



FPU

Charging and testing unit for bladder, piston and diaphragm accumulators

1. DESCRIPTION

1.1. FUNCTION

The HYDAC FPU charging and testing unit is used to charge accumulators with nitrogen or to check or 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).

The A3 adapter 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 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 data, see catalogue section:

- Nitrogen charging units N2-Server No. 2.201

Higher pre-charge pressures up to 470 bar available on request.

Notice

All work with HYDAC charging and testing units 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. 3.501.BA

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

1.2. DESIGN

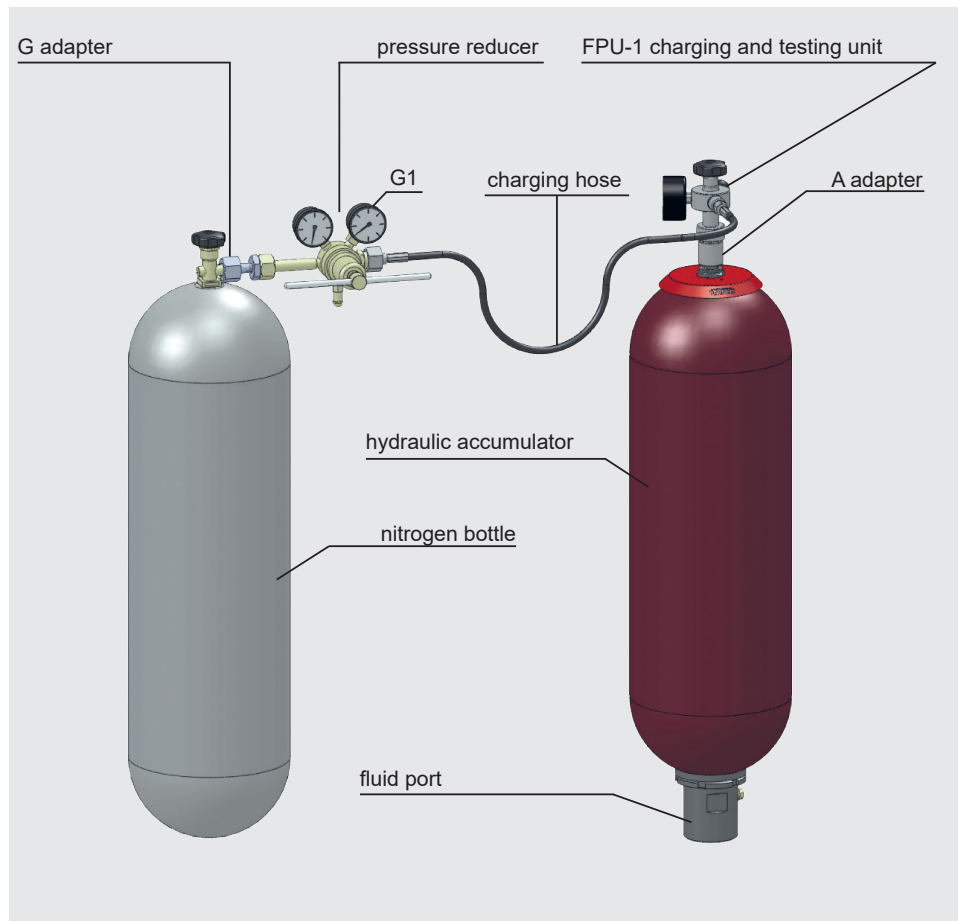
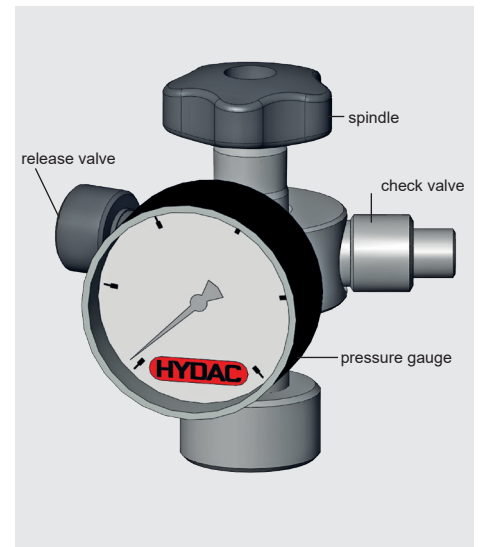
The HYDAC charging and testing unit FPU-1 for bladder, piston and diaphragm accumulators consists of a primary body with the following:

- 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 for 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 A3 DM200/100 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

G adapter for nitrogen bottles (only FPU-1)

See table, section 3.5.

A adapter

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.

Pressure reducer

E.g. DM200/20 = 200 bar starting pressure, 20 bar back pressure

Accessories

K = protective case

For other accessories, see section 4.

2.2. FPU-1 STANDARD DESIGNS

The basic version of the FPU-1 ($p_{max} = 350 \text{ bar}$, $-10 \text{ °C} \dots +80 \text{ °C}$) is the minimum equipment required to test and set the pre-charge pressure (p_0) at the hydraulic accumulator. It comprises of the FPU-1, the charging hose and the A3 adapter for bladder accumulators and is supplied in a practical protective case.

