SK Series
Piston Accumulators

Description

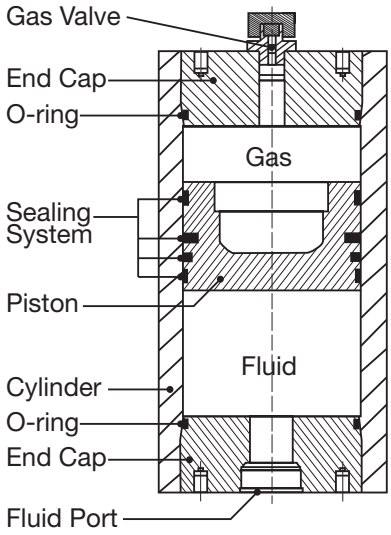
Piston Accumulators are a cost effective option for numerous functions involving energy storage, and sometimes shock absorption in a hydraulic or fluid system. They are well suited for applications needing:

- High Pressure Ratios
- Large Volumes of Oil
- High Fluid flow rates
- Volume monitoring by way of piston position sensor or switch systems

Construction

HYDAC piston accumulators consist of:

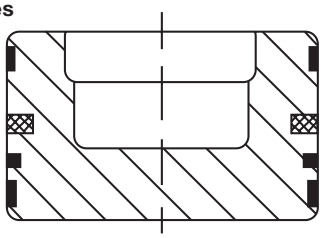
- A cylinder with a finely finished internal surface
- An end cap on the gas side and fluid side, sealed with o-rings
- A lightweight metal piston
- A variety of sealing systems are available depending on the application



Piston Types

TYPE 2

Without Check Valves



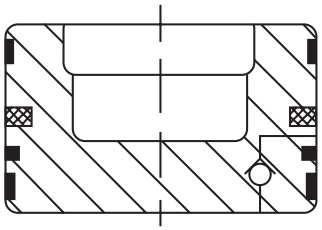
Application (without Check Valve)

Low-friction design for higher piston speeds, slow movements without stick-slip effect and high number of actuations (millions). Actual cycles achieved will vary with operating parameters.

Notes: Filtration ≤ 10 µm absolute. (ISO 17/15/12)
Max. continuous velocity = 12 ft/sec

TYPE 2

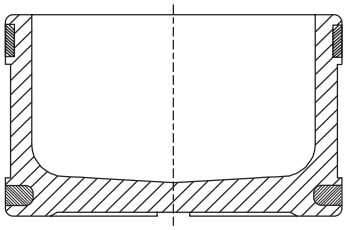
With Check Valves



Application (with Check Valve)

The addition of a check valve drastically reduces the oil pumping to the gas side of the piston.

TYPE 3



Application

Actual cycles achieved will vary with operating parameters.

Notes: Filtration ≤ 10 µm absolute. (ISO 17/15/12)

Max. continuous velocity = 3 ft/sec

Sealing Systems

Precise information about the proposed operating conditions is required in order to select the most appropriate sealing system. Important criteria for this selection are:

- Number of actuations or cycles
- Piston speed
- Temperature fluctuation
- Operating fluid
- Cleanliness of fluid
- Maintenance requirements

PN#02068195 / 04.13 / ACU1102-1326

Seal Materials

The following sealing elastomers are available, depending on the operating conditions:

- NBR (acrylic nitrile butadiene rubber)
- FPM (fluoro-elastomer)
- PUR (polyurethane)

Suitable materials are also available for low temperature applications.

Fluids

The following sealing materials are suitable for the fluids listed below:

NBR, resistant to:

- Mineral Oils (HL and HLP)
- Non-flammable fluids from groups HFA, HFB, and HFC
- Water and seawater up to approx. 100°C

NBR, not resistant to

- Aromatic hydrocarbons
- Chlorinated hydrocarbons
- Amines and ketones
- Hydraulic fluids from the HFD Groups

FPM, resistant to:

- Mineral Oils (HL and HLP)
- Hydraulic fluids from the HFD Groups
- Fuels as well as aromatic and chlorinated hydrocarbons
- Inorganic acids (but not all, please contact HYDAC)

FPM not resistant to:

- Ketones and amines
- (Anhydrous) ammonia
- Organic acids such as formic acid and acetic acid

PUR resistant to:

- Mineral Oils (HL and HLP)
- Non-flammable fluids from the HFA group

PUR not resistant to:

- Water and water-gylcol mixtures
- Alkalis
- Acids

Corrosion Protection

For use with certain aggressive or corrosive fluids, or in a corrosive environment, HYDAC offers protective coatings and corrosive resistant materials (i.e. stainless steel) for the accumulator parts that come in contact with the fluid, or are exposed to the hostile environment.

System Mounting

HYDAC piston accumulators may operate in any position. Vertical installation is preferable with the gas side up. We recommend the use of our mounting components, which are detailed on page 84, to minimize risk of failure due to system vibrations.

Effects of Seal Friction

The permissible piston velocity depends on the sealing friction. Higher piston velocities are possible where there is less sealing friction.

HYDAC piston accumulators with low friction piston seals allow continuous operating velocities of up to 12 ft/sec with short bursts, up to 15 ft/sec *(see type 2 piston)*.

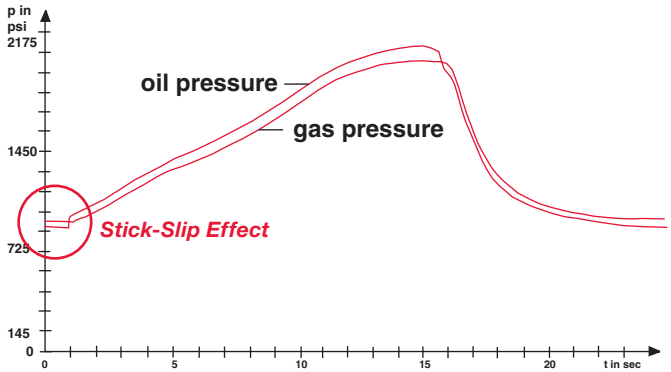
Small pressure differentials between gas and oil side improve the effectiveness of HYDAC piston accumulators. To emphasize the friction effect on the pressure curve during an accumulation cycle, measurements with various sealing systems are illustrated.

The measurement graphs below are a true representation of the gas and oil pressure of piston accumulators with different sealing systems. The comparison of these two measurements clearly shows the difference in the pressure differential between gas and oil side:

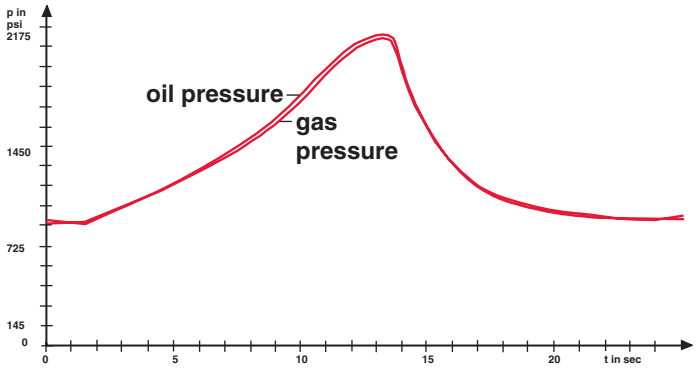
Graph 1: Δp max. ≈ 125 psi

Graph 2: Δp max. ≈ 14.5 psi

The effect of the sealing friction on the working pressure is particularly striking in traditional piston designs. Abrupt piston movements *(the stick-slip effect)* are caused by the seal friction as shown in Graph 1. The low sealing friction of HYDAC type 2 pistons drastically reduces the stick-slip effect therefore maximizing piston responsiveness.



Graph 1: Traditional piston designs



Graph 2: Piston Type 2 *(low friction model)*

Advantages of Using the Low-friction Sealing System (type 2):

- Minimum friction.
- Suitable for low pressure differentials.
- No start-up friction, no stick-slip.
- Low noise, no vibration.
- High piston speeds up to 12 ft/sec continuous.
- Improved accumulator efficiency.
- High life expectancy, low maintenance requirements.

Advantages of HYDAC Piston Accumulators

- Complete size range from 1 qt. to 100 gallons nominal volume.
- High ratios possible between precharge pressure and maximum working pressure.
- High flow rates - up to 4700 gpm from one accumulator.
- Power savings.
- Gas-proof and leak-free.
- No sudden discharge of gas when seal is worn.
- Space efficient.
- Piston location monitoring available.

