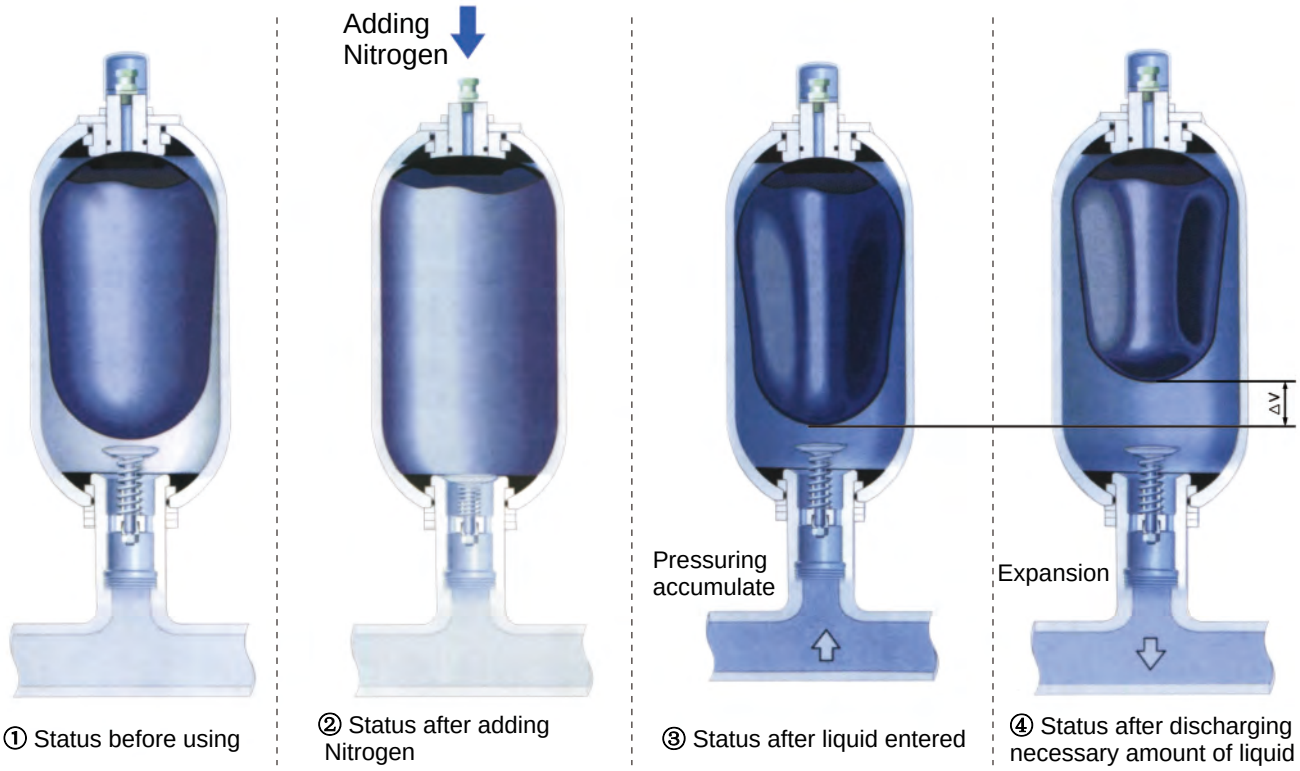
NXQ Series

Operating Principle



Inner space of accumulator is divided into two parts by bladder: the nitrogen is flled in bladder and hydraulicoil i filled the bladder.When hydraulic oil is compressed into accumulator by hydraulic pump, the bladder is deformed by the pressure, the volume of gasis compacted with the increasing of pressure, the hydraulic oil is stored gradually. the accumulator discharge the hydraulic oil andcompensate the system energy,as required.