The following versions are available:

Part no.*	Pressure gauge display up to [bar]	Pressure reducer [bar]	Charging hose [m]	G adapter
2114305	0 ... 25	-	2.5	-
2114401				G2
2121210				G3
2116738			4	-
4082127				G2
4426522				G3
4426524	0 ... 25	200/20	2.5	-
3652830				G2
3814960				G3
4426653			4	-
4426654				G2
3365217				G3
2115314	0 ... 100	-	2.5	-
2122515				G2
3243316				G3
2114842			4	-
3043585				G2
2120359				G3
4427109	0 ... 100	200/100	2.5	-
4427114				G2
4427126				G3
4427128			4	-
4427157				G2
4427158				G3
2114302	0 ... 250	-	2.5	-
2114309				G2
2114308				G3
2114303			4	-
2116743				G2
2116779				G3
3187297	0 ... 250	200/100	2.5	-
4427160				G2
4427161				G3
4427162			4	-
4427163				G2
4427164				G3
4427304	0 ... 250	200/170	2.5	-
4328598				G2
4427335				G3
4427336			4	-
4427339				G2
4427341				G3
2114307	0 ... 400	-	2.5	-
2114605				G2
2115692				G3
2114304			4	-
2122119				G2
2115656				G3
4427342	0 ... 400	200/170	2.5	-
4427344				G2
4427355				G3
4427356			4	-
4427357				G2
4427358				G3

* Preferred models, others on request

2.3. FPU-1 SPECIAL DESIGNS

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

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

We are able to provide detailed information on request.

2.4. HIGH PRESSURE VERSIONS



The FPU-2 was specifically designed 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 testing HYDAC piston and diaphragm accumulators.

In connection with a HYDAC bladder accumulator, the A3H high pressure adapter 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

Operating temperature:

$-10 \text{ °C} \dots +80 \text{ °C}$

2.4.2 FPU-2 standard designs

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

Other versions on request.

Models without protective case

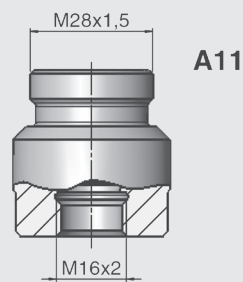
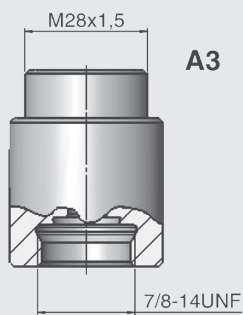
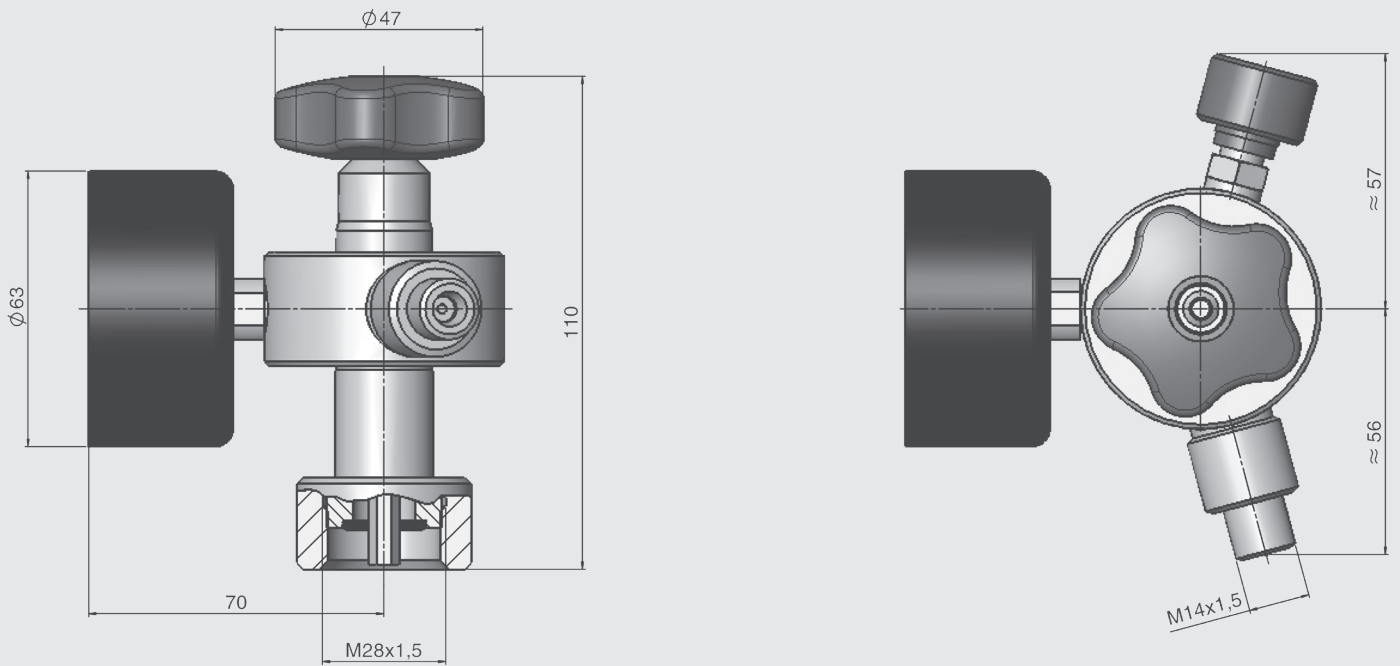
Designation	Part no.
FPU-2-800/1000F6	4043456
FPU-2-800/1000F6A3H	4043455