SK 210 Series
(Non-ASME) 3000 psi

Advantages

The piston accumulator series SK210 & 250 are an intermediate bore diameter with repairable design. They are HYDAC certified, designed in accordance with ASME pressure code. Features of this series are:

- Bore Diameter up to 6” ID
- Sizes from 1 quart to 15 gallons
- Largest range of standard models for quick delivery times
- Military Style Gas Valve MS28889-2 / M6164-2, repairable

Application

- Mobile Hydraulic
- Industrial Hydraulic

SK 250 Series
(Non-ASME) 3600 psi

Advantages

The piston accumulator series SK350 are an intermediate bore diameter with repairable design. They are HYDAC certified, designed in accordance with ASME pressure code. Features of this series are:

- Bore Diameter up to 6” ID
- Sizes from 1 quart to 15 gallons
- Largest range of standard models for quick delivery times
- Military Style Gas Valve MS28889-2 / M6164-2, repairable

Application

- Mobile Hydraulic
- Industrial Hydraulic

SK 280 Series
(Non-ASME) 4000 psi

Advantages

The piston accumulator series SK280 is a weight optimized, non-repairable design. The non-repairable design and special production process of these HYDAC accumulators save cost, making this series an economic option.

- Cost-effective – due to the non-repairable design and an optimized production process
- Weight reduced series
- Reduced installation space
- Standard-gas valve (HYDAC Version 1) with integrated M28x1.5 male thread
- Quick delivery for models with standard connection
- SAE fluid ports are available
- PED/CE pressure code certification

Application

- Mobile Hydraulic
- Weight Sensitive Industrial Hydraulic

SK 350 Series
(Non-ASME) 5000 psi

Advantages

The piston accumulator series SK350 are an intermediate bore diameter with repairable design. They are HYDAC certified, designed in accordance with ASME pressure code. Features of this series are:

- Bore Diameter up to 6” ID
- Sizes from 1 quart to 15 gallons
- Largest range of standard models for quick delivery times
- Military Style Gas Valve MS28889-2 / M6164-2, repairable

Application

- Mobile Hydraulic
- Industrial Hydraulic

SK 350
(ASME) 3000 psi
SK 600 Series
(ASME) 5000 psi

Advantages

The piston accumulator series SK350 & 600 is HYDAC’s most versatile series with a repairable design and large selection of options. The largest range of possible sizes, material construction, and other options are offered. Standard and Low Friction piston designs are available for superior performance and flow rates. Features of this series are:

- Bore Diameters from 2.4” ID to 19.3” ID
- Sizes from 1 quart to 200 gallons
- Largest range of possible sizes and material options
- Standard and Low Friction piston designs available
- Largest variety of gas and fluid port options
- A variety of piston position sensor monitoring systems are available
- ASME, CRN, PED/CE and other pressure code certifications are available

Application

- Heavy Mobile Hydraulic
- Industrial Hydraulic

PN#02068195 / 04.13 / ACU1102-1326

Model Code

Model Codes containing RED selections are non-standard items – Contact HYDAC for information and availability
Not all combinations are available

SK 210 - 20 / 2112 S - 210 F C F - V _ E - 18 _ - _ H

Series
SK 210 = Piston Accumulator *(3000 psi, Typically)*
SK 250 = Piston Accumulator *(3600 psi, Typically)*
SK 280 = Piston Accumulator *(4000 psi, Typically)* - Non-Repairable
SK 350 = Piston Accumulator *(3000 psi, Typically)*
SK 600 = Piston Accumulator *(5000 psi, Typically)*

Size (in Liters, see tables on dimension pages to follow)
20 = 20 Liters
...see tables on following pages for complete list of sizes, and which versions they are available in

Material and Piston Type
For series SK 210 & SK 250, only material combination 3218 is available
For series SK 280, only material combinations 3218, 3268, 3265 are available

Piston Type *(see page xx)*
2 = Low Friction Model *(only available for series SK350 & SK600)*
3 = General Duty

Piston Material
1 = Aluminum
2 = Carbon steel *(machined)*
3 = Stainless steel
4 = Carbon steel with surface protection *(machined)*
5 = Steel *(cold impact formed)*

Cylinder and End Cap Material
1 = Carbon steel *(machined)*
2 = Carbon steel with surface protection *(machined)*
3 = Stainless steel
6 = Low temperature carbon steel *(< -20°F)*

Seal Material *(including piston seals)*
2 = NBR *(-4 to 180°F)*
5 = Low Temperature NBR *(-50° to 180F)*
6 = FPM fluoroelastomer *(5 to 320°F)*
8 = PUR Polyurethane *(-22 to 180°F)*

Country of Installation
S = USA
S1 = Canada *(CRN registered)*
U = PED/CE
(for other countries see page 2 for proper code designation)

Maximum Working Pressure in bar *(based upon first choice - SERIES)*
210 = 3000 psi *(SK 210...H, 350 Typically)*
250 = 3600 psi *(SK 250...H Typically)*
280 = 4000 psi *(SK 280 Typically)*
345 = 5000 psi *(SK 600 Typically)*

Fluid Port Connection
Type of Connection *(refer to tables on the following page)*
A = Threaded, Female
F = Flanged

Standard / Specification of Type of Connection *(refer to tables on the following page)*
A, B, C, D

Size of Connection *(refer to tables on the following page)*
A, B, C, D, E, ...

Gas Side Connection
Type of Connection *(refer to tables on the following page)*
A = Threaded, Female
F = Flanged
V = Gas Valve
KCH = Gas Valve MS28889-2 *(with protective cover)* Requires an FPO Charging Kit or a FPK Charging Kit with an A9 Adapter
000 = Factory Precharged and sealed (not rechargeable) for SK280 series only. Required min order qty. 200

Standard/Specification of Type of Connection ***(OMIT if V was selected from Type of Connection, refer to tables on the following page)***
(omit), A, B, C, D

Size of Connection (refer to tables on the following page)
A, B, C, D, E, ...

Piston Diameter (Some piston diameters are only available in certain series)

05	=	50mm	12	=	125mm	25	= 250mm
06	=	60mm	15	=	150mm	35	= 355mm
08	=	80mm	18	=	180mm	49	= 490mm
10	=	100mm					

Supplementary Equipment (only available for series SK350 & SK600)

A	=	Electrical Limit Switch (35mm stroke)	M	=	Magnetic flapper indication
B	=	Electrical Limit Switch (200mm stroke)	S	=	Cable tension measurement system
C	=	Electrical Limit Switch (500mm stroke)	U	=	Ultrasonic measurement system
K	=	Protruding Piston Rod	E...	=	Special switch1 (fixed and adjustable)

Safety Devices
1 = Burst Disc *(indicate nominal pressure)*
2 = Gas safety valve
3 = Thermal fuse cap *(see page 62 and 63)*

H = Made in the USA *(not available for series SK280)*

1) Consult HYDAC for assistance with specifying switch details

Connections
SK 210 & SK 250 Series (Non-ASME)

Maximum Working Pressure - 3000 PSI
Operating Temperature - 14°F to 180°F
Standard Seal for Petroleum-Based Oils - Polyurethane
Military Style Gas Valve - MS28889-2 / M6164-2
Paint - Black Primer
Pre-Charge - None

Model Code Support Tables for Fluid Connections

Female Threaded Connections: A **Sample Code = A[1] C[2] K[3]**

Code	Type of Connection	A	B	C	D	E	F	G	H	J	K	4" L	6" M
C	ANSI B1.1 (UN..-2B) Seal SAE J 514	SAE-2 5/16-24UNF	SAE-3 3/8-24UNF	SAE-4 7/16-20UNF	SAE-5 1/2-20UNF	SAE-6 9/16-18UNF	SAE-8 3/4-16UNF	SAE-10 7/8-14UNF	SAE-12 1 1/16-12UN	SAE-14 1 3/16-12UN	SAE-16 1 5/16-12UN	**SAE-20 1 5/8 12UN**	**SAE-24 1 7/8 12UN**
D	NPT (ANSI B1.20.3)	1/16-27	1/8-27	1/4-18	3/8-18	1/2-14	3/4-14	1-11 1/2	1 1/4-11 1/2	1 1/2-11 1/2	2 1/2-11 1/2	2 1/2-8	n/a

Note: Bold copy indicates standard size.
1) use "A" as the first character of the connection code for all Female Threaded Connections.
2) Enter the letter of the ROW (red) as the second character of the connection code.
3) Enter the letter of the COLUMN (gray) as the third character of the connection code.

Flange Connections: F[4] **Sample Code = F[4] C[5] E[6]**

Code	Type of Connection	A	B	C	D	E	F
C	SAE Code 61 (3000 psi)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"

4) Use "F" as the first character of the connection code for all Flange Connections.
5) Use "C" as the second character of the connection code for all flange connections.
6) Enter the letter of the COLUMN (gray) as the third character of the connection code.