Typical applications of the accumulator

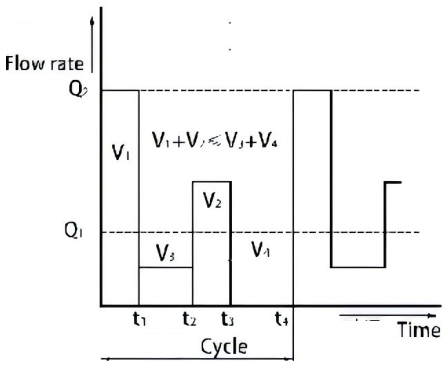


Fig.2

In the case of hydraulic circuits where a large flow rate is required for a short period,alternating with a low or no flow condition,the use of an accumulator allows smallerpumps and motors to be used,thus reducing both installation and operating costs.The operation cycle shown in fig.2 would require a pump having a capacity Q2.If anaccumulator is used,it is possible to store oil during the time periods(t2-t1)and (t4-t3)when requirement is very low or zero,and to re-utilize.Duringt?and(t3-t2),when therequired flow rate is higher than the pump capacity Q1.This pump must be selected tohave the volumesV1+V2≤V3+V4.

Both piston and diaphragm pumps create pulsation or pressure peaks during operation, this beingundesirable and detrimental to boththe smooth operation and operational life of components. The fitting of an accumulator adjacent to down stream of the pump willdampen the pulsation to an acceptable level(fig.3).Typical applications are dosing pumps,pumps with a small number of pistons etc.

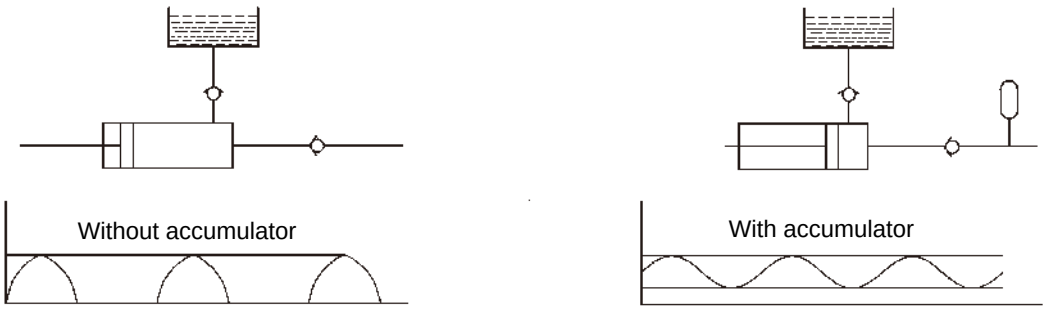


Fig.3

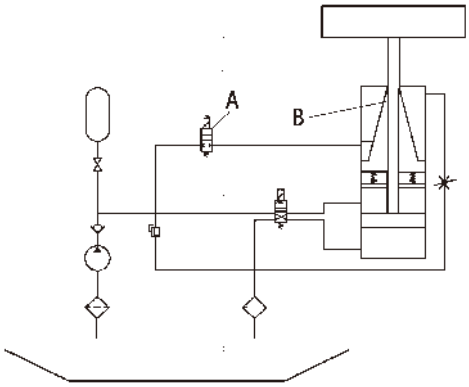


Fig.4

In the case ofa sudden power loss,e.g.pipe orjoint failure, pump break-downetc.the accumulator can supply with pressure to complete an operational cycleor to allow actuators,valves etc. to reset to a "safe"position,and so preventdamage to equipment or product.The availability of such an emergency powersource is essential in cases where a hydraulic power supply is required forclosing a safety door,electrical switch,safety valve,emergency brakes etc.

Another typical application is the emergency supply of fuel oil to power plantburners Fig.4 illustrates that a failure at "B"causing a loss of energy can beffset by manually overriding the electro valve "A"thus utilizing the potentialenergy of the accumulator.

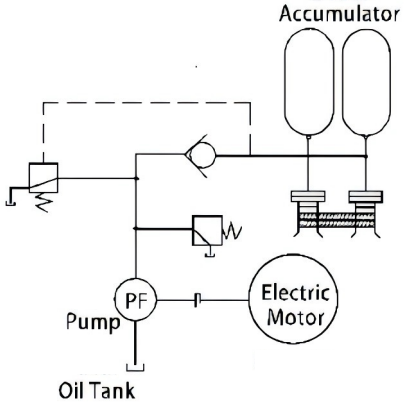


Fig.5

The installation of an accumulator compensates for the changein volume caused by temperature differences,thuslimiting overpressurization inside a closed system.This increases the life of thevalves,washer,gauge etc.Common applications are found in refineriesand pipelines(Fig.5).