Models with protective case

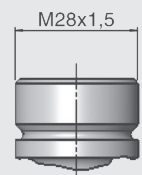
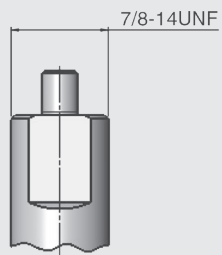
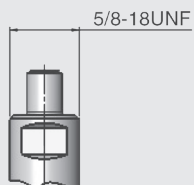
Designation	Part no.
FPU-2-800/1000F6K	4029954
FPU-2-800/1000F6A3HK	4023260

3. DIMENSIONS AND CONNECTIONS

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



D4 adapter
(see section 4.)



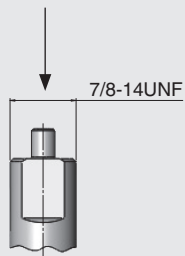
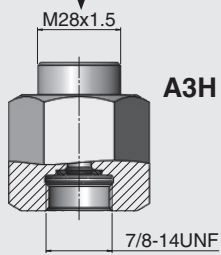
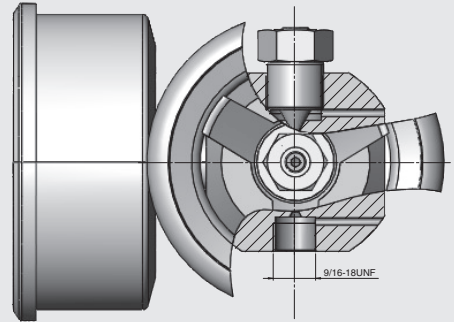
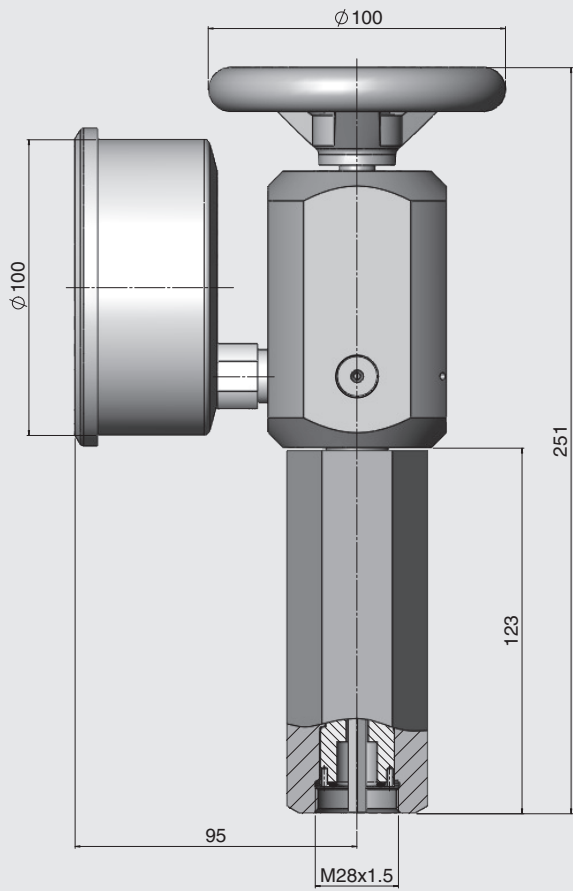
bladder accumulators
330-0.5 / 400-0.5

bladder accumulators
≥ 1l

gas valve
to ISO 10945

piston and
diaphragm
accumulators

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



bladder accumulators
≥ 1 l

piston and diaphragm
accumulators

3.3. CHARGING HOSES

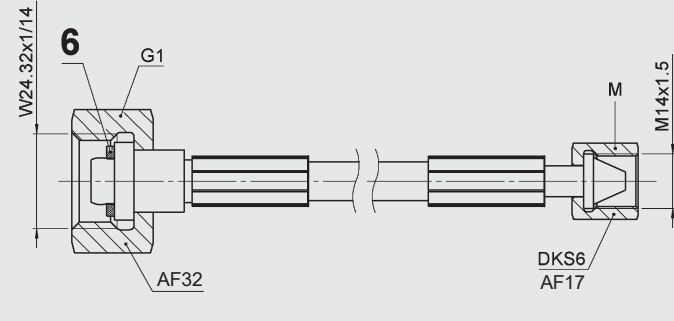
Charging hoses are designed for the particular maximum permitted operating pressure marked on them and 10,000 charging processes.

