HYDAC INTERNATIONAL



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 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 control the pressure

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

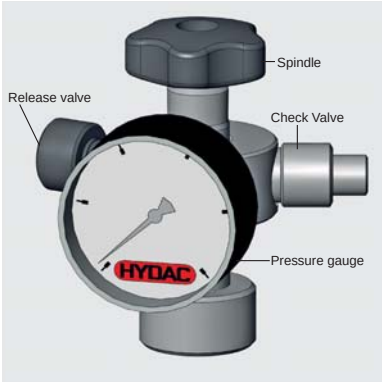
Information on how to check the pre-charge pressure, on testing intervals and other instructions relating to operation can be found in the Operating Manual.

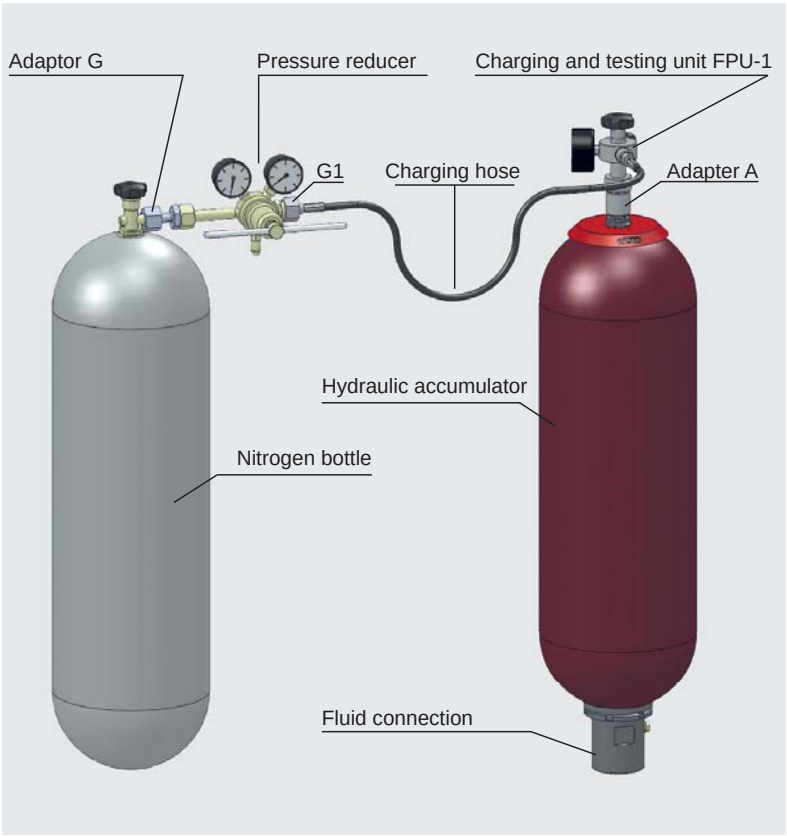
Please read the operating manual!
No. 3.501.BA

1.2. DESIGN

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

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





E 3.501.28/03.16

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 3.4.

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 3.3.

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_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. HIGH PRESSURE VERSIONS



The FPU-2 was designed specifically for high pressure applications.
Just like the FPU-1, the FPU-2 is universally applicable.
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

