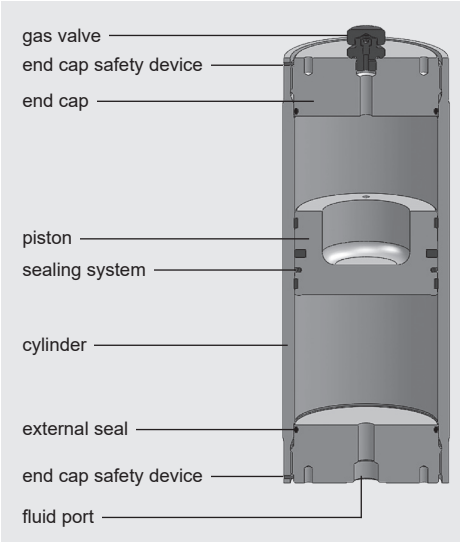
Piston Accumulators
Standard design

1. DESCRIPTION

1.1. FUNCTION

Fluids are practically incompressible and cannot therefore store pressure energy. The compressibility of a gas (nitrogen) is utilised in hydraulic accumulators for storing fluids. HYDAC piston accumulators are based on this principle.
A piston accumulator consists of a fluid section and a gas section with the piston acting as a gas-tight separation element. The gas section is pre-charged with nitrogen.
The fluid section is connected to the hydraulic circuit so that the piston accumulator draws in fluid when the pressure increases and the gas is compressed.
When the pressure drops, the compressed gas expands and forces the stored fluid into the circuit.

1.2. DESIGN



HYDAC piston accumulators consist of:

- A cylinder with very finely machined internal surface
- End caps on the gas side and the oil side, sealed with O-rings
- A floating steel or aluminium piston which can easily be accelerated due to its low weight
- A sealing system adapted to the particular field of application

The piston floats on guide rings which prevent metal-to-metal contact between the piston and the accumulator wall.
For use with certain aggressive or corrosive fluids, the parts coming into contact with the fluid can be nickel plated for protection, or made entirely from corrosion-resistant material.
Suitable materials are also available for low temperature applications.

When supplied piston accumulators are suitable for short-term storage.

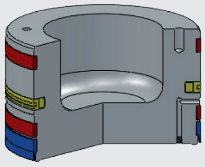
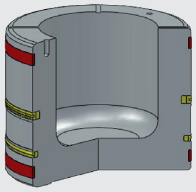
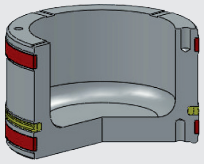
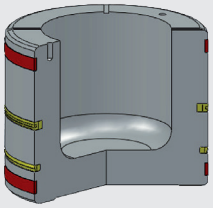
Piston accumulators suitable for long-term storage are available on request.

1.3. SEALING SYSTEMS

Precise information about the intended operating conditions is required in order to select the most appropriate sealing system for the field of application. Important criteria for this selection are, for example, the:

- Design pressure
- Actual pressure differential
- Switching frequency or switching cycle
- Temperature fluctuation
- Operating fluid
- Cleanliness of fluid (filtration rating)
- Maintenance requirements

The sealing systems differ according to the type of piston used, each of which has its own type and arrangement of seals. Various elastomers are available as a sealing material, depending on the operating conditions, see section 1.7.5.

Design		Application	Contamination level of fluid	Comment
	1	● For general accumulator operation without special requirements Application limitations: max. piston velocity: 0.5 m/s	Optimised for applications with a high level of contamination	
	2	● Low-friction design ● For high piston speeds ● Depending on fluid, slow movements without stick-slip effect Application limitations: max. piston velocity: 3.5 m/s	Filtration: NAS 1638 – Class 6 ISO 4406 - Class 17/15/12	
	3	● Low-friction design ● Simple-to-fit seals ● Depending on fluid, slow movements without stick-slip effect Application limitations: max. piston velocity: 0.8 m/s		1 guide ring for pistons with Ø ≤ 150 mm 2 guide rings for pistons with Ø ≥ 180 mm
	4	● Low-friction design with emergency safety features ● Depending on fluid, slow movements without stick-slip effect ● Very low oil transfer to the gas side Application limitations: max. piston velocity: 5 m/s		

1.4. INSTALLATION POSITION

HYDAC piston accumulators operate in any position.
Vertical installation is preferable with the gas side at the top, to prevent contaminant particles from the fluid settling on the piston seals. For hydraulic accumulators with certain piston position indicators, vertical installation is essential.

