



Safety Equipment for Hydraulic Accumulators

1. DESCRIPTION

1.1. GENERAL

Hydraulic accumulators are pressure equipment, as defined by the European Pressure Equipment Directive (PED), and as such their manufacture is subject to the statutory regulations.

For safety in the workplace, system manufacturers and operators must draw up risk assessments for the particular site. These must take into account possible risks at the installation site, particularly in combination with external factors.

Fundamental risks affecting hydraulic accumulators are:

- Excessive pressure and
- Temperature increase (e.g. in the event of an external fire).

HYDAC provides the appropriate safety equipment to protect accumulators from the maximum permitted operating pressure PS of a hydraulic accumulator being exceeded on the gas and fluid side; see also catalogue section:

- HYDAC Accumulator Technology No. 3.000

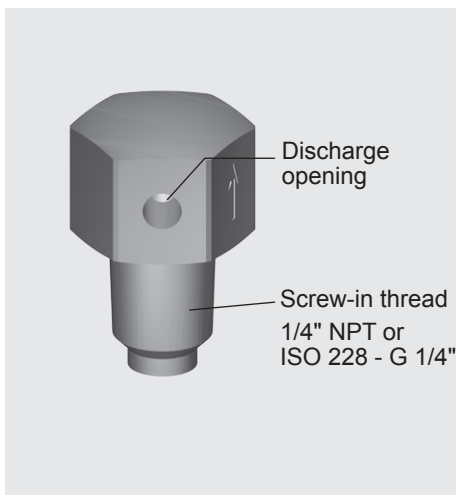
When selecting safety equipment, consideration must be given to the material (elastomers and housing material) as regards material compatibility in the application.

The response pressure of safety equipment must **not** exceed the max. permitted operating pressure PS of a hydraulic accumulator.

2. PROTECTION ON THE GAS SIDE

2.1. BURST DISC

2.1.1 Design



2.1.2 Function

If the pressure exceeds the permitted level, the burst disc is destroyed, permanently opening the port. This reduces the gas pressure by discharging the nitrogen completely.

Burst discs are designed for different response pressures and are supplied with a declaration of conformity.

Bursting discs are made either entirely of stainless steel, or from an alloy based on stainless steel and nickel.

2.1.3 Standard types

Burst disc, welded, with declaration of conformity to PED
DN5

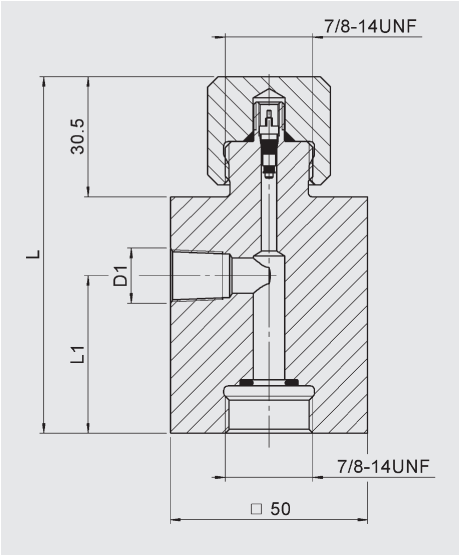
Designation	Burst pressure ± 10% at 50 °C	Part no.
Burst disc plug 1/4" NPT	210 bar	3156148
	250 bar	3156150
	300 bar	3156151
	330 bar	3341280*
	350 bar	3156152
Burst disc plug ISO 228 G 1/4"	210 bar	3516441
	330 bar	3560189
	400 bar	3358418

* preferred models
others on request

Burst disc, clamped, with declaration of conformity to ASME VIII, Div. 1 and VD stamp
DN 15, 1/2" NPT
on request