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

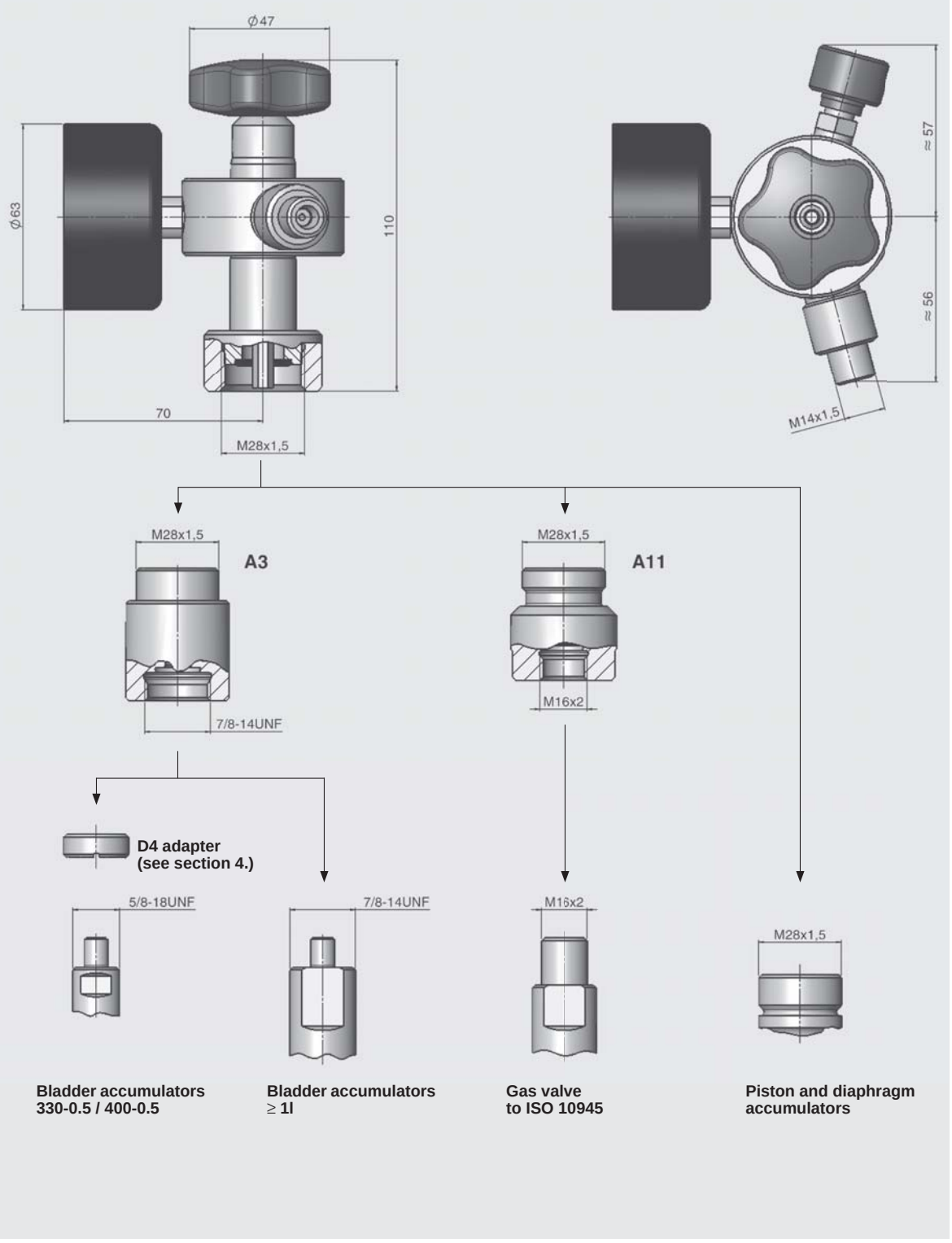
Models with protective case

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

E 3.501.28/03.16

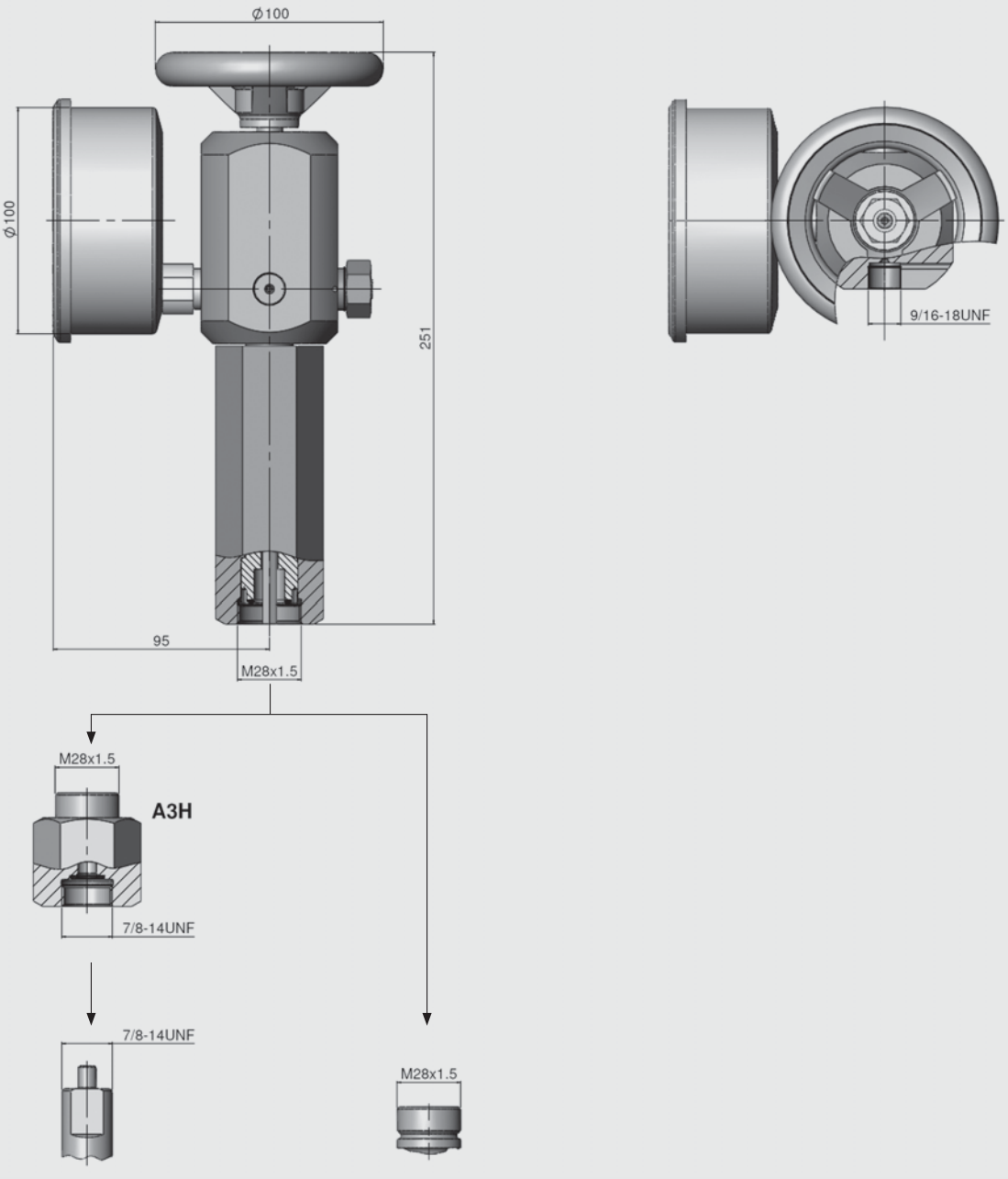
3. DIMENSIONS

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



E 3.501.28/03.16

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



Bladder accumulator ≥ 1 l

Piston and diaphragm accumulators

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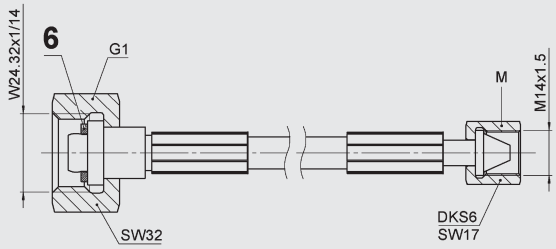