1.5. TYPE OF INSTALLATION

For strong vibrations and volumes above 1 litre, we recommend the use of two HYDAC mounting clamps, or more as appropriate, ideally in the end cap area.
See catalogue section:

- Mounting elements for hydraulic accumulators No. 3.502

1.6. ADVANTAGES

- Complete range with nominal volumes up to over 3300 litres possible
- High ratios possible between pre-charge pressure and max. operating pressure
- Economic solution using back-up gas bottles for low pressure differentials
- High flow rates possible; limitation: max. piston velocity
- Power savings
- High level of efficiency of the hydraulic system
- No sudden gas discharge when seals are worn
- Low space requirements
- Monitoring of the volume across the entire piston stroke or electrical limit switch

Further advantages of using the low-friction sealing system:

- Minimum friction
- Also suitable for low pressure differentials
- No start-up friction
- Depending on fluid, slow movements without stick-slip effect
- Low noise, no vibration
- High piston velocity up to 5 m/s for piston design 4
- Improved accumulator efficiency
- Good service life of seals due to low wear
- Suitable for large temperature fluctuations
- Low maintenance requirements

1.7. TECHNICAL REQUIREMENTS

HYDAC piston accumulators are suitable for high flow rates (e.g. 1000 l/s).

1.7.1 **Effect of sealing friction**

The permitted piston velocity depends on the sealing friction.

Higher piston velocities are possible where there is less sealing friction.

HYDAC piston accumulators of piston design 2 allow velocities of up to 3.5 m/s.

1.7.2 **Permitted velocities**

Gas velocity
The flow velocities in the gas side connection and pipe system should be limited to 30 m/s when using piston accumulators of the back-up type. Gas velocities of over 50 m/s should be avoided at all costs.

Oil velocity
In order to limit the pressure losses when the operating fluid is displaced, the flow velocity should not exceed 10 m/s in the fitting cross-section.

1.7.3 **Function tests and fatigue tests**

Function tests and fatigue tests are carried out to ensure continuous improvement of our piston accumulators.
By subjecting the accumulators to endurance tests under realistic as well as extreme working conditions, important data can be obtained about the long-term behaviour of the components. In the case of piston accumulators, important information on gas density and the service life of seals is gained from such tests.

Vital data for use in accumulator sizing is gained by altering the working pressure and switching cycles.

1.7.4 **Gas charging**

Hydraulic accumulators must only be charged with nitrogen.
Never use other gases.
Risk of explosion!

In principle, only use nitrogen of at least Class 4.0 (filtration < 3 µm).
If other gases are to be used, please contact HYDAC for advice.

1.7.5 **Working temperature and operating medium**

The permitted working temperature of a piston accumulator is dependent on the application limits of the metal materials and the piston seal. Outside this temperature range, special materials must be used. The operating medium must also be taken into account.
The following table displays a selection of elastomer materials including max. temperature range and a rough overview of resistant and non-resistant fluids. Please contact us for help in selecting a suitable elastomer.

Materials		Material code [1]	Temperature range	Overview of the fluids [2]	
				Resistant to	Not resistant to
NBR	Acrylonitrile butadiene rubber	2	-20 °C ... + 80 °C	● Mineral oil (HL, HLP) ● Flame-retardant fluids from the groups HFA, HFB, HFC ● Synthetic esters (HEES) ● Water ● Sea water	● Aromatic hydrocarbons ● Chlorinated hydrocarbons (HFD-S) ● Amines and ketones ● Hydraulic fluids from the group HFD-R ● Fuels
		5	-40 °C ... + 80 °C		
PUR	Polyurethane	8	Standard application -30 °C ... + 80 °C Special application -40 °C ... +100 °C	● Mineral oil (HL, HLP) ● Flame-retardant fluids from the HFA group	● Water and water-glycol mixture HFC ● Alkalis ● Acids
FKM	Fluorine rubber	6	-15 °C ... +160 °C	● Mineral oil (HL, HLP) ● Hydraulic fluids from the group HFD ● Synthetic esters (HEES) ● Fuels ● Aromatic hydrocarbons ● Inorganic acids	● Amines and ketones ● Ammonia ● Skydrol and HyJet IV ● Steam

