

Technical Data

Design	: Floating Piston, non-repairable
Max. Pressure (PS)	: 250 bar [3625 psi].
Test Pressure (PT)	: 1.43 x PS (PED Design)
	: 1.3 x PS (ASME Design)
Temperature range	: -20°C to +80°C (Standard)
	: -4°F to +212°F (Standard)
Allowable pre.ratio (P_2/P_0)	: 8:1
Nominal capacity	: 0.1 to 8 Ltrs.
Fluid	
Fluid Viscosity range	: 10 to 400 cSt
Recommended viscosity	: 32 cSt
Fluid contamination degree:	Class 20/18/13
	according to ISO 4406:1999
	or better on request.



Specifications

Material of Construction

Body	: Carbon Steel.
Piston	: Aluminium Alloy.
Piston Seals	: PU / PTFE.
	Others on request.

Connections

Gas Side	: 5/8" UNF / 1/4" BSP / M28x1.5 / 5/16" UNEF/Vg8.
	Others on request.
Fluid Side	: Female Threaded.
	Others on request.

Paint-CS Accumulators	: Externally painted in RAL-5010.
	Others on request.

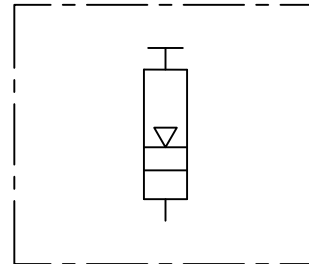
Description

A hydro-pneumatic piston accumulator is a device used specifically for storage of liquid under pressure. As liquids, for all practical purposes, are incompressible, this objective is achieved by utilizing the compressibility of gases.

A floating piston is fitted into the accumulator tube. An inert gas - nitrogen - is filled into the gas side through a pressure valve to a pressure P_0 . The piston moves to the bottom end, filling the entire volume V_0 of the accumulator. When the system pressure P_1 is higher than the gas precharge pressure P_0 , the liquid enters the accumulator and the piston is moved towards the gas side compressing and reducing the gas volume to V_1 . Should the liquid pressure rise to P_2 , the volume of gas reduces to V_2 with an attendant rise in pressure, thus balancing the Liquid pressure.

A potential energy is now stored in the accumulator to be utilised whenever needed.

Hydraulic Symbol



Certification

The EPE piston accumulators are generally designed & manufactured according to European directive. They can also be supplied as per ASME or others on request.

Materials

In standard version, the tube is made of seamless Carbon Steel, internally honed and externally painted; the end covers are made from Carbon Steel. The floating piston is in Aluminium Alloy & seals in PU/PTFE. This configuration is suitable for oils and non-corrosive liquids.

Options for tube in Stainless Steel, piston in SG Iron and seals in Viton / EPDM are available on request.

Ordering Code - Accumulators

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
APC - **1** - **250** - **50** - **C** - **2** - **PPU** - **P** - **0** - **0** - **0** - **FV** - **0** - **G04F** - **0** / **P0:10** / **-** - **-** - **-**

↑ indicate only if applicable ↗

1	Series	Piston Accumulator - non-repairable	= APC
2	Nominal Capacity (Ltrs)	Piston dia 40mm Piston dia 50mm Piston dia 80mm Piston dia 100mm	= 0.1-0.3 = 0.1-1 = 0.25-3 = 0.75-8
3	Max working pressure	250 Bar	= 250
4	Piston Diameter	Piston dia 40mm Piston dia 50mm Piston dia 80mm Piston dia 100mm Others on request	= 040 = 050 = 080 = 100
5	Tube & End Cover material	Carbon Steel Stainless Steel	= C (standard) = X
6	Piston material	SG Iron Aluminium Alloy Stainless Steel	= 1 = 2 (standard) = X
7	Piston speed & Seal material	Speed 3 m/s Polyurethane (PU) Seals Speed 0.5 m/s PU + PTFE Seals	= PPU (standard) = APT
8	End Cap Seals	Nitrile (NBR) Viton (FKM) Ethylene-Propylene (EPDM)	= P (standard) = V = E
9	Piston Design	EPE Standard Special	= 0 (standard) = S
10	Inner Surface	Standard Others	= 0 (standard) = S
11	Gas Side - design	Standard Others	= 0 (standard) = S
12	Gas Side - connections	Gas Fill Valve - 5/8" UNF Gas Fill Valve - 5/8" UNF in SS Gas Fill Valve - 5/16" UNEF/Vg8 Gas Fill Valve - 1/4" BSP Gas Fill Valve - M16x2.0 Gas Fill Valve - Double Lock Military Valve Gas Fill Valve - M28x1.5 Others (xx - Design No. specified by EPE)	= FV (standard) = FX = F1 = F2 = F3 = F8 = FM = SGxx