As a constant static pressure is required for a long period,anaccumulator is indispensable as it will compensate for pressureloss due to leakage through joints,seals etc.as well as balancingpressure peaks which may occur during the operating cycle.

Typical applications are found in closing system(Fig .6),loadingplatforms,curing presses,machine tools, lubricating systems,etc.

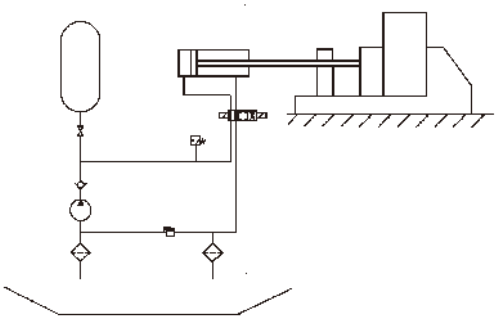


Fig.6

Rapid closing of the valve can generate pressure waves which travel through the pipe lines causing water hammer.The use of asuitable accumulator can bring the pressure surge back to an acceptable value. Typical applications are water pipe (Fig.7),fuel and oildistribution circuits, washing equipment etc.

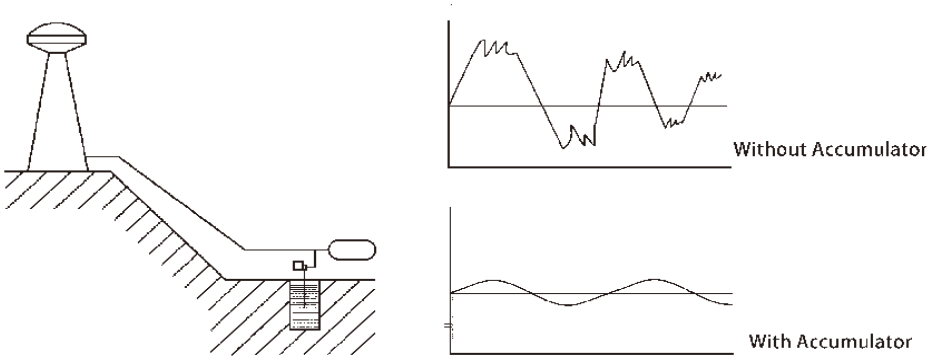


Fig.7

Mechanical shocks in hydraulically driven equipment canbe absorbed by accumulators. Possible applications are indrive and suspension systems for fork-lifts,mobile cranes,agricultural and civil angineering machinery,rock crusher etc(Fig.8).

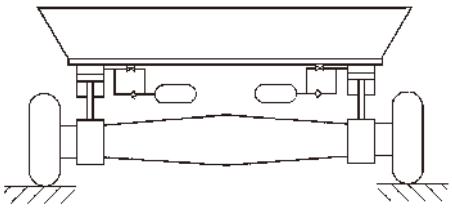


Fig.8

In a system where fluid pressure developed on one side of the circuitmust be transferred,to another fluid without any possibility of the twofluids intermixing, the bladder accumulator provides the satisfactorysolution(Fig.9).

The accumulator bladder acts as a flexible barrier between the fluidsand the gas,providing instantaneous response without reducing thesystem pressure.

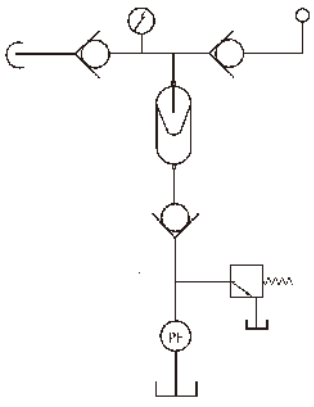


Fig.9

The balancing of a force of weight can be achieved by using hydraulicpistons driven by an accumulator,thus avoiding the use of counterweights with attendant dimensional and weight savings.Typicalapplications are in machine tools,hoists etc(fig.10)

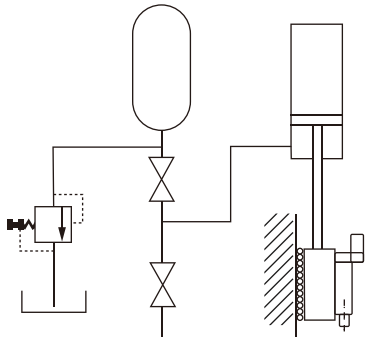


Fig.10

Accumulator selection

It's necessary to clear the following parameters during the selection of an accumulator.