(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

F charging hose

Connection to DIN 477, Part 1

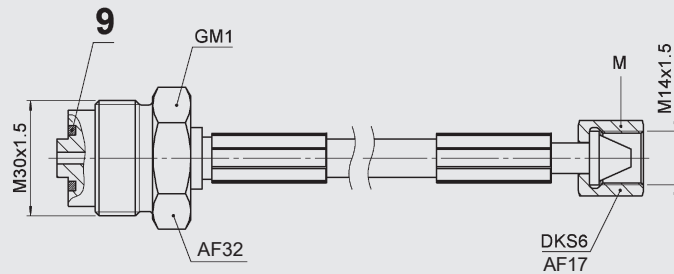


Type	Length [m]	Part no.
F charging hose	2.5	236514
	4	236515
	10	373405
	15	2115552
	20	2109765
	28	2109574

3.3.2 Charging hoses for nitrogen bottles up to 300 bar

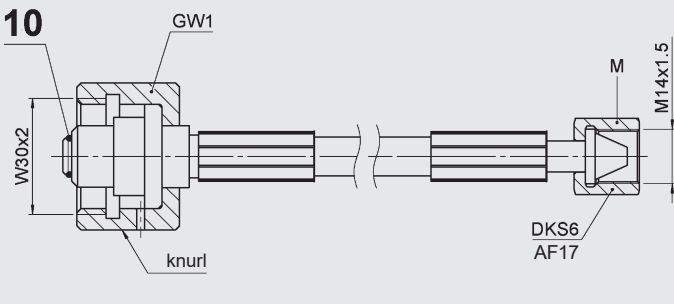
FM charging hose

Connection to DIN 477, Part 5 up to April 2002



FW charging hose

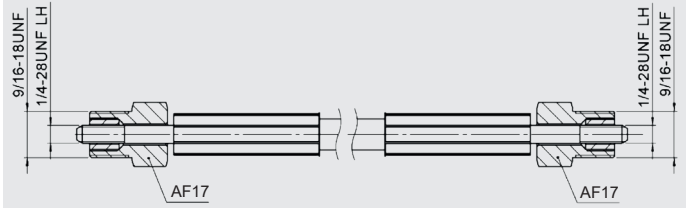
Connection to DIN 477, Part 5 from April 2002



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

3.3.3 Pressure hose for pressure booster systems

FH charging hose



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

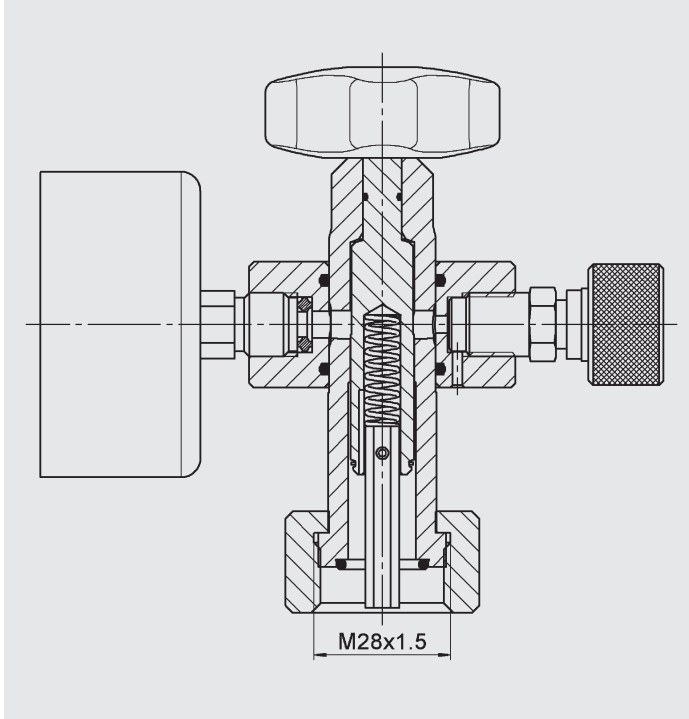
3.4. ADAPTERS FOR FPU

3.4.1 FPU-1

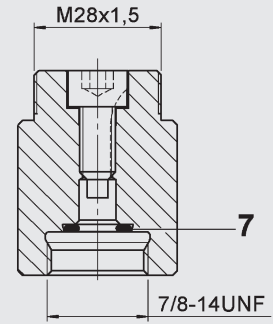
The FPU-1 can be screwed onto piston and diaphragm accumulators directly. In connection with a bladder accumulator, the A3 adapter must be used. The A3 adapter is included in the scope of delivery as standard.

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

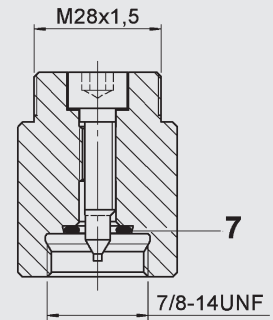
The following adapters are to be used exclusively with the FPU-1, see also section 3.1.



