囊式蓄能器使用说明书

Bladder Accumulator Instruction Manual

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1 简介

1.1 工作原理

囊式蓄能器是用于液压系统的一个能量转换和蓄集的装置。液体实际上是不可压缩的，因此利用气体（氮气）的可压缩性来储存液体。

囊式蓄能器由油液部分和皮囊隔离的气体部分构成。皮囊内预先充有氮气，皮囊周围的油液与液压回路相通。当压力升高时油液进入蓄能器，气体被压缩；当压力下降时，被压缩的气体膨胀，且将蓄积的压力油压入液压回路。

1.2 结构特点

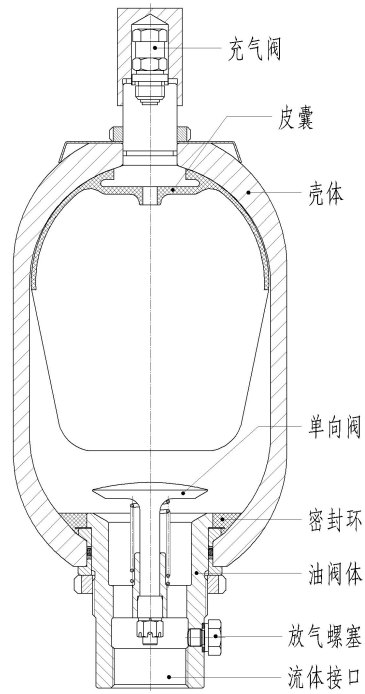
• 囊式蓄能器构成：囊式蓄能器有一个钢制壳体，一个皮囊，一个充气阀和以个带有单向阀的流体接口组成。

• 蓄能器壳体是一个锻造的或是焊接的而制造的钢制压力容器，其设计与制造都符合相关的国内外标准。

• 皮囊是气阀杆和皮囊压注成一体的，它可以根据客户使用的工作介质和工作温度的要求，使用相应的橡胶配方，制造满足要求的产品。

• 防挤压的单向阀可防止皮囊挤入流体接口，同时让液体自由流动。在高压系列中使用的是蘑菇式的单向阀，而在低压系列中则使用一个有孔的圆盘。就后者而言，预充压力不应超过 15 bar。

• 对于特定的刺激性和腐蚀性介质，可将与介质接触的金属零件进行镀镍或全部采用不锈钢材料。



1.3 应用范围

• 辅助能源
• 紧急动力源
• 吸收脉动
• 吸收冲击
• 容积补偿
• 压力补偿
• 平衡配重
• 液压弹簧

1.4 皮囊材质

皮囊所用的弹性体的选择取决于将要使用的工作介质和温度。

- 丁腈橡胶 NBR（N）
- 低温丁腈橡胶 L-NBR（D）
- 氯醚橡胶 ECO（O）
- 乙丙橡胶 EPDM（Y）
- 氯丁橡胶 （C）
- 丁基橡胶 （I）
- 氟橡胶 FKM（V）

1.5 型号说明

- 国标囊式蓄能器

NXQ－AB－40 / 20－L－Y

① ② ③ ④ ⑤ ⑥

① 名称代号：囊式蓄能器
② 结构型式：A 型 ； AB 型
③ 公称容积： L
④ 设计压力： MPa
⑤ 连接形式：
螺纹连接 L ； 法兰连接 F
⑥ 工作介质：
液压油 Y ； 乳化液 R ； 水 H

- 美标囊式蓄能器

AC－TR－11 / 30－G－Y

① ② ③ ④ ⑤ ⑥

① 名称代号：美标囊式蓄能器
② 结构型式：S 型 ； SB 型 ； TR 型
③ 公称容积：Gal
④ 公称压力：×100 Psi
⑤ 连接形式：
螺纹连接：
G－英制管螺纹
M－公制螺纹
N－NPT 螺纹
S－SAE 螺纹
法兰连接 F
⑥ 工作介质：
液压油 Y ； 乳化液 R ； 水 H

- 欧标囊式蓄能器

BA－S－50 / 330－G－Y

① ② ③ ④ ⑤ ⑥

① 名称代号：欧标囊式蓄能器
② 结构型式：S 型 ； SB 型 ； TR 型
③ 公称容积： L
④ 公称压力： bar
⑤ 连接形式：
螺纹连接：
G－英制管螺纹
M－公制螺纹
N－NPT 螺纹
S－SAE 螺纹
法兰连接 F
⑥ 工作介质：
液压油 Y ； 乳化液 R ； 水 H