1、Operating pressure

The minimum and maximum operating pressure(P_1,P_2),and the maximum allowable operating pressure must be lower orequal to the maximum nominal operating pressure of the accumulator which is selected.

2、Operating volume

Volume(△V)of liquid to be stored or utilized is required in addition to the maximum and minimum operating pressure forcorrect sizing of the accumulator.

3、Operating mediums

In general,the operating mediums are nitrogen and hydraulic oil or emulsion,for any special medium,please consults us.

4、Operating temperature

The operating temperature determines the material of the bladder,also have influence on the preloading pressure,andconsequently on the accumulator volume.

5、Maximum flow rate

For the same(△V)volume,the specification and responseof the accumulator can be inluenced on the immediate flow rate.

6、Location

It is important to know the using location of the accumulator in order that the design can meet local design and testparameter.

6、Volume calculation

Application	Formula	Note
Auxiliary power source	$\frac{V_x}{\left(\frac{P_0}{P_1}\right)^{1/n}-\left(\frac{P_0}{P_2}\right)^{1/n}}$	V0-(L) Volume required P0- Precharging pressure Pa, ：0.9P1 > P0 > 0.25P2 Vx-(L) Efficient volume P1-(MPa) Min.operating pressure P2-(MPa) Max.operating pressure
Pulsation damper	$\frac{Kq}{\left(\frac{P_0}{P_1}\right)^{1/n}-\left(\frac{P_0}{P_2}\right)^{1/n}}$ $q=AL=Q/N=\frac{流量\ (L/min)}{\text{Number of trips / Minutes}}$	A- (m^2) Efficient square L- (m) Plunger stroke K- Coefficient relation with pump Type of pump? ??Coefficient Single cylinder,single action? ?0.60 Single cylinder,dual action? ?0.25 Dual cylinder,single acting? ?0.25 Dualcylinder,dual action? ?0.15 Triplex cylinder,single action? ?0.13 Triplex cylinder,dual action? ?0.05 -Pre-charge pressure,charge the accumulator at a average pressure60%operating pressure or 80%min. operating pressure.
Absorb emergency energy	$\Delta P_{max}=\frac{2\rho L v}{t\times 10^5}$ $V_0=\frac{\frac{Q}{7.2}\left(\frac{2\rho L v}{\Delta p\times 10^5}-t\right)}{\left(\frac{p_0}{p_1}\right)^{0.7143}-\left(\frac{p_0}{p_2}\right)^{0.7143}}$	Q: Flow rate in the pipe (m^3/h) : Specific gravity of liquid(Kg/m^3) L: Total length of piping(m); V: Flow velocity:v=Q/S×(10^3/3.6)(m/s) S: Internal pipe section (mm^2); △P: Allowable over pressure(bar) P1: Operating pressure by free flow(bar): P2: Max.allowable pressure P2=P1+△P(bar) t: Deceleration time(valve shut down,etc.)(s)

Pre-charging pressure shall be determined according to application location.

In case the accumulator keep working over 3 minutes,it should be calculated as isothermical condition,or calculated as adiabaticcondition.n-coefficient n=1, isothermal condition;n=1.4,adiabatic condition.

Ifyou have any trouble in selection,please contact our techinical department.

