



## Charging and Testing Unit FPU

for Bladder, Piston and Diaphragm Accumulators

### 1. DESCRIPTION

#### 1.1. FUNCTION

The HYDAC charging and testing unit FPU is used to charge hydraulic accumulators with nitrogen or to check or to change the existing pre-charge pressure in accumulators.

For this purpose the charging and testing unit is screwed onto the gas valve of the hydraulic accumulator and connected to a nitrogen bottle via a flexible hose with a pressure reducer (see diagram of design with FPU-1, right).

Adapter A3 is needed to charge and test the HYDAC bladder accumulator (included in scope of delivery).

HYDAC nitrogen charging units make it possible to rapidly and inexpensively charge and/or test the required gas pre-charge pressures in bladder, piston and diaphragm accumulators. They guarantee an optimal utilisation of standard commercial nitrogen bottles up to a residual pressure of 20 bar and a maximum pre-charge pressure of 350 bar. Portable, mobile and stationary N2-Server versions are available.

For further information and technical specifications, see catalogue section:

- Nitrogen charging units N2-Server No. 2.201

Higher pre-charge pressures up to 500 bar available on request.

Information on how to check the pre-charge pressure and testing intervals and other instructions relating to operation can be found in the operating instructions.

**The operating instruction must be observed!**

No. 3.501.BA

#### 1.2. DESIGN

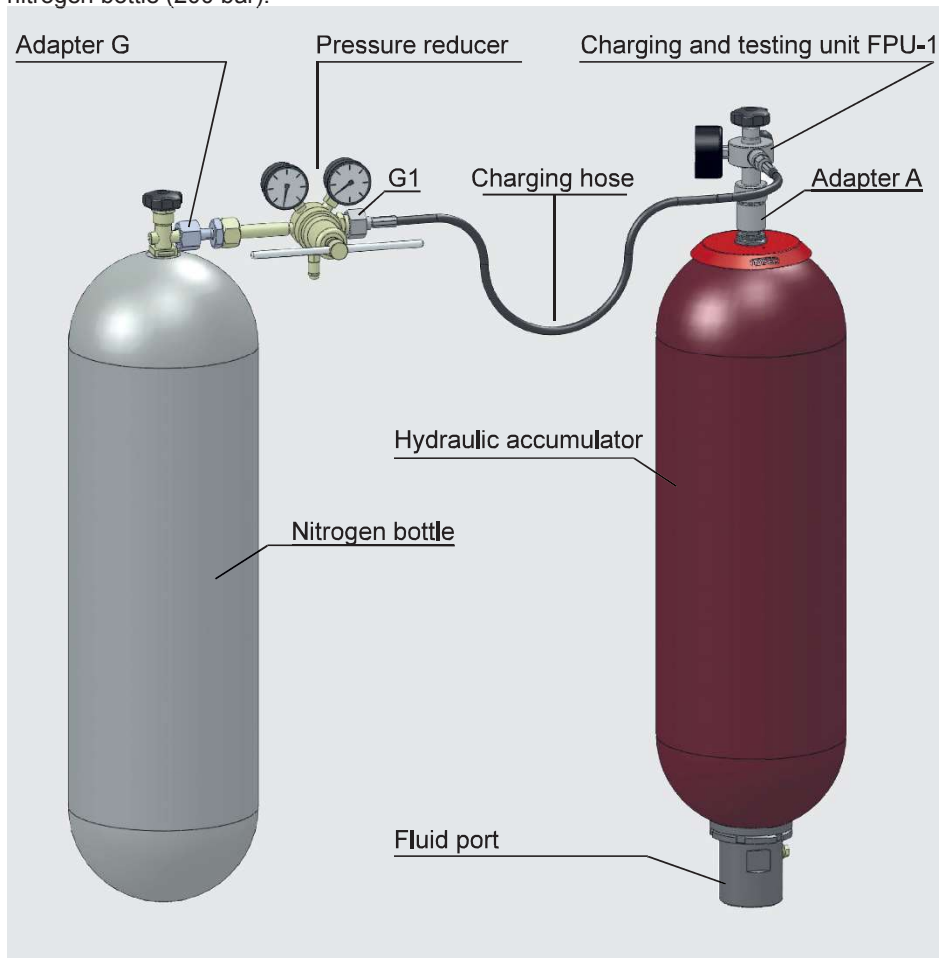
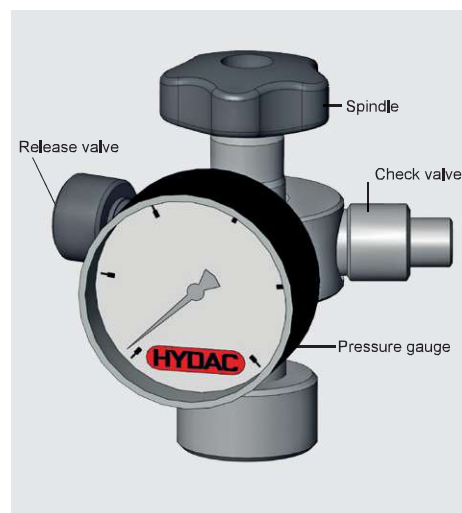
The HYDAC charging and testing unit FPU-1 for bladder, piston and diaphragm accumulators consists of a primary body with:

- Spindle
- Check-valve
- Release valve
- Pressure gauge

(for ports, see section 3.)

#### 1.3. DIAGRAM OF CHARGING AND TESTING PROCEDURE

The following illustration shows the typical design of the charging and testing procedure of a HYDAC bladder accumulator used in connection with a nitrogen bottle (200 bar).