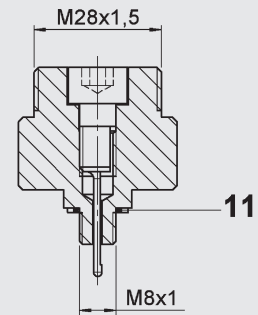
A3 (part no. 291533)



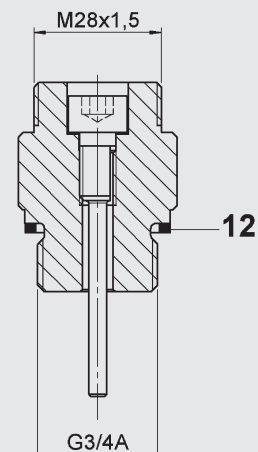
A4 (part no. 291536)



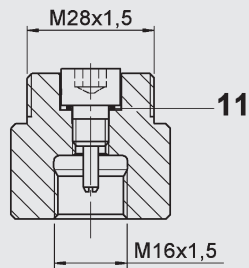
A5 (part no. 291531)



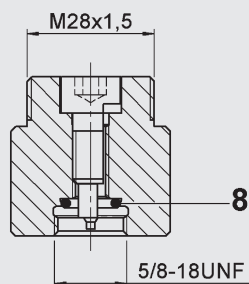
A6 (part no. 2108819)



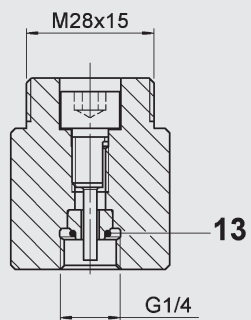
A1 (part no. 361619)



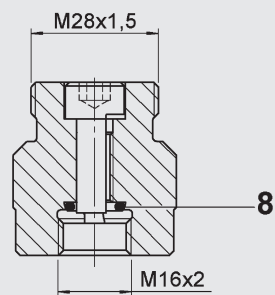
A2 (part no. 361605)



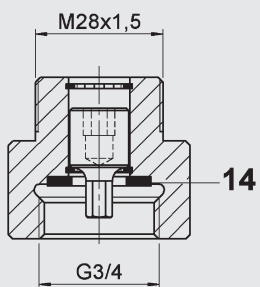
A7 (part no. 2110629)



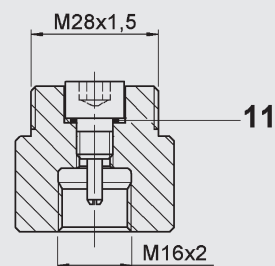
A11 (part no. 3018210)



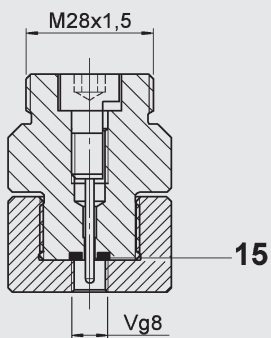
A8 (part no. 2124524)



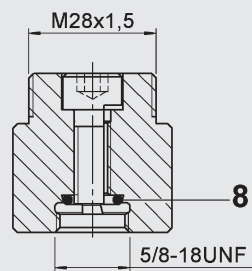
A12 (part no. 3203185)



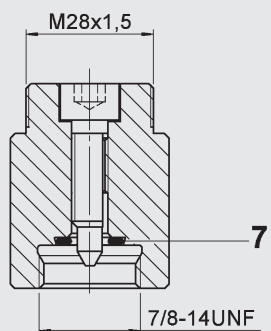
A9 (part no. 2128638)



A13 (part no. 3911267)



A10 (part no. 2128849)