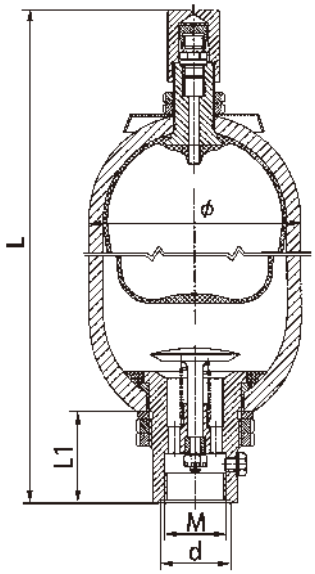
Product selection

NXQ - ※ - ※ - ※ - ※ - ※ - ※

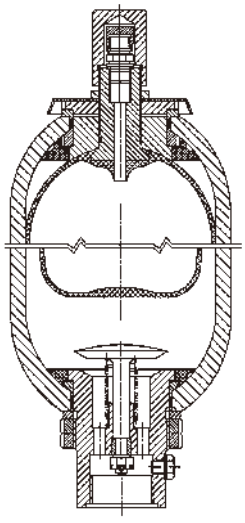
Product Type	Type of Construction	Nominal Volume	Nominal Pressure	Hydraulic Port	Medium
Hydraulic Bladder Accumulators	A: Small opening AB: Big opening	(L) 0.4~250L	(MPa) 10、20、31.5MPa	L:Threaded F:Flanged	Y:Hydraulic oil R:Emulsion

Internal structure and external dimensions

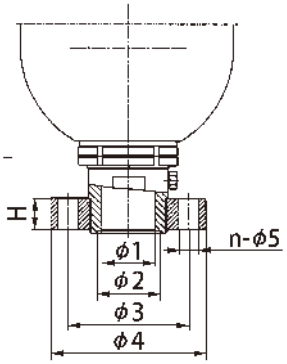
NXQ-A type threaded hydraulic portconstruction diagram of accumulator
NXQ-A-※/※-L-※



NXQ-AB type threaded hydraulic portconstruction diagram of accumulator
NXQ-AB-※/※-L-※



NXQ-A(AB)type flanged hydraulic portconstruction diagram of accumulator
NXQ-A(AB)-※/※-F-※



Model Code and Size(GB)

Model Code	Nominal Pressure (MPa)	Nominal Volume (L)	Size(mm)												Hydraulic Port		Weight (kg)
			M	d	Φ1	Φ2	Φ3	Φ4	n-Φ5	L1	L2	L3	H	Φ	Thread (L)	Flange (F)	
															L		
NXQ-A-0.4/*-L-	10	0.4	M27×2	/	22	30	85	115	4-Φ17	52	18		22	89	260		3
NXQ-A-0.63/ -L-		0.63													315		3.5
NXQ-A-1/*-L-*		1													430		4.5
NXQ-A-1/ -L(F)-		1										62		114	330	340	5
NXQ-A-2/*-L(F)-*		2													445	455	7.4
NXQ-A-1.6/ -L(F)-		1.6	M42×2	50	42	50	97	130	6-Φ17	66	23	84	28	152	365	387	11
NXQ-A-2.5/*-L(F)-*		2.5													430	452	14
NXQ-A-4/ -L(F)-		4													540	562	16
NXQ-A-6.3/*-L(F)-		6.3													710	732	22
NXQ- -10/ -L(F)-	20	10	M60×2	70	55	65	125	160	6-Φ21	90	34	106	32	219	650	665	39
NXQ-*-16/*-L(F)-		16													860	875	54
NXQ- -20/ -L(F)-		20													985	1000	62
NXQ-*-25/*-L(F)-		25													1160	1175	74
NXQ- -32/ -L(F)-		32													1400	1415	90
NXQ-*-40/*-L(F)-		40													1680	1695	108
NXQ- -50/ -L(F)-		50													2010	2025	128
NXQ-*-20/*-L(F)-*	31.5	20	M72×2	80	70	80	150	200	6-Φ26	106	40	121	40	299	660	675	80
NXQ- -25/ -L(F)-		25													750	765	90
NXQ-*-32/*-L(F)-		32													890	905	104
NXQ- -40/ -L(F)-		40													1030	1045	118
NXQ-*-50/*-L(F)-*		50													1210	1225	138
NXQ- -63/ -L(F)-		63													1450	1465	171
NXQ-*-80/*-L(F)-*		80													1790	1805	213
NXQ- -100/ -L(F)-		100													2170	2185	253
NXQ-*-150/*-L(F)-*		150													3105	3120	335
NXQ- -63/ -L(F)-		63	M85×2	95	83	95	170	230	6-Φ26	110	40	125	40	351	1150	1165	170
NXQ-*-80/*-L(F)-*		80													1375	1390	206
NXQ- -100/ -L(F)-		100													1640	1655	250
NXQ-*-125/*-L(F)-		125													1970	1985	304
NXQ- -150/ -L(F)-		150													2290	2305	356
NXQ-*-160/*-L(F)-		160													2430	2445	379
NXQ- -180/ -L(F)-		180													2680	2695	420
NXQ-*-200/*-L(F)-*		200													2960	2975	466
NXQ- -100/ -L(F)-		100	M100×3	115	90	115	220	255	8-Φ26	115	55	140	50	426	1340	1355	443
NXQ-*-125/*-L(F)-*		125													1580	1595	485
NXQ- -160/ -L(F)-		160													1940	1955	553
NXQ-*-200/*-L(F)-*		200													2335	2350	666
NXQ- -250/ -L(F)-		250													2935	2950	784
NXQ-*-180/*-L(F)-*	10	180	M125×3	140	125	140	290	355	12-Φ33	135	55	145	54	480	1680	1700	526
NXQ- -230/ -L(F)-		230													2042	2062	632
NXQ-*-280/*-L(F)-*	25	280													2404	2424	759
NXQ- -330/ -L(F)-		330													2766	2786	885
NXQ-*-200/*-L(F)-*	10	200	M150×3	165	150	165	360	430	12-Φ36	155	55	160	58	559	1427	1447	460
NXQ- -300/ -L(F)-		300													1830	1850	583
NXQ-*-375/*-L(F)-*		375													2192	2212	687
NXQ- -450/ -L(F)-		450													2557	2277	798
NXQ-*-350/*-L(F)-*		300	M175×3	190	168	190	430	505	12-Φ39	175	55	165	62	630	1645	1665	552
NXQ- -400/ -L(F)-		400													2024	2044	693
NXQ-*-500/*-L(F)-		500													2403	2423	835
NXQ- -600/ -L(F)-		600													2782	2802	984