1.6 注意事项

- 过滤精度：对于液压动力零部件，特别是蓄能器，为了延长使用寿命，需要压力流作内不含金属颗粒，水或其它污染物。为使流体保持较高的清洁度，液压系统的最低等级应相当于 ISO 4406 标准的等级 19 / 15，过滤精度≤20μ。
- 预充气：仅允许为蓄能器充入纯度大于 99.8%的氮气，不允许充入氧气或压缩空气（因为会有爆炸的危险）。

2 蓄能器的计算

2.1 计算用参数定义

P_0＝预充气压力（bar）

P_1＝最小工作压力（bar）

P_2＝最大工作压力（bar）

V_0＝有效气体体积（L）

V_1＝压力 P_1 时的气体体积（L）

V_2＝压力 P_2 时的气体体积（L）

△V＝所排放或所储存的液体容积（L）

T_0＝预充气体温度（℃）

T_1＝最低工作温度（℃）

T_2＝最高工作温度（℃）

2.2 预充气压力的选择

正确选择预充气压力是获得蓄能器及其部件的最佳效率和最大使用寿命的基础。当预充气压力 P_0 尽可能接近最小上作压力时，在理论上，能够获得液体的最大储量(或释放量)。

在实际应用中应给出安全系数。为了避免在运行中菌型阀关闭，此值（除非另有规定）为：$P_0＝0.9\ P_1$

P_0 的极限值为：　$P_0\ \min \geqslant 0.25\ P_2$

$P_0\ \max \leqslant 0.9\ P_1$

特殊值用于：

脉动缓冲和减振

$P_0＝0.6～0.75\ P_m$ 或 $P_0＝0.8\ P_1$

式中：P_m＝平均工作压力

液路缓冲

$P_0＝0.6～0.9\ P_m$

式中：P_m＝平均工作压力。

通常，考虑到温度对预充气的影响，最大工作温度时的预充气压力和正常温度状态下的预充气压力的计算方法：

$$P_{0(T_0)} = P_{0(T_2)} \times \frac{T_0 + 273}{T_2 + 273}$$

注：由公司提供的 BUCCMA 蓄能器，其预充气压力的条件系指温度 20℃。

2.3 注意事项

• 皮囊内预先充有氮气，油阀体中的菌型阀是关闭的，以防止皮囊脱离。

• 达到最小工作压力时皮囊和油阀体之间用保留少量油液（约为蓄能器公称容量的 10%）。以便皮囊不会在每次膨胀过程中撞击菌型阀，因为这样会引起皮囊损坏。

• 允许的最大压缩比为　P_2：P_0≤ 4：1

3 安装

3.1 验收

产品到厂验收时，应保证：

• 蓄能器在运输期间没有损坏。

• 充气阀、油阀体、螺母是否紧固等。

• 铝牌上的技术规格符合订单要求。

• 使用说明书、合格证书随蓄能器一起提供，除非另有要求。

3.2 安装

• 为了获得最佳工作效率，蓄能器时，应尽可能就近装在它工作的地方。

• 皮囊式蓄能器可以垂直、水平和倾斜

安装，均可获得同样的容积性能和工作性能。最好垂直安装（气体侧向上），防止胶囊与壳体内壁磨损加大，减少胶囊的使用寿命。

• 蓄能器上方应留有至少 150mm 空间，用于充气和检测。

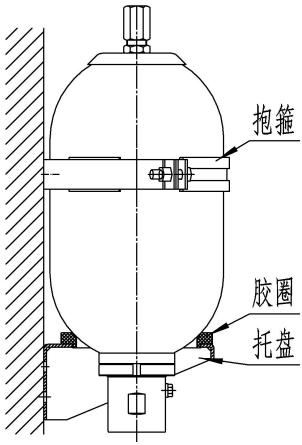
• 要远离热源，如果在有高温辐射热源环境中使用，可在蓄能器的旁边装设两层铁板和一层石棉组成的隔热板，起隔热作用。