3.3. CHARGING HOSES

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

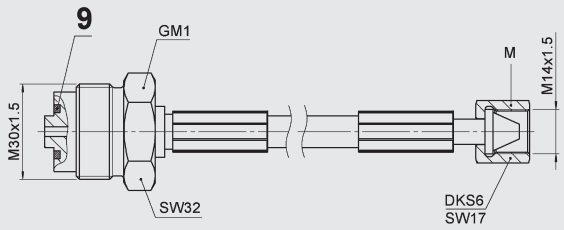


Type	Length [m]	Part no.
Charging hose **F**	2.5	236514
	4	236515
	10	373405
	15	2115552
	20	2109765
	28	2109574

3.3.2 **Charging hoses for nitrogen bottles up to 300 bar**

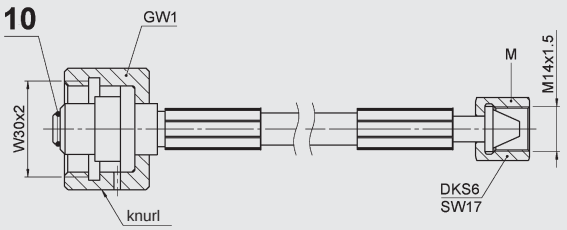
Charging hose **FM**

Connection to DIN 477, Part 5 up to April 2002



Charging hose **FW**

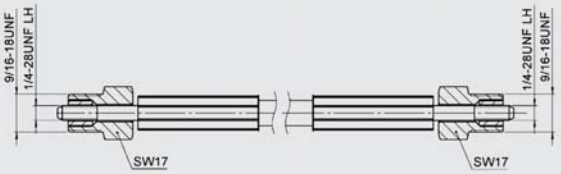
Connection to DIN 477, Part 5 from April 2002