Note: For dimensions L greater than φ299 in the table, they are all of the AB type. The data in the table is for reference only; the actual values should be based on the drawings.

Ordering Note

1. The model code must be indicated completely when ordering. For example, accumulator NXQ-A40/31.5-LY(φ219) means: working pressure:31.5MPa,nominal volume:40L, construction type: smallopening, bottom repai,the medium: hydraulicoil, hydraulic port:threaded, outside diameter:φ219mm.

2.when the user choose the big diameter series accumulator of the same capacity,please indicate the diameter on the back of the modelcode. For example,there are two kind of outside diameter for 40L accumulator, one is φ219 and the other is φ299,if the user need φ299diameter accumulator. operating pressure:31.5MPa,type of construction: big opening/ top repair, the medium:hydraulicoil, hydraulic port:threaded. This kind of the accumulator should be expressed as following: NXQ-AB-40/31.5-L-Y(φ299).If the user choose a small diameter series, the diameter is not required to note.

3.Ifyou have special requirements on the accumulator,please negotiate with the technical department of our company.

Model Code	NXQ-A(AB)-※/10	NXQ-A(AB)-※/20	NXQ-A(AB)-※/31.5
Nominal Pressure MPa	10	20	31.5
Testing Pressure MPa	12.5	25	39.5
Allowance charging pressure	Less than 90%the min.operating pressure of the hydraulic system		
	More than 25%the max.operatng pressure of the hydraulic system		
Max.discharging flow	Threaded hydraulic port	0.4~1L	1L/S
		1.6~6.3L	3.2L/S
		10~40L	6L/S
		40~100L	10L/S
		150L	15L/S
	Flanged hydraulic port	1.6~6.3L	6L/S
		10~40L	10L/S
		40~100L	15L/S
		150~200L	25L/S
Fixation way	Fixing direct to the pipeline if the volume of the accumulator is within 1 liter, and fixing to the pipeline by clampand bracket when the accumulator volume is more than 1 liter.		
Installation way	Vertical installation		
Design temperature	40~+70℃(low temp.)、-20+70℃(normal temp.)、-20~+93℃(high temp.)		