## 2. SPECIFICATIONS

### 2.1. MODEL CODE

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

FPU-1-350 / 250 F 2.5 G2 A1 K

#### Charging and testing unit

FPU-1-350 = standard ( $p_{\max} = 350$  bar)

FPU-2-800 = high-pressure version ( $p_{\max} = 800$  bar)

#### Pressure gauge display range

10 = 0 - 10 bar (0 - 145 psi)

25 = 0 - 25 bar (0 - 363 psi)

100 = 0 - 100 bar (0 - 1450 psi)

250 = 0 - 250 bar (0 - 3625 psi)

400 = 0 - 400 bar (0 - 5800 psi)

1000 = 0 - 1000 bar (0 - 14500 psi high-pressure version)

#### Charging hose

F = for nitrogen bottle 200 bar with connection W24,32x1/14  
(DIN 477, Part 1)

FM = for nitrogen bottle 300 bar with connection M30x1.5  
(DIN 477, Part 5 up to April 2002)

FW = for nitrogen bottle 300 bar with connection W30x2  
(DIN 477, Part 5 from April 2002)

FH = for pressure booster systems with connection 9/16-18UNF

#### Charging hose length

Standard

2,5 = 2.5 m

4,0 = 4 m

High pressure version

6,0 = 6 m

others on request

#### Adapter G for nitrogen bottles (only FPU-1)

see table, section 3.5.

#### Adapter A

A3 = 7/8-14UNF, incl. in FPU-1 scope of delivery as standard

A3H = 7/8-14UNF (high pressure version), not incl. in FPU-2 scope of delivery  
for others, see table, section 3.4.

#### Accessories

K = Protective case

for other accessories, please give full details when ordering, see section 4.

### 2.2. STANDARD TYPES FPU-1

The basic version of the FPU-1 is the minimum equipment required to test and set the pre-charge pressure ( $p_0$ ) at the hydraulic accumulator. It comprises the FPU-1, a charging hose and the adapter A3 for bladder accumulators. The following standard types are available (others on request):

#### Models without protective case

Designation	Part no.
FPU-1-350/010F2.5A3	2114486
FPU-1-350/010F4A3	2115056
FPU-1-350/025F2.5A3	2114481
FPU-1-350/025F4A3	2116876
FPU-1-350/100F2.5A3	2114310
FPU-1-350/100F4A3	2115657
FPU-1-350/250F2.5A3	2114306
FPU-1-350/250F4A3	2114311
FPU-1-350/400F2.5A3	2115646
FPU-1-350/400F4A3	2119673

#### Models with protective case

Designation	Part no.
FPU-1-350/010F2.5A3K	2115365
FPU-1-350/010F4A3K	3013690
FPU-1-350/025F2.5A3K	2114305
FPU-1-350/025F4A3K	2116738
FPU-1-350/100F2.5A3K	2115314
FPU-1-350/100F4A3K	2114842
FPU-1-350/250F2.5A3K	2114302
FPU-1-350/250F4A3K	2114303
FPU-1-350/400F2.5A3K	2114307
FPU-1-350/400F4A3K	2114304

To enable nitrogen bottles from different countries to be used, HYDAC provides a selection of adapters as accessories. The following standard types are available (others on request):

#### Models with protective case and adapter G

Designation	Part no.
FPU-1-350/250F2,5G2A3K	2114309
FPU-1-350/250F2,5G3A3K	2114308
FPU-1-350/250F2,5G4A3K	2103046
FPU-1-350/250F2,5G5A3K	2117038
FPU-1-350/250F2,5G6A3K	2115420
FPU-1-350/250F2,5G7A3K	2120010
FPU-1-350/250F2,5G8A3K	2115216
FPU-1-350/250F2,5G9A3K	2115833
FPU-1-350/250F2,5G10A3K	2115403
FPU-1-350/250F2,5G11A3K	3104265
FPU-1-350/250F2,5G12A3K	3738731
FPU-1-350/250F2,5G13A3K	3820014

2.3. SPECIAL DESIGNS FPU-1

In addition to the standard FPU-1, HYDAC supplies special designs, such as

- with digital pressure gauge
- with additional ports (e.g. Minimes M16x2)
- for aggressive media

We are able to provide detailed information on request.

2.4. HIGH PRESSURE VERSIONS



The FPU-2 was designed specifically for high pressure applications. Just like the FPU-1, the FPU-2 can be used for universal applications. It can be screwed on directly for charging and/or filling HYDAC piston and diaphragm accumulators. In connection with a HYDAC bladder accumulator, the high pressure adapter A3H must be used. This is not included in standard delivery.