• 蓄能器采用抱箍、托盘的紧固方法，如图所示，液压接管不得用以支撑蓄能器的重量。绝对不允许焊接蓄能器底座或改变蓄能器的壳体。

• 在蓄能器的油液侧安装一个过滤器。

• 在泵和蓄能器之间安装一个多功能的安全阀组或截止阀，此阀供充气、调整、检查、维修或者长期停机使用。

• 保证液压系统的实际工作压力不超过蓄能器壳体上钢印的工作压力。



3.3 注意事项

• 出厂的囊式蓄能器，其预充氮气压力为 0.05～0.15 MPa，除非另有规定。

• 客户使用时，预充氮气压力应符合要求的值或规定的值。

• 蓄能器连接的液压系统中的空气要排尽，防止由于困气影响系统正常工作。

4 检查与充气

4.1 概述

• 为使蓄能器正确工作，必须使蓄能器保持预充气压力，必须定期使用充气工具进行检测。

• 可以使用充气工具对蓄能器的充气压力进行检测、降低和升高操作。

• 如果蓄能器的最大工作压力低于氮气瓶的最大工作压力，那么必须在氮气瓶的出口安装减压阀，而且减压阀的压力调节范围不能超过蓄能器的最大工作压力，以免发生危险。

• 在每次检测或调整充气压力之前，蓄能器与系统断开并将液体放空。

•进行充气时，必须使用纯度大于 99.8%的氮气，不得使用压缩空气或氧气。

• 在充气时，氮气瓶中的压力必须足够高，以满足充气的要求，否则需要有氮气增压设备。

注：压力表的选择，表的最大量程是工作压力的 1.5 倍。

4.2 升高充气压力

• 松开充气阀的保护帽。

• 充气工具装配前，确保手轮 A 已松开（左旋），放气阀 B 已关闭。

• 用螺母 D 将充气工具固定到蓄能器的气阀杆或充气阀上，密封配合。

• 使用充气软管一端连接充气工具的单向阀 C，一端连接氮气瓶接头。

• 缓慢拧紧手轮 A（右旋），直到读出压力值。**（不能太用力拧，可能将充气阀的阀芯顶坏，造成充气阀损坏漏气。）**

• 慢慢打开氮气瓶的阀门，直到压力表上显示的压力略高下所要求的压力，然后关闭氮气瓶的阀门。

• 拧松手轮 A，打开放气阀 B，排出充气工具和充气软管内的残余氮气。

• 关闭放气阀 B，稍等几分钟，让压力稳定后，重新拧紧手轮 A，直到压力表上显示的压力略高下所要求的压力。

• 完全拧松手轮 A，打开放气阀 B，然后取下蓄能器上的充气工具。

• 通过放气阀 B 可以调整预充压力。

• 用肥皂液检查蓄能器的充气阀是否有泄漏。

• 重新拧紧充气阀保护帽。

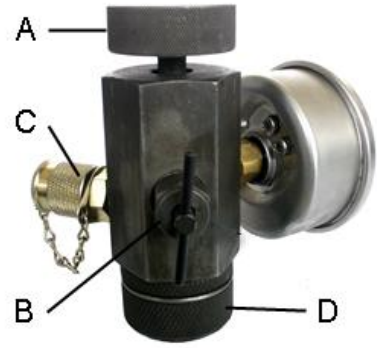
此时，蓄能器已可以使用。

4.3 检查或者降低充气压力

• 将蓄能器与系统分开，液体侧压力卸载为零。

• 检查或者降低充气压力，这时不需要连接充气软管。

• 如果预充气压力值高于要求的值，可以通过放气阀 B 卸压到需要的压力值。建议慢慢地卸压，减压后过几分钟才能读到有效的压力值。



4.4 充气工具

氮气的充装用充气工具进行，建议使用本企业制造的充气工具，如氮气瓶的压力不能满足（高压）蓄能器的要求，建议使用本企业制造的氮气增压装置——MNC 型移动充氮小车。

5 维护及维修

5.1 维护

• 蓄能器在使用过程中，应定期检查预充气压力。

• 对于新使用的蓄能器，第一周检查一次，第一个月内还要检查一次，然后每三个月检查一次，是保证囊式蓄能器最佳效率的最好方法。

• 对于作应急动力源的蓄能器，为了确

保安全，更应经常检查与维护。

• 检查预充气压力的同时，还必须注意观察意外情况发生时的环境温度。因为意外的环境温度可能与预充气时的温度有差异，是造成故障的原因所在。

• 皮囊的使用寿命取决于油液的清洁度、工作温度和油液介质。油液内的金属颗粒或杂质会使壳体和皮囊的表面产生磨蚀。建议采用过滤器和换热器作为保护蓄能器和所有零部件的预防性措施。