Dimensions
SK 210 & SK 250 Series (Non-ASME)

Series	Nominal Size gal.	Eff Gas Volume (Vo) in³ / L	Weight lbs / kg	A in / mm	øD1 in / mm	øD2 in / mm
SK 210	0.25	77.5 / 1.27	38 / 17	18 / 457	4 / 100	4.92 / 125
	0.5	138 / 2.27	50 / 23	22 / 569	4 / 100	4.92 / 125
	1	260 / 4.27	71 / 32	31 / 791	4 / 100	4.92 / 125
	2	504 / 8.27	107 / 49	45 / 1131	4 / 100	4.92 / 125
	1	294 / 4.82	94.7 / 43	17.1 / 435	6 / 150	6.89 / 175
	1.5	416 / 6.82	107.4 / 48.8	21.7 / 550	6 / 150	6.89 / 175
	2.5	660 / 10.82	132 / 60.1	30.5 / 775	6 / 150	6.89 / 175
	5	1270 / 20.82	1945 / 88.4	52.8 / 1340	6 / 150	6.89 / 175
	7.5	1759 / 28.82	245.2 / 111.4	70.9 / 1800	6 / 150	6.89 / 175
	10	2491 / 40.82	319.6 / 145.3	97.4 / 2475	6 / 150	6.89 / 175
SK 250	1	294 / 4.82	112 / 51	18 / 451	6 / 150	6.89 / 175
	1.5	416 / 6.82	125 / 57	22 / 566	6 / 150	6.89 / 175
	2.5	660 / 10.82	150 / 68	31 / 791	6 / 150	6.89 / 175
	5	1270 / 20.82	215 / 98	53 / 1358	6 / 150	6.89 / 175
	7.5	1759 / 28.82	269 / 122	72 / 1836	6 / 150	6.89 / 175
	10	2491 / 40.82	344 / 156	98 / 2491	6 / 150	6.89 / 175

Maximum Working Pressure	3000 PSI
Operating Temperature	14°F to 180°F
Standard Seal for Petroleum-Based Oils	Polyurethane
Military Style Gas Valve	MS28889-2 / M6164-2
Paint	Black Primer
Pre-Charge	None

4" Clamp Part Number 444505 see page 86
6" Clamp Part Number 3059445 see page 86

PN#02068195 / 04.13 / ACU1102-1326

Seals Included with Piston Seal Kit

Seal Kits

Piston Diameter	*Piston Seal Kits
10 (100 mm)	Rebuild Kit SK210..10 /2123414
15 (150 mm)	Rebuild Kit SK210..15 /3145418

*Includes the following
End Cap O-rings (2)
Guide Ring (1)
Center Seal (1)
(number of components)

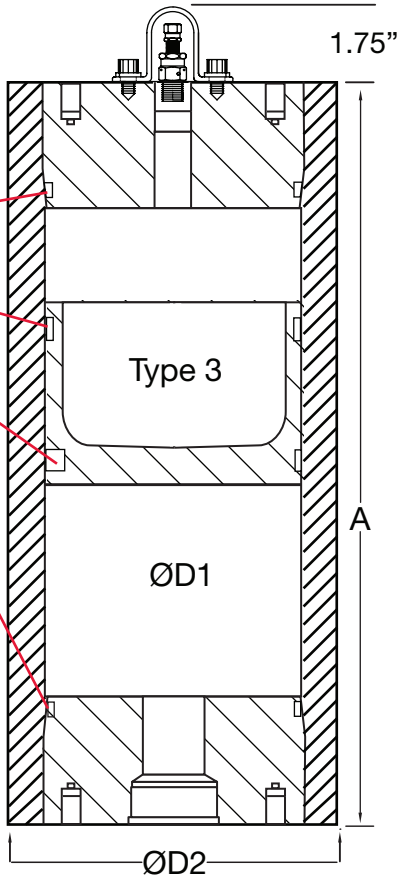
Replacement Gas Valve
Model Code: GAS VALVE M6164-2 W/CAP
Part Number : 2054712

Replacement Pistons

Piston Diameter	Replacement Piston PN
10 (100 mm)	2115547
15 (150 mm)	3016231

Tools

Diameter	Seal Assembly	Piston Insertion
10 (100mm)	00352198	00290056
15 (150mm)	02124157	02124161



Standard Product Offering

Nom. Size (gal.)	øD1 (in Nom.) / (mm)	Fluid Port	Model Code	Max Working Pressure (psi)
0.25	4 / (100)	SAE-20 (1 5/8-12 UN)	SK210-1/3218S-210-ACL-KCH-10HP	3000
0.50	4 / (100)	SAE-20 (1 5/8-12 UN)	SK210-2/3218S-210-ACL-KCH-10HP	3000
1	4 / (100)	SAE-20 (1 5/8-12 UN)	SK210-4/3218S-210-ACL-KCH-10HP	3000
2	4 / (100)	SAE-20 (1 5/8-12 UN)	SK210-8/3218S-210-ACL-KCH-10HP	3000
1	6 / (150)	SAE-24 (1 7/8-12 UN)	SK210-4/3218S-210ACM-KCH-15HP	3000
1.5	6 / (150)	SAE-24 (1 7/8-12 UN)	SK210-6/3218S-210ACM-KCH-15HP	3000
2.5	6 / (150)	SAE-24 (1 7/8-12 UN)	SK210-10/3218S-210ACM-KCH-15HP	3000
5	6 / (150)	SAE-24 (1 7/8-12 UN)	SK210-20/3218S-210ACM-KCH-15HP	3000
7.5	6 / (150)	SAE-24 (1 7/8-12 UN)	SK210-28/3218S-210ACMKCH-15HP	3000
10	6 / (150)	SAE-24 (1 7/8-12 UN)	SK210-40/3218S-210ACM-KCH-15HP	3000

Connections

SK 280 Series (Non-ASME) 4000 psi

Female Threaded Connections: A(1 Sample Code = A(1 A(2 A(3

Code	Type of Connection	D	E	F	G	H	J	K
A	BSPP (ISO 228)	G 1/2	G 3/4	G1				
C	ANSI B1.1 (UN..-2B) Seal SAE J 514		SAE-6 9/16-18UNF	SAE-8 9/16-16UNF	SAE-10 3/4-14UNF	SAE-12 7/8-12UN	SAE-14 1 1/16-12UN	SAE-16 1 5/16-12UN

1) use “A” as the first character of the connection code for all Female Threaded Connections.
2) Enter the letter of the ROW (red) as the second character of the connection code.
3) Enter the letter of the COLUMN (gray) as the third character of the connection code.

Standard Dimensions

SK 280 Series (Non-ASME) 4000 psi

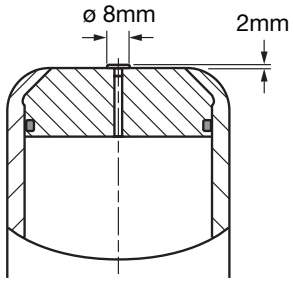
(Non-repairable)

Nominal Volume (L)	A +/- 3 (mm)	Thread F		Weight (kg)	D1 (mm)	D2 (mm)
		BSPP female	SAE female			
0.16	160	G 1/2	9/16-18-2B	2	50	60
0.32	240	G 1/2	9/16-18-2B	2.5		
0.5	335	G 1/2	3/4-16-2B	3.1		
0.75	460	G 1/2	3/4-16-2B	4		
1	590	G 1/2	3/4-16-2B	4.8		
0.32	205	G 1/2	3/4-16-2B	3	60	70
0.5	265	G 1/2	3/4-16-2B	3.5		
0.75	355	G 1/2	3/4-16-2B	4.2		
1	445	G 1/2	3/4-16-2B	5.1		
1.5	620	G 1/2	3/4-16-2B	6.4		
2	800	G 1/2	3/4-16-2B	7.8		
2.5	975	G 1/2	3/4-16-2B	9.2		
0.5	210	G 3/4	1 1/16-12-2B	6.5	80	95
0.75	260	G 3/4	1 1/16-12-2B	7.2		
1	310	G 3/4	1 1/16-12-2B	8		
1.5	410	G 3/4	1 1/16-12-2B	9.5		
2	510	G 3/4	1 1/16-12-2B	11.5		
2.5	605	G 3/4	1 1/16-12-2B	13		
3	705	G 3/4	1 1/16-12-2B	14.5		
3.5	805	G 3/4	1 1/16-12-2B	16		
4	905	G 3/4	1 1/16-12-2B	17.5		
0.75	235	G 1	1 5/16-12-2B	14	100	125
1	265	G 1	1 5/16-12-2B	15		
1.5	330	G 1	1 5/16-12-2B	17		
2	395	G 1	1 5/16-12-2B	19		
3	520	G 1	1 5/16-12-2B	23.5		
4	650	G 1	1 5/16-12-2B	28		
5	775	G 1	1 5/16-12-2B	32.5		
6	900	G 1	1 5/16-12-2B	37		

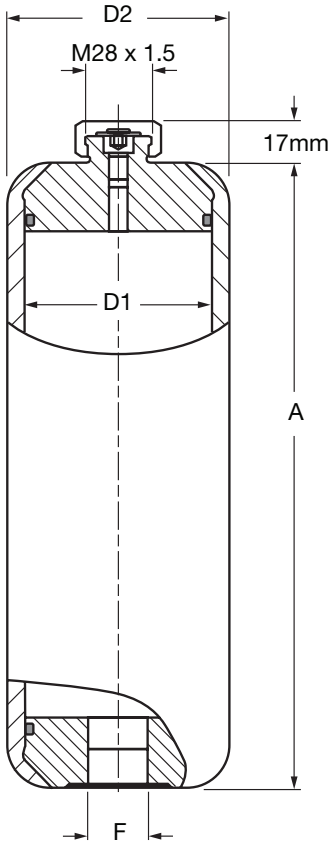
Clamps for D1=50mm D2=60mm Part Number 3018442
Clamps for D1=60mm D2=70mm Part Number 3018444
Clamps for D1=80mm D2=95mm Part Number 444995
Clamps for D1=100mm D2=125mm Part Number 444505
see page 83 for details

Dimensions are for general information only, all critical dimensions should be verified.