[1] See section 2.2. Model code, material and piston code, material of seals incl. piston seals

[2] Others available on request

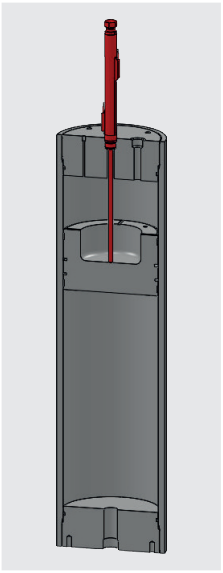
1.8. PISTON POSITION INDICATORS

Examples of piston monitoring devices.
Further options for determining the piston position and detailed technical data available on request.

See also flyer:

- Monitoring systems for hydraulic accumulators
  No. 3.506

1.8.1 Electrical limit switch



What is measured?
Max. or set fill level of the piston accumulator

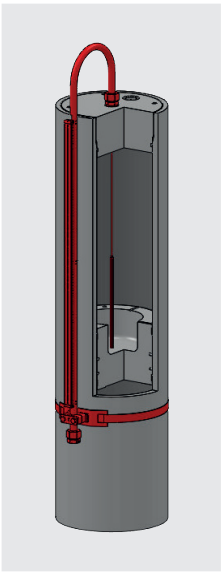
How are measurements taken?
As point measurements

Where to measure?
Gas side

Identification in the model code:
A, B, C, ..., depending on stroke

Product information:
No. 10000769094

1.8.2 Magnetic flap indication



What is measured?
Piston position via a magnet fastened to the cable that moves coloured flaps that can be read from the outside

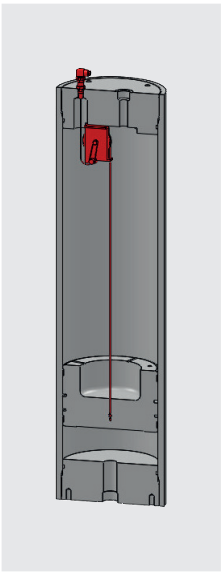
How are measurements taken?
Continuously

Where to measure?
Gas side

Identification in the model code:
M

Product information:
No. 10000769200

1.8.3 Cable tension measurement system



What is measured?
Piston position via a cable fastened to the piston

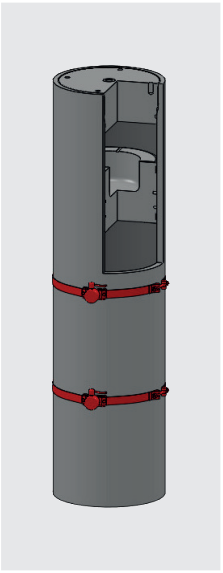
How are measurements taken?
Continuously

Where to measure?
Gas side

Identification in the model code:
S

Product information:
No. 10000641374

1.8.4 Piston position switch



What is measured?
Piston position via ultrasonic measurement

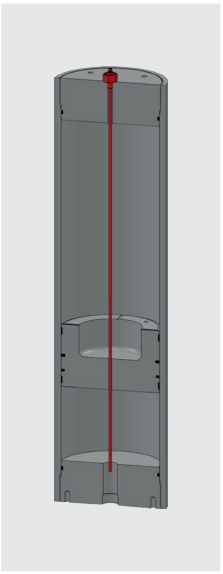
How are measurements taken?
As point measurements

Where to measure?
Fluid side

Identification in the model code:
UP...