* Before ordering, check for availability

Ordering Code - Accumulators

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
APC - 1 - 250 - 50 - C - 2 - PPU - P - 0 - 0 - 0 - FV - 0 - G04F - 0 / PO:10 / - - -

↑ indicate only if applicable ↗

13	Liquid Side - design	Standard Special	= 0 (standard) = S
14	Liquid Side - connections (Refer page 4 for standard connections)	3/8" BSP(F) 1/2" BSP(F) 3/4" BSP(F) 1" BSP(F) SAE 9/16-18 UNF-2B SAE 7/8-14 UNF-2B SAE 1-1/16-12 UN-2B SAE 1-5/16-12 UN-2B Others (yy - Design No. specified by EPE)	= G03F = G04F = G05F = G06F = S6 = S10 = S12 = S16 = Slyy
15	Test certification	Factory Testing CE/PED Design as per ASME - w/o U Stamp	= 0 = 8 = 7W
16	Precharge Pressure	Uncharged Condition Precharge Pressure in bar	= - = XX
17	Piston Position Monitoring Devices	Without	= -
18	Other variants	<u>Standard - Without any variants</u> External Variants Finish Paint - RAL-5003 Internal Variants Flushing to NAS-10 Flushing to NAS-9 Flushing to NAS-8 Flushing to NAS-7 Flushing to NAS-6 Flushing to NAS-5	= -- = E01 = F10 = F09 = F08 = F07 = F06 = F05