Dimensions
000 Connection -
Not Rechargeable



VB Connection - Refillable



PN#02068195 / 04.13 / ACU1102-1326

Connections
SK 350 Series (Non-ASME) 5000 psi

Model Code Support Tables for Fluid Connections

Female Threaded Connections: A **Sample Code = A[1] C[2] K[3]**

Code	Type of Connection	A	B	C	D	E	F	G	H	J	K	4" L	6" M
C	ANSI B1.1 (UN..-2B) Seal SAE J 514	SAE-2 5/16-24UNF	SAE-3 3/8-24UNF	SAE-4 7/16-20UNF	SAE-5 1/2-20UNF	SAE-6 9/16-18UNF	SAE-8 3/4-16UNF	SAE-10 7/8-14UNF	SAE-12 1 1/16-12UN	SAE-14 1 3/16-12UN	SAE-16 1 5/16-12UN	**SAE-20 1 5/8 12UN**	**SAE-24 1 7/8 12UN**
D	NPT (ANSI B1.20.3)	1/16-27	1/8-27	1/4-18	3/8-18	1/2-14	3/4-14	1-11 1/2	1 1/4-11 1/2	1 1/2-11 1/2	2 1/2-11 1/2	2 1/2-8	n/a

Note: Bold copy indicates standard size.
1) use "A" as the first character of the connection code for all Female Threaded Connections.
2) Enter the letter of the ROW (red) as the second character of the connection code.
3) Enter the letter of the COLUMN (gray) as the third character of the connection code.

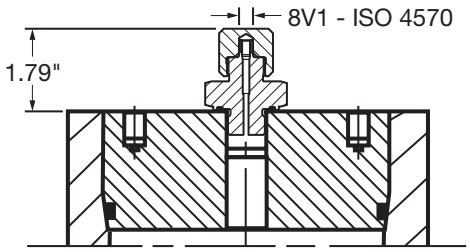
Flange Connections: F[4] **Sample Code = F[4] C[5] E[6]**

Code	Type of Connection	A	B	C	D	E	F
C	SAE Code 61 (3000 psi)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"

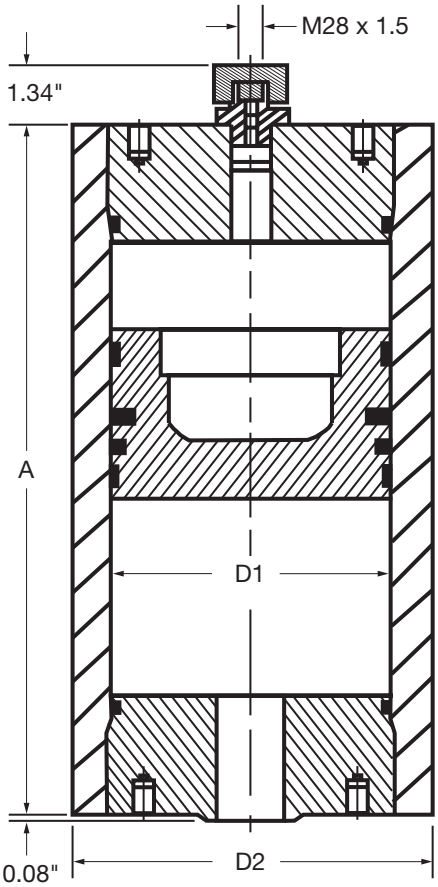
4) Use "F" as the first character of the connection code for all Flange Connections.
5) Use "C" as the second character of the connection code for all flange connections.
6) Enter the letter of the COLUMN (gray) as the third character of the connection code.

Type 2 Dimensions
SK 350 Series (Non-ASME) 5000 psi

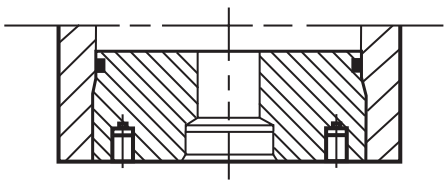
Gas Valve Version 4 (code designation VE)
Uses Charging Unit FPS



Gas Valve Version 1 (code designation VA)
Uses Charging Unit FPK



Flange Connection (code designation F_ _)
(specified by model code)



Threaded Connection (code designation A_ _)
(specified by model code)

5000 psi maximum working pressure

Size liters	Effective Gas Volume gal	Weight lbs / (kg)	A in / (mm)	ø D1 in / (mm)	ø D2 in / (mm)
0.2	0.05	15 / (7)	8.6 / (218)	2.36 (60)	3.15 (80)
0.5	0.125	20 / (9)	12.8 / (325)		
1	0.25	26 / (12)	19.8 / (502)		
0.5	0.125	24 / (11)	9.8 / (250)	3.15 (80)	3.94 (100)
1	0.25	29 / (13)	13.8 / (350)		
2	0.5	40 / (18)	21.7 / (550)		
2.5	0.625	62 / (28)	20.9 / (532)	3.94 (100)	4.96 (126)
5	1.25	88 / (40)	33.5 / (850)		
7.5	1.875	115 / (52)	46.1 / (1170)		
2	0.5	82 / (37)	13.6 / (345)	4.92 (125)	6.30 (160)
5	1.25	115 / (52)	23.2 / (590)		
15	3.75	225 / (102)	55.3 / (1405)		
6	1.5	128 / (58)	21.5 / (545)	5.91 (150)	7.09 (180)
20	5	231 / (105)	52.6 / (1335)		
40	10	386 / (175)	97.2 / (2470)		

Note: Other sizes available on request. Intermediate sizes are possible, depending on the length/ diameter required. Please consult factory for details on special sizes.
Dimensions are for general information only, all critical dimensions should be verified.

Connections

SK 350 & SK 600 Series (ASME) 3000 psi

Model Code Support Tables for Gas & Fluid Connections

Female Threaded Connections: A(1 Sample Code = A(1 A(2 A(3

Code	Type of Connection	Code, Size											
		A	B	C	D	E	F	G	H	J	K	L	M
A	BSPP (ISO 228)	G1/8	G1/4	G3/8	G1/2	G3/4	G1	G1 1/4	G1 1/2	G2	G2 1/2	G3	N/A
B	DIN 13 or ISO 965/1 (Metric)	M10x1	M12x1.5	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M27x2	M33x2	M42x2	M48x2	M60x2	N/A
C	ANSI B1.1 (UN..-2B) Seal SAE J 514	SAE-2 5/16-24UNF	SAE-3 3/8-24UNF	SAE-4 7/16-20UNF	SAE-5 1/2-20UNF	SAE-6 9/16-18UNF	SAE-8 3/4-16UNF	SAE-10 7/8-14UNF	SAE-12 1 1/16-12UN	SAE-14 1 3/16-12UN	SAE-16 1 5/16-12UN	SAE-20 1 5/8 12UN	SAE-24 1 7/8 12UN
D	ANSI B1.20.3	1/16-27	1/8-27	1/4-18	3/8-18	1/2-14	3/4-14	1-11 1/2	1 1/4-11 1/2	1 1/2-11 1/2	2-11 1/2	2 1/2-8	N/A

1) use “A” as the first character of the connection code for all Female Threaded Connections.
2) Enter the letter of the ROW (red) as the second character of the connection code.
3) Enter the letter of the COLUMN (gray) as the third character of the connection code.

Flange Connections: F(4 Sample Code = F(4 C(5 B(6

Code	Type of Connection	Code, Size											
		A	B	C	D	E	F	G	H	J	K	L	M
C	SAE Code 61 (3000 psi)	1/2”	3/4”	1”	1 1/4”	1 1/2”	2”	2 1/2”	3”	3 1/2”	4”	5”	N/A
D	SAE Code 62 (6000 psi)	1/2”	3/4”	1”	1 1/4”	1 1/2”	2”	N/A	N/A	N/A	N/A	N/A	N/A

4) use “F” as the first character of the connection code for all Flange Connections.
5) Enter the letter of the ROW (red) as the second character of the connection code.
6) Enter the letter of the COLUMN (gray) as the third character of the connection code.