Product information:
No. 10000769179

1.8.5 Linear position measurement system



What is measured?
Piston position via elapsed time measurement

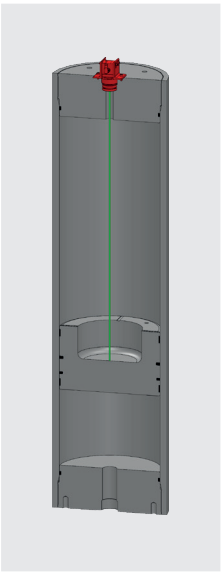
How are measurements taken?
Continuously

Where to measure?
Gas side

Identification in the model code:
L

Product information:
No. 10000810655

1.8.6 Laser linear position measurement system



What is measured?
Piston position via
laser elapsed time measurement

How are measurements taken?
Continuously

Where to measure?
Gas side

Identification in the model code:
LA

Product information:
No. 10000810664

2. SPECIFICATIONS

2.1. EXPLANATIONS, NOTES

2.1.1 **Nominal volume [l]**
See table in section 3.2.

2.1.2 **Eff. gas volume V_0 [l]**
This differs slightly from the nominal volume and forms the basis of the calculations of the effective fluid volume.
See section 3.3.

2.1.3 **Effective volume ΔV [l]**
Volume (fluid side) between operating pressures p_2 and p_1.

2.1.4 **Permitted operating temperature of the hydraulic accumulator**
-10 °C ... +80 °C
Standard design, others on request

2.1.5 **Certificate codes**

Country	Certificate code (CC)
EU member states	U
Australia	F [1]
Belarus	A6
Canada	S1 [1]
China	A9
Hong Kong	A9
Iceland	U
Japan	P
Korea (Republic)	A11
New Zealand	T
Norway	U
Russia	A6
South Africa	S2
Switzerland	U
Turkey	U
Ukraine	A10
USA	S

[1] Registration required in the individual territories or provinces.

Others on request

2.1.6 **Notice**
All work on HYDAC piston accumulators must only be carried out by suitably trained staff.

Incorrect installation or handling can lead to serious accidents.
The operating instructions must be observed!
No. 3.301.BA

Assembly and repair instructions are available for work which may be carried out on the piston accumulator after installation and commissioning, e.g. repair work.
No. 3.301.M

Further information such as accumulator sizing, safety information and extracts from the acceptance specifications can be found in the following catalogue section:

- HYDAC Accumulator Technology
  No. 3.000

Relevant PDF documents can be accessed at:
www.hydac.com » Downloads » Documents » Accumulator Division

2.2. MODEL CODE

Not all combinations are possible.
Order example. For further information, please contact HYDAC.

SK350 – 20 / 2212 U – 350 AAG – VA – 18 A – 1 – 050

Series

Nominal volume [l]

Material and piston code (MC)
Piston design (see section 1.3.)

Piston material
1 = aluminium
2 = carbon steel
3 = stainless steel [1]

Material of cylinder and end cap
1 = carbon steel
2 = carbon steel with surface protection
3 = stainless steel [1]
6 = carbon steel (low temperature)

Material of seals including piston seals
2 = NBR [2] / PTFE compound
5 = NBR [2] / PTFE compound
6 = FKM / PTFE compound
8 = NBR [2] / PUR
9 = special qualities

Certification code
U = European Pressure Equipment Directive (PED)

Permitted operating pressure [bar]

Fluid port
Type of connection (see Table 1)
Standard or specification of the type of connection (see Tables 2 + 3)
Size of connection (see Tables 4 + 5)

Gas-side connection or gas valve
Type of connection (see Table 1)
Standard or specification of the type of connection (see Tables 2 + 3)
(no letter required with connection type V)
Size of connection (see Table 4; 5 + 6)

Piston diameter

04	= 40 mm	20	= 200 mm
05	= 50 mm	25	= 250 mm
06	= 60 mm	31	= 310 mm
08	= 80 mm	35	= 355 mm
10	= 100 mm	49	= 490 mm
12	= 125 mm	54	= 540 mm
15	= 150 mm	61	= 610 mm
18	= 180 mm		

Additional equipment*
Detailed technical data on request
A = electrical limit switch – 35 mm stroke
B = electrical limit switch – 200 mm stroke
C = electrical limit switch – 500 mm stroke
E.. = other electrical limit switch, fixed or adjustable
K = protruding piston rod
L = linear position measurement system
LA = laser linear position measurement system
M = magnetic flap indication
S = cable tension measurement system
U = ultrasonic measurement system
UP.. = piston position switch
(e.g. UP2 = 2 position switches, UPEX = ATEX version)
W = limit switch with linear position measurement system

Safety equipment*
1 = burst disc (please give nominal pressure and temperature)
2 = gas safety valve
3 = temperature fuse

Pre-charge pressure p_0 [bar] at 20 °C*

* If required, please state at time of ordering!
[1] Dependent on type and pressure rating
[2] Observe temperature ranges, see section 1.7.