• 定期进行外现检查，检查是否有腐蚀或变形。

• 根据工作状况，定期对皮囊等易坏零部件进行更换。

5.2 维修

• 对于突发性故障，或有计划的检查，需要拆卸蓄能器，检查各零部件。

• 必须按规定的要求进行操作。如果未能保证液体压力或气体压力完全释放，请不要拆卸蓄能器的任何零部件。

5.3 拆卸蓄能器

如果液体侧压力已经放尽，蓄能器已经从设备上取下来，就可把它横放到工作台上或台虎钳上。囊式蓄能器可以作如下准备：

• 取下充气阀保护帽；

• 使用充气工具排放皮囊中剩留的氮气；

• 拆下充气阀。

高压标准型

〈1〉 拆下油阀体上的放气螺塞；（图 1）

〈2〉 用勾扳手拆下圆螺母和压环；（图 2）

〈↑图 1〉

〈↑图 2〉

〈3〉 将液体侧油阀推入壳体内，取出聚四氟挡圈、O 型圈、金属挡圈；（图 3）

〈4〉 从油阀体上取下橡胶环，对折后从壳体内取出。（图 4）

〈↑图 3〉

〈↑图 4〉

〈5〉 取出油阀体。（图 5）

〈6〉 拆下气阀杆上小螺母和铭牌，将气阀杆推入到壳体内。（图 6）

<↑图 5>

<↑图 6>

〈7〉稍稍转动皮囊，将它从液体口一侧拉出来。（图 7）

<←图 7>

高压顶部可修型

〈1〉拆下气阀杆上的小螺母和铭牌，使皮囊与气端阀体分离；

〈2〉拆下气端的圆螺母和压环；（图 2）

〈3〉将气端的顶端阀体和皮囊推入壳体内，取出聚四氟挡圈、0 型圈、金属挡圈；（图 3）

〈4〉从气端的顶端阀体上取下橡胶环，对折从壳体内取出。（图 4）

〈5〉取出顶端阀体。

〈7〉稍稍转动皮囊，将它从气体口一侧拉出来。（图 7）

5.4 清洗与检验

仔细清洁所有部件，包括蓄能器壳体的内部，主要检查内容：

• 皮囊无老化、无损伤、磨损或遭破坏。

• 油阀体上的菌型阀滑动自如，弹簧无损伤。

• 聚四氟挡圈、0 型圈、金属挡圈等密封组件无损伤。

• 蓄能器壳作的内部没有裂缝或其它影响强度的缺陷。

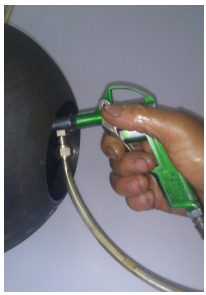
更换所有值得怀疑的和磨损的零件。

皮囊是不可修理零件。

5.5 装配蓄能器

〈1〉蓄能器所有部件清理干净后，使用气枪喷涂一层干净的防锈油于壳体内部；（图 8）

〈2〉装入皮囊，对于大规格的蓄能器可用一根拉杆，拧紧在气阀杆的内螺纹或充气阀外螺纹上；（图 9）



<↑图 8>

<↑图 9>

〈3〉将胶囊的气阀杆从气口拉出，安装铭牌和小螺母于气阀杆上,并拧紧小螺母；（图 10）

〈4〉先装入油阀体，再装入橡胶环，然后将油阀体穿过橡胶环的内孔，从壳体的油口拉出；（图 11）

〈↑图 10>

〈↑图 11>

〈5〉按顺序将金属挡圈、0 型圈、聚四氟挡圈和压盖依次装配在油阀体上；

〈6〉装配上圆螺母，并缓慢拧紧和拧松其多次，使压盖推动聚四氟挡圈和 0 型圈，无损伤的装配在壳体和油阀体之间的环缝内；（图 12）

〈7〉安装充气阀，使用充气工具充入皮囊约 1MPa 的氮气；（图 13）

〈↑图 12>

〈↑图 13>

〈8〉再一次拧紧气端和油端圆螺母，使壳体和压盖之间没有缝隙，防止蓄能器工作时，油阀体在壳体内上下窜动，从而造成蓄能器漏油。（图 14）

聚四氟挡圈和 0 型圈装配中不能损伤，必要时，可以在 0 型圈上涂抹润滑油。

〈9〉安装并拧紧塞堵和密封件在油阀体上。（图 15）

〈10〉最后，安装保护帽，保护充气阀。

〈↑图 14>

〈↑图 15>

1 Brief Introduction

1.1 Working Principle

The Bladder Accumulator is a device designed specifically of liquid under pressurize, it is incompressible to liquid, to make use of the compressibility of gas (Nitrogen) to achieve the purpose of energy.

The Bladder Accumulators working media consists of working fluid and gas isolated by the bladder. There is pre-charged nitrogen in the bladder before its working, and the fluid is linked with hydraulic system. Fluid charged in the accumulator when pressure of the system gets higher than pre-charged, and charged in the system by the way of gas inflating when pressure of the system drops down.