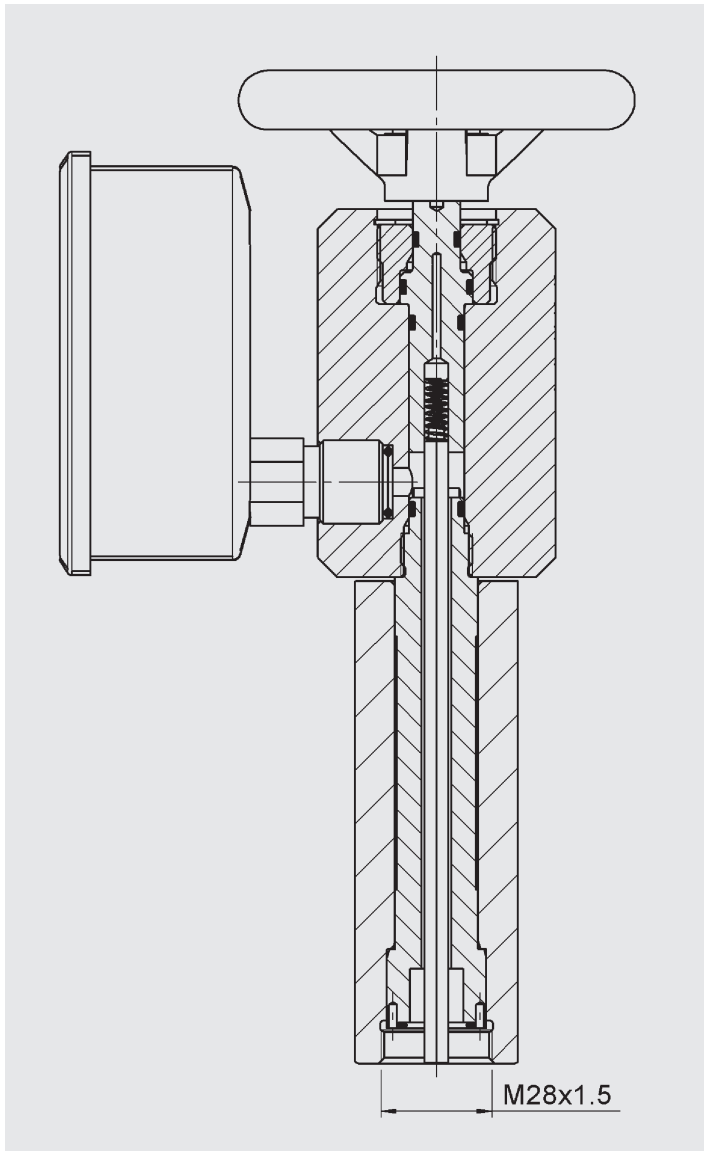


3.4.2 FPU-2

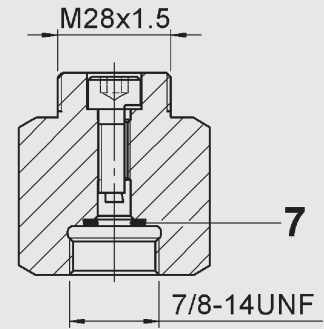
The FPU-2 can be screwed onto piston and diaphragm accumulators directly. In connection with a bladder accumulator, the A3H adapter must be used. This is not included in standard delivery.

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

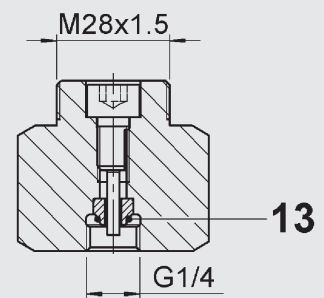
The following adapters are to be used exclusively with the FPU-2, see also section 3.2.



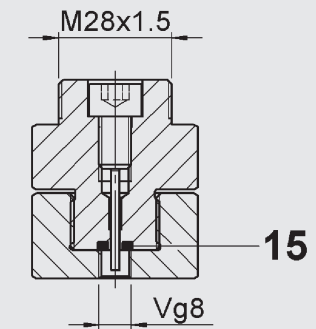
A3H (part no. 3963048)



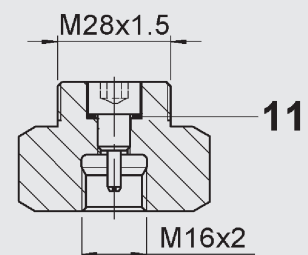
A7H (part no. 4237124)



A9H (part no. 4322422)



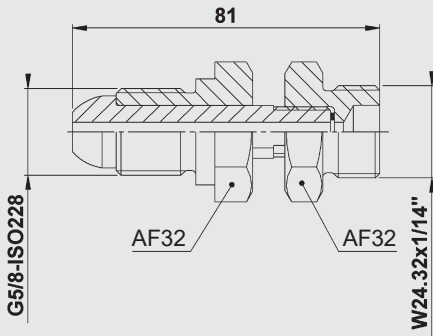
A12H (part no. 4237689)



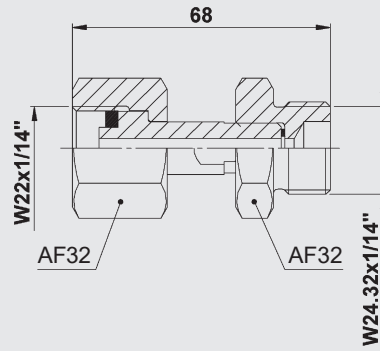
3.5. ADAPTER FOR FPU-1

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.

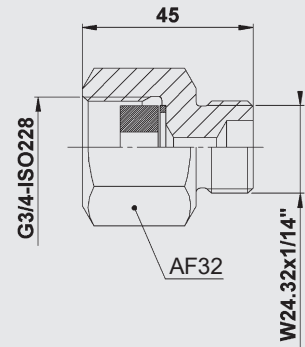
G 2 (part no. 236376)



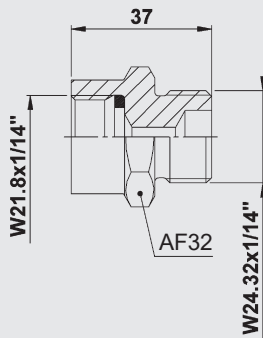
G 6 (part no. 2103423)



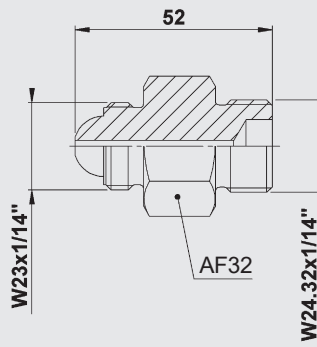
G 10 (part no. 2103427)