Table 1, Connection type

Code letter	Description
A	Threaded connection (internal thread)
B	Threaded connection (external thread)
F	Flange connection
H	Protruding flange
K, S	Combination connection / special connection
V	Gas valve type

Table 2, Threaded connection: standard or specification

Code letter	Description
A	Thread to ISO 228 (BSP)
B	Thread to DIN 13 or ISO 965/1 (metric)
C	Thread to ANSI B1.1 (UN..-2B, seal SAE J 514)
D	Thread to ANSI B1.20.3 (NPTF)

Table 3, Flange connection: standard or specification

Code letter	Description
A	Flanges to DIN standards (pressure rating + standard)
B	Flanges to ANSI B 16.5
C	SAE flange 3000 psi
D	SAE flange 6000 psi
E	High pressure block flange (Bosch-Rexroth) PN320
F	High pressure block flange (AVIT, HAVIT) PN320

Table 4, Threaded connection: sizes

Type listed in Table 2	Code letter, size										
	A	B	C	D	E	F	G	H	J	K	L
A	G 1/8	G 1/4	G 3/8	G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2	G 2 1/2	G 3
B	M10x1	M12x1.5	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M27x2	M33x2	M42x2	M48x2	M60x2
C	5/16-24UNF	3/8-24UNF	7/16-20UNF	1/2-20UNF	9/16-18UNF	3/4-16UNF	7/8-14UNF	1 1/16-12UNF	1 3/16-12UNF	1 5/16-12UNF	1 5/8-12UNF
D	1/16-NPTF	1/8-NPTF	1/4-NPTF	3/8-NPTF	1/2-NPTF	3/4-NPTF	1-11 1/2 NPTF	1 1/4-11 1/2 NPTF	11/2-11 1/2 NPTF	2-11 1/2 NPTF	2 1/2 - NPTF

Table 5, Flange connection: sizes

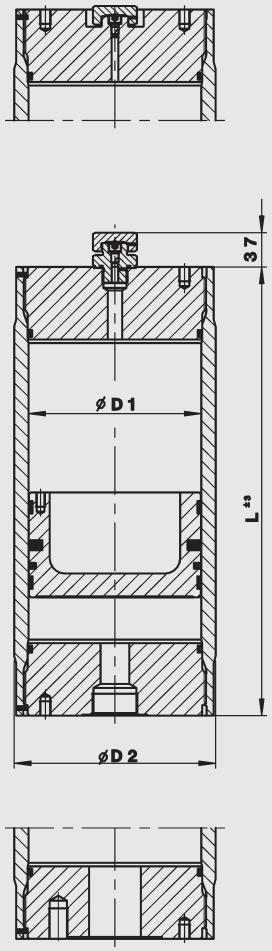
Type listed in Table 3	Code letter, size										
	A	B	C	D	E	F	G	H	J	K	L
A	DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	–
B	1/2" - 1500 psi	1" - 1500 psi	1 1/2" - 1500 psi	2" - 1500 psi	2 1/2" - 1500 psi	3" - 1500 psi	1/2" - 2500 psi	1" - 2500 psi	1 1/2" - 2500 psi	2" - 2500 psi	2 1/2" - 2500 psi
C	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"
D									–	–	–
E	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	–	DN 25	–
F											

Table 6, Gas valve models

Code letter	Description
A	Gas valve G3/4 male, with M28x1.5/M8
B	Gas valve in end cap M28x1.5/M8
C	Gas valve 1/2"-20UNF, male, with M16x2 (ISO 10945)
D	Gas valve M14x1.5, male, with male M16x1.5 (Minimess)
E	Gas valve G3/4 male, with 7/8-14UNF-VG8
F	Gas valve in end cap M42x1.5/M12