2.4.1 Technical data

**Model code:**  
see section 2.1.

**Max. operating pressure:**  
800 bar

**Pressure gauge display range:**  
0 - 1000 bar (0 - 14500 psi)

**Material:**  
Stainless steel 1.4313

2.4.2 Standard types FPU-2

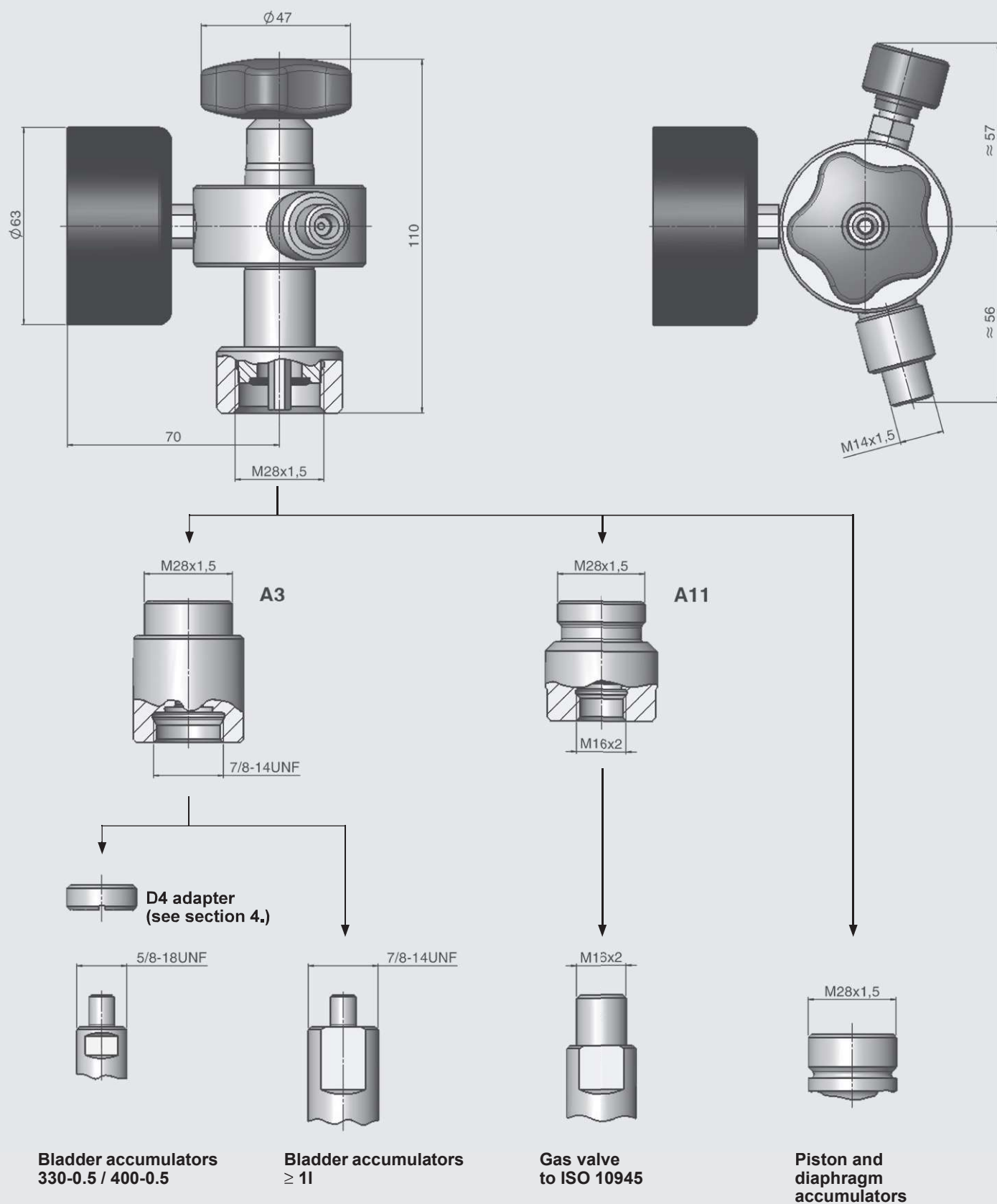
The following versions are exclusively suitable for use with a pressure booster system.  
Other versions on request.

Models without protective case	
Designation	Part no.
FPU-2-800/1000F6	4043456
FPU-2-800/1000F6A3H	4043455

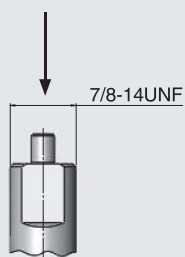
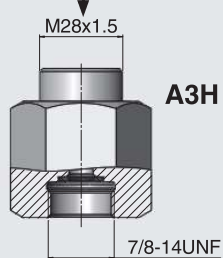
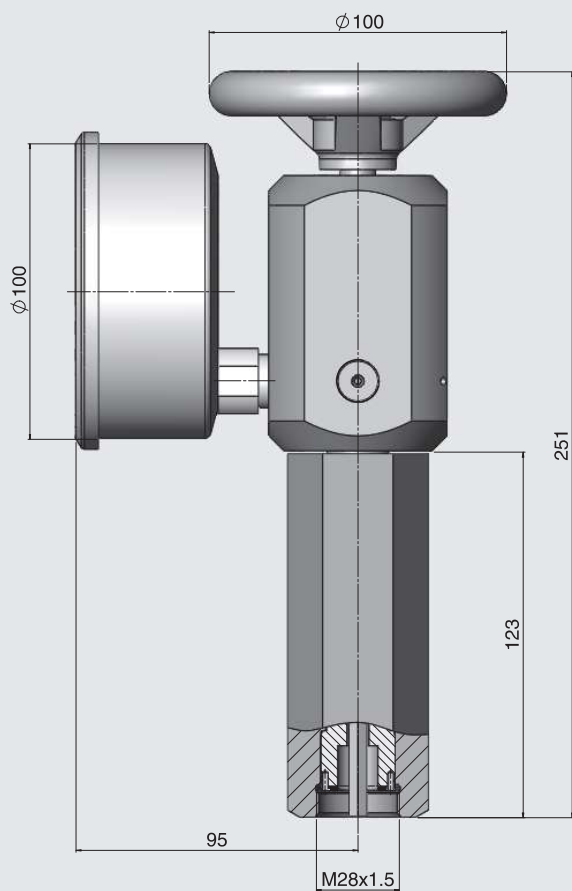
Models with protective case	
Designation	Part no.
FPU-2-800/1000F6K	4029954
FPU-2-800/1000F6A3HK	4023260

### 3. DIMENSIONS AND CONNECTIONS

#### 3.1. DESIGN OF CHARGING AND TESTING UNIT FPU-1 WITH ADAPTER FOR HYDAC ACCUMULATOR



### 3.2. DESIGN OF CHARGING AND TESTING UNIT FPU-2 WITH ADAPTER FOR HYDAC ACCUMULATOR



**Bladder accumulators  
 $\geq 1\text{ l}$**



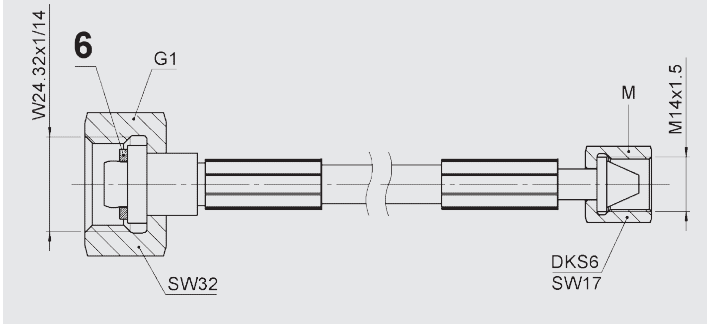
**Piston and diaphragm  
accumulators**

3.3. CHARGING HOSES

Charging 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)

3.3.1 Charging hoses for nitrogen bottles up to 200 bar

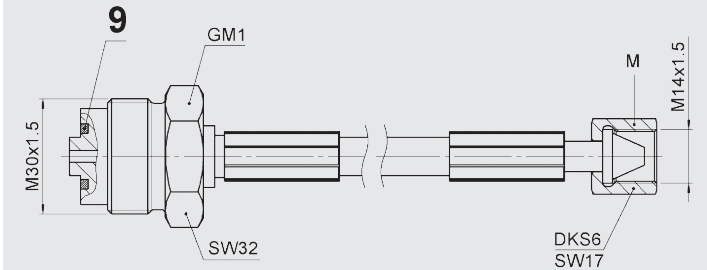
Charging hose **F**  
Connection to DIN 477, Part 1