2.1.4 Adapter for bladder accumulators

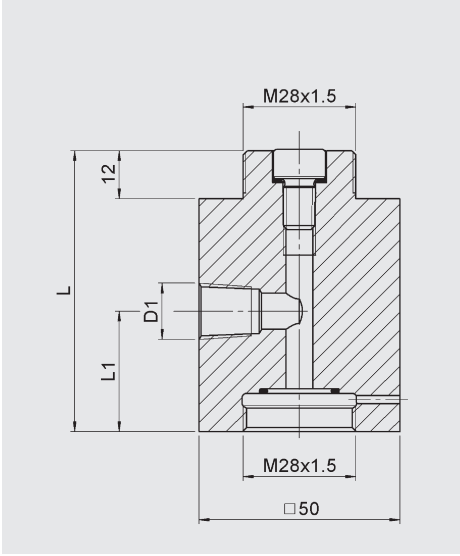
To protect standard and low pressure bladder accumulators, the adapter shown below must be ordered with the burst disc:



L [mm]	L1 [mm]	D1	Carbon steel	Stainless steel
90.5	40	1/4" NPT	366694	–
81.5	30	1/4" NPT	–	3117711
90.5	40	ISO 228 G 1/4"	364802	–
81.5	30	ISO 228 G 1/4"	–	3521154

2.1.5 Adapter for piston and diaphragm accumulators

To protect piston and diaphragm accumulators, the adapter shown below must be ordered with the burst disc:



L [mm]	L1 [mm]	D1	Carbon steel	Stainless steel
70	30	1/4" NPT	3344645	–
		1/4" NPT	–	4329253
		ISO 228 G 1/4"	4286781	–
		ISO 228 G 1/4"	–	3564669

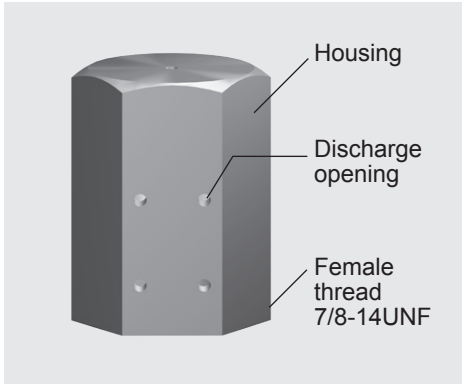
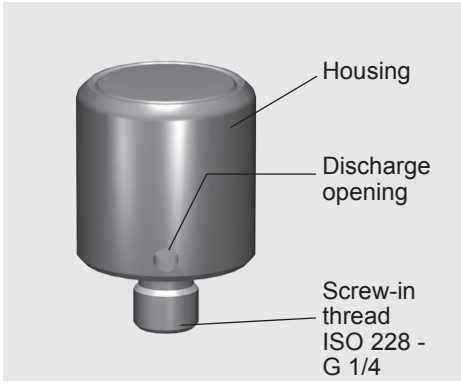
2.2. TEMPERATURE FUSE PLUG

HYDAC offers two different kinds of temperature fuse. In addition to the temperature fuse in carbon steel and stainless steel, which is suitable for bladder accumulators, HYDAC also offers a temperature fuse of the type GMP6, which is approved according to the European Pressure Equipment Directive (PED). It is made of stainless steel and has a CE marking.

2.2.1 Function

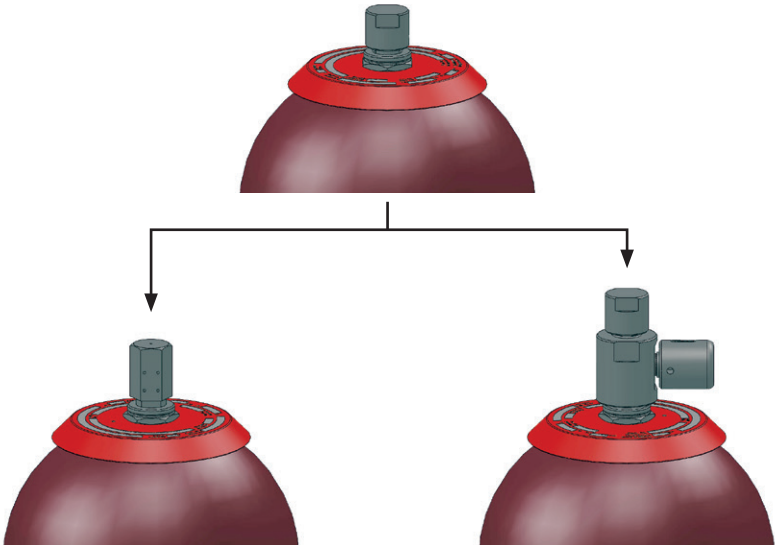
Temperature fuses are “devices with a safety function” and are used to release the gas pressure by discharging the nitrogen completely when an increase in temperature reaches unacceptable levels (e.g. in the case of fire).