3. TECHNICAL DATA

3.1. DRAWING



3.2. DIMENSIONS

Nom. volume V min. - max. [l]	Series	Perm. operating pressure (PED) [bar]	Ø D1 [mm]	Ø D2 [mm]	Length calculation [1] L = a + (b • V) a [mm]	b [mm/l]	Weight [2] min. - max. [kg]
0.2 – 5	SK350	350	60	80	126	353.7	6 – 35
0.5 – 10	SK350	350	80	100	157	198.9	11 – 48
0.5 – 15	SK350	350	100	125	184	127.3	19 – 85
1 – 50	SK350	350	125	160	185	81.5	32 – 280
2.5 – 70	SK210	210	150	180	210	56.6	47 – 280
	SK350	350			234		52 – 285
2.5 – 100	SK210	210	180	210	262	39.3	70 – 346
	SK350	350		220			79 – 458
2.5 – 200	SK210	210	200	235	290	31.8	100 – 690
	SK350	350					
10 – 200	SK210	210	250	286	408	20.4	173 – 731
	SK350	350		300			204 – 999
25 – 400	SK350	350	310	350	462	13.2	390 – 1110
25 – 750	SK210	210	355	404	534	10.1	472 – 2154
	SK350	350		434			594 – 3413
200 – 1300	SK210	210	490	570	700	5.3	1589 – 4492
	SK350	350					1641 – 4696
300 – 3300	SK210	210	610	691	856	3.42	2500 – 11000
	SK350	350		710	950		

[1] The lengths calculated are usually rounded up or down in 5 mm increments
[2] Intermediate weights can be calculated approximately depending on the length/diameter required

Other pressures, volumes, approvals etc. possible on request.

3.3. EFFECTIVE GAS VOLUME V_0

The gas volume V is larger than the nominal volume given in the table in section 3.2. by the amount shown below.

Piston Ø D1 [mm]	Piston design 1	2	3	4
	Δ[l]			
60	–	0.040	0.038	0.040
80	–	0.044	0.081	0.044
100	0.062	0.062	0.270	0.062
125	–	0.169	0.546	0.169
150	–	0.653	0.824	0.653
180	1.213	1.213	1.286	1.213
200	–	0.999	1.601	0.999
250	3.034	3.034	2.617	3.034
310	–	6.221	–	6.221
355	4.514	4.514	–	4.514
490	–	12.705	–	12.705

3.4. VERSIONS

Piston design 2 (depending on version aluminium or carbon steel)

Carbon steel, NBR / PTFE

Nominal volume [l]	Series	Perm. operating pressure (PED) [bar]	Part no. [1]	Ø D1 [mm]	Ø D2 ±3 [mm]	L [mm]	Gas side connection	Fluid side connection ISO 228	Weight [kg]
10	SK350	350	3946133	150	180	800	M28x1.5	G 3/4	76
			3946157				G 3/4		
			3946158				gas valve		77
20	SK350	350	3946159	150	180	1365	M28x1.5	G 3/4	111
			3946161				G 3/4		
			3946164				gas valve		112
	SK210	210	3946260	180	210	1050	G 3/4	G 3/4	119
			3946262					G 1 1/2	120
			3586466				gas valve	G 3/4	
			3123789					G 1 1/2	118
32	SK350	350	3946195	150	180	2045	M28x1.5	G 3/4	152
			3946196				G 3/4		
			3946198				gas valve		153
			3946330	180	220	1520	G 3/4	G 3/4	193
			3112126					G 1 1/2	189
			3946331				gas valve	G 3/4	194
			3123473					G 1 1/2	190
	SK210	210	3946297	180	210	1520	G 3/4	G 3/4	153
			3152988					G 1 1/2	
			3946298				gas valve	G 3/4	
			3123470					G 1 1/2	150
	SK350	350	3946383 [2]	200	235	1310	G 3/4	G 3/4	174
			3946396 [2]				gas valve		175
50	SK350	350	3946332	180	220	2225	G 3/4	G 3/4	262
			3213717					G 1 1/2	250
			3946333				gas valve	G 3/4	262
			3123505					G 1 1/2	251
	SK210	210	3946301	180	210	2225	G 3/4	G 3/4	203
			3823656					G 1 1/2	
			3946302				gas valve	G 3/4	
			3280844					G 1 1/2	201
	SK350	350	3946399 [2]	200	235	1880	G 3/4	G 3/4	228
			3946402 [2]				gas valve		229
			3221083 [2]	250	300	1425	G 3/4	G 1 1/2	339
			3946442 [2]				gas valve		341
75	SK350	350	3946403 [2]	200	235	2675	G 3/4	G 3/4	302
			3946438 [2]				gas valve		303
100	SK350	350	3484504 [2]	250	300	2445	G 3/4	G 1 1/2	512
			3946475 [2]				gas valve		514

[1] Preferred models, others on request

[2] Material and piston code (MC) = 2112, see Model code, section 2.2.