1.2 Structure Characteristics

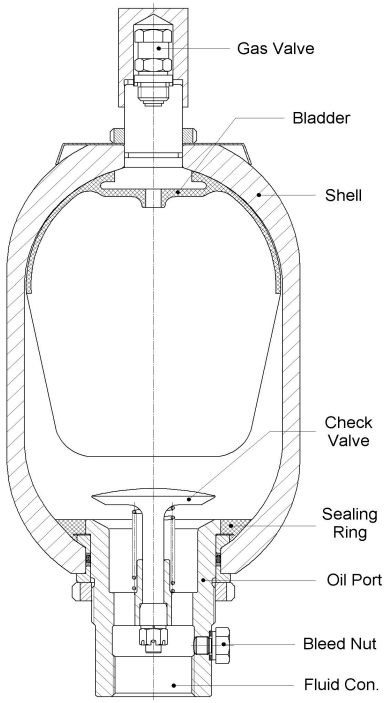
·Structure of the Bladder Accumulator: Steel Shell, Bladder, Gas Valve and Fluid Oil Port.

• Accumulator shell is a forged or welded steel pressure vessel, whose design and manufacture conform to domestic and national standard.

The Bladder components are the integral of bladder and gas stem. Moreover, different recipes can be adopted according to different media and different temperature required by customers.

·Extrusion prevention valve can prevent the bladder from squashing into the oil port, and make the fluid enter or leave freely. There are two different types of check valve for bladder accumulators, mushroom type and disc type, and the pre-charging pressure should not be higher than 15 Bar normally.

• Considering irritant and corrosive medium, all of the parts related to the medium should be nickel plated or all adopt the stainless steel material.



1.3 Application Scope

- Auxiliary power source
- Emergency energy reserve
- Pulsation damper
- Hydraulic line shock damper
- Volume compensator
- Pressure compensator
- Force balance
- Hydraulic spring

1.4 Bladders material

Selection of bladder material mainly depends on the fluid and gas temperature. Normally as below.

·NBR（N）

·L-NBR（D）

·ECO（O）

·EPDM（Y）

·Polychloroprene （C）

·Butyi （I）

·FKM（V）

1.5 Model Specification

· China Standard Bladder Type Acc.

NXQ－AB－40 / 20－L－Y

① ② ③ ④⑤ ⑥

① Name Code: Bladder Accumulator

② Structure Type: Type A / Type AB

③ Nominal Volume: /L

④ Design Pressure: /MPa

⑤ Connection Type:

Thread connection －L

Flange connection －F

⑥ Working medium: Hydraulic oil Y; Emulsion R; Water H

· ASME CODE Bladder Acc.

AC－TR－11 / 30－G－Y

① ② ③ ④ ⑤ ⑥

① Name Code: Bladder Accumulator

② Structure Type: Type S, Type SB, Type TR

③ Nominal Volume: Gal

④ Design Pressure: ×100 Psi

⑤ Connection Type:

Thread connection:

G－BSP thread

M－Metric thread

N－NPT thread

S－SAE thread

Flange connection －F

⑥ Working medium: Hydraulic oil Y; Emulsion R; Water H

· PED CODE Bladder Acc.