2.2.2 Design/technical data/standard models

Type	Temperature fuse		Temperature fuse GMP6	
Design				
Permitted operating pressure	≤ 450 bar		50 ... 420 bar	
Temperature range	-10 °C ... +80 °C		-40 °C ... +120 °C	
Melting temperature	between +160 °C and +170 °C		between +160 °C and +170 °C	
CE marking	not available		available	
Standard types	363501*	Temperature fuse 7/8-14UNF	3517438	GMP6-10-CE1637...
	3094166*	Temperature fuse 7/8-14UNF with eye bolt (for crane hook)	3521196	GMP6-10-CE1637... with adapter for bladder accumulators
			3584817	GMP6-10-CE1637... with adapter for piston and diaphragm accumulators

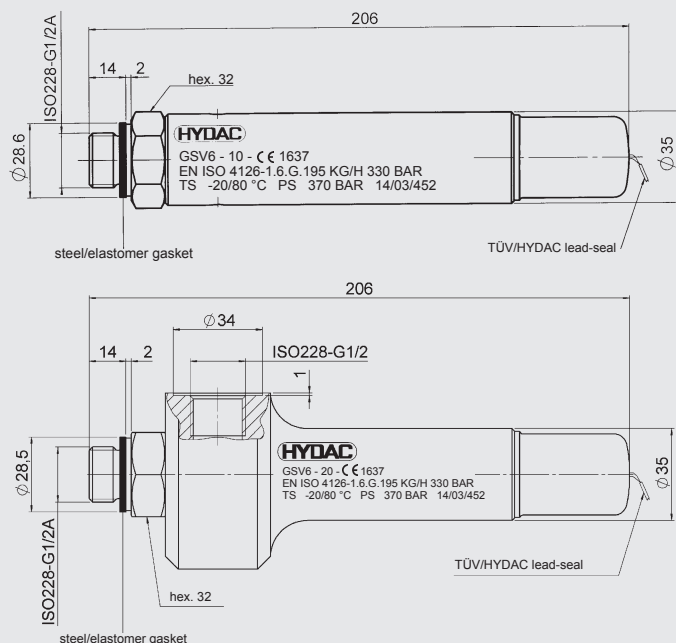
* Preferred models

2.2.3 Installation instructions

Type	Temperature fuse	Temperature fuse GMP6
The operating instruction must be followed! ● GSV/GMP No. 3.504.BA	Simple to retrofit (using the example of a bladder accumulator) by replacing the sealing cap with the temperature fuse.	
Bladder accumulator without temperature fuse		
Temperature fuse or temperature fuse GMP6 and adapter		

2.3. GAS SAFETY VALVE

2.3.1 Design and dimensions



2.3.2 Function

The gas safety valve protects the hydraulic accumulator by reducing the pressure in a controlled way if pressure exceeds the permitted level unexpectedly. It is pre-set on the pressure side and lead-sealed by the authorised representative. It is also supplied with a declaration of conformity and a type approval.

The gas safety valve is not suitable for continuous operation. This may cause the valve to leak prematurely.

