



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 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 via a flexible charging hose to a commercial nitrogen bottle.

If the nitrogen pressure is only to be checked or reduced, the charging hose does not need to be connected. The unit has a screw-type fitting with a built-in pressure gauge, check valve and a spindle for opening the accumulator gas valve to check the pressure.

HYDAC piston and diaphragm accumulators can be charged and checked without the need for adapters. Bladder accumulators, however, require an A3 adapter.

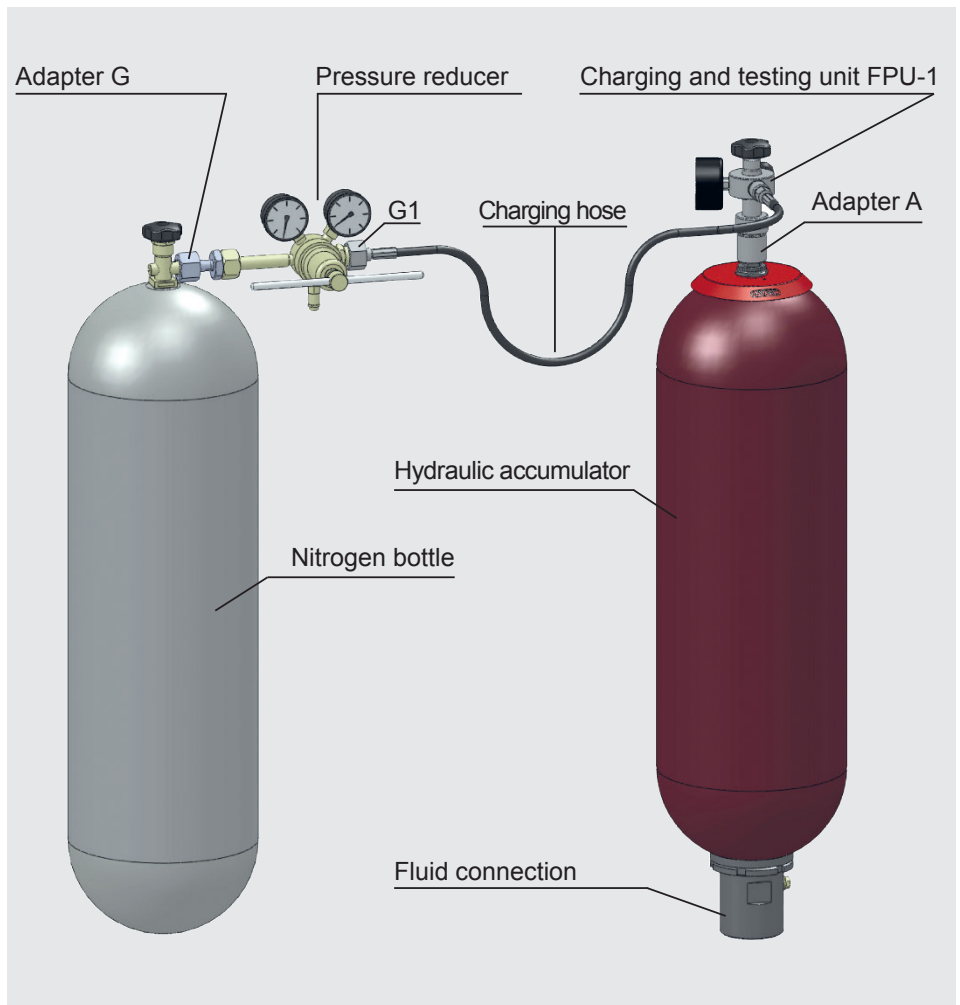
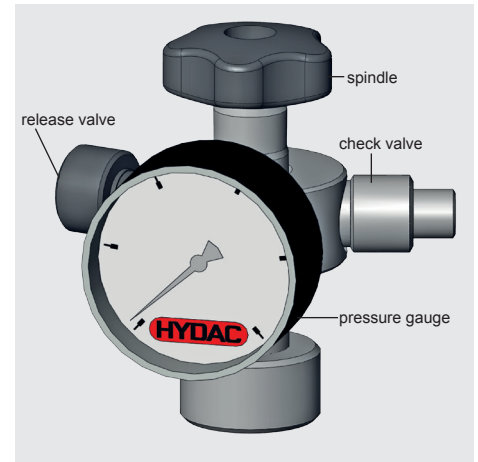
Information on how to check the pre-charge pressure and testing intervals and other instructions relating to operation can be found in the operating instruction.