BA－S－50 / 330－G－Y

① ② ③ ④ ⑤ ⑥

① Name Code: Bladder Accumulator

② Structure Type: Type S, Type SB, Type TR

③ Nominal Volume: L

④ Design Pressure: Bar

⑤ Connection Type:

Thread connection:

G－BSP thread

M－Metric thread

N－NPT thread

S－SAE thread

Flange connection －F

⑥ Working medium: Hydraulic oil Y; Emulsion R; Water H

1.6 NOTE

·Filtration precision — For the sake of a long service life of the hydraulic accumulator, there should be no metal particle, water or any other contaminant. The hydraulic oil should satisfy grade 19/15 of ISO 4406. Filtration precision ≤20μ.

·Pre-charging — Only allowed nitrogen charged with purity higher than 99.8% in accumulator, other gas included oxygen and compressed air are prohibited (explosion dangerous).

2 Calculation

2.1 Parameter Define

P_0= Pre-charge Pressure /Bar

P_1= Min Working Pressure /Bar

P_2= Max Working Pressure /Bar

V_0= Efficiency Gas Volume /L

V_1= Gas Volume at Pressure P_1 /L

V_2= Gas Volume at Pressure P_2 /L

△V＝Working Liquid Volume /L

T_0＝Temperature at pre-charging /℃

T_1＝Min Working Temperature/℃

T_2＝Max Working Temperature/℃

2.2 Precharge pressure selection

Pre-charging pressure is directly related to an accumulator's working efficiency and working life. When pre-charging pressure is close to minimum working pressure, the system can achieve the maximum volume theoretically.

Safety factor should be applied for its application in system. In case of the valve shuts off instantaneously (unless there is other regulation): Precharge pressure: $P_0=0.9P_1$

The limitation of the value P_0:

$$P_0 \text{ min} \geq 0.25\ P_2$$

$$P_0 \text{ max} \leq 0.9\ P_1$$

Special value applied for Pulsation compensator and vibration reduction

$$P_0 = 0.6 \sim 0.75\ Pm$$

$$\text{or } P_0 = 0.8\ P_1$$

Hereinto:

P_m=Average working pressure

Absorbing pressure surges

$$P_0 = 0.6 \sim 0.9\ Pm$$

Hereinto: Pm=Average pressure of average operating pressure for free flow.

Generally the recommended gas pre-charge pressures can be maintained, even at relatively high operating temperatures, the calculation of charging in high or normal temperature shall be as follows:

NOTE: The precharging pressure is always in 20℃ supplied by BUCCMA.

2.3 NOTE

·Bladder is pre-charged by nitrogen and oil port valve is closed in order to prevent bladder from disengaging.

·When accumulator is under the condition of minimum working pressure, a bit of hydraulic oil(almost 10% of nominal volume of accumulator) should be kept between bladder and oil port valve, so that the bladder will not hit oil port valve during the process of its inflation, which may cause the bladder's damage.

·Allowable maximum compression ratio: $P_2 : P_0 \leq 4 : 1$

3 Installation

3.1 Primary inspection

Inspection items after goods arrive at the destination:

·If accumulators incur damages during the transportation

·If gas valves, oil port valves and lock nuts have been screwed tightly

·If specification stamped on name plate is meet the requirements of order.

·Accumulator should be accompanied with certificate of quality, unless that additional requests are mentioned.

3.2 Installation

·In order to obtain the best working efficiency, accumulators should be fixed close to hydraulic system and operating area.

·There are no any limitations in terms of horizontal direction and vertical direction for fixation, which can also make the same volume capacity and working performance achieved. Vertical installation is the best way for fixation (gas-charging port should be placed upward).

·For the sake of pre-charging space, some essential space is necessary, always higher than 150mm.