* Before ordering, check for availability

Dimensions

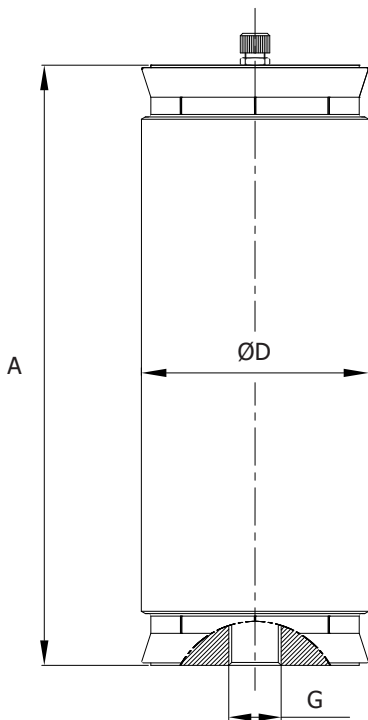


Fig.1

Type	Max. Pressure bar [psi]	External Diameter mm [in] ØD	Piston Diameter mm [in]	Oil Capacity ltrs [cu.in]	Length (mm) A	Fluid Port Connection - G		Weight kgs [lbs]
						BSP	SAE J1926/1	
APC-0.1	250 [3625]	Ø50 [1.97]	Ø40 [1.57]	0.1 [6.10]	200 [7.87]	3/8"	SAE 9/16 -18UNF-2B	2.1 [4.63]
APC-0.2				0.2 [12.20]	280 [11.02]			2.5 [5.51]
APC-0.3				0.3 [18.31]	360 [14.17]			2.9 [6.39]
APC-0.1	250 [3625]	Ø60 [2.36]	Ø50 [1.97]	0.1 [6.10]	190 [7.48]	1/2"	SAE 7/8 -14UNF-2B	2.9 [6.39]
APC-0.25				0.25 [15.26]	265 [10.43]			3.3 [7.28]
APC-0.5				0.5 [30.51]	390 [15.35]			4.2 [9.26]
APC-0.75				0.75 [45.77]	520 [20.47]			5.0 [11.02]
APC-1				1.0 [61.02]	645 [25.39]			5.9 [13.01]
APC-0.25				0.25 [15.26]	210 [8.27]			6.3 [13.89]
APC-0.5	250 [3625]	Ø90 [3.54]	Ø80 [3.15]	0.5 [30.51]	260 [10.24]	3/4"	SAE 1-1/16 -12UN-2B	6.9 [15.21]
APC-0.75				0.75 [54.77]	310 [12.20]			7.4 [16.31]
APC-1				1 [61.02]	360 [14.17]			7.9 [17.42]
APC-1.5				1.5 [91.54]	460 [18.11]			9.0 [19.84]
APC-2				2 [122.05]	560 [22.05]			10.0 [22.05]
APC-3				3 [183.07]	760 [29.92]			12.1 [26.68]
APC-0.75	250 [3625]	Ø120 [4.72]	Ø100 [3.94]	0.75 [45.77]	285 [11.22]	1"	SAE 1-5/16 -12UN-2B	15.2 [33.51]
APC-1				1 [61.02]	315 [12.40]			16.0 [35.27]
APC-1.5				1.5 [91.54]	380 [14.96]			17.8 [39.24]
APC-2				2 [122.05]	445 [17.52]			19.6 [43.21]
APC-3				3 [183.07]	570 [22.44]			23.0 [50.71]
APC-4				4 [244.10]	700 [27.56]			26.5 [58.42]
APC-5				5 [305.12]	825 [32.48]			29.9 [65.92]
APC-6				6 [366.14]	950 [37.40]			33.3 [73.41]
APC-8				8 [488.19]	1205 [47.44]			40.2 [88.93]

* Other sizes on request

Dimensions in mm [inch]

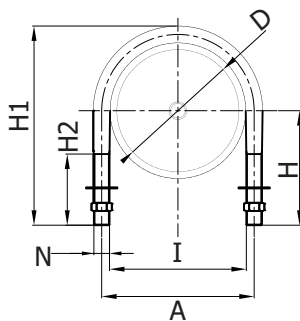


Fig.2

U-Clamp Assembly - Order code & dimensions

Accumulator Ext. Dia.	U-Clamp Assy. Code	A	D	H	H1	H2	I	N
120 [4.72]	11545	136 [5.35]	133 [5.24]	123 [4.84]	217 [8.54]	105 [4.13]	148 [5.83]	M16

* Other sizes on request

Dimensions in mm [inch]

General

EPE Piston Accumulators are designed, manufactured and tested in accordance with the current standards. All accumulators are carefully inspected and tested at the factory and are exactly as designated by the model code printed on the name plate. The name plate is also marked with the maximum working pressure, precharge pressure, serial number and year of manufacture.

Accumulators are normally supplied empty (uncharged). Nitrogen precharged units can be supplied on request. Test certificates if required are supplied with the accumulator, or forwarded by mail.

ATTENTION

- The max working pressure marked on the accumulator must be \geq that the calibrated pressure of the relief valve.
- Do not machine or weld the Accumulator body.
- Precharge gas must be nitrogen unless otherwise agreed between manufacturer & user.
- Do not use liquids incompatible with the material of construction.
- Before undertaking any work on the hydraulic circuit for mounting an accumulator, it is required to release the pressure completely.
- For system and personnel safety, ensure that all the necessary precautions for pressure vessels are taken.

Installation

EPE Piston Accumulator may be installed in any position. However, the vertical position (fluid port down) is preferred.

To achieve a high degree of efficiency, the accumulator should be fitted as close as possible to the installation it serves.

Leave sufficient space to allow use of the precharging equipment. The space necessary for charging & gauging kit is at least 150mm above the gas fill valve.

Leave the name plate clearly visible.

Ensure space for easy removal of Accumulator from the system.

To guarantee trouble free operation, the following points should be observed:

- A non-return valve to be fitted between pump and accumulator to prevent flow reversal.
- A relief valve must be fitted close to the accumulator and set at lower than the max. working pressure marked on the accumulator.
- A shut-off valve and a dump valve are recommended to enable periodic checks or isolating during normal operation. EPE safety blocks **Type B** incorporate all the essential functions.