Material and ISO code	Temperature range	Medium
NBR	-20~+80	Water, mineral oil, vegetable oil, HFA, HFB, HFC, diesel, kerosene, fuel oil, etc.
HNBR	-40~120	Same as above, excellent performance at wide temperatures.
IIR	-30~+90	Phosphate ester (HFDR), ammonia water, caustic soda, hot water, Freon (22-31-502), etc.
EPDM	-20~+100	Ethylene glycol brake fluid, detergent, hot water, aqua ammonia, acids & alkalis, HFCs
FKM	-10~+150	HFD, heavy oil, chlorinated hydrocarbons, benzene, high aromatic gasoline, etc.
CR	-20~+85	Freon (12-21-22-113-114-115), ammonia water, mineral oil, paraffin and silicone oil, etc.
ECO	-30~+100	Unleaded gasoline, mineral oil

Note:
(1) Welding, riveting and mechanical machining is not applied to fixthe accumulator.
(2) Never use oxygen or air. Use nitrogen and inert gas only.
(3) When the accumulator is used as saving the energy, the inflating pressure should be lower than 90% of the min. operating pressure of thehydraulic system(generally 60%-80%).
(4)Check the hydraulic port for leakage when installing the accumulator.
(5) Check the pressure as required timely after the accumulator is settled down.

Installation

1.Accumulator shall be installed vertically with the gas valve upright.Inspection space shall be retained near gas valve.
2.Accumulator shall be fixed tightly on the frame orwall.
3.When used for buffering and pulsation damper, accumulator shall be placed near the fluctuation source.
4.Check valve shallbe placed between accumulator and hydraulic pump to prevent return flow of il for the acumulator when the electric machine ofpump stops working.
5.Stop valve shall be placed between acumulator and pipe system to be used in gas charging,draining speed adjusting or long term stopping.
6.Welding shall not be applied in fixing the accumulator.

Charging the Nitrogen

1.Accumulator shall be inspected before charging.
2.Nitrogen shall be charging slowly to ensure the bladder be not broken by quickly charging.
3.0xygen,compressed air or other flammable gas are forbidden to be used.
4. Inflating tool (nitrogen charger) shall be used in charging the Nitrogen. Inflating tool is an inseparable part of the accumulator to beused in charging, draining, measuring and adjusting the pressure.
5.Determing of charging pressure
(1) Buffering impact: Charging pressure shall be the normal pressure of installation site or a little above.
(2)Absorbing fluctuation:Charging pressure shall be 60%Or 80% minimum working pressure of average pressure of fluctuation.
(3) Storage of energy: Charging pressure shall be lower than 90% of min.operating pressure(generally 60%-80%)and higher than25% of max. operating pressure.
(4) Compensation for hot swelling: Charging pressure shall be the minimum pressure of close circuit of hydraulic system or alittlelower.