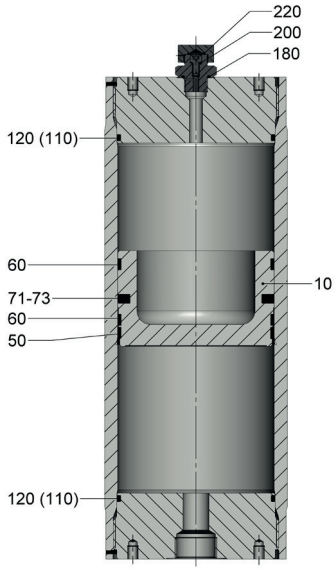
Notice:

Dimensions, particularly lengths, are approximate and dependent on various factors (e.g. piston design, approval).

The specified values are maximum values and must not be considered as referring to a permanent load. The tolerable pressure ratio is influenced by the geometry, temperature, fluid and flow rate as well as any gas losses caused by physical properties.

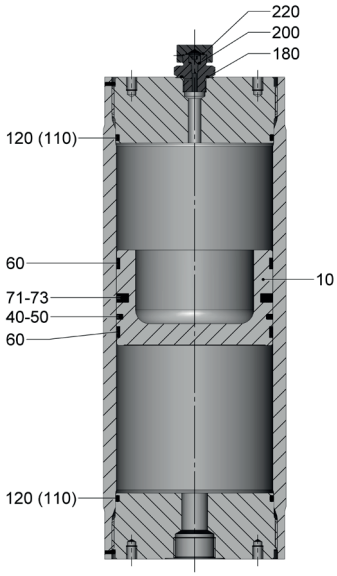
4. SPARE PARTS

Piston design 1



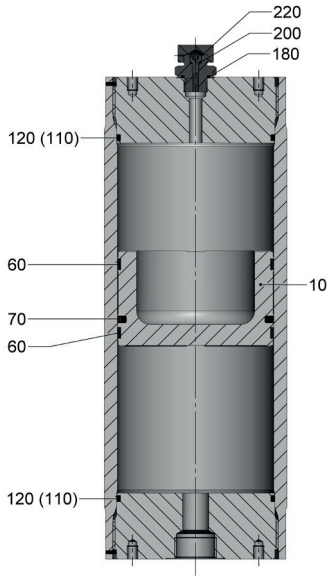
Description	Qty.	Item
Piston assembly [2] consisting of:		
Piston	1	10
Seal ring	1	50
Guide ring	2	60
Centre seal	1	71-73
Seal kit consisting of:		
Seal ring	1	50
Guide ring	2	60
Centre seal	1	71-73
(Support ring)	(2)	(110)
O-ring	2	120
O-ring	1	180
Seal ring	1	200
O-ring	1	220

Piston design 2



Description	Qty.	Item
Piston assembly [2] consisting of:		
Piston	1	10
Seal ring	1	40+50
Guide ring	2	60
Centre seal	1	71-73
Seal kit consisting of:		
Seal ring	1	40+50
Guide ring	2	60
Centre seal	1	70-73
(Support ring)	(2)	(110)
O-ring	2	120
O-ring	1	180
Seal ring	1	200
O-ring	1	220