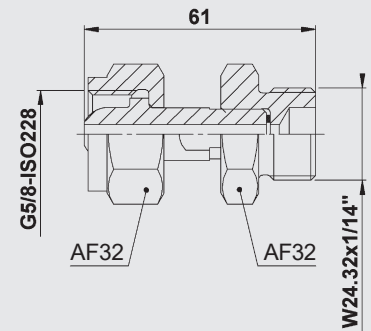
G 3 (part no. 2103421)



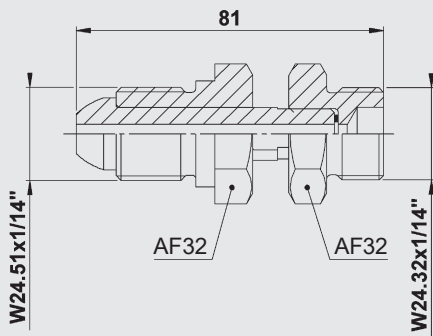
G 7 (part no. 236377)



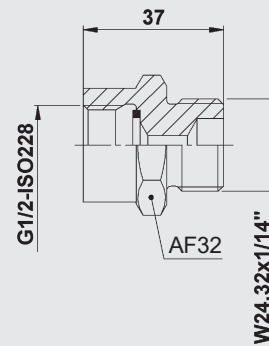
G 11 (part no. 3018678)



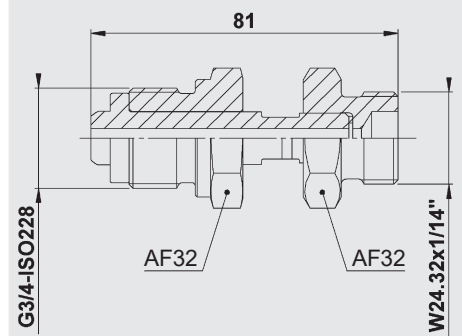
G 4 (part no. 236374)



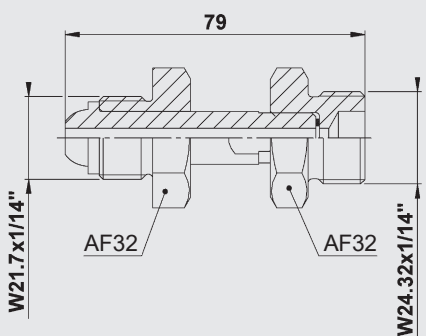
G 8 (part no. 2103425)



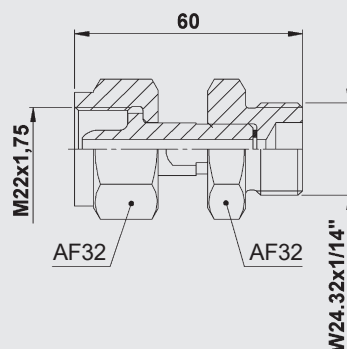
G 12 (part no. 3195556)



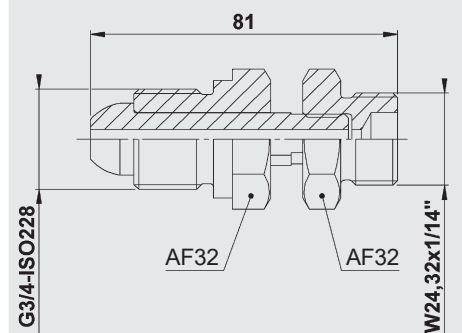
G 5 (part no. 236373)



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				•									
Britain		•											
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		•											
Greece		•											
Guatemala								•					
Guinea			•										
Guyana								•					
Honduras								•					
Hong Kong		•											
Hungary			•										
India		•											
Indonesia		•											
Ireland		•											
Italy					•								
Ivory Coast			•										
Jamaica		•											
Japan						•							
Jordan			•										
Kenya		•											
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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		•											
Suriname		•											
Sweden	•												
Switzerland	•												
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 contaminated 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 requirements.

	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

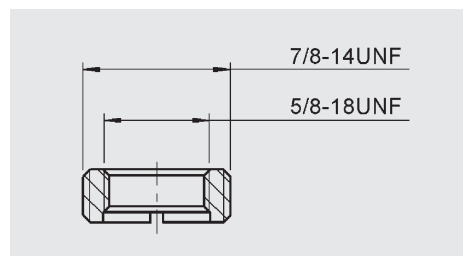
Provides protection by reducing the pressure in a controlled way if pressure exceeds the permitted level unexpectedly, see catalogue section:

- Safety equipment for hydraulic accumulators No. 3.552

4.3. D4 ADAPTER FOR FPU-1

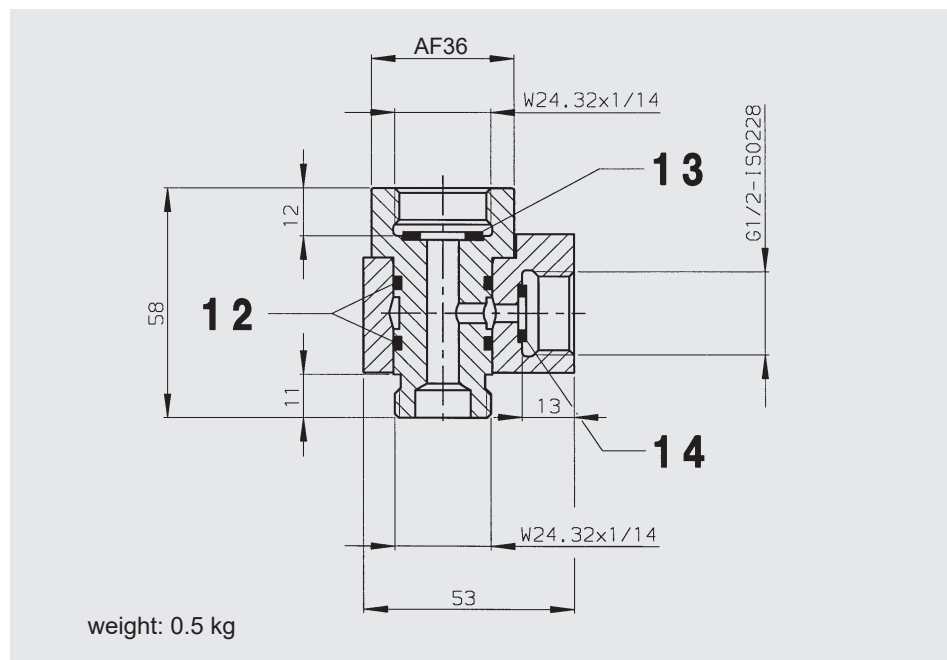
D adapter for bladder accumulator < 1 litre (see section 3.)

D4 = 5/8-18UNF (part no. 366374)



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

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



Description	Quantity	Item	Part no.
GSV6-10-CE intermediate piece	-	-	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 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-DIN 477, 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

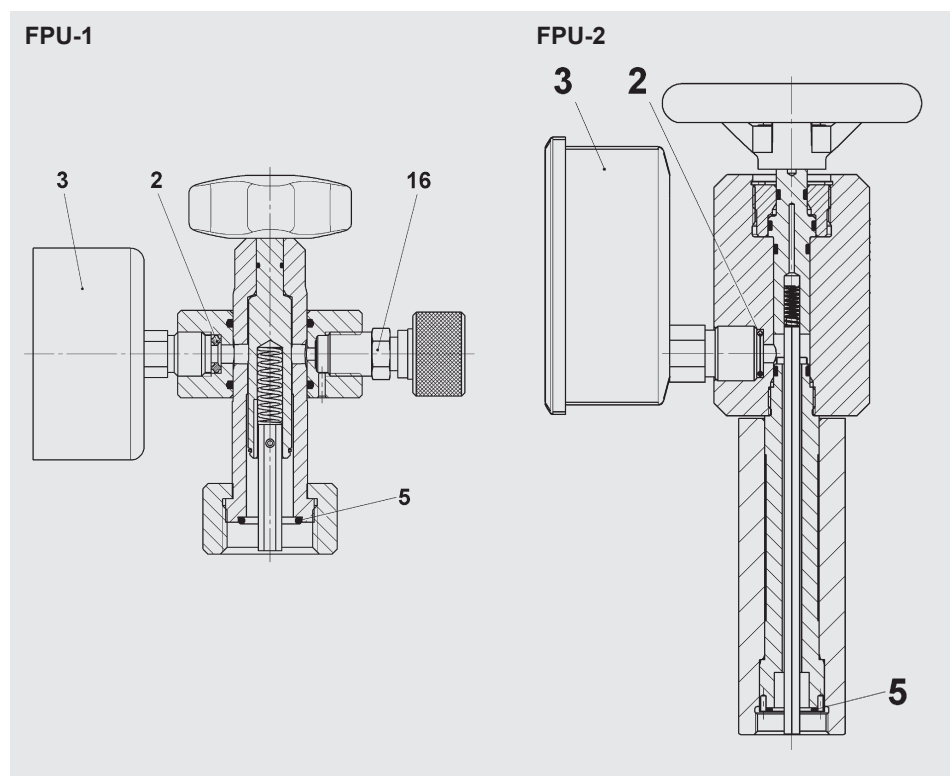
Outlet: external thread W24, 32x1/14-DIN 477, Part 1

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

* For back pressures >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
Seal kit for FPU consisting of:		2117669	1	4295673	
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	–	–
Pressure gauge					
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
Release valve	16	3103471	1	–	

5.2. SPARE PARTS FOR ADAPTER

Description	Item	FPU-1, FPU-2	
		Part no.	Quantity
Seal kit for FPU adapter 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 A7 adapter up to May 2006

5.3. TOOLS FOR FPU-1

Designation	Part no.
Wrench 14x15	1011065
Allen key AF6	1005164
Torque wrench	3136470
Gas valve removal tool	616886

6. 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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