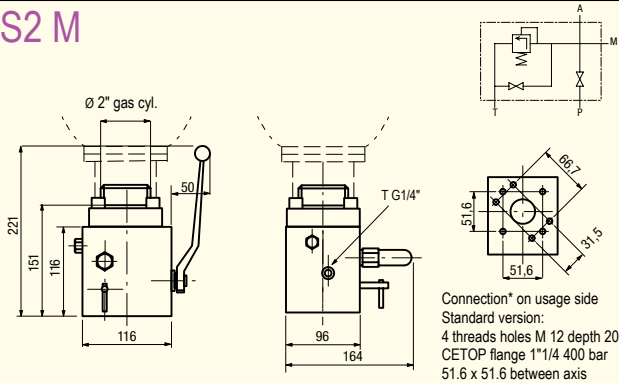
**BS1 E**



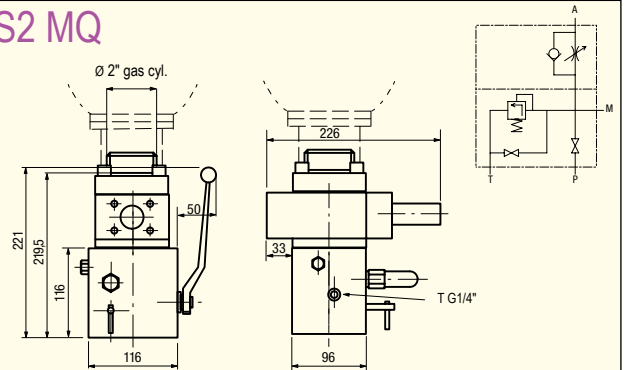
**BS1 EQ**



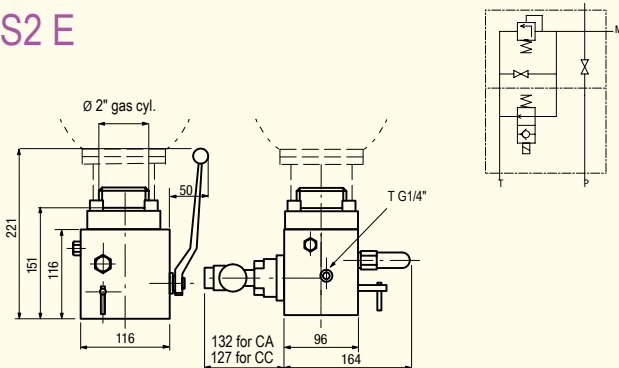
**BS2 M**



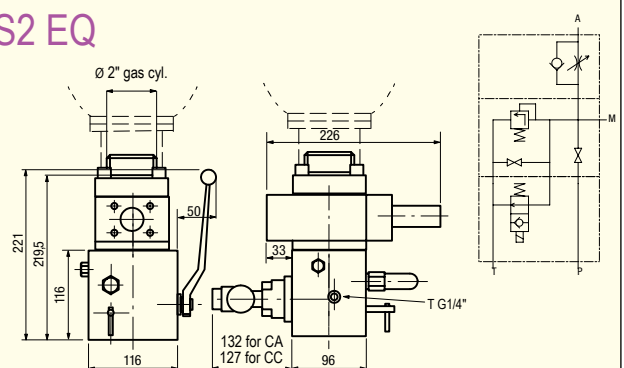
**BS2 MQ**



**BS2 E**



**BS2 EQ**



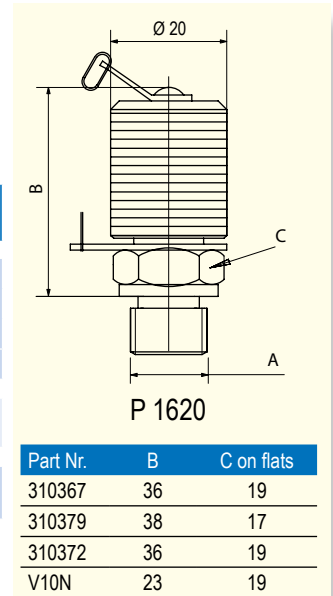
\* This interface is the same on all the BS2 blocks.