Gas Valve Connections: V(7 Sample Code = V(7 (omit)(8 A(9

Code	Type of Connection
A	G 3/4 male with M28x1.5/M8 (standard HYDAC gas valve version 1)
B	M28 x 1.5 / M8 Integrated in gas side end-cap
E	G 3/4 male with 7/8-14 UNF-VG8 (standard HYDAC gas valve version 4)

7) use “V” as the first character of the connection code for all Gas Valve Connections.
8) OMIT the second character of the connection code.
9) Enter the letter of the ROW as the third character of the connection code.

Other Connections & Custom Solutions are Available:

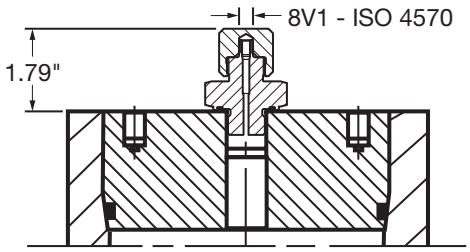
HYDAC has the capabilities to produce accumulators with many other types of connections. The options listed above are simply the most common, and most readily available. Other connection options include:

- Male threads
- Protruding flanges
- ANSI flanges
- DIN flanges
- Autoclave
- High Pressure Block FLANGE (Rexroth, AVIT, HAVIT) PN320

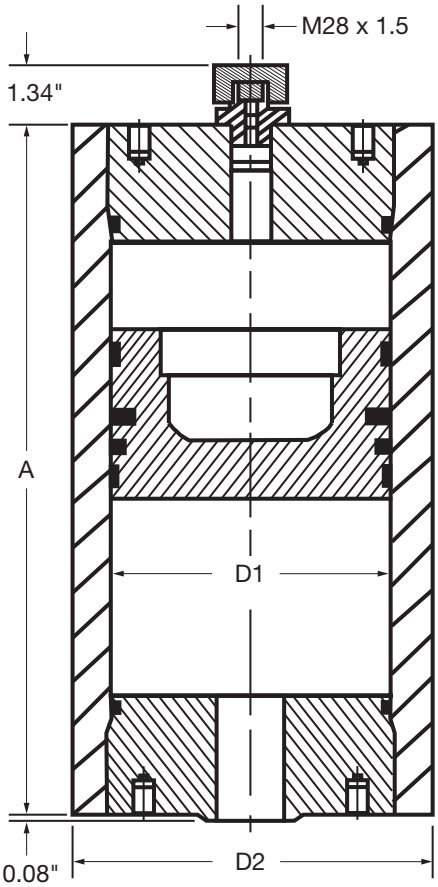
Custom solutions that incorporate valve/manifold assemblies are also available, for more information on special connections and custom solutions, consult factory.

Type 2 Dimensions
SK 350 Series (ASME) 3000 psi

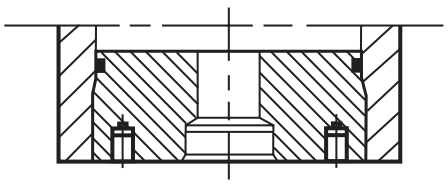
Gas Valve Version 4 (code designation VE)
Uses Charging Unit FPS



Gas Valve Version 1 (code designation VA)
Uses Charging Unit FPK



Flange Connection (code designation F_ _)
(specified by model code)



Threaded Connection (code designation A_ _)
(specified by model code)

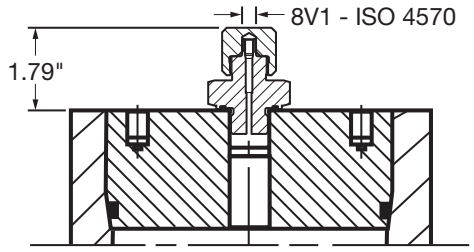
3000 psi maximum working pressure

Size liters	Effective Gas Volume gal	Weight lbs / (kg)	A in / (mm)	ø D1 in / (mm)	ø D2 in / (mm)
10	2.5	235 / (106)	28 / (710)	7.09 (180)	8.62 (219)
20	5	318 / (144)	43.4 / (1103)		
28	7.5	383 / (174)	55.8 / (1418)		
38	10	465 / (211)	71.3 / (1811)		
47	12.5	540 / (245)	85.2 / (2165)		
57	15	622 / (282)	100.7 / (2558)		
40	10	788 / (357)	49 / (1245)	9.84 (250)	12.21 (310)
50	12.5	882 / (400)	57.1 / (1450)		
60	15	974 / (442)	65 / (1651)		
75	20	1114 / (505)	77.1 / (1958)		
100	25	1347 / (611)	97.1 / (2466)		
115	30	1488 / (675)	109.2 / (2774)		
135	35	1676 / (760)	125.3 / (3183)		
150	40	1816 / (824)	137.4 / (3490)		
170	45	2004 / (909)	152.4 / (3871)		
190	50	2194 / (994)	168.4 / (4277)		
100	25	1859 / (843)	61.9 / (1572)	13.98 (355)	17.09 (434)
115	30	1986 / (901)	67.9 / (1725)		
150	40	2287 / (1037)	81.8 / (2078)		
190	50	2630 / (1193)	97.7 / (2482)		
250	65	3144 / (1426)	121.6 / (3089)		
300	80	3572 / (1620)	141.5 / (3594)		

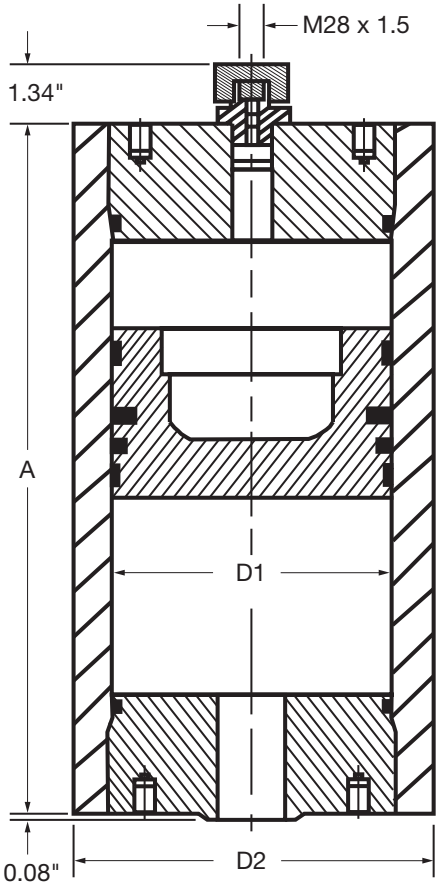
Clamps for D1=180mm Part Number 237401 *see page 83*
Clamps for D1=250mm Part Number 237389 *see page 83*
Clamps for D1=355mm (refer to factory)

Type 2 Dimensions
SK 600 Series (ASME) 5000 psi

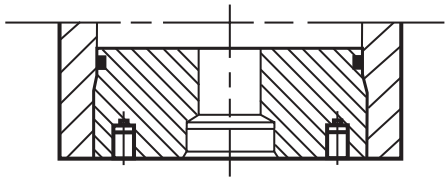
Gas Valve Version 4 (code designation VE)
Uses Charging Unit FPS



Gas Valve Version 1 (code designation VA)
Uses Charging Unit FPK



Flange Connection (code designation F_ _)
(specified by model code)



Threaded Connection (code designation A_ _)
(specified by model code)

5000 psi maximum working pressure

Size liters	Effective Gas Vol gal	Weight lb (kg)	A in (mm)	ø D1 in / (mm)	ø D2 in / (mm)
10	2.5	302 / (137)	28 / (711)	7.09 (180)	9.61 (244)
16	4	402 / (182)	37.2 / (945)		
20	5	447 / (203)	43.4 / (1102)		
30	7.5	606 / (275)	58.9 / (1496)		
40	10	736 / (334)	74.4 / (1890)		
50	12.5	884 / (401)	89.9 / (2283)		
40	10	1110 / (503)	49 / (1245)	9.84 (250)	13.31 (338)
50	12.5	1254 / (569)	57.1 / (1450)		
60	15	1396 / (633)	65 / (1651)		
75	20	1611 / (731)	77.1 / (1958)		
100	25	1969 / (893)	97.1 / (2466)		
115	30	2184 / (990)	109.2 / (2774)		
135	35	2472 / (1121)	125.3 / (3183)		
150	40	2689 / (1220)	137.4 / (3490)		
170	45	2977 / (1350)	153.5 / (3899)		
190	50	3265 / (1481)	169.5 / (4305)		

Dimensions are for general information only, all critical dimensions should be verified
Consult factory for clamps on these accumulators..