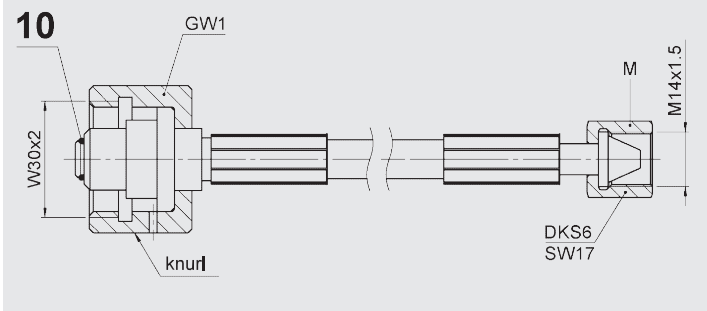
Type	Length [m]	Part no.
Charging hose <b>F</b>	2.5	236514
	4	236515
	10	373405
	15	2115552
	20	2109765
	28	2109574

3.3.2 Charging hoses for nitrogen bottles up to 300 bar

Charging hose **FM**  
Connection to DIN 477, Part 5 up to April 2002



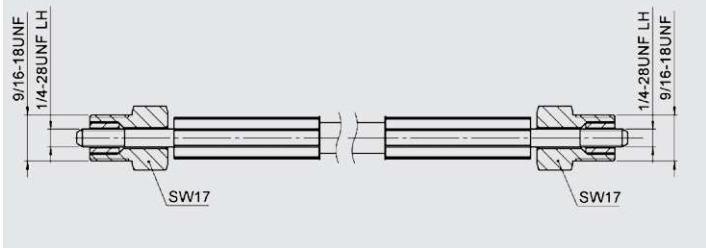
Charging hose **FW**  
Connection to DIN 477, Part 5 from April 2002



Type	Length [m]	Part no.
Charging hose <b>FM</b>	2.5	3019417
	4	3019418
Charging hose <b>FW</b>	2.5	3019419
	4	3019420

3.3.3 Pressure hose for pressure booster systems

Charging hose **FH**



Type	Length [m]	Part no.
Charging hose <b>FH</b>	6	6169682

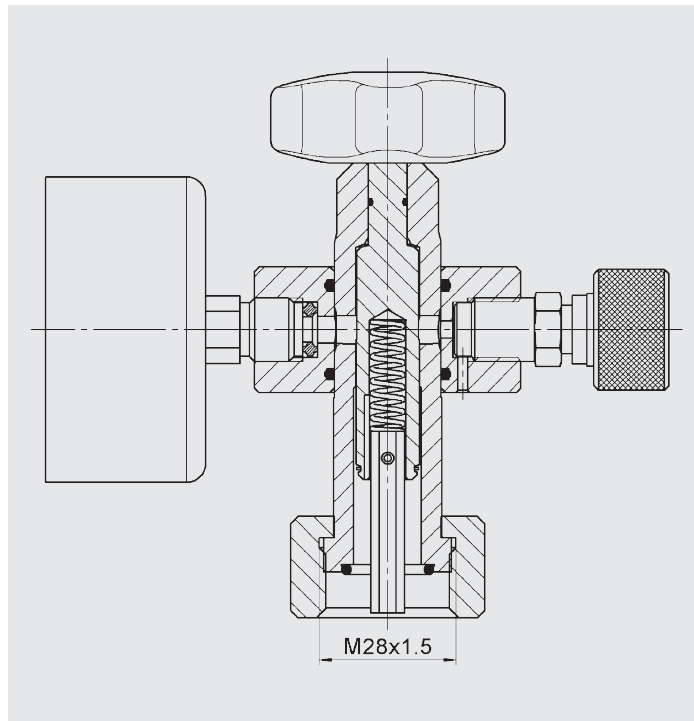
### 3.4. ADAPTERS FOR FPU

#### 3.4.1 FPU-1

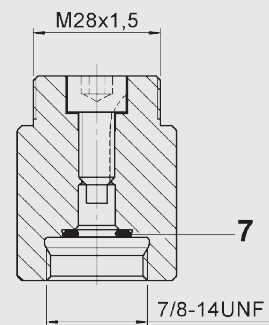
The FPU-1 can be screwed onto piston and diaphragm accumulators directly. In connection with a bladder accumulator, adapter A3 must be used. Adapter A3 is included in the scope of delivery as standard.

Additional adapters can be used to charge and test other brands of accumulator.

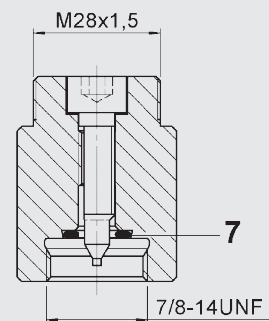
The following adapters are to be used exclusively with FPU-1, see also section 3.1.