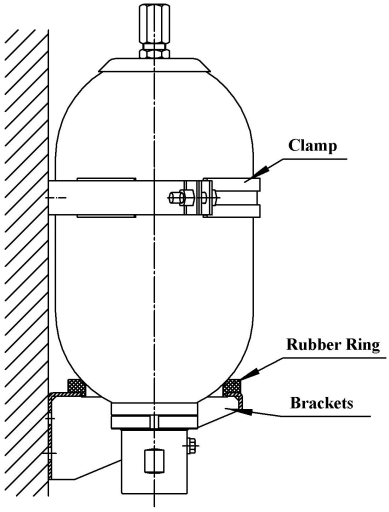
·Keep away from heat producer. If accumulators have to work in the environment of high temperature and intense heat radiation, put two-layer iron plates and one-layer asbestos thermal baffle beside the accumulators to stop heat.

Accumulators are tightened by clamp brackets and base brackets assembly. As shown in the right graph, hydraulic pipe is not allowed to be used to hold the weight of accumulator, getting bedplate of accumulator welded and practically changing the body of shell are forbidden as well.

·A filter should be installed by the oil port.

·Multifunction safety valve group and break valve are extremely needed between the pump and the accumulator, because they can play some important roles when accumulator need to be charged, regulated, examined, repaired or long time machine halt.

·Actual pressure of hydraulic system shall not exceed the working pressure stamped on the name plate.



3.3 Note

·Pre-charge pressure of accumulator supplied always be 0.05 ~ 0.15 MPa, unless stipulated.

·When start to use, pre-charge pressure must according requirements.

·Gas in hydraulic system connected with accumulator must be completely discharged so as to prevent trapped gas from affecting normal working.

4 Inspection and charging

4.1 Summary

·In order to keep accumulators' normal working, accumulators must be pre-charged and examined regularly by pre-charging tool.

·pre-charging tool can be used for charging, discharging and testing.

·When stated pre-charge pressure lower than standard nitrogen bottle, pressure reduction valve advised to be used to connect with nitrogen bottle to make nitrogen gas into the accumulator at a very low speed.

·Before testing or pre-charging, accumulator shall be closed with system and discharge all of the oil.

·Only allowed nitrogen charged with purity higher than 99.8% in accumulator, other gas included oxygen and compressed air are prohibited (explosion dangerous).

·Pressure in nitrogen must higher than accumulator, the pressure boosting shall be used otherwise.

Note: The pressure range of gauge shall not exceed 1.5 times of working pressure.

4.2 Pre-charge and compensate

·Disassemble gas valve protection cap.

·make button A unscrewed and throttle valve B closed (as shown in right graph).

·Tightly screw lock nut D by hand with gas valve.

·Connect C with tube joint and connect with nitrogen gas bottle or pressure reduction valve.

·Screw button A slowly with little strength until pressure comes out (for prevent of destroy of gas valve core, do not screw compulsively).

·Slowly open the valve of nitrogen gas bottle until the pre-charge pressure gets little higher than stated pressure, then shut off.

·Unscrew button A and make pressure valve B discharge the pressure.

·Disconnect hose with unidirectional valve C.

·Close pressure valve B, install the cap of valve C and wait for several minutes until the pressure keep stable.

·If the pressure stated is lower than needed, tighten the knob A again until the pressure stated is slightly higher than needed.

·Release the pressure , adjust the pre-charging valve, then unscrew the lock nut and disassemble the pre-charging tool as follow steps:

·Completely unscrew button A with little strength.

·Open throttle valve B.

·Use soap-suds to examine if pre-charging valve has leakage.

·Again tightly screw the protection cap of pre-charging valve.

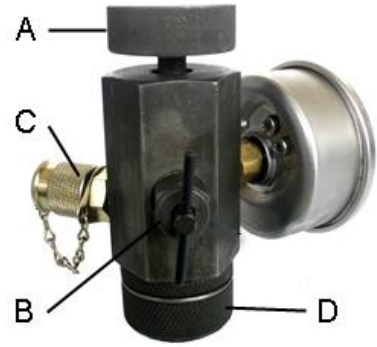
Now the accumulator is ready.

4.3 Reduce pre-charging pressure

·Close accumulator and system, make oil pressure zero.

·Testing charging pressure, hose is no need connected.

·If the pre-charging pressure is higher than stipulated, open throttle valve B until get the pressure wanted. Release the pressure shall be slowly and get an exact pressure value several minutes after the pressure is released, then disassemble the pre-charging tool.



4.4 Pre-charging tool

Pre-charging tool made in Buccma is advised for charging of accumulators. The Mobile charging cart - MNC is advised if pre-charging pressure is higher than standard nitrogen bottle.