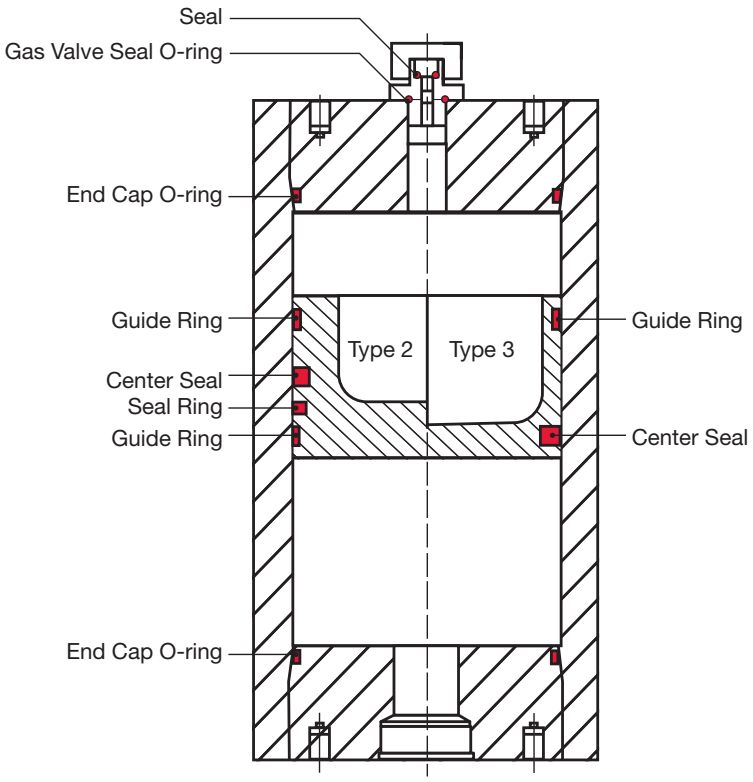
Piston Accumulators - Spare Parts

Seal Kits & Replacement Pistons

For seal kits other than Buna N, and for sizes not listed please consult factory.
Example: SK 350 - 20 / **2**112 S - 210 FCF - VE - **18** E - 1 *(see page 36 for details)*
Piston Type **Diameter**

Piston Seal Kits

Diameter	Type 2 (NBR)	Type 3 (PUR)
06 (60mm)	—	3016210
08 (80mm)	2123890	3013230
10 (100 mm)	363268	2123414
12 (125 mm)	—	2128104
15 (150 mm)	3016235	3145418
18 (180 mm)	363270	2123415
25 (250 mm)	363266	3016213
31 (310 mm)	3016200	—
35 (355 mm)	363272	—
49 (490 mm)	3104100	—



Replacement Pistons - w/ Seals

Diameter	Type 2 (NBR)	Type 3 (PUR)
06 (60mm)	—	3009372
08 (80mm)	352225	2119931
10 (100 mm)	356847	2115547
12 (125 mm)	3016232	3016150
15 (150 mm)	3016228	3016231
18 (180 mm)	2118451	3046277
25 (250 mm)	353980	3016171
31 (310 mm)	3004987	—
35 (355 mm)	356382	—
49 (490 mm)	3462428	—

Tools

When repairing a piston accumulator, it is critical to use the appropriate tools to avoid seal damage.
There are two tools required:

Seal Assembly Tool:

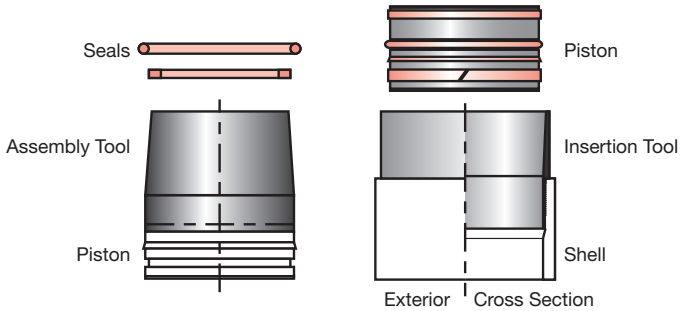
allows for gradual and even stretching of the seals when installing them onto the piston.

Piston Insertion Tool:

a tapered shroud that protects the seals from the threaded portion of the shell, and provides even seal compression and piston alignment when inserting the piston into the shell.

Tools

Diameter	Seal Assembly	Piston Insertion
08 (80 mm)	359537	359614
10 (100 mm)	352198	290056
12 (125mm)	3016278	2128223
15 (150 mm)	2124157	2124161
18 (180 mm)	350148	290049
25 (250 mm)	290035	290046
31 (310 mm)	2127304	2127305
35 (355 mm)	354147	3389677
49 (490mm)	3114220	3440695



For items not listed please contact HYDAC.
WARNING: Only qualified persons should perform maintenance on any type of accumulator.
Complete maintenance instructions are available - Contact HYDAC.

Accumulators

SK 210 / 350 / 600
Piston Accumulators

Maintenance and Parts

Index

1. Description

These Operating and Maintenance Instructions apply to HYDAC piston accumulators of the series SK210, SK350 and SK 600 having the following specifications:

permiss. operating pressure: 210 / 350 bar

permiss. operating temperature: –10 / 80°C with NBR seal

max. pre–charge pressure p_0: $p_{0,tmax} \leq p1 - 5$ bar

permiss. pressure ratio p_0: $p_2 \leq 1 : \infty$

Design, Approval: PED/AD–Regulations, ASME

For volumes, dimensions and weights *(when empty)*, see drawing or brochure.

2. Delivery Inspection

Prior to delivery, HYDAC accumulators undergo a careful inspection. Upon receipt of the accumulator, check that:

- no damage has been sustained during transport. In particular, check the gas valve and the hydraulic connection for damage,
- the details shown on the model code correspond to the order details,
- the test certificates (if required) are present and correspond to the factory number of the accumulator,
- the protective cap of the gas valve is tightly closed,
- the hydraulic connection has been closed off with a protective plug.

CAUTION!

After discharging and/or completely draining the accumulator (e.g. to depressurize the hydraulic system before work is carried out), the accumulator can build-up an amount of pressure again when the lines are later shut off on the fluid side.

This problem must be taken into account generally and in particular before carrying out work on hydraulic systems which include connected hydraulic accumulators.

All the fluid-side lines connected to the accumulator must therefore be depressurized and after that the lines remain open. Only then may the appropriate work (e.g. disassembly of the accumulator) be carried out.

CAUTION!

PRESSURIZED VESSEL USE DRY NITROGEN GAS ONLY

Please refer to HYDAC Operating and Installation Instructions

3. Installation and Mounting

3.1. Mounting Position

The piston accumulators can be mounted in any position. However, the vertical mounting position with the gas valve at the top is generally preferred.

Sufficient clearance must be left to mount and disconnect the piston accumulator. In particular, an area of at least 150 x 150 x 150 mm must be left above the gas valve for fitting and operating the charging and gauging unit.

3.2. Mounting

In accordance with the recommendations of the HYDAC brochure “Mounting Components”, HYDAC piston accumulators must be mounted vibration free using clamps and base brackets.

Note: Mounting elements must never be welded to the piston accumulator.

4. Connection

The connection of the accumulator to the system must be stress free and torque free.

It must be possible to isolate the accumulator from the pressurized hydraulic system.

5. Commissioning and Safety Precautions

5.1 Commissioning

Prior to connecting the accumulator to the pressurized system, the precharge pressure should be rechecked. If the accumulator was precharged at HYDAC the pressure level can be found on the label.

The level of the precharge pressure generally depends on the following criteria:

- type of system,
- expected changes in operating temperature,
- intended function of the accumulator.

The following precharge pressures are recommended:

for energy storage:

$p_{0,tmax} \leq$ P1 - 5 bar

$p_{0,tmin} \geq$ 2 bar

for volume compensation:

p_0 = static pressure of the system

Further information on the gas precharge pressures can be found in the HYDAC accumulator brochure “Piston Accumulators”. Charging and gauging of the precharge pressure is described in Point 6 “Inspection and Maintenance”.

5.2. Venting

Prior to commissioning, the accumulator must be vented on the oil side. Then apply the maximum operating pressure to the complete hydraulic system and check for leakages.

5.3. Safety Precautions

IMPORTANT!

Only use nitrogen to charge the accumulator, never oxygen or compressed air *(risk of explosion)*.

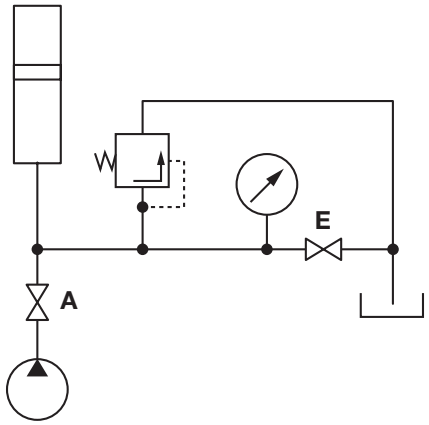
If the pressure of the nitrogen bottle is higher than the permissible operating pressure of the accumulator, a pressure regulating valve must be fitted.

6. Inspection and Maintenance

On the whole, nitrogen losses on piston accumulators are very low. However, it is advisable to check the precharge pressure p_0 at least once during the first week following commissioning so that larger nitrogen losses can be detected immediately. During the course of the first two months check the precharge pressure every two weeks, and thereafter every four weeks. If after this period no pressure change is detected, an annual check of the nitrogen pressure is sufficient.