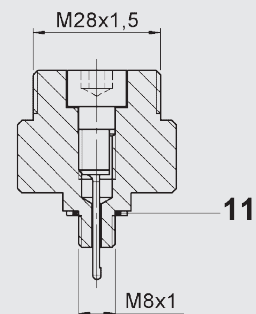
**A3 (Part no. 291533)**



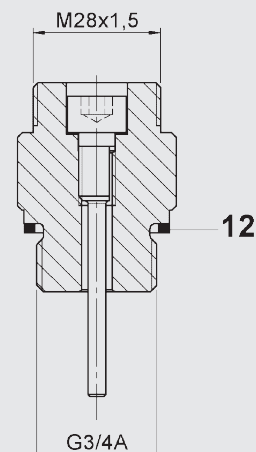
**A4 (Part no. 291536)**



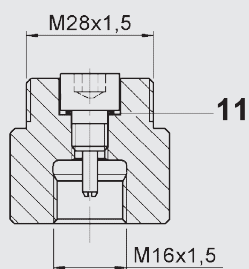
**A5 (Part no. 291531)**



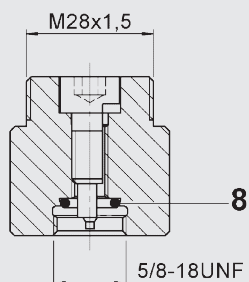
**A6 (Part no. 2108819)**



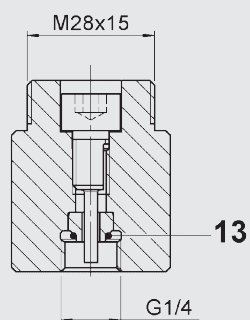
**A1 (Part no. 361619)**



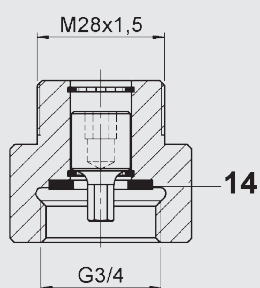
**A2 (Part no. 361605)**



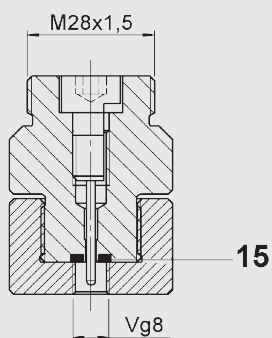
**A7 (Part no. 2110629)**



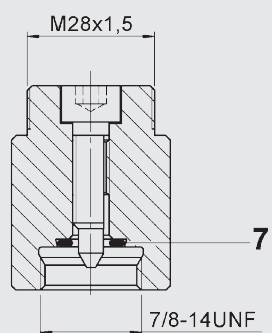
**A8 (Part no. 2124524)**



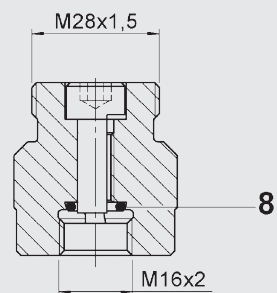
**A9 (Part no. 2128638)**



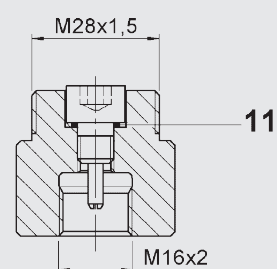
**A10 (Part no. 2128849)**



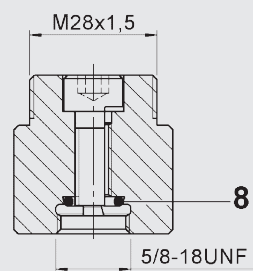
**A11 (Part no. 3018210)**



**A12 (Part no. 3203185)**



**A13 (Part no. 3911267)**

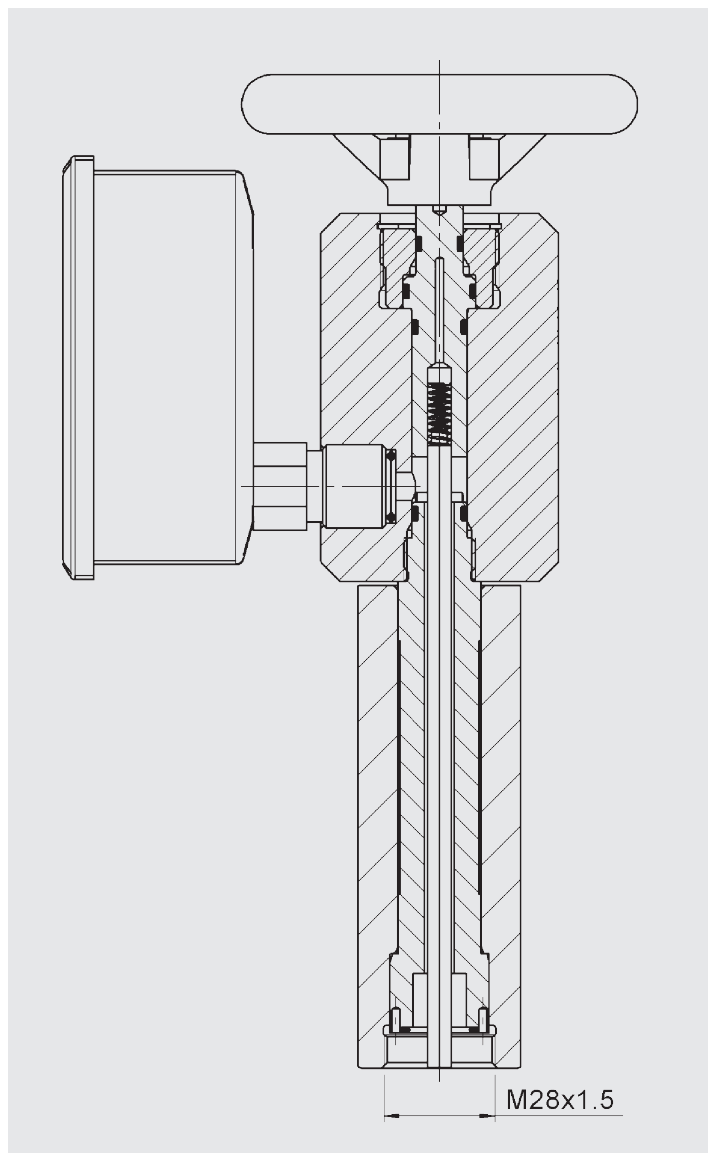


### 3.4.2 FPU-2

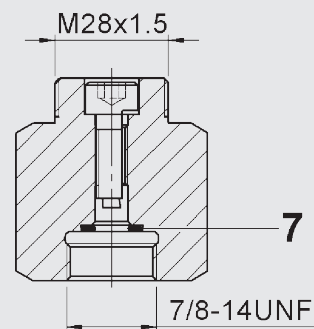
The FPU-2 can be screwed onto piston and diaphragm accumulators directly. In connection with a bladder accumulator, adapter A3H must be used. This is not included in standard delivery.

Additional adapters can be used to charge and test other brands of accumulator.