2.3.3 Model code

(also order example)

GSV6 - 10 - CE1637.ENISO4126-1.6.G. 195. 330

Gas safety valve

Series

10 = Standard with 2 discharge openings nominal size 6 mm
20 = 1 discharge opening ISO 228 - G 1/2

Component code

Outlet mass flow Q_m [kg/h]

(see table, section 2.3.6)

Response pressure p [bar]

(see table, section 2.3.6)

2.3.4 Technical data

Dimensioning

European Pressure Equipment Directive (PED), EN ISO4126-1, EN 764-7, others on request

Module category

IV to European Pressure Equipment Directive (PED)
Module B + D (EC type examination)
Module G (EC individual examination) on request

Nominal size

6 mm

Outlet mass flow

see section 2.3.6

Material

Stainless steel, closing element with flexible seat seal

Medium

Nitrogen (N₂)

Operating pressure range

30 ... 370 bar

Temperature range

-20 °C ... +80 °C
others on request

Weight

1.1 kg

2.3.5 Installing the gas safety valve GSV

The self-centring steel-elastomer seal ring means that this valve can be installed simply and securely in any position.

The operating instructions must be followed!

- GSV/GMP
No. 3.504.BA

2.3.6 Standard types

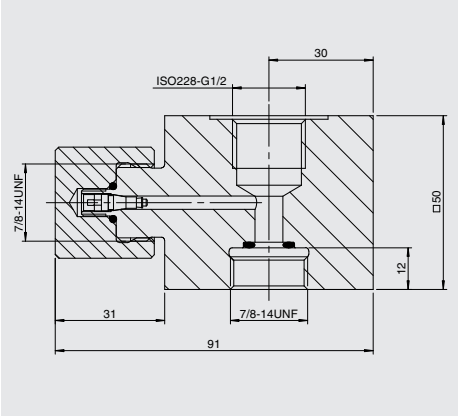
Selection of the response pressure is based on the maximum operating pressure of the hydraulic accumulator, according to the application.

Q _m [kg/h]	p [bar] ± 10 %	Part no. ¹⁾
15	30	3123965
20	40	3123966
28	50	3123967
35	60	3124028
40	70	3124029
45	80	3124030
50	90	3124031
58	100	3124032
65	110	3124033
70	120	3124034
75	130	3124035
83	140	3124036
88	150	3124037
95	160	3124038
100	170	3124039
105	180	3124040
110	190	3124041
118	200	3124042
125	210	3124043
130	220	3124044
135	230	3124045
140	240	3124046
148	250	3124047
155	260	3124048
160	270	3124049
165	280	3124050
170	290	3124051
178	300	3124052
185	310	3124053
190	320	3124054
195	330	3124055
200	340	3124056
205	350	3124057

¹⁾ others on request
> 350 bar = additional price required for EC type examination, please ask

2.3.7 Adapter for bladder accumulators

To protect standard and low pressure bladder accumulators, the adapter shown below must be ordered with the gas safety valve GSV6.

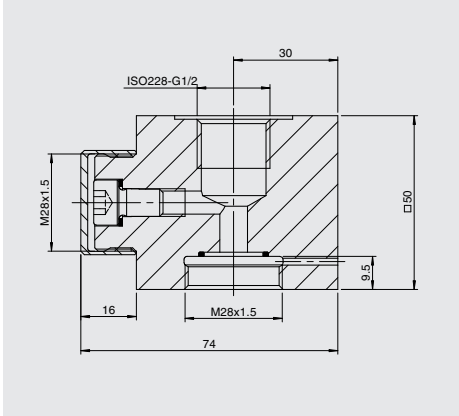


Designation	Part no.
Adapter assembly for bladder accumulators	2103381

others on request

2.3.8 Adapter for piston and diaphragm accumulators

To protect piston and diaphragm accumulators, the adapter shown below must be ordered with gas safety valve GSV6:

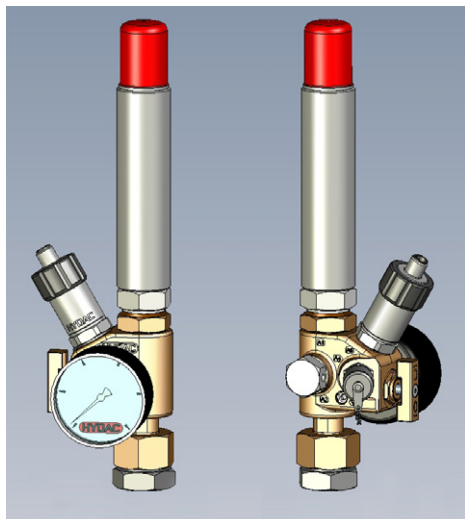


Designation	Part no.
Adapter assembly for piston and diaphragm accumulators	3423339

others on request

2.4. GAS SAFETY BLOCK

2.4.1 Design



Gas safety block GSB450 consists of a brass block (other materials on request) with integrated bleed and shut-off valve and ports for:

- Pressure gauge
- Gas safety valve (GSV6)
- Gas charging valve (e.g. Minimess)
- Pressure transmitter or pressure switch
- Burst disc or temperature fuse

The gas safety valve connection is designed as a check-valve. Therefore the valve can be changed, even if the system is pressurised.

2.4.2 Function

The GSB450 is an adapter block, which is mounted on an hydraulic accumulator on the gas side and which can be fitted with various pressure devices, charging equipment, safety valves and other safety components.

2.4.3 Advantages

- Compact design
- Flexible connection options
- Variable indication options: bar, MPa or psi, analogue or digital (optional)
- Pressure indicator can be oriented according to customer requirement
- Accumulator can be charged with nitrogen, directly via Minimess valve
- Pre-charge pressure can be checked without FPU-1

2.4.4 Model code (also order example)

GSB450 - 1 - 1 - 5 - 1 - 1 - 350

Series

Material

- 1 = standard
(brass and add-on parts in carbon steel)
- 2 = stainless steel
(brass and add-on parts in stainless steel)
- 3 = stainless steel
(on request)

Accumulator connection

- 1 = connection for SK/SBO
- 2 = connection for SB 7/8-14UNF
- 3 = connection for SB 5/8-18UNF
- 8 = connection for threaded pipe fitting DKS18
- 9 = special connection

Pressure gauge display

- 0 = none
- 1 = 0 - 25 bar
- 2 = 0 - 100 bar
- 3 = 0 - 160 bar
- 4 = 0 - 250 bar
- 5 = 0 - 400 bar
- 9 = special pressure gauge

Gas charging connection

- 0 = none
- 1 = Minimess valve M16x2
- 2 = Minimess valve M16x1.5
- 3 = Minimess valve M16x1.5 for permanent monitoring
(see section 2.4.6)
- 9 = special connection

Safety devices

- 0 = none
- 1 = GSV
- 2 = burst disc
- 3 = temperature fuse

Pressure range of the safety equipment

2.4.5 Technical data

Medium

Nitrogen (N₂)

Permitted operating temperature

-20 °C ... +80 °C

Max. operating pressure

400 bar / 5800 psi

Accumulator connection

Bladder accumulator:
7/8-14UNF with adapter

For bladder accumulators, the appropriate adapter is supplied. All other connections are sealed with screw plugs.