Mounting Instructions

The accumulator should be properly fitted / clamped (Fig.3) on the system to ensure that the mechanical movements and vibrations are safely absorbed and that liquid and gas connections do not become additionally loaded or stressed due to over tightening.

There must be no additional forces or moments acting on the Accumulator other than those due to the fluid power system.

CONNECTION adopters and flanges are available on request. When fitting screws, reducers or the safety block, care must be taken that the accumulator is held firmly.

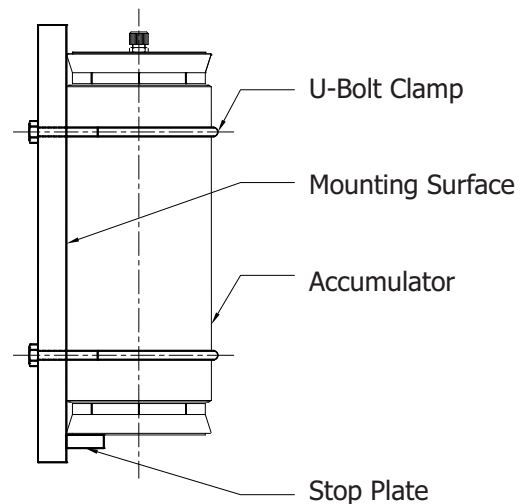


Fig.3

Position

It is suggested that the accumulators are installed vertically with gas side on top. The manufacturers name plate stating the initial pressure must be visible.

The mounting must be such that, should a rupture occur on the pipe system at the liquid connection, or should the gas fill valve break, the accumulator cannot be pulled from its mounting by the forces involved.

Preliminary Checking

On receipt of the Accumulator, check to ascertain that

- The Accumulator is not damaged in transit.
- The identification code is as per the order.
- The Accumulator is precharged to the required pressure. In general piston accumulators are precharged to 5 bar lower than the minimum working pressure. Gas precharge pressure is of crucial importance to the correct functioning of the accumulator. The gas pressure, when the accumulator is supplied pre-charged is related to the temperature of 20°C.

In case of accumulators supplied without pre-loading pressure, or after repair work, it is necessary to precharge the accumulator with nitrogen using equipment type-PC following procedure Checking & Charging.

Initial Operation

Before the system is pressurised, check that The precharge pressure in the accumulator is as required. The setting of the safety valve or relief valve is lower than the maximum working pressure of the Accumulator, and air is vented from the piping.

Periodic Checking

After the installation of a new unit, or following recharging, the accumulator should be checked to ensure that the gas pressure has not reduced. Before checking, the Accumulator must be isolated from the system and the fluid drained. An initial check is required during the first week of installation so that any gas losses can be immediately observed and remedied.

If no gas losses are observed during the first check, a second check should be carried out approximately 3 months later and subsequent checks after every 3 to 6 months.

It is however recommend that heavy duty applications be checked every month.

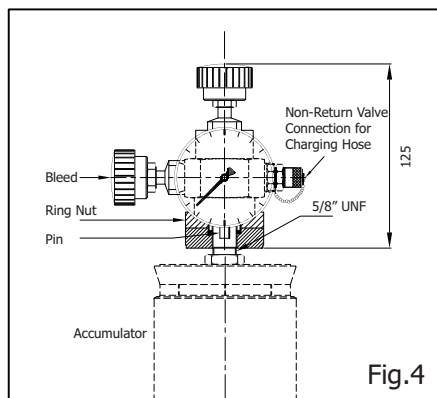


Fig.4

Checking & Charging

Pre-Loading & Checking Set type-PC (refer Fig.5) is to be used for checking / charging of these accumulators. When charging, the nitrogen bottles must be capable of delivering pressure higher than the desired accumulator gas pressure.

Use dry industrial nitrogen. NEVER USE OXYGEN OR AIR.

Proceed as follows:

- Fit the suitable pre-charging equipment to the gas fill valve;
- Connect it to the nitrogen cylinder with the charging hose;
- Slowly introduce nitrogen into the accumulator until reaching a pressure slightly above the required level;
- Close the valve of nitrogen cylinder and disconnect the charging hose from the equipment;
- Wait for the gas temperature stabilization;
- Set the pressure by venting off the excess of gas.