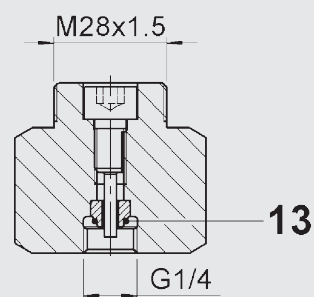
The following adapters are to be used exclusively with FPU-2, see also section 3.2.



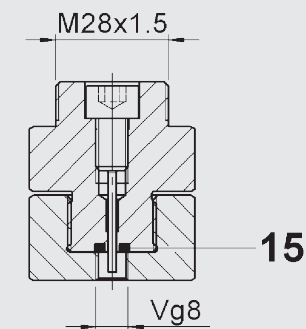
#### A3H (Part no. 3963048)



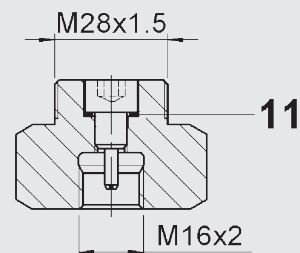
#### A7H (Part no. 4237124)



#### A9H (Part no. 4322422)



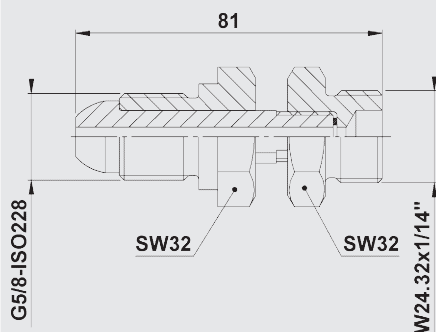
#### A12H (Part no. 4237689)



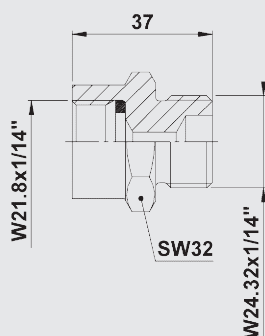
### 3.5. ADAPTER FOR FPU-1

The FPU-1 can be used with nitrogen bottles from various countries. Depending on the particular country of manufacture for the nitrogen bottles (see list of countries), HYDAC offers the following G adapters, exclusively for use with the FPU-1. The FPU-2 is connected to a pressure booster system.