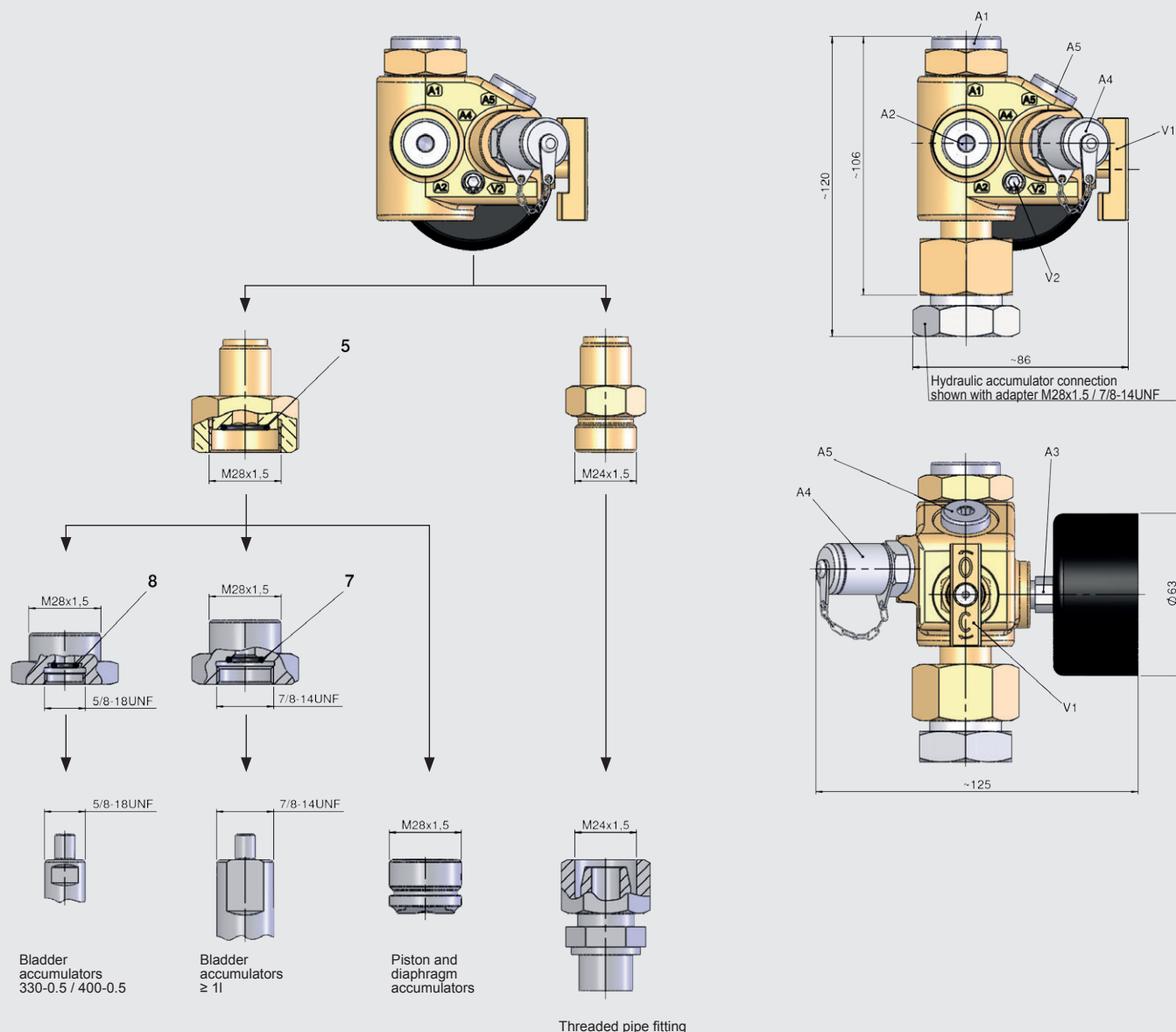
Piston and diaphragm accumulators:
M28x1.5

For piston and diaphragm accumulators the connection is a lock nut with M28x1.5 thread as standard.

Weight

- Standard model for SB
1.6 kg
- Standard model for SBO and SK
1.5 kg

2.4.6 Dimensions and models



Standard model

The GSB450 is delivered with the following as standard:

- Shut-off valve
- Unloading valve
- Pressure gauge (0 - 400 bar, Ø 63 mm) and
- Gas charging connection, code 1 (Minimess threaded coupling, series 1620, M16x2)

The shut-off valve (V1) must always be closed following the charging and testing procedure to protect the pressure gauge (A3), Minimess valve (A4) and pressure switch/pressure transmitter (A5) from long-term pressure load.

The pressure side must be depressurised at the release valve (V2).

If a pressure switch/pressure transmitter for permanent monitoring of the accumulator pre-charge pressure is screwed in at connection A5, the shut-off valve (V1) must be open. We recommend the gas charging connection with code 3 for this, see also options.