The operating instruction must be followed!
No. 3.501.BA

1.2. DESIGN

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

- Valve body
- Spindle
- Check valve
- Release valve
- Pressure gauge



2. TECHNICAL 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.

Protective case

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_p) 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. 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 onto HYDAC piston and diaphragm accumulators directly to charge and/or to check the accumulator. For use with a bladder accumulator, the high pressure adapter A3H must be used. This is not included in standard delivery.

2.3.1 Technical specifications

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

2.3.2 Standard types FPU-2

Models without protective case

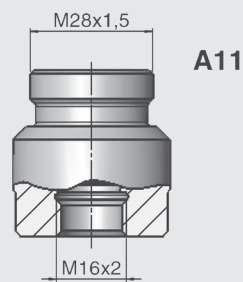
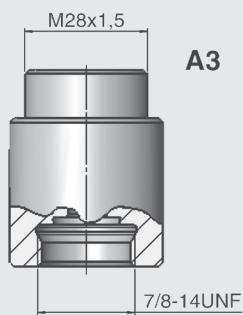
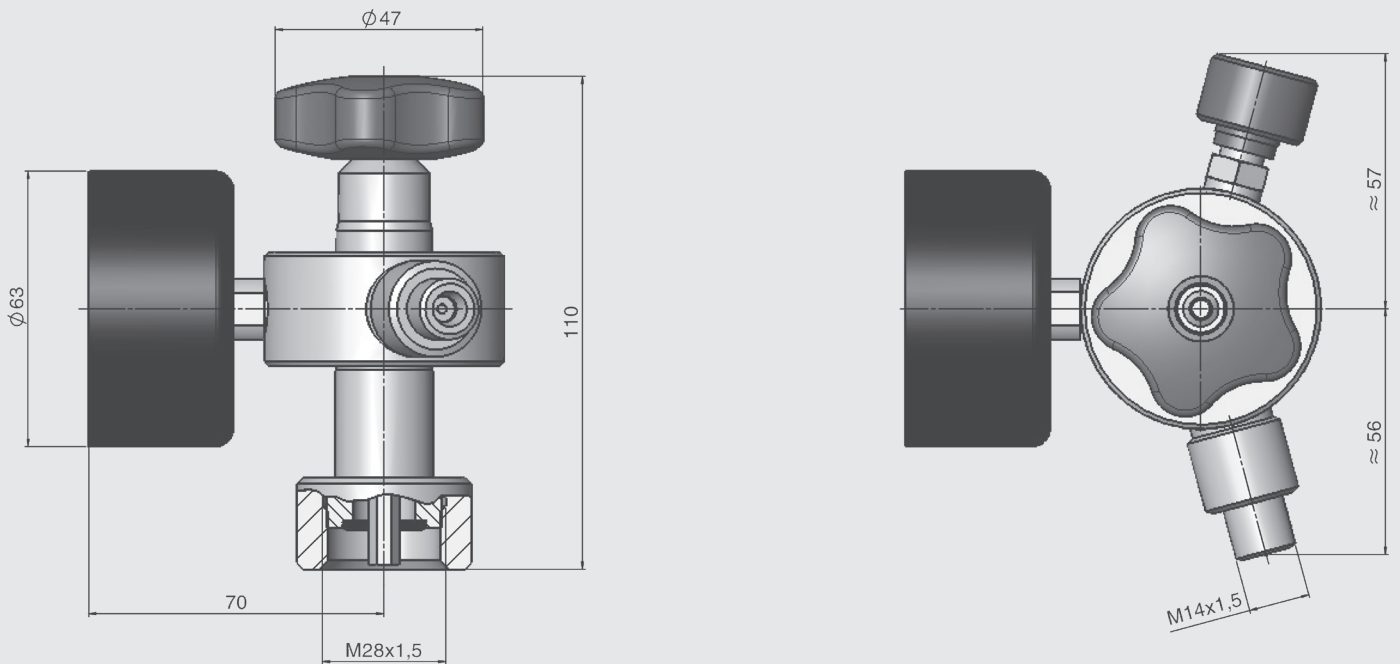
Designation	Part no.
FPU-2-800/1000F6	4043456
FPU-2-800/1000F6A3H	4043455

Models with protective case

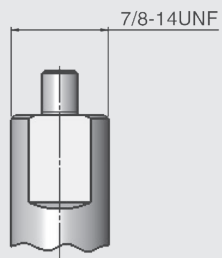
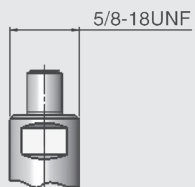
Designation	Part no.
FPU-2-800/1000F6K	4029954
FPU-2-800/1000F6A3HK	4023260

3. DIMENSIONS

3.1. GAS-SIDE CONNECTION OF THE CHARGING AND TESTING UNIT FPU-1 USING ADAPTERS FOR HYDAC ACCUMULATORS



D4 adapter
(see section 4.)