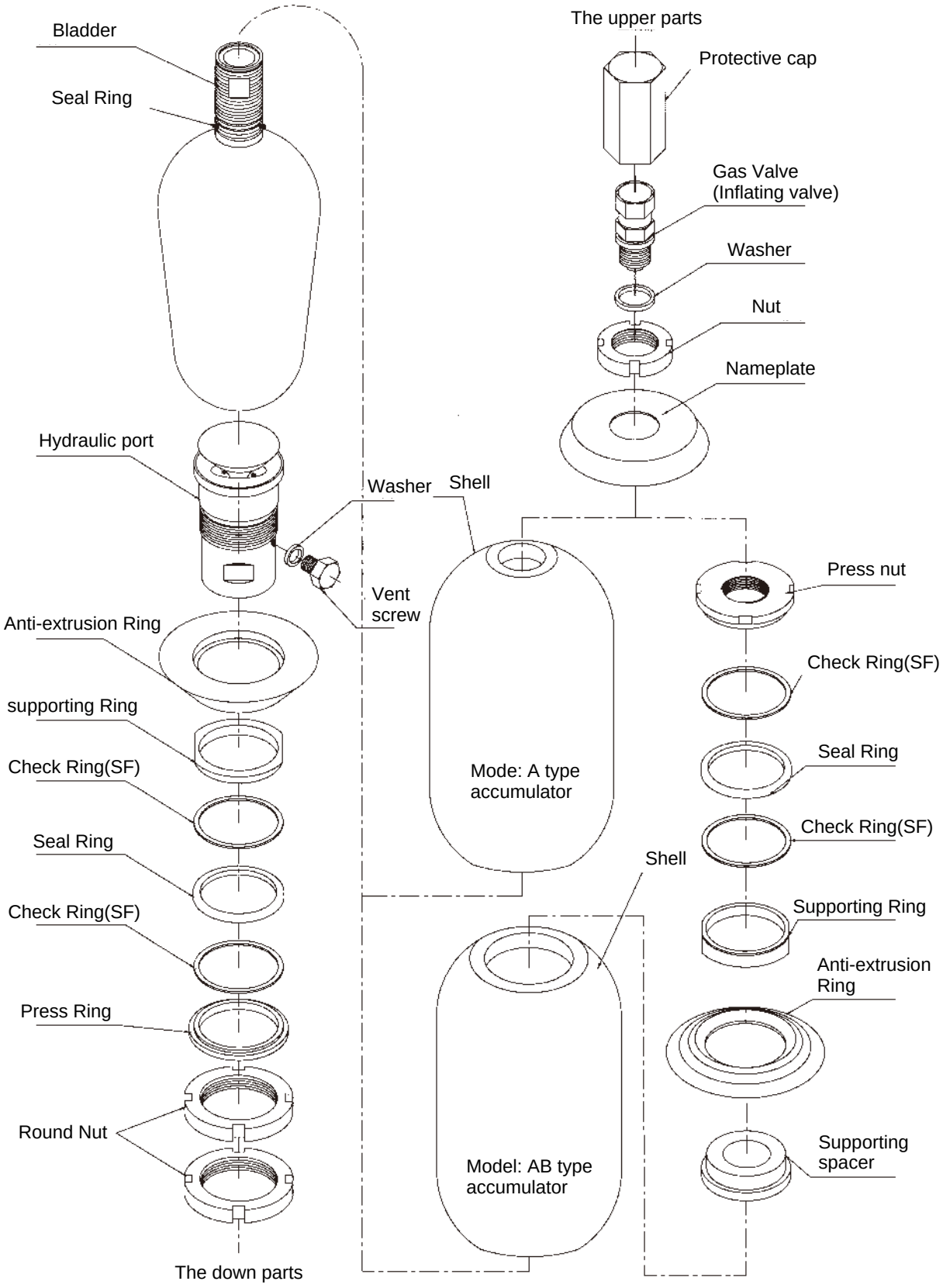
Inspection and Repairation

1. Inspection of leakage
After installation, check the gas pressure in bladder every week. A month later, check every month,half a year later, check every halfyear.
Inspection Method : Place a check-valve in the oil pipe connects the accumulator oi-inlet and oil box,and installs a pressure gage before the checkvalve. Open thecheck-valve slowly to let compressed oil return to oil tank and watch the pressure gage simultaneously. The pointer of gage at firt turn downslowly, turns down rapidly to zero at a certain point. The changed valve of moving speed of pointer is the gas charging pressure besides,gascharging device could be used to inspect pressure,but gas will be discharged a bit during each inspection.
2. When accumulator is not used for a long period, the check-valve shall be closed to ensure that the oil pressure is higher than chargingpressure.
3. If the accumulator does not takeffect, check whether there is leakage. If there is no nitrogen in the bladder and oil is out of gas valve,please check the bladder.
4. Drain the oil before demounting the accumulator. First let out the nitrogen with the charging device, then the parts can be demounted.5.If there is leakage because of loosening of nuts in the process of transportation and testing,please check that seal ring is in the slot.Place the seal ring in the right place and revolve the nut. if leakage still exists please replace the parts.

Appendix

1.Before debugging,air in the pipe shall be expelled.
2.Place a safety-valve in the hydraulic port when the volume of theaccumulator is larger than 10L.
3.Check the pre-charging pressure before using the accumulator.
4.Never use oxygen and flammable gas,risk of explosion.

Bladder accumulator assembly schematic



Bladder accumulator assembly schematic