Options

The GSB450 can be supplied with the following options*:

- Special pressure gauge, e.g.
 - units other than bar/psi
 - glycerin-filled
- Minimess gas charging valve with code 3 for permanent monitoring (series 1615, M16x1.5, stainless steel version)
- Version where all steel parts are stainless steel (A4)
- Safety devices (gas safety valve GSV6, burst disc, temperature fuse)

* on request and must be ordered separately and at additional cost

2.4.7 Standard types

Designation	Part no.
GSB450-1-1-1-1-0	3534710
GSB450-1-1-2-1-0	3534711
GSB450-1-1-3-1-0	3534712
GSB450-1-1-4-1-0	3528946
GSB450-1-1-5-1-0	3426882
GSB450-1-2-1-1-0	3534713
GSB450-1-2-2-1-0	3534714
GSB450-1-2-3-1-0	3484861
GSB450-1-2-4-1-0	3433824
GSB450-1-2-5-1-0	3426905

2.4.8 Installation of gas safety block GSB

The operating instruction must be followed!

- GSB
No. 3.505.BA

2.4.9 Accessories

Block connections

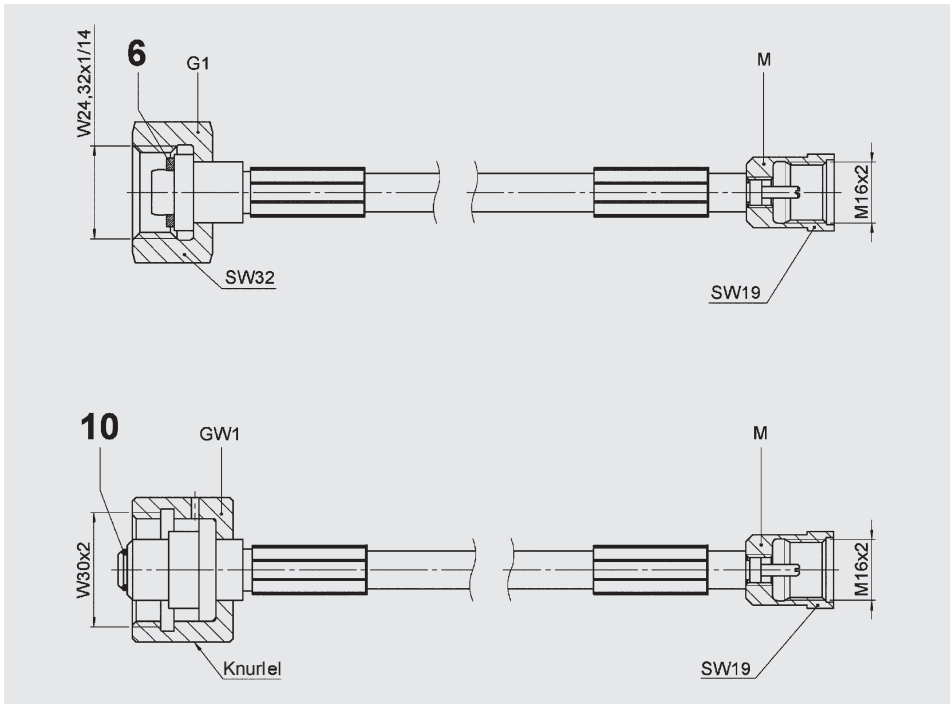
Ports	Size	Standard configuration	Optional configuration
A1	ISO 228 - G1/2	Screw plug	Gas safety valve GSV6
A2	ISO 228 - G1/4	Screw plug	● Remote charging (on customer side) ● Burst disc ● Temperature fuse
A3		Pressure gauge 0 - 400 bar	● for other measuring ranges, see section 2.4.4 ● special pressure gauge (please specify)
A4		Minimess valve M16x2	Minimess valve M16x1.5 (various versions possible, please request, see section 2.4.4)
A5		Screw plug	Pressure transmitter e.g. HYDAC HDA, EDS

Valves

Type	Description
V1	Shut-off valve
V2	Unloading valve (int. hex. AF width 4)