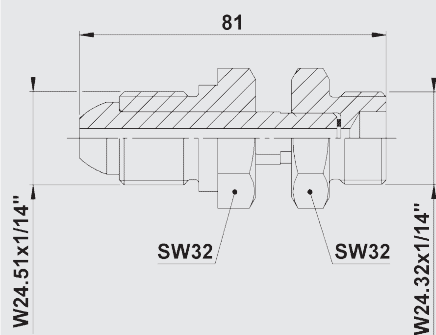
**G 2 (Part no. 236376)**



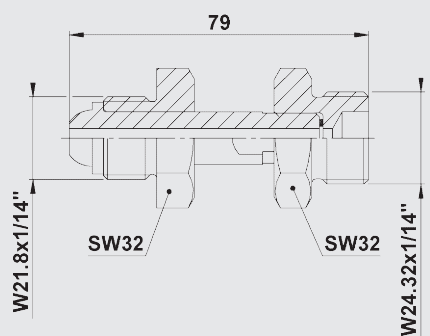
**G 3 (Part no. 2103421)**



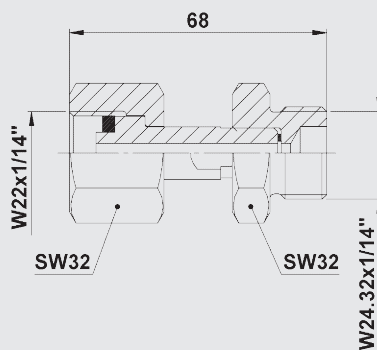
**G 4 (Part no. 236374)**



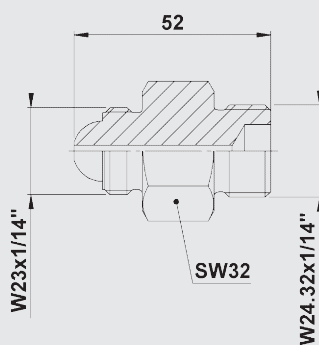
**G 5 (Part no. 236373)**



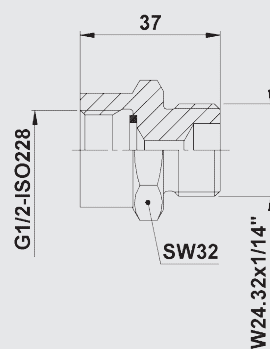
**G 6 (Part no. 2103423)**



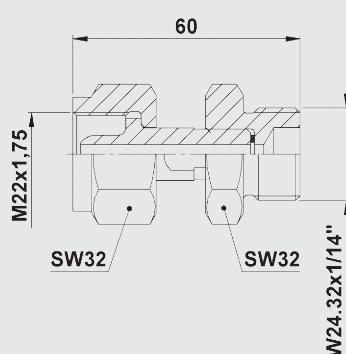
**G 7 (Part no. 236377)**



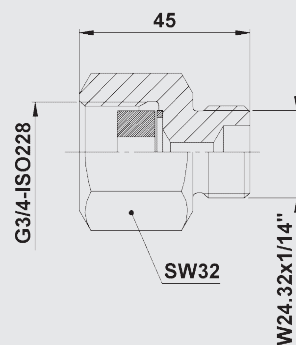
**G 8 (Part no. 2103425)**



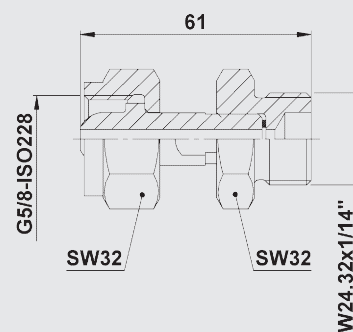
**G 9 (Part no. 241168)**



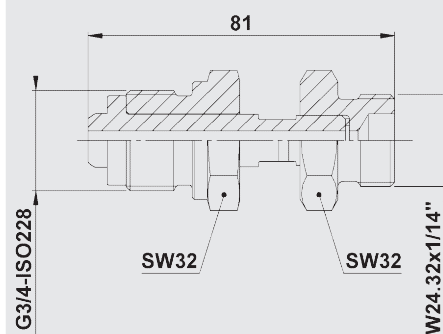
**G 10 (Part no. 2103427)**



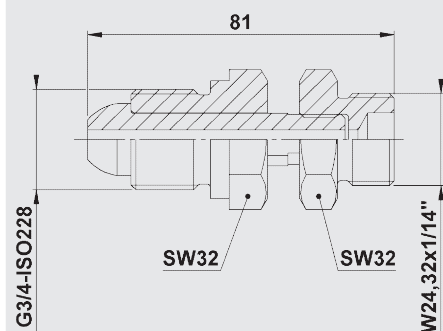
**G 11 (Part no. 3018678)**



**G 12 (Part no. 3195556)**



**G 13 (Part. no. 3787884)**



## List of countries

Country	Type / Part no.												
	G1 <sup>1)</sup>	G2 236376	G3 2103421	G4 236374	G5 236373	G6 2103423	G7 236377	G8 2103425	G9 241168	G10 2103427	G11 3018678	G12 3195556	G13 3787884
Africa <sup>3)</sup>													•
Albania										•			
Algeria			•										
Argentina		•											
Australia												•	
Austria	•												
Bahamas		•											
Bahrain			•										
Bangladesh		•											
Barbados		•											
Belgium	•												
Bolivia								•					
Brazil				•									
Bulgaria			•										
Burma		•											
Canada				•									
Chile								•					
China											•		
Colombia								•					
Costa Rica		•											
Cyprus		•											
Czech Republic	•												
Denmark	•												
Djibouti			•										
Dominican Republic								•					
Ecuador								•					
Egypt			•										
Ethiopia		•											
Fiji		•											
Finland	•												
France			•										
Gabon			•										
Gambia		•											
Germany	•												
Ghana		•											
Great Britain		•											
Greece		•											
Guatemala								•					
Guinea			•										
Guyana								•					
Honduras								•					
Hong Kong		•											
Hungary			•										
India		•											
Indonesia		•											
Iran			•										
Iraq			•										
Ireland		•											
Israel			•										
Italy					•								
Ivory Coast			•										
Jamaica		•											
Japan						•							
Jordan			•										
Kenya		•											
Korea							•						
Kuwait			•										
Lebanon			•										
Libya			•										
Malawi		•											
Malaysia		•											
Malta		•											
Mauritius			•										
Mexico			•										
Morocco			•										
Netherlands	•												
New Zealand		•											
Nigeria			•										
Norway	•												
Oman			•										
Pakistan		•											
Paraguay								•					
Peru								•					
Philippines		•											
Poland	•												
Portugal		•											
Puerto Rico				•									
Qatar			•										
Romania			•										
Russia										•			
Saudi Arabia			•										
Singapore		•											
Spain			•										
Sri Lanka		•											
Sudan		•											
Surinam		•											
Sweden	•												
Switzerland	•												
Syria			•										
Taiwan									•				
Tanzania		•											
Thailand		•											
Trinidad/Tobago										•			
Tunisia			•										
Turkey		•											
Ukraine										•			
United Arab Emirates			•										
Uruguay								•					
USA				•									
Venezuela										•			
Vietnam		•											
Yugoslavia <sup>2)</sup>										•			
Zambia		•											

<sup>1)</sup> = already fitted to hose

<sup>2)</sup> = Bosnia, Herzegovina, Croatia, Macedonia, Slovenia

<sup>3)</sup> = Angola, Botswana, Lesotho, Mozambique, Namibia, Somalia, South Africa, Swaziland, Zimbabwe

## 4. ACCESSORIES

### 4.1. PROTECTIVE CASE

To protect the FPU from becoming soiled or damaged, with foam insert and prefabricated recesses to hold all parts and any accessories (adapters, tools, etc.).

**Different types of case are available, depending on customer requirement.**

	Weight approx. [kg]	Outer dimensions [mm]
FPU-1 (basic version)	without case	1.4 –
	with case	3 460x350x120
FPU-2	without case	8.2 –
	with case	14.2 530x430x180

### 4.2. GAS SAFETY VALVE FOR FPU-1

Provides protection by reducing the pressure in a controlled way if pressure exceeds the permitted level unexpectedly, see catalogue section:

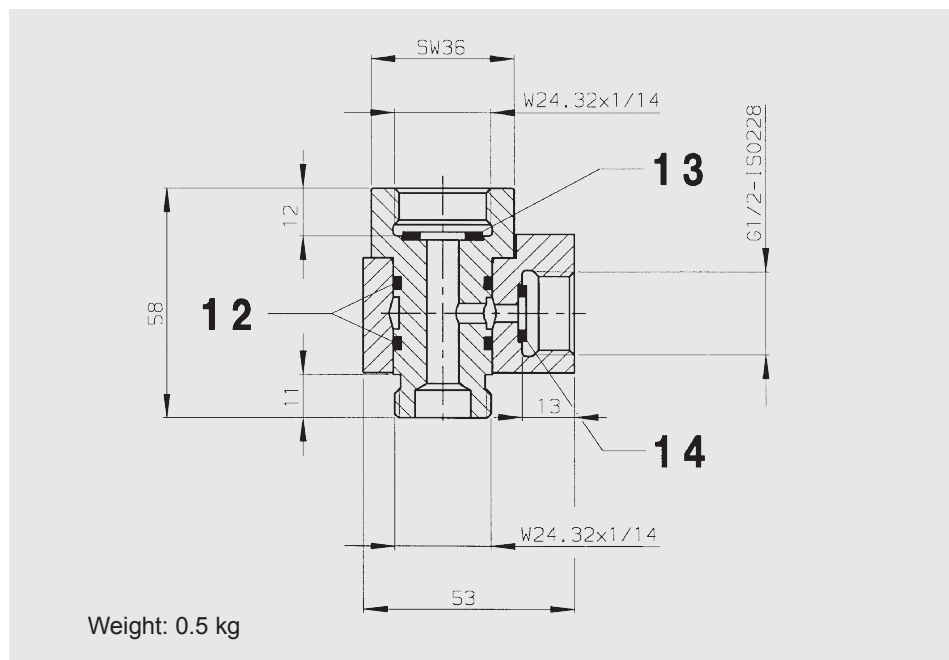
- Safety Equipment for Hydraulic Accumulators No. 3.552

### 4.3. ADAPTER D4 FOR FPU-1

For lock nut D for bladder accumulators < 1 l (see section 3.)  
D4 = 5/8-18UNF (Part no. 366374)

### 4.4. INTERMEDIATE PIECE GSV6-10-CE FOR FPU-1

Intermediate piece for installing the gas safety valve GSV 6 between the 200 bar nitrogen bottle and the Charging and Testing Unit FPU-1.