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**



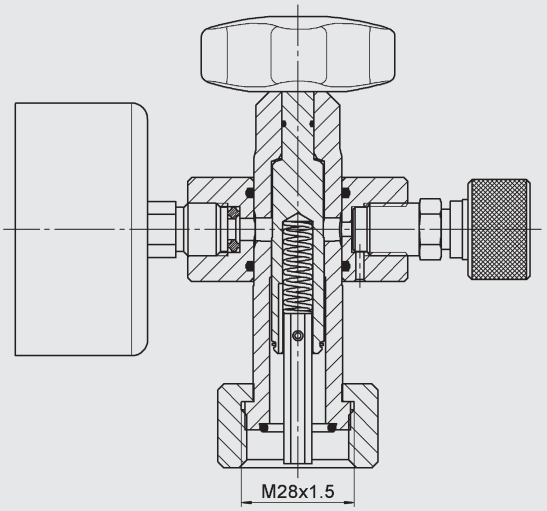
Type	Length [m]	Part no.
Charging hose **FH**	6	6169682

E 3.501.28/03.16

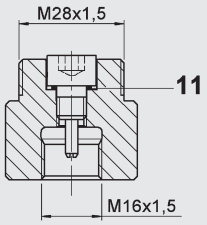
3.4. ADAPTERS A1 TO A13 FOR FPU-1

The FPU-1 is universally applicable because as well as HYDAC piston and diaphragm accumulators, bladder accumulators can also be charged and tested using the A3 adapter supplied as standard.
Additional adapters can be used to charge and test other brands of accumulator.

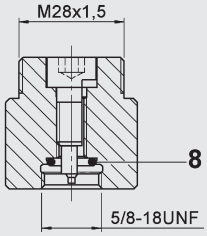
The following adapters are to be used exclusively with FPU-1, see section 3.1.



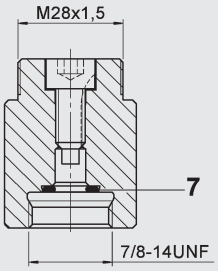
A1 (Part no. 361619)



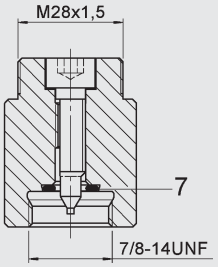
A2 (Part no. 361605)



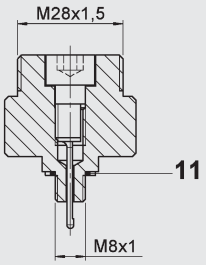
A3 (Part no. 291533)



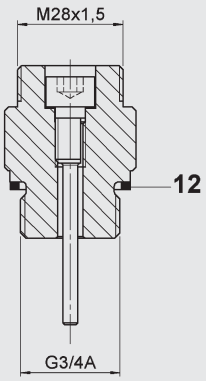
A4 (Part no. 291536)



A5 (Part no. 291531)

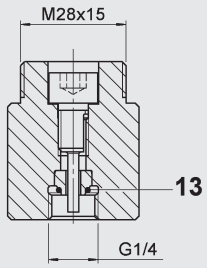


A6 (Part no. 2108819)

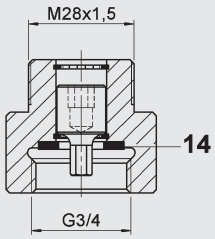


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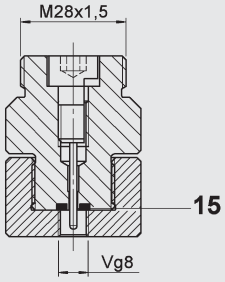
A7 (Part no. 2110629)



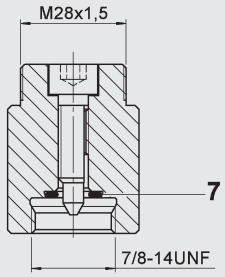
A8 (Part no. 2124524)



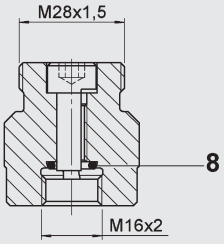
A9 (Part no. 2128638)



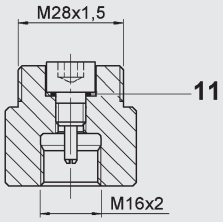
A10 (Part no. 2128849)