Connecting hoses

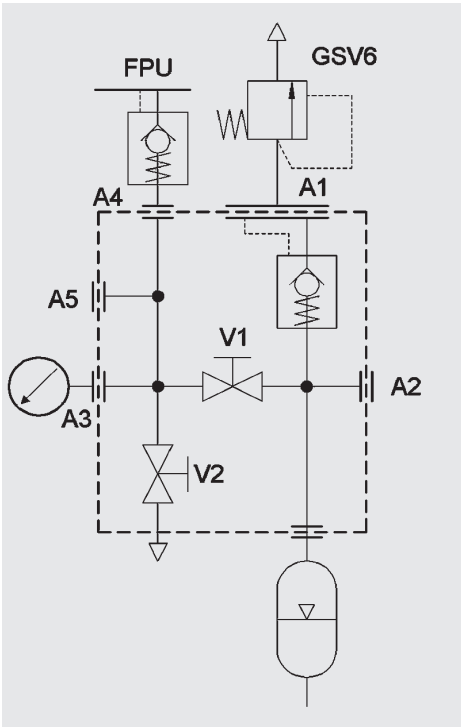
Connecting hoses are designed for the particular maximum permitted operating pressure marked on them and 10,000 charging processes.
(HYDAC charging hoses comply with DIN EN ISO 4413 and DIN EN 853 to 857)



Gas connection of nitrogen bottles	Minimess connection	Length [m]	Part no.
W30x2	M16x2	2.5	3434454
		4	3434457
W24.32x1/14	M16x2	2.5	3434424
		4	3434451
		10	3526858

Suitable adapters for foreign nitrogen bottles can be found in the following catalogue section:

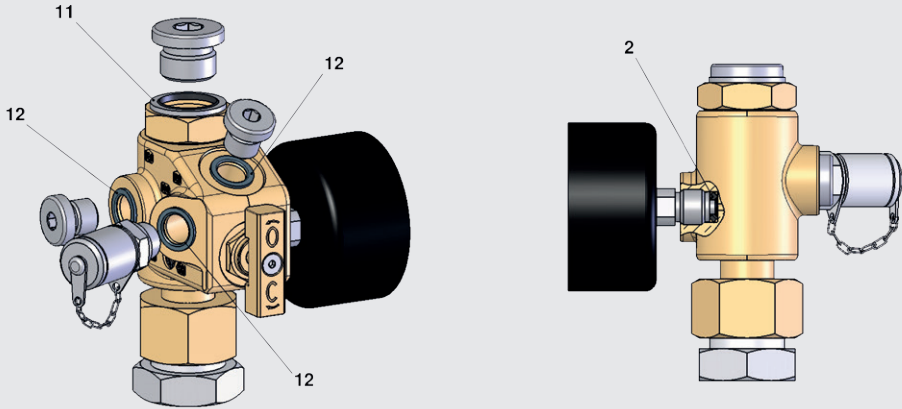
- Charging and testing unit FPU No. 3.501



2.4.10 Spare parts

The following spare parts for GSB450 relate to the standard version:

Carbon steel/NBR



Description	Quantity	Item	Part no.
Seal kit for GSB450 consisting of:	1	-	4024196
Rhombic seal 1/4"	1	2	-
O-ring 15x2	1	5	-
Seal ring	1	6	-
O-ring 11x2	1	7	-
O-ring 9x2	1	8	-
O-ring 5.7x1.9	1	10	-
Seal ring	1	11	-
Seal ring	3	12	-
Pressure gauge	1	3	635139
0 - 10 bar			635140
0 - 25 bar			635141
0 - 100 bar			635142
0 - 250 bar			635143
0 - 400 bar			

3. PROTECTION ON THE FLUID SIDE

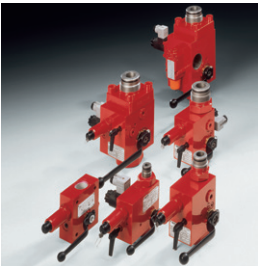
3.1. GENERAL

The fluid side must be protected from pressures exceeding the permitted operating pressures by installing approved and appropriate unloading valves.

HYDAC offers pressure relief valves (DB12) which have a response pressure of up to 400 bar (set by HYDAC). The valve bears the CE marking, is built into safety and shut-off blocks in the series DSV10 and SAF in nominal sizes DN10 to DN50 and is lead-sealed.

Further information is available from the following catalogue section:

- Safety and Shut-off Block SAF/DSV No. 3.551



4. NOTE

The information in this brochure relates to the operating conditions and fields of application described. For fields of application and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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