## Charging valves

The P 1620 universal valve exists in two versions:

- P 1620: standard valve, threading M 16 x 200.
- PX 1620: stainless steel valve, threading M 16 x 200.

charging valve	reference	connection on gas side (A)	accumulator	Remark	charging device	Adaptor
P 1620	310367	G 1/4	ACS - AS - ACSL	Standard	VGL 4	M 16 x 2.00
	310379	M10x1.50	ABVE	Standard		
PX 1620	310527	G 1/4	AS - AF	Stainless steel		
V10N	062050	1/2 20 UNF	ACS - AS - ABVE	old valve V10N		5/8"18 UNF
Screw	066542	M8x1.25 with BS130331 ring	ACS - ACSL	Standard	VGL 4	without
Schrader	067210	G1/4	ACS - AS - ACSL		VGL 4	8V1



## Charging kit

Reference: CGLU 4F 066650

CGLU 4F: includes hose adapter for use on French and 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" 18UNF - G3/4" - 7/8" 14UNF - 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:

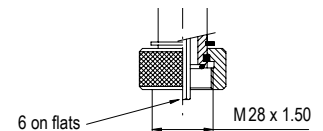
The VGL 4 charging and gauging device is the essential instrument to check nitrogen filling pressure and to reduce nitrogen pre-charge pressure of accumulators, up to maximum working pressure of 400 bar.

Technical characteristics:

Maximum pressure: 400 bar

Accumulator connection: M 16x200 - 5/8" 18UNF - G3/4" - M28 x 1.50.

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.

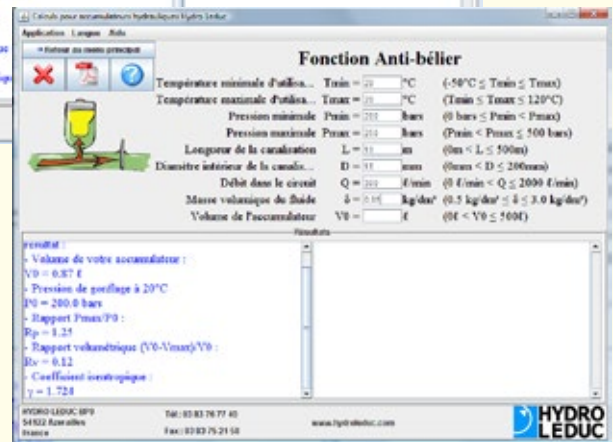
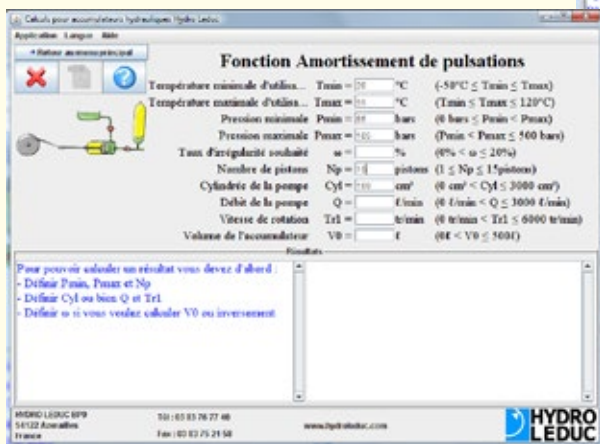
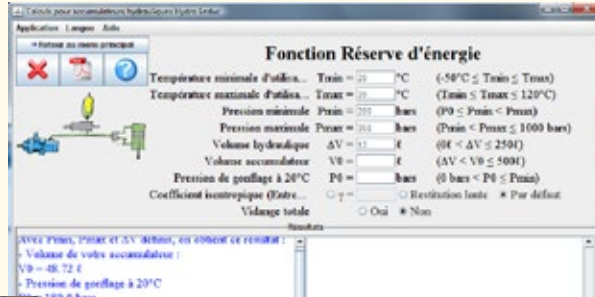




## Determining the right LEDUC accumulator for your application.



Free of charge, available on request, a USB stick with software to assist in calculations to determine the right accumulator for each application.