6.1. Checking the Nitrogen Pressure without a Charging and Gauging Unit

In this case, as shown in the following drawing, a pressure gauge is connected to a line which is directly connected to the accumulator.



Isolate the fully charged piston accumulator from the hydraulic system by closing the shut off valve A. Slowly discharge the accumulator on the fluid side via drain valve E. The pressure gauge must be constantly monitored during this process. A slow, steady pressure drop is displayed. The pressure only drops abruptly when the accumulator has been completely discharged. The pressure displayed before the drop corresponds to the precharge pressure of the piston accumulator. If this pressure lies below the permissible value, the charging procedure must be carried out, as described in the following section.

6.2. Charging Procedure with the Charging and Gauging Unit

Using the charging and gauging units, hydraulic accumulators can be charged with nitrogen or tested to the precharge pressure P_0.

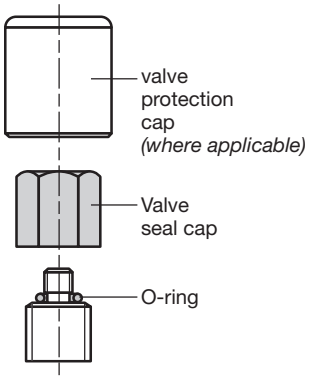
First, isolate the piston accumulator from the hydraulic system by closing the shut off valve A and discharge it on the fluid side. Then remove the valve seal cap of the piston accumulator.

When using accumulators with gas valves version 1 the gas valve insert must first be unscrewed slightly *(approx. 1/2 turn)* using a 6mm allen wrench.

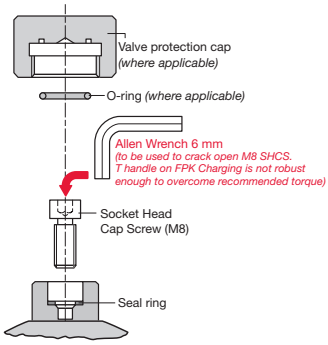
The T-handle of the FPU-1 must not be used for this. Now the charging and gauging unit can be connected.

When using accumulators with gas valve version 4, the valve seal cap must first be unscrewed. Only then can the charging and gauging unit and the nitrogen bottle be connected in accordance with the operating instructions *(with adapter A3)*. Ensure that the pressure release valve of the charging and gauging unit is closed. Turn the spindle in a counter-clockwise direction to unscrew the internal hex screw of the gas valve. Then slowly open the valve of the nitrogen bottle so that the nitrogen is released into the accumulator. Wait until approximately 1 bar precharge pressure has been reached and the piston is at the fluid side before opening the shut off valve of the nitrogen bottle further to enable faster charging.

Gas Valve Version 4



Gas Valve Version 1



Interrupt the charging procedure from time to time and check the precharge pressure reached. When the required precharge pressure has been reached, close the shut-off valve of the nitrogen bottle. Wait for approx. five minutes until temperature equalization is reached *(a longer period must be allowed for larger systems quantities)*, then recheck the precharge pressure and adjust if necessary. If the pressure is too high, it can be lowered via the pressure release valve of the charging and gauging unit.

Turn the spindle clockwise to securely tighten the internal hex screw. Then discharge the charging and gauging unit via the pressure release valve and remove it by loosening the cap nuts. On piston accumulators with gas valve version 1, the internal hex screw must be tightened to a torque rating of 20 Nm and with version 4 the valve seal cap must be tightened to a torque rating of 30 Nm. Finally check for leaks on the accumulator gas valve using a leak detector spray. Screw on valve protection cap.

Further details can be found in the operating instructions for part number 02068202.

6.3. Pressure Testing

For piston accumulators with a permissible operating pressure p greater than 1 bar and a pressure capacity p*V > 1000, for non-corrosive fluids, a pressure test must be carried out by an approval authority every 10 years, otherwise every 5 years.

An internal inspection must be carried out every five years and an external inspection every two years.

7. Storage and Preservation

If the period of storage until commissioning is no longer than three months, it is sufficient for the precharged accumulator to be stored in a cool, dry place, protected from direct sunlight, providing that the inside of the accumulator has first been coated with the intended hydraulic fluid. The accumulator can be stored in any position. To prevent contamination from entering the accumulator, ensure that the hydraulic connection is plugged.

If the accumulator is to be stored for longer than three months, check the required precharge pressure of the accumulator before commissioning.

If the accumulator has not been precharged, it must be plugged on the gas side and conserved with the intended operating fluid or another suitable conservation fluid.

8. Disassembly, Inspection and Assembly

8.1 Removal From System

- Carefully clean the area around the end caps on the gas and fluid side.
- On backup type piston accumulators the nitrogen feed line must be isolated by means of the shut off valve.
- Completely release the pressure on the fluid side of the accumulator. This causes the piston to move down to the end cap on the fluid side with the aid of the gas precharge pressure.
- Connect the charging and gauging unit according to the operating instructions and section 6.2. and release the pressure slowly by opening the pressure release valve.
- Remove all non pressurized lines on the gas and fluid side and remove the complete piston accumulator from the system.

8.1.1 Disassembly

Further disassembly should be carried out in a suitable, clean area.

- Clamp piston accumulator to a work bench and remove the gas valve and all adapters and accessories.
- Unscrew end caps on the gas and fluid side. This can be achieved by using 2 bolts or threaded rods positioned opposite each other. On large end caps an extension rod can be used.
- If the end cap is in two parts, then the connection screws between the threaded ring and end cap must be loosened first. Unscrew the threaded ring by approximately 3 turns and screw in the connection screws again. This pulls the end cap out. Carry out this process several times until the end cap is completely free.
- Push the piston out of the accumulator in the direction of the fluid side *(use suitable plastic or wooden rod and a rubber mallet)*. Both threaded bores in the piston can be used for this purpose.

8.1.2 Testing and Cleaning

a) Cylindrical tube
Carefully clean the inside of the cylindrical tube (piston body) with a non aggressive, non abrasive cleaning agent and then dry with a lint free cloth. Check the inside of the tube for rough spots and grooves. If these are found, it is possible for HYDAC to remachine the cylindrical tube within certain tolerances.

If any external or internal damage is found, the pressure vessel must be submitted to the manufacturer and, if applicable, the appropriate inspection authority for assessment.

b) End caps
Carefully clean the end caps and replace both O–rings.

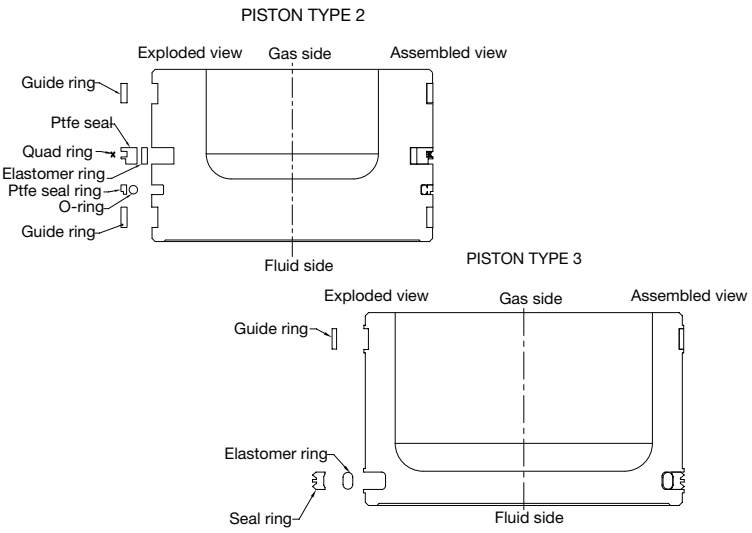
c) Piston
Remove all seals and guide rings and clean the piston thoroughly.

8.1.3 Assembly

a) Fitting the piston seals

Piston design type 2:

- Guide the mounting sleeve *(see point 9 – Special tools and spare parts)* over the piston from the fluid side as far as the groove provided for the center seal *(see part of center seal)*.
- Draw the elastomer ring over the sleeve into the groove provided. Then heat the center seal ring to 150°C to facilitate fitting and push it over the mounting sleeve into the designated position *(shoulder towards the oil side)*. This process must be completed in 10 to 15 seconds.
- Push the quadring into the recess of the seal ring *(see figure)*.
- Withdraw the mounting sleeve as far as the groove for the seal ring and fit elastomer O-ring. Then heat the seal ring to 150°C to facilitate fitting and press into the designated position over the mounting sleeve *(shoulder towards the oil side)*. This process must be completed in 10 to 15 seconds.
- Fit guide rings both on the gas as well as the oil side with the ends displaced by 180°.