Piston design 3



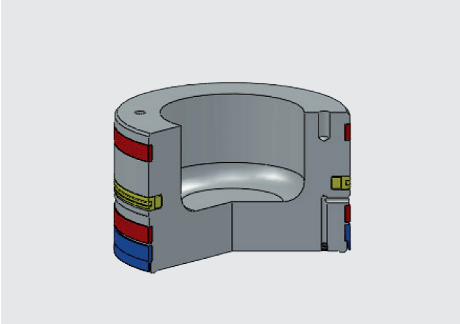
Description	Qty.	Item
Piston assembly [2] consisting of:		
Piston	1	10
Guide ring [1]	1/2	60
Seal ring	1	70
Seal kit consisting of:		
Guide ring [1]	1/2	60
Seal ring	1	70
(Support ring)	(2)	(110)
O-ring	2	120
O-ring	1	180
Seal ring	1	200
O-ring	1	220

Pressure-bearing parts cannot be supplied as spares.
(…) for SK690 and standard SK, internal diameters 310 mm and above
[1] The bottom guide ring for internal diameters 180 mm and above
[2] Items (110), 120, 180, 200 and 220 are enclosed unassembled.

Spare parts for piston design 4 are available on request.

4.1. PISTON AND SEAL KIT

Piston design 1



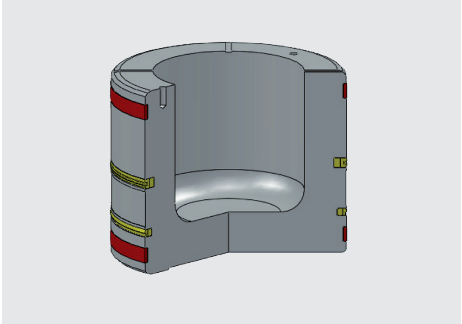
Piston assembly

Piston Ø [mm]	NBR / PTFE Part no.	FKM / PTFE Part no.
60	–	–
80	–	–
100	3128922	3128926
125	–	–
150	–	–
180	3141888	3182493
200	–	–
250	3128924	3128938
310	–	–
355	3128925	3128939
490	–	–

Seal kit

Piston Ø [mm]	NBR / PTFE Part no.	FKM / PTFE Part no.
60	–	–
80	–	–
100	3128940	3128944
125	–	–
150	–	–
180	3128941	3128945
200	–	–
250	3128942	3128946
310	–	–
355	3128943	3128947
490	–	–

Piston design 2



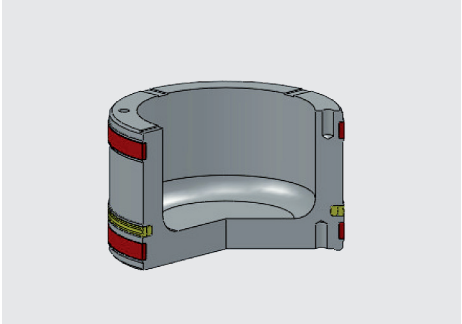
Piston assembly

Piston Ø [mm]	NBR / PTFE Part no.	FKM / PTFE Part no.
60	3183495	–
80	3183496	3183497
100	3175476	3183117
125	3016232	3016253
150	3016228	3016229
180	2118451	2112535
200	3110811	3016215
250	353980	353981
310	3016195	3016197
355	356382	354079
490	3128989	3128990

Seal kit

Piston Ø [mm]	NBR / PTFE Part no.	FKM / PTFE Part no.
60	3090507	–
80	3041573	3015745
100	363268	363269
125	3116665	3016234
150	3016235	3016237
180	363270	363271
200	3110810	3016242
250	363266	363267
310	3016200	3016201
355	363272	363273
490	3104100	3128991

Piston design 3



Piston assembly

Piston Ø [mm]	NBR / PUR Part no.
60	3009372
80	2119931
100	2115547
125	3016150
150	3016231
180	3046277
200	3016218
250	3016171
310	–
355	4323005
490	4323006

Seal kit

Piston Ø [mm]	NBR / PUR Part no.
60	3016210
80	3013230
100	2123414
125	2128104
150	3007546
180	2123415
200	3113127
250	3016213
310	4374872
355	3726888
490	3894300

Pressure-bearing parts cannot be supplied as spares.
Spare parts for piston design 4 are available on request.

4.2. ASSEMBLY INSTRUCTIONS

Special assembly sleeves are needed to assemble the piston and seals, see:

Assembly and repair instructions for piston accumulators
No. 3.301.M

5. NOTE

The information in this brochure relates to the operating conditions and fields of application described.

For applications and/or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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