5 Maintenance and Repair

5.1 Maintenance

·Check the pre-charging pressure of nitrogen regularly.

·Check the new accumulator one time at the first week and another time at the first month. And check the accumulator every three month to keep its working efficiency.

·For the sake of safety, the accumulator used as emergency energy storage, user should check it more constantly.

·Pay more attention to the environment temperature when testing pre-charging pressure.

·The service life of the bladder is always related to the cleanness of working media, the working temperature and media type. There shouldn't be metal grain and any other foreign substance in accumulators. We advise that a filter and cooling equipment should be used on system to protect accumulators.

·Check up the visual regularly to see if there is any corrosion or distortion.

·The bladder or other quick-wear parts should be replaced regularly according the working condition.

5.2 Repair

·For unexpected quality problem or testing planned, accumulator should be disassembled and tested for its parts.

·The operations must be done exactly according to the operation manual. Please do not disassemble the accumulator or any components as it have pressure of oil or gas.

5.3 Disassemble Accumulator

Accumulator can be taken down when there is no pressure with system. Put accumulator on working table or special equipment. Steps in details are shown as follows:

·Take down the protection cap of gas valve.

·Discharge pressure in bladders by charging tool.

·Take down gas valve.

〈↑Fig.1>

〈↑Fig.2>

〈↑Fig.3>

〈↑Fig.4>

〈↑Fig.5>

〈↑Fig.6>

〈←Fig.7>

Standard Type

<1>Take down the bleed nut of oil valve. (Fig.1)

<2>Taking down the lock nut and spacer. (Fig.2)

<3>Put oil valve into the shell and take out the O ring and sealing parts. (Fig.3)

<4>Taking out the anti-extrusion ring on oil valve from oil port. (Fig.4)

<5>Taking out oil valve. (Fig.5)

<6>Take out gas valve, lock nut and name plate. (Fig.6)

<7>Rotating the bladder in a way, and take it out from oil port. (Fig.7)

Top Repairable Type

<1>Take down the hex nut from the gas stem, make the bladder separated from the valve block.

<2>Taking down the lock nut and the spacer. (Fig.2)

<3>Put gas valve block into the shell and take out the O ring and sealing parts. (Fig.3)

<4>Taking out the anti-extrusion ring from gas valve block. (Fig.4)

<5>Taking out gas valve block. (Fig.5)

<6>Rotating the bladder in a way, and then take it out from gas port. (Fig.7)

5.4 Cleaning and testing

Cleaning all parts of accumulators carefully, including the inside surface of

shells. Main testing content are shown as follows:

·The bladder has no aging, no break, and no any other defects.

·Poppet valve must slide freely and has no break of spring.

·O ring, spacer, and sealing parts should have no defects.

·Inside of shells has no break or any other defects.

Change all the imperfect parts. The bladder can not be repaired in any way.

5.5 Accumulator assembly

<1>Cleaning all parts of accumulator, and then spray a coat of clean anti-rust oil into the shell. (Fig.8)

<2>Assemble bladder, drawing stick shall be used to connect with gas stem or gas valve for large accumulators. (Fig.9)

<3>Pulling bladder from inside of shell, and then fixing the name plate and the gas stem nut. (Fig.10)

<4>Put in oil valve and the anti-extrusion ring, make oil valve outside from shell with good fitness with anti-extrusion ring. (Fig.11)

<5> Assemble metal ring, O ring, F4 ring and spacer sequently.

<6> Screw down the lock nut slowly and loosen for prevent of O ring damage, and pay more attention to the gap between the shell and spacer. (Fig.12)

<7>Assemble gas valve, precharging about 1MPa nitrogen by charging tool. (Fig.13)

<↑Fig.8>

<↑Fig.9>

<↑Fig.10>

<↑Fig.11>

<↑Fig.12>

<↑Fig.13>

<8>Fixing lock nut of gas and oil port end, there shall be no gas in case of leakage. (Fig.14)

F4 ring and O ring shall be coated with oil if necessary.

<9>Fixing bleed nut and its sealing on the oil valve. (Fig.15)

<10>At last, fixing protect cap to protect gas valve.

<↑Fig.14>

<↑Fig.15>