### ■ 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.admet.com/jo>
  - European legislation: <http://europa.eu.int>

Independent approved organisations: ASAP, APAVE, TÜV, VERITAS...

### ■ 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 14, charging equipment).

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

Use only nitrogen (N<sub>2</sub>, 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 14, charging and gauging kit).

The volumetric ratio  $(V_0 - V_2)/V_0$  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 14 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.

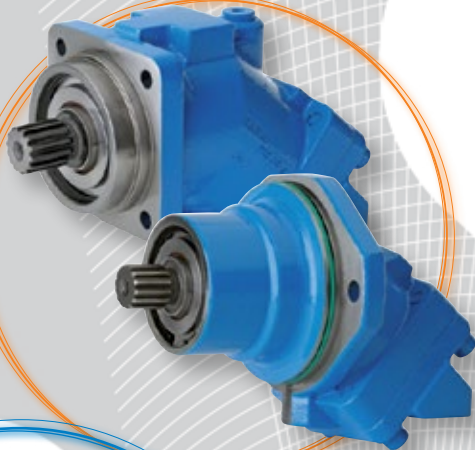


Welding robot for accumulators

## other product lines

### hydraulic motors

Fixed displacement bent-axis piston motors. Models from 5 to 180 cc. Available both in ISO and SAE versions.



### mobile and industrial pumps

Fixed displacement pumps, the W series, and variable displacement pumps, the DELTA series. High pressure capabilities within minimal size.

W series: flanges to ISO 3019/2, shafts to DIN 5480.  
DELTA series: SAE shafts and flanges.



### hydro-pneumatic

### accumulators

Bladder, diaphragm accumulators.  
Spherical and cylindrical accumulators.  
Volume capacities from 20 cc to 50 liters.  
Pressures up to 500 bar.  
Accessories for use with hydraulic accumulators.

TXV

XP

PA  
PAC  
PAD

### piston pumps for trucks

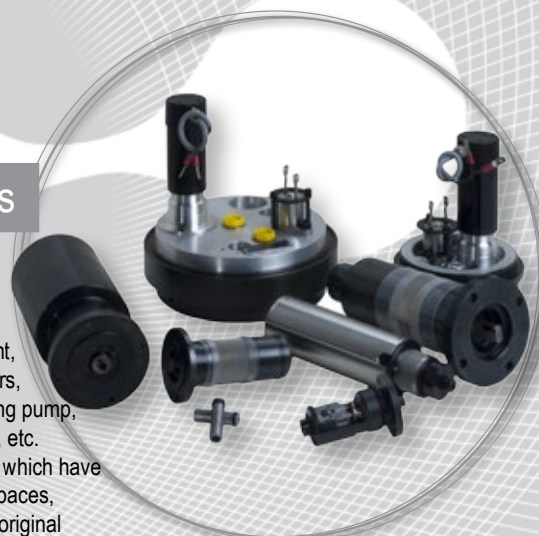
HYDRO LEDUC offers 3 types of piston pumps perfectly suited to all truck and PTO-mount applications. Fixed and variable displacement from 12 to 150 cc.

### micro-hydraulics

This is a field of exceptional HYDRO LEDUC know-how:

- axial and radial piston pumps, of fixed and variable displacement,
- axial piston micro-hydraulic motors,
- micro-hydraulic units incorporating pump, electric motors, valving, controls, etc.

To users of hydraulic components which have to be housed in extremely small spaces, HYDRO LEDUC offers complete, original and reliable solutions for even the most difficult environments.



we are passionate  
about hydraulics...

 **HYDRO  
LEDUC**

A dedicated R&D team means HYDRO LEDUC is able to adapt or create products to meet specific customer requirements. Working in close cooperation with the decision-making teams of its customers, HYDRO LEDUC optimizes proposals based on the specifications submitted.

a passion for hydraulics

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[www.hydroleduc.com](http://www.hydroleduc.com)



HYDRO LEDUC

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LEDUC**  
*make it simple*