It is important that the gas pressure be kept constant and should therefore be checked periodically by means of the filling and checking equipment PC/...

The same equipment is used for charging the accumulator after repair work or change of use.

Connection is made by the special hose to the dry nitrogen bottle.

ONLY NITROGEN MUST BE USED. AIR OR OXYGEN COULD CAUSE AN EXPLOSION.

Pressure Checks

This is simple operation, the correct procedure is as follows:

- Isolate the accumulator from the system and reduce the liquid pressure to zero.
- Remove the protection cap from the gas fill valve.
- Prior to the mounting PC/ - equipment ensure that the valve A is unscrewed, that bleed valve B is closed and that non-return valve C is screwed tight. (refer Fig.5)
- Attach the unit to the gas-fill valve by means of the knurled nut D.
- Screw valve A to a point where pressure is registered.

If the pressure is OK remove the PC/unit as follows:

- Unscrew the valve A.
- Open the bleed valve B and unscrew the nut D.

Pressure Reduction

If the pressure has to be reduced this is done by opening the bleed valve B slowly until the correct pressure is registered on the gauge.

Increase or reset precharge pressure

If it is necessary to fill, or to increase the gas pressure, proceed as follows:

- Fit the PC/ unit as described above.
- Fit the connection to nitrogen cylinder. (refer Fig.5 & Fig.6)
- Connect the hose between the cylinder and the non-return valve C.
- Slowly open the valve on the cylinder till the gauge registers a pressure slightly higher than the one desired, then shut.
- Unscrew A and reduce the pressure PC/ unit to zero by means of the bleed valve B.
- Disconnect the hose from the non-return valve C and replace cap.
- Close the bleed valve B and wait approximately 5 mins. for the temperature to adjust.
- Screw valve A until the pressure can be read. This should be slightly higher than the desired pressure.
- Adjust by means of bleed valve, remove the filling unit.
- Use soapy water test for leaks.
- Replace the valve cover and protection cap.

The accumulator is ready for use.

Standard equipment PC-280/70 is supplied with two pressure gauges: the high pressure gauge (0-280 bar) is used for pre-loading values higher than 50 bar and low pressure gauge (0-70 bar) for values lower than 50 bar.

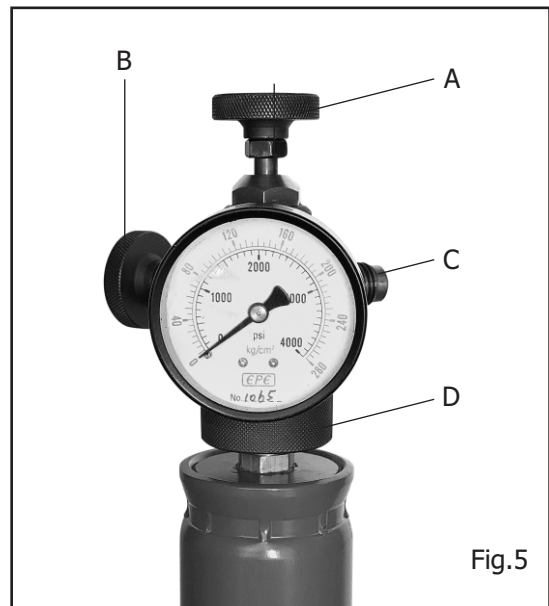


Fig.5

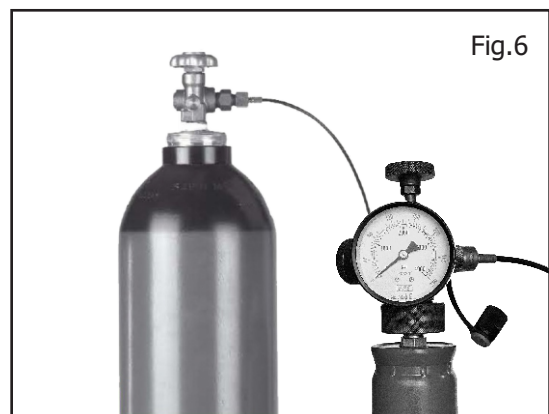


Fig.6

A PRESSURE REDUCING VALVE MUST BE INSTALLED BETWEEN THE NITROGEN GAS CYLINDER AND THE ACCUMULATOR WHEN THE GAS CYLINDER PRESSURE IS HIGHER THAN MAX PERMISSIBLE PRESSURE OF ACCUMULATOR.