Piston design type 3:

- Fit elastomer O-ring into the designated groove and then draw the seal ring over it.
- Fit guide rings both on the gas as well as the oil side with the ends displaced by 180°.

b) Fitting the piston

- Lubricate the upper area of the cylinder wall and the guide ends of the piston with a suitable lubricating agent *(filtered operating fluid)*. Do not use grease or water - water is not a lubricant!
- Place mounting sleeve *(see section 9 - Special tools and spare parts)* onto the cylindrical tube.
- With the hollow side towards the gas connection, insert the piston fully into the tube. A plastic or wooden rod or a rubber mallet can be used for this purpose.
- Grease both O-rings and the threads on the end caps.
- Screw both end caps, or end caps with threaded ring, into the cylindrical tube, if necessary with the aid of the two bolts and a rod, until they are level with the ends of the accumulator.
- If specified, the accumulator must be filled on the gas side with the designated quantity of oil.
- Fit the gas valve and all adapters and other accessories.
- Connect HYDAC charging and gauging unit and charge the accumulator according to the instructions *(see section 6.2)* with the required precharge pressure.
- On piston accumulators with the gas valve version 1, the internal. hex. screw must be tightened to a torque rating of 20 Nm and with version 4, the valve seal cap must be tightened to a torque rating of 30 Nm.
- Screw on valve protection cap.

c) Fitting the accumulator into the system

Reconnect the piston accumulator to the system and check for leaks according to section 6 - Inspection and Maintenance.

8.2. Piston Accumulator with Protruding Piston Rod

8.2.1 Disconnection, Disassembly, Testing and Cleaning

Disconnect the piston accumulator as described in section 8.1.

8.2.2 Assembly

a) Fitting the piston seals

Fit the piston seals as described in point 8.1.4 a)

b) Assemble the piston accumulator

- Fit piston rod into the piston base.
- Lubricate the upper part of the cylinder wall and the guide ends of the piston with a suitable lubricant *(filtered operating fluid)*. Do not use grease or water - water is not a lubricant!
- Place mounting sleeve *(see section 9 - Special tools and spare parts)* onto the cylindrical tube.
- With the hollow side towards the gas connection, insert the piston fully into the tube. A plastic or wooden rod or a rubber mallet can be used for this purpose.
- Grease both O-rings and the threads on the end caps.
- Screw in both end caps, or end caps with threaded ring, into the cylindrical tube, if necessary with the aid of the two bolts and a rod, until they are level with the ends of the accumulator.
- If specified, the accumulator must be filled on the gas side with the designated quantity of oil.
- Fit the gas valve and all adapters and other accessories.
- Push the guide block, fitted with an O–ring, over the piston rod and screw it firmly to the end cap.
- Fit the rubber packing seal kit in the groove provided.
- Place the sealing flange with the skimmer in position and screw on.
- Connect HYDAC Charging and Testing Unit FPU–1 and charge the accumulator according to the instructions *(see section 6.2)* with the required pre–charge pressure.
- On piston accumulators with the gas valve version 1, the internal. hex. screw must be tightened with a torque rating of 20 Nm and with version 4, the valve seal cap must be tightened with a torque rating of 30 Nm.
- Screw on valve protection cap.

c) Fitting the accumulator into the system

Reconnect the piston accumulator to the system and check for leaks according to section 6 - Inspection and Maintenance.

8.3. Piston Accumulator with Electrical Limit Switch

For item numbers, see section 9.2.3.

8.3.1 Disconnection, Disassembly, Testing and Cleaning

Disconnect the piston accumulator as described in section 8.1.

8.3.2 Assembly

a) Fitting the piston seals

Fit the piston seals as described in section 8.1.4 a)

b) Assemble the piston accumulator

- Lubricate the upper part of the cylinder wall and the guide ends of the piston with a suitable lubricant *(filtered operating fluid)*. Do not use grease or water - water is not a lubricant!
- Place mounting sleeve *(see section 9 - Special tools and spare parts)* onto the cylindrical tube.
- With the hollow end towards the gas connection, insert the piston fully into the tube. A plastic or wooden rod or a rubber mallet can be used for this purpose.
- Grease both O–rings and the threads on the end caps.
- Fit the limit switch with the O–ring in place.
- Screw in both end caps, or end caps with threaded ring, into the cylindrical tube, if necessary with the aid of the two bolts and a rod, until they are level with the ends of the accumulator.
- If specified, the accumulator must be filled on the gas side with the designated quantity of oil.
- Fit the gas valve and all adapters and other accessories.
- Connect HYDAC Charging and Testing Unit FPU–1 and charge the accumulator according to the instructions *(see section 6.2)* with the required precharge pressure.
- On piston accumulators with the gas valve version 1, the internal. hex. screw must be tightened with a torque rating of 20 Nm and with version 4, the valve seal cap must be tightened with a torque rating of 30 Nm.
- Screw on valve protection cap.

c) Fitting the accumulator into the system

Reconnect the piston accumulator to the system and check for leaks according to section 6 - Inspection and Maintenance.

9. Seal Kits & Replacement Pistons

For seal kits other than Buna N, and for sizes not listed please consult factory.

Example: SK 350 - 20 / **2**112 S - 210 FCF - VE - **18** E - 1 *(see page 33 for details)*

Piston Type — Diameter

Piston Seal Kits

Diameter	Type 2 (NBR)	Type 3 (PUR)
06 (60mm)	—	3016210
08 (80mm)	2123890	3013230
10 (100mm)	363268	2123414
12 (125mm)	—	2128104
15 (150mm)	3016235	3145418
18 (180mm)	363270	2123415
25 (250mm)	363266	3016213
31 (310mm)	301600	—
35 (355mm)	363272	—
49 (490mm)	3104100	—

Replacement Pistons - w/ Seals

Diameter	Type 2 (NBR)	Type 3 (PUR)
06 (60mm)	—	3009372
08 (80mm)	352225	2119931
10 (100mm)	356847	2115547
12 (125mm)	3016232	3016150
15 (150mm)	3016228	3016231
18 (180mm)	2118451	3046277
25 (250mm)	353980	3016171
31 (310mm)	356382	—
35 (355mm)	356382	—
49 (490)	3462428	—

Piston Accumulators: Tools

When repairing a piston accumulator, it is critical to use the appropriate tools to avoid seal damage. There are two tools required:

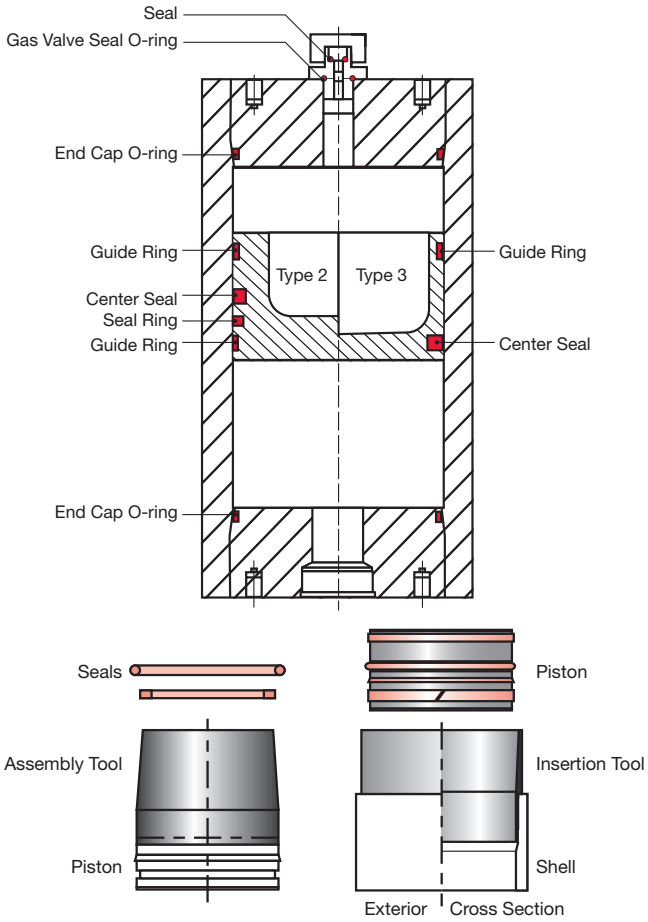
Seal Assembly Tool:
allows for gradual and even stretching of the seals when installing them onto the piston

Piston Insertion Tool:
a tapered shroud that protects the seals from the threaded portion of the shell, and provides even seal compression and piston alignment when inserting the piston into the shell.

Tools

Diameter	Seal Assembly	Piston Insertion
08 (80 mm)	359537	359614
10 (100mm)	352198	290056
12 (125mm)	3016278	2128223
15 (150mm)	2124157	2124161
18 (180mm)	350148	290049
25 (250mm)	290035	290046
31 (310mm)	2127304	2127305
35 (355mm)	354147	3389677
49 (490mm)	3114220	3440695

Seals Included with Piston Seal Kit



For items not listed please consult factory.

WARNING: Only qualified persons should perform maintenance on any type of accumulator.
For addition information please contact HYDAC.

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