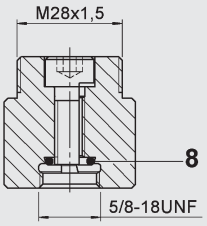
A11 (Part no. 3018210)



A12 (Part no. 3203185)



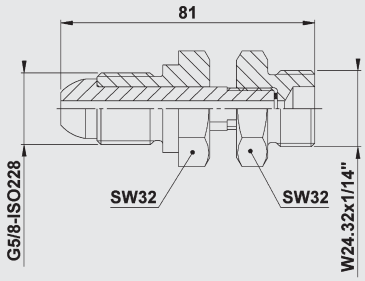
A13 (Part no. 3911267)



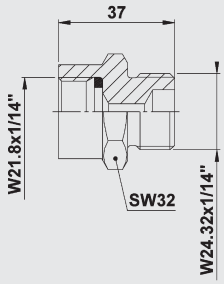
3.5. ADAPTERS G2 TO G13 FOR FPU-1

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.

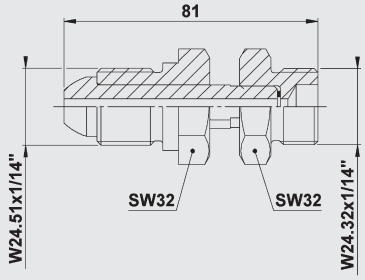
G 2 (Part no. 236376)



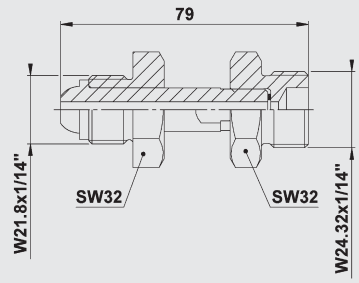
G 3 (Part no. 2103421)



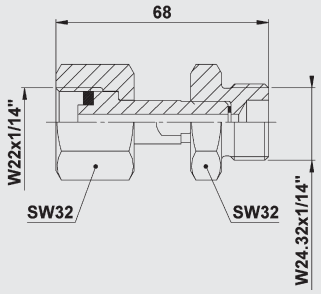
G 4 (Part no. 236374)



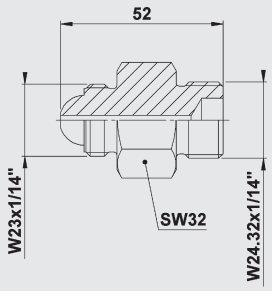
G 5 (Part no. 236373)



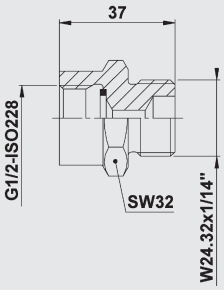
G 6 (Part no. 2103423)



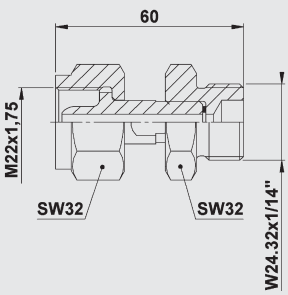
G 7 (Part no. 236377)



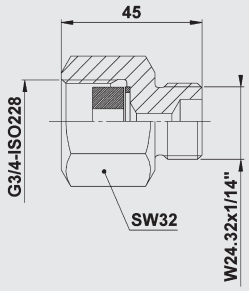
G 8 (Part no. 2103425)



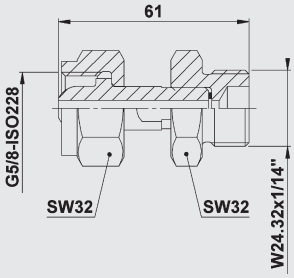
G 9 (Part no. 241168)



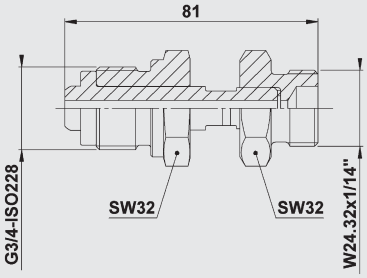
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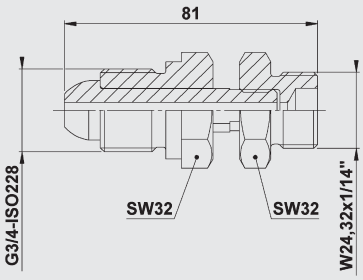
G 11 (Part no. 3018678)



G 12 (Part no. 3195556)