Description	Quantity	Item	Part no.
<b>Intermediate piece GSV6-10-CE</b>	-	-	242558
<b>Seal kit for intermediate piece</b>	-	-	2117287
consisting of:			
O-ring 20x2.5x2	2	12	-
Seal ring 20x11.5x2	1	13	-
Seal ring 14x8.5x2	1	14	-

### 4.5. PRESSURE REDUCING VALVE

For adjusting the required pre-charge pressure between the nitrogen bottle and the accumulator.

#### 4.5.1 Pressure reducing valve for 200 bar nitrogen bottles

Inlet: lock nut W24, 32x1/14-DIN477, Part 1

Outlet: external thread W24, 32x1/14-DIN477, Part 1

Starting pressure [bar]	Back pressure [bar]	Part no.
200	20	635409
	100	635411
	170	635412

#### 4.5.2 Pressure reducing valve for 300 bar nitrogen bottles

Inlet: lock nut W30x2-DIN 477, Part 5

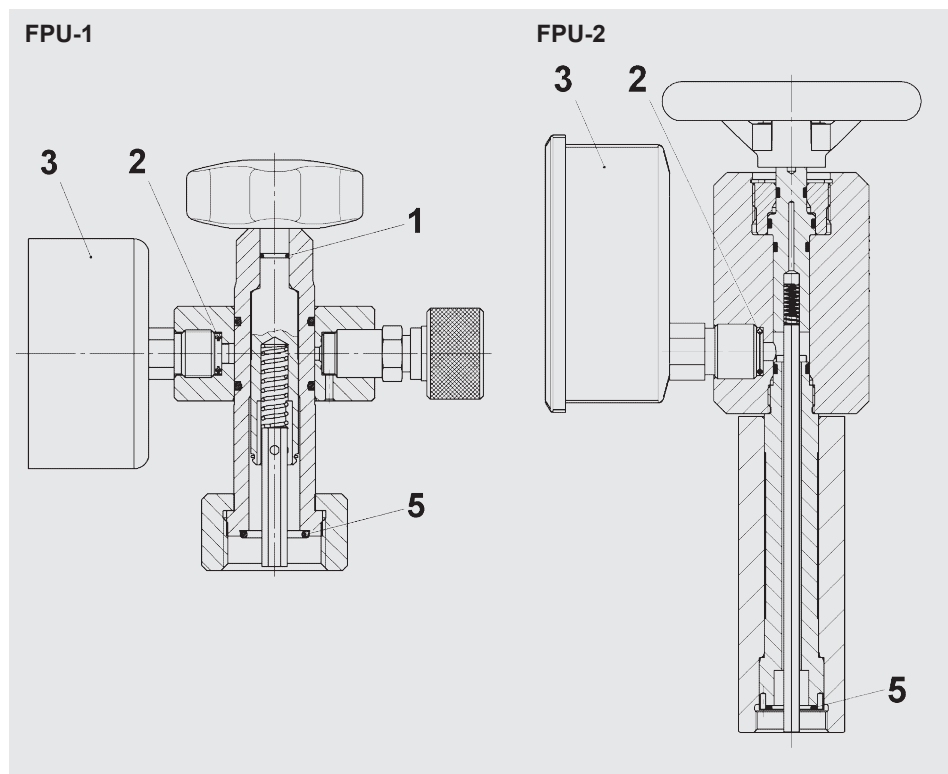
Outlet: external thread W24, 32x1/14-DIN 477, Part 5

Starting pressure [bar]	Back pressure [bar]	Part no.
300	20	6004020
	100	6004021
	170	6004022
	270*	6004023

\* for pressures after reducer >200 bar, the outlet has an external thread W30x2-DIN 477, Part 5

## 5. SPARE PARTS, ADAPTERS AND TOOLS

### 5.1. SPARE PARTS FOR FPU-1 AND FPU-2



Description	Item	FPU-1		FPU-2	
		Part no.	Quantity	Part no.	Quantity
<b>Seal kit for FPU</b> consisting of:		2117669	1	4295673	
O-ring 6x1	1	—	1	—	—
Rhombic seal	2	—	1	—	1
O-ring 15x2	5	—	1	—	1
Seal ring	6	—	1	—	—
O-ring 11x2	7	—	1	—	—
O-ring 11x2.5	9	—	1	—	—
O-ring 5.7x1.9	10	—	1	—	—
<b>Pressure gauge</b>	0 - 10 bar	3	635139	1	—
	0 - 25 bar	3	635140	1	
	0 - 100 bar	3	635141	1	
	0 - 250 bar	3	635142	1	
	0 - 400 bar	3	635143	1	
	0 - 1000 bar	3	—	6167756	1

### 5.2. SPARE PARTS FOR ADAPTER

Description	Item	FPU-1, FPU-2	
		Part no.	Quantity
<b>Seal kit for adapter FPU</b> consisting of:	—	3269153	
O-ring 11x2	7	—	3
O-ring 9x2	8	—	3
Seal ring 9.3x13.3x1	11	—	3
Seal ring 27x32x2	12	—	1
O-ring 6x1.2	13	—	1
O-ring 19x2	14	—	1
Seal ring for adapter A9	15	—	1
Seal ring 6x13x2	50*	—	1

\* only suitable for adapter A7 up to May 2006

### 5.3. TOOLS FOR FPU-1

Designation	Part no.
Wrench 14x15	1011065
Allen key SW6	1005164
Torque wrench	3136470
Valve tool for gas valve	616886

## 6. 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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