Maintenance / Repair

The APC Series Piston Accumulators are non-repairable in design. Hence no repair work is to be carried out to the body / components.

Only the Accumulator Gas Fill Valve may be replaced if found leaking. Before removing Accumulator for servicing, the fluid pressure must be reduced to zero by exhausting the fluid through the system and back to the reservoir.

When this is not possible the Accumulator shut-off valve must be closed and the dump valve opened to exhaust the Accumulator directly to the reservoir.

Replacing the Gas Fill Valve

- Isolate the Accumulator & completely depressurise.
- Remove the defective Gas Fill Valve.
- Check the Accumulator threading on the gas side for any damage.
- Clean the mounting threading of any contamination.
- Reassemble the Gas Fill Valve.

Precharge

Carry out precharging using EPE pre-loading and checking equipment, Type-PC. Only dry industrial nitrogen should be used.

Follow procedure as explained in "Checking & Charging" on page-6.

WARNING : Before any work is undertaken the gas pressure must be fully relieved.

Special Instructions

Certification

All hydraulic accumulators are pressure vessels and are subject to the national regulations and directives, valid at the place of installation.

Piston accumulators type APC are generally designed and manufactured according to European Directive.

As per the provisions of the European Directive all accumulators with $V \leq 1$ ltr and $PS \leq 1000$ bar ($PS = \text{max. working pressure in bar}$) are not allowed to be CE marked [Articles 3; 1.1 and 1.4 (3)].

Accumulators of capacity greater than 1 ltr are eligible to be supplied with CE marking. When specified every shipping batch is provided with a conformity declaration and use and maintenance instructions.

Safety

All pressure vessels must be protected by means of a pressure relief valve in accordance with European Directive. Safety Blocks are used for this purpose.

The most important elements of the safety-related equipment are the pressure measuring device (pressure gauge), device for the preventing excess pressure (safety valves), non-return valves and shut-off valves and devices for de-pressurising (bleed valves). These functions can be performed with individual components or integrated in the form of a safety block .

Special Instructions

It is strictly forbidden to:

- weld or solder or carry out any mechanical operations on the accumulator.
- engrave or permanently stamp the surfaces of the accumulator shell and / or carry out other operations that could affect or change the mechanical properties of the accumulator
- use the accumulator as a structural element: it should not be subjected to stresses or loads.
- change the data of the nameplate and / or accumulator without the permission of the manufacturer.
- use a different fluid than those designed for.

Installation

Before installation, you must perform a visual check to verify that the accumulator has not suffered any damage during shipping / handling. Verify that the requested type matches with what stamped on the nameplate.

We recommend using the accumulator with a suitable safety valve or a security safety block. This device provides user and equipment protection against possible damage caused by pressure surges, and also makes the maintenance of the accumulator easier, so facilitating the interception and the discharge.

Provide for a clearance of 200 mm above the gas pre-charge valve to allow access to and control of the pre-charge equipment.

These accumulators may be installed in any position from horizontal to vertical (preferably with the pre-charge valve at the top), and the identification details must be visible.

Proceed to the assembly so that no abnormal force affects the pipes connected directly or indirectly to the accumulator, so we recommend the use of supporting components and also fastening to avoid the transmission of vibrations.

Make sure the fluid is compatible with the piston seals and end cap seals.

Check that the max. allowed accumulator pressure is equal to or greater than that of the hydraulic circuit and that the temperature during operation is maintained within the range expected.

Make sure the fluid does not contain contaminants and/or abrasive.

Disposal

Before the accumulator is sent for disposal or recycling, it should always be discharged completely of the pre-charge pressure and the gas valve unscrewed. Pre-loading and checking kits are suited for this task.

Environmental Protection

Careless disposal of the accumulator and the residual fluid contained therein can cause environmental pollution.

Dispose the Accumulator in accordance with provisions applicable in the country of use.

Fluid residues are to be disposed according to the respective safety data sheets valid for the specific hydraulic fluids.