G 13 (Part no. 3787884)



Hyquip Limited New Brunswick Street Horwich Bolton Lancashire BL6 7JB UK
Company Registered in England No: 4167649 VAT Registration No: 732 5692 25 BS EN ISO 9001:2008 No: LRQ 0964389

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

E 3.501.28/03.16

4. ACCESSORIES

4.1. PROTECTIVE CASE

for storing the charging and testing unit FPU and adapters – 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]	
	Without case	With case
FPU-1 (basic version)	1.4	3
FPU-2	8.2	14.2

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

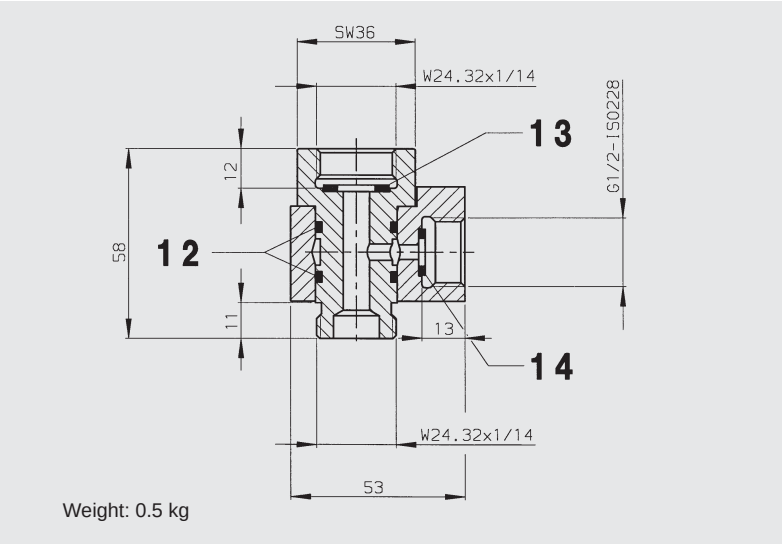
4.3. ADAPTER D4 FOR FPU-1

For screw connector D on 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.



Weight: 0.5 kg

Description	Quantity	Item	Part no.
Intermediate piece GSV6-10-CE	-	-	242558
Seal kit for intermediate piece consisting of:	-	-	2117287
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-DIN477, Part 1
Outlet: male 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-DIN477, Part 5
Outlet: male thread W24, 32x1/14-DIN477, Part 5

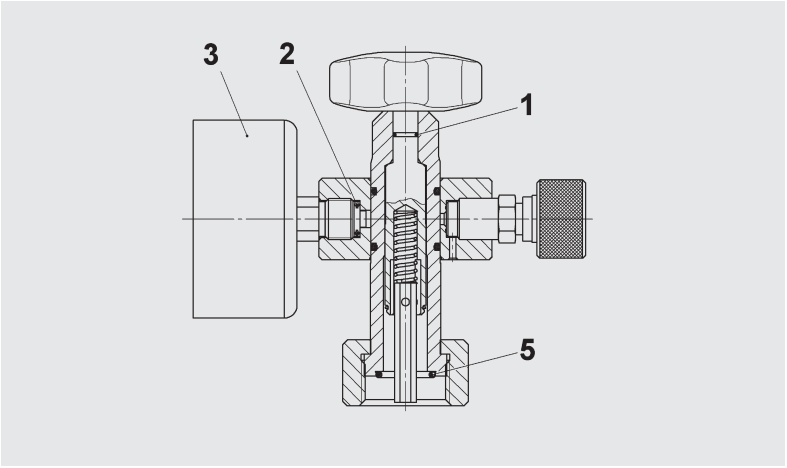
Bottle pressure [bar]	Pressure after reducer [bar]	Part no.
300	20	6004020
	100	6004021
	200	6004022
	270*	6004023

* for pressures after reducer > 200 bar, the outlet has an external thread W30x2-DIN477, Part 5

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5. SPARE PARTS, ADAPTERS AND TOOLS

5.1. SPARE PARTS FOR FPU-1



Description	Quantity	Item	Part no.
Seal kit for FPU-1 consisting of:	1	-	2117669
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	1	3	635139
0 - 25 bar			635140
0 - 100 bar			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 consisting of:	1	-	3269153
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 adapter A9	1	15	-
Seal ring 6x13x2	1	50*	-

* only suitable for adapters 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

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/or operating conditions not described, please contact HYQUIP.
Subject to technical modifications.

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