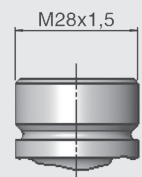


Bladder accumulators
330-0.5 / 400-0.5

Bladder accumulator
≥ 1l

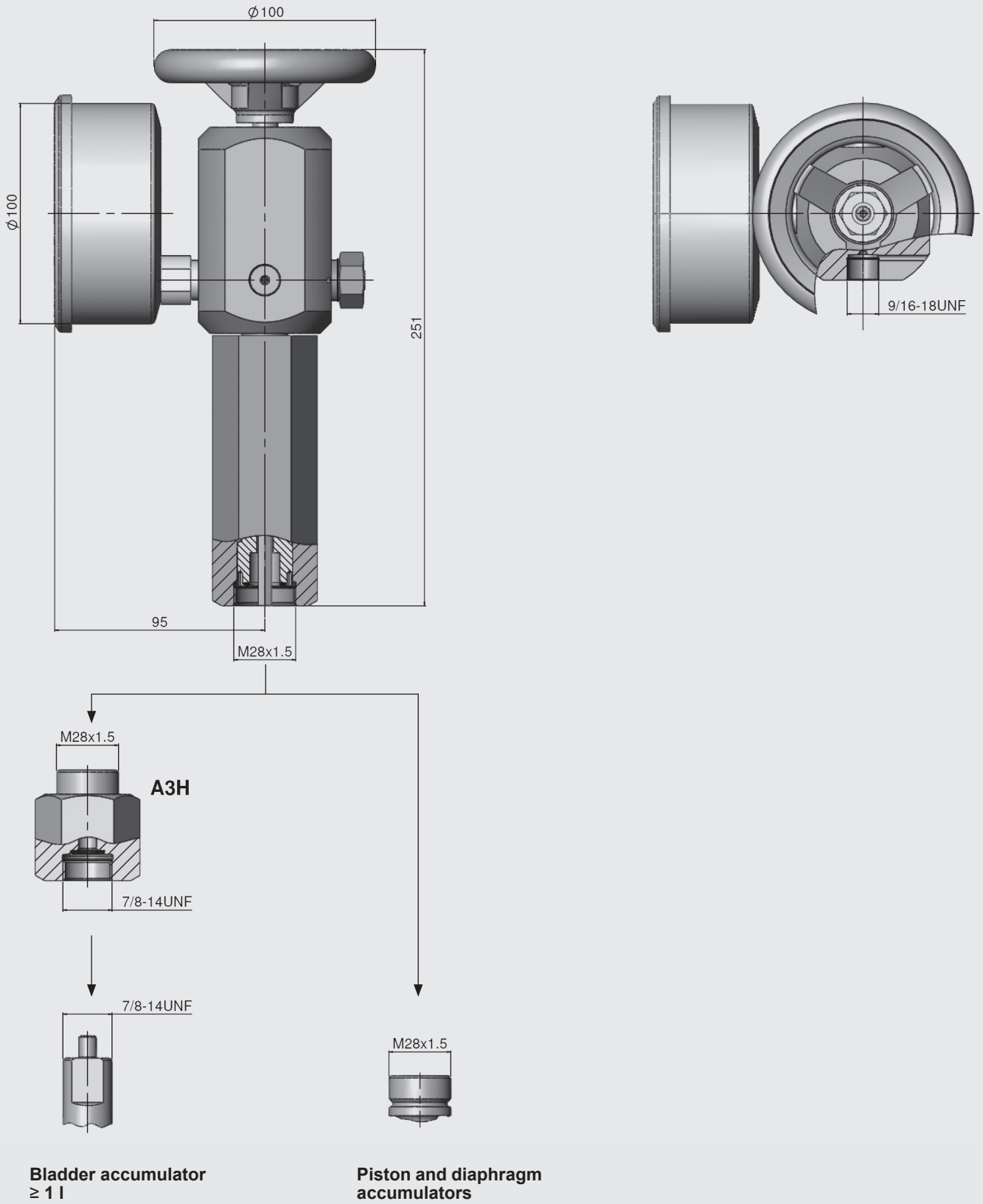


Gas valve
to ISO 10945



Piston and diaphragm accumulators

3.2. GAS-SIDE CONNECTION OF THE CHARGING AND TESTING UNIT FPU-2 USING ADAPTERS FOR HYDAC ACCUMULATORS



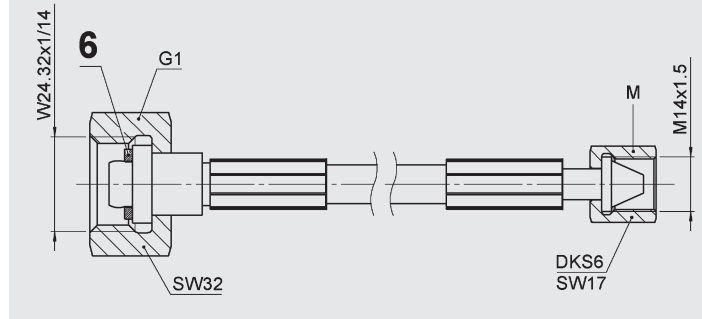
3.3. CHARGING HOSES

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

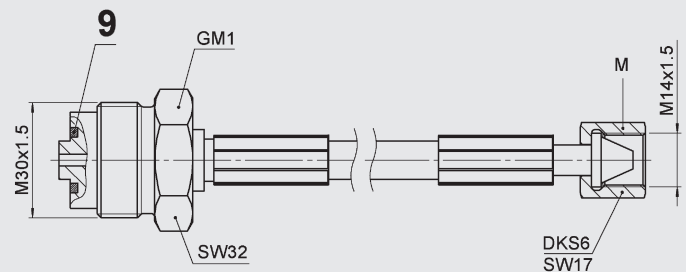


Type	Length [m]	Part no.
Charging hose F	2.5	236514
	4	236515
	10	373405
	15	2115552
	20	2109765
	28	2109574

3.3.2 Charging hoses for nitrogen bottles up to 300 bar

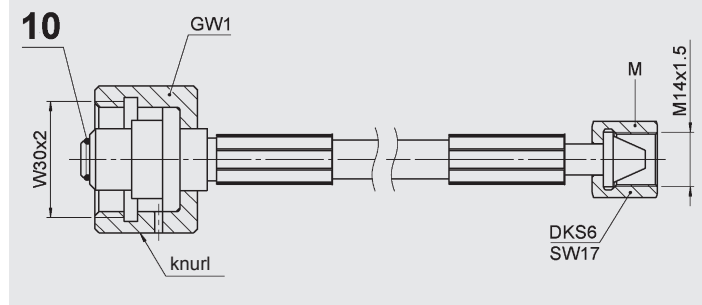
Charging hose **FM**

Connection to DIN 477, Part 5 up to April 2002



Charging hose **FW**

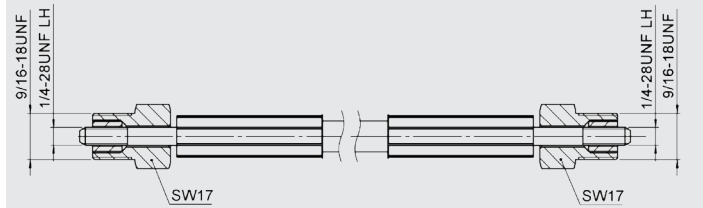
Connection to DIN 477, Part 5 from April 2002



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

3.3.3 Pressure hose for pressure booster systems

Charging hose **FH**



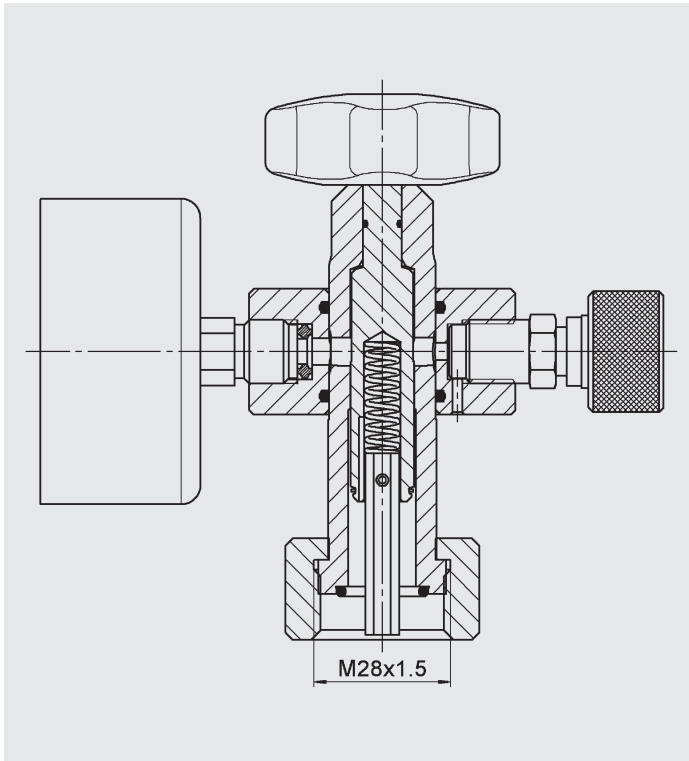
Type	Length [m]	Part no.
Charging hose FH	6	6169682

3.4. ADAPTERS A1 TO A13 FOR FPU-1

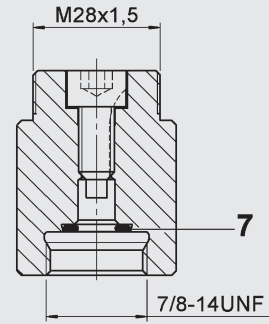
The FPU-1 is suitable for universal applications, as the A3 adapter that is included with delivery as standard allows both HYDAC piston and diaphragm accumulators and bladder accumulators to be charged and tested.

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

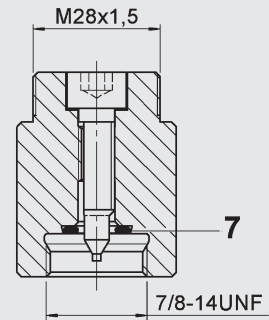
The following adapters are to be used exclusively with FPU-1, see section 3.1.



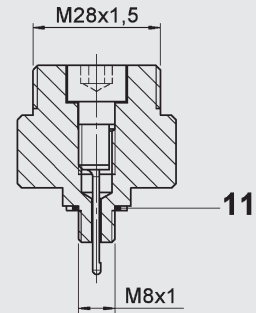
A3 (Part no. 291533)



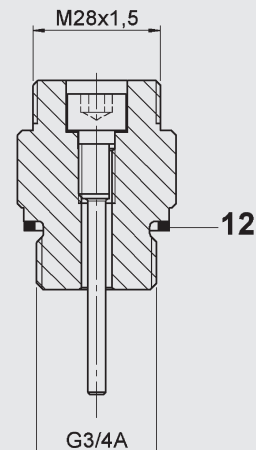
A4 (Part no. 291536)



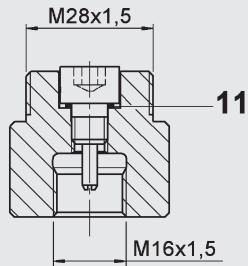
A5 (Part no. 291531)



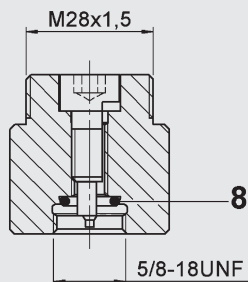
A6 (Part no. 2108819)



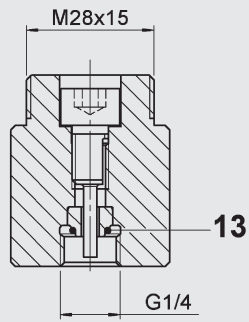
A1 (Part no. 361619)



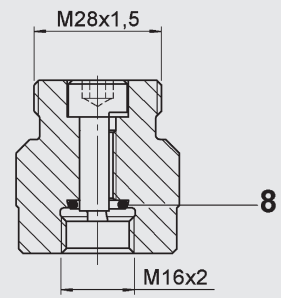
A2 (Part no. 361605)



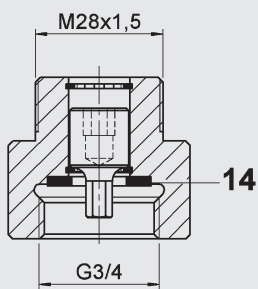
A7 (Part no. 2110629)



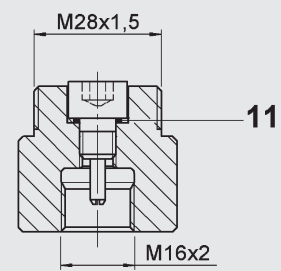
A11 (Part no. 3018210)



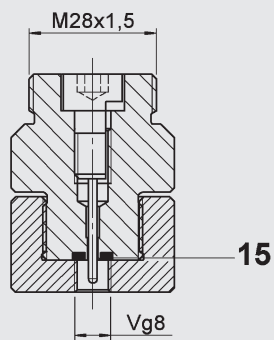
A8 (Part no. 2124524)



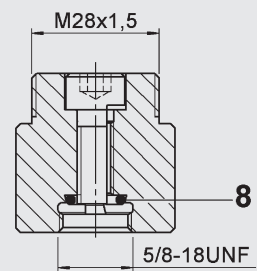
A12 (Part no. 3203185)



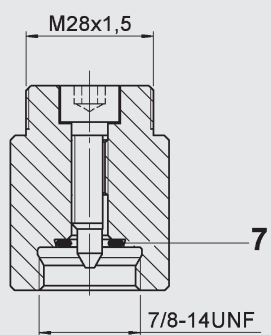
A9 (Part no. 2128638)



A13 (Part no. 3911267)



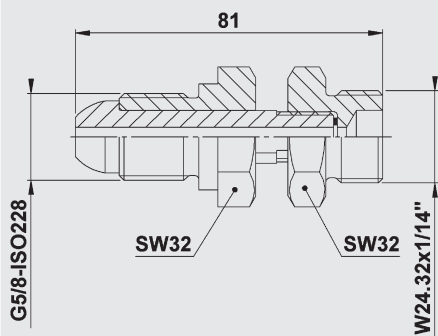
A10 (Part no. 2128849)



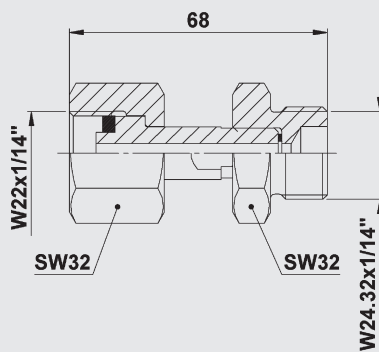
3.5. ADAPTERS G2 TO G13 FOR FPU-1

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.

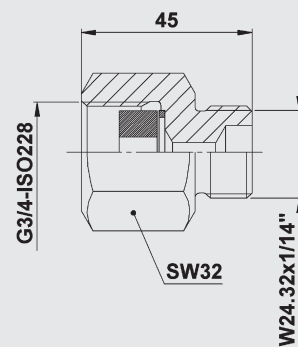
G 2 (Part no. 236376)



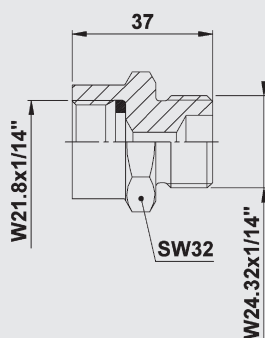
G 6 (Part no. 2103423)



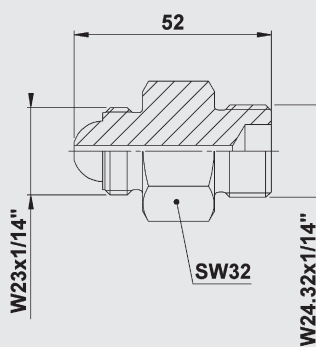
G 10 (Part no. 2103427)



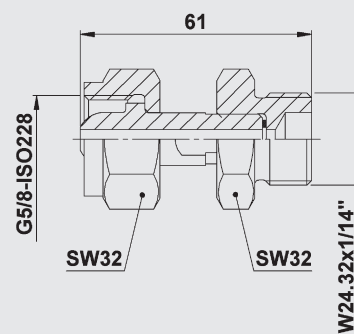
G 3 (Part no. 2103421)



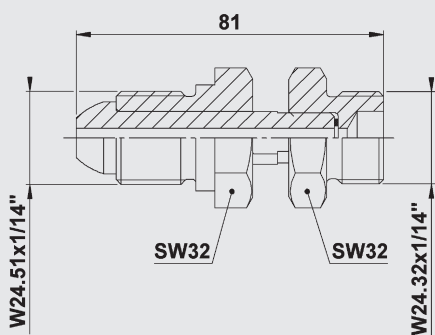
G 7 (Part no. 236377)



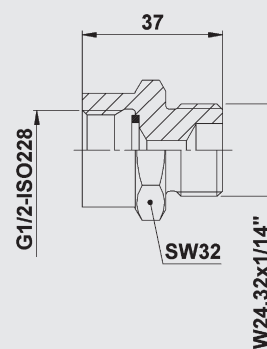
G 11 (Part no. 3018678)



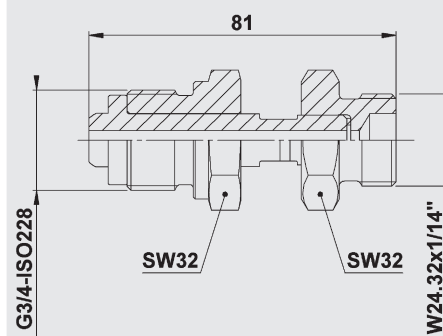
G 4 (Part no. 236374)



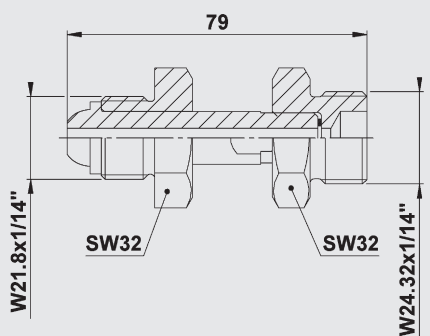
G 8 (Part no. 2103425)



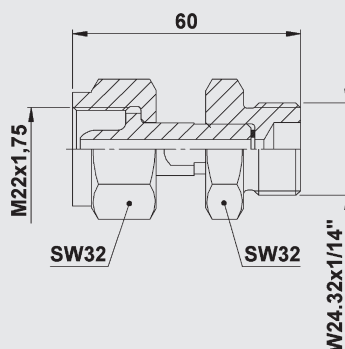
G 12 (Part no. 3195556)



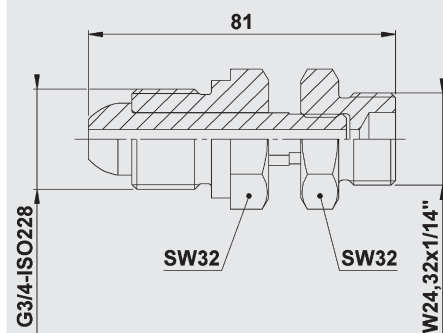
G 5 (Part no. 236373)



G 9 (Part no. 241168)



G 13 (Part no. 3787884)



List of countries

Country	Type / Part no.												
	G1 ¹⁾	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 ³⁾													
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 2)										•			
Zambia		•											

¹⁾ = already fitted to hose

²⁾ = Bosnia, Herzegovina, Croatia, Macedonia, Slovenia

³⁾ = 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 configurations are available, depending on customer requirement.

	Weight approx. [kg]	External 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

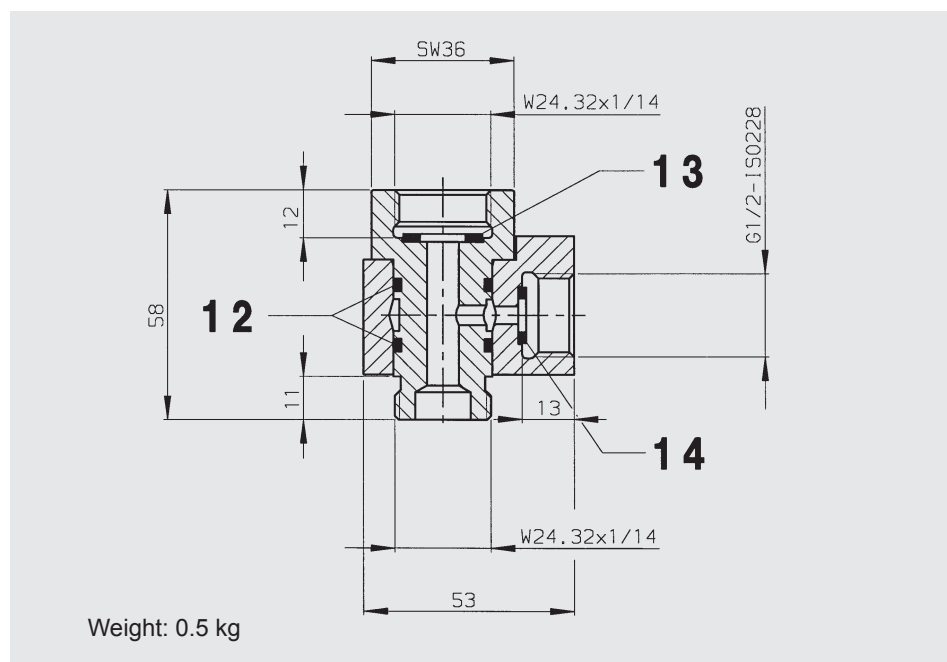
4.3. ADAPTER D4 FOR FPU-1

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 GSV6 between the 200 bar nitrogen bottle and the Charging and Testing Unit FPU-1.



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

4.5. PRESSURE REDUCER

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

4.5.1 Pressure reducer for 200 bar nitrogen bottles

Inlet: connection W24, 32x1/14-DIN 477, Part 1

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

Bottle pressure [bar]	Pressure after reducer [bar]	Part no.
200	20	635409
	100	635411
	200	635412

4.5.2 Pressure reducer for 300 bar nitrogen bottles

Inlet: connection W30x2-DIN 477, Part 5

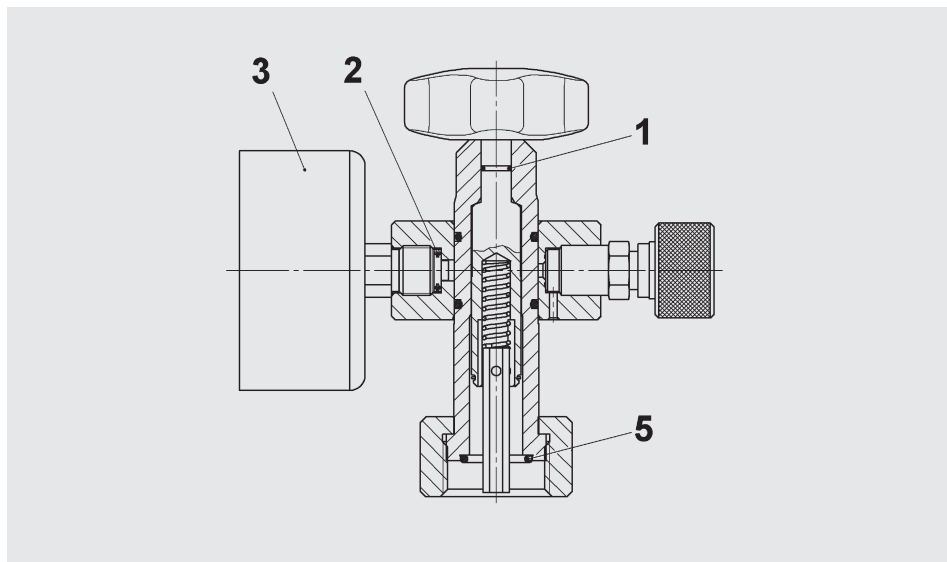
Outlet: external thread W24, 32x1/14-DIN 477, Part 1

Bottle pressure [bar]	Pressure after reducer [bar]	Part no.
300	20	6004020
	100	6004021
	200	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



Description	Quantity	Item	Part no.
Seal kit for FPU-1	1	-	2117669
consisting of:			
O-ring 6x1	1	1	-
Seal ring	1	2	-
O-ring 15x2	1	5	-
Seal ring	1	6	-
O-ring 11x2	1	7	-
O-ring 9x2	1	8	-
O-ring 11x2.5	1	9	-
O-ring 5.7x1.9	1	10	-
Pressure gauge			
0 - 10 bar			635139
0 - 25 bar			635140
0 - 100 bar	1	3	635141
0 - 250 bar			635142
0 - 400 bar			635143

5.2. ADAPTERS FOR FPU-1

Description	Quantity	Item	Part no.
Seal kit for adapters A1-13	1	-	3269153
consisting of:			
O-ring 11x2	3	7	-
O-ring 9x2	3	8	-
Seal ring 9.3x13.3x1	3	11	-
Seal ring 27x32x2	1	12	-
O-ring 6x1.2	1	13	-
O-ring 19x2	1	14	-
Seal ring for A9 adapter	1	15	-
Seal ring 6x13x2	1	50*	-

* only suitable for A7 adapter 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

5.4. SPARE PARTS FOR FPU-2

The scope of delivery for FPU-2 already includes additional seals as replacements.

6. NOTE

The information in this brochure relates to the operating conditions and applications described.

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

Subject